Oberon to Tarana Rail Line

Strategic Options Assessment

Central West NSW Forestry Hub Inc

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Executive summary

The Commonwealth Government has developed the policy “Growing a Better Australia, A billion trees for jobs and growth” which will create the setting to significantly increase new plantation forestry plantings to help support forestry dependent communities and provide stable, long-term employment in rural towns across Australia. A key component in the expansion of existing plantation forests and establishment of new plantations will be the creation of a series of industry hubs to address regional issues in the forestry sector.

Established in 2020, the Central West Forestry Hub (CWFH) is a beneficiary of funding under the National Forestry Industry Plan. The CWFH is focused on Oberon with its major wood processing facilities and the softwood plantation estate in the Central West region.

The CWFH has a number of key objectives aimed at improving the productivity and efficiency of the forestry sector. One of the CWFH’s key objectives is to investigate the potential of reopening the Oberon to Tarana rail line to expand the resource catchment for the processing facilities in Oberon, optimise infrastructure investment and utilisation and improve the overall inbound and outbound logistics operations from an economic, social, environmental and safety perspective.

GHD has prepared this high-level strategic options assessment to collate and analyse information on the viability of reopening the Oberon to Tarana rail line for commercial operations. Freight operations on this section of rail line ceased in 1979 and the reopening of the line is expected to have a range of benefits for the industry and the community.

This report outlines the case for change by providing some background context around the rail line, provides an understanding of the problem to be solved and clearly defines the base case and associated options. An economic and financial analysis has been completed which outlines the key benefits and costs including a quantification of the freight tasks and transport cost comparison between the current road service and the proposed rail option. In addition, a preliminary desktop engineering assessment was completed to provide an estimate of the capital expenditure required to reinstate the Oberon to Tarana rail line including the proposed restoration required to achieve the minimum requirements of a track class 5 as per Transport for NSW Standard TS 01044:1.0 Track System.

Background

The Oberon to Tarana rail line is a short, disused branch railway line within the Central Tablelands of New South Wales, Australia. The line branches from the Main Western line at Tarana railway station and heads in a southerly direction to Oberon railway station, with a length of 24.3 km.

The line rises over 300 metres from the Tarana Valley to the Oberon Plateau with two intermediate stations at Carlwood and Hazelgrove along the line. Leaving the Main Western line at Tarana, the line meandered south to Carlwood where it began the 10km climb to Hazelgrove. This section featured some of the steepest (1 in 25 compensated) and tightest (5 chain radius) curves in the state. From there, the line proceeded toward the terminus at Oberon.

First opened in 1923, the Oberon to Tarana rail spur was a ‘pioneer line’ operated by lightweight steam and then diesel locomotives. This line was used to transport local seasonal agricultural produce, timber and livestock, connecting into the main line at Tarana where it connects into the Main Western Line. Passenger services ended in 1971, with the last freight service running in 1979, when operations were suspended.

This line is currently a non-operational line associated with the Country Regional Network which is owned by Transport for NSW and which UGL has responsibility for operations and maintenance. Since 2005 the Oberon-Tarana Heritage Railway Inc has been working towards restoring this spur line with the aim of one day running a heritage tourist train along the line and generating tourist related employment and volunteer opportunities for Oberon and surrounding regions. The first stage of the restoration between Oberon to Hazelgrove is planned for late 2022. It is expected that the reopening of the rail line will fit in with the objectives of the Oberon-Tarana Heritage Railway and provide further tourism and social benefits to the Oberon Community.

In addition to the broader tourism and social benefits, the reopening of the line is expected to have a range of benefits for the industry and the community including the reduced risk and exposure to vital transport routes. In August 2020 and March 2021, the Jenolan Caves Road at Hampton was closed for an extended period which caused significant disruption and additional cost to industry and the community, forcing truck traffic onto longer routes.

Importance of the timber industry to Oberon

This assessment has considered the various Commonwealth, State and Local Government objectives for the region with a number of the core strategies selected align with the reopening of the Oberon to Tarana railway, including supporting manufacturing, improving competitiveness of local industry with transportation networks, regional development with infrastructure, and diversifying local tourism offering.

Forestry is Oberon's main industry and provides employment for hundreds of the town and region's residents. There is almost 90,000 hectares of pine plantations in the CWFH region with the majority of the region's commercial plantation forests concentrated in the Oberon LGA and are predominately managed by the Forestry Corporation of NSW. The various forestry-related businesses in the Oberon LGA include Australian Panel Products, Highland Pine Products (Joint Venture between AKD Softwoods and Pentarch Forestry) and Australian United Timbers at Burraga which combined, comprise many stages of the timber value chain.

Oberon's production of large quantities of house construction related timber products supports large volumes of inputs for development of new homes and the alterations and additions market in Sydney and around Australia. Supporting more efficient and effective movement of goods to and from the Oberon factories will ensure better supply of construction inputs and improve the whole supply chain of housing development.

As demand for timber logs increases in the Oberon area, construction timber factories will need to bring in logs and other wood based raw materials from further away, which will increase costs both financially on the business and economically on the community. Further road safety and environmental implications will need to be considered as a result of increased heavy vehicle movements on local roads.

Productivity of the forestry operations and the general impacts from additional traffic flows is impacted by limitations of the current road transport systems to cope with the current and expected truck trips. The Forestry Hubs were set up by the Commonwealth Government to find methods for improving the domestic supply of timber and related products that underpin much of the Australian construction industry. The Oberon to Tarana Rail line is identified as a key asset that can assist in improving the operations of the region that produce large volumes of timber products.

Economic and Financial Analysis

GHD completed an economic and financial analysis which outlines the key benefits and costs including a quantification of the freight tasks and transport cost comparison between the current road service and the proposed rail option. In addition, a preliminary desktop engineering assessment was completed to provide an estimate of the capital expenditure required to reinstate the Oberon to Tarana rail line. Consultation was carried out to inform this analysis particularly around freight tasks and the engineering assessment of reopening the Oberon to Tarana rail line.

The assessment of current and future freight demand for rail services between Tarana and Oberon was a key component of the input data to support future needs and the viability of the corridor. The demand is driven by the input and output products required by major timber related production facilities at Oberon. Pine logs from plantation forests across NSW are the main inputs used by the timber facilities for their production with logs sourced from the Oberon and Central West region, Walcha in northern NSW and from the northern rivers area north of Grafton. The main outputs from these facilities is medium density fibreboard, mouldings, particleboard and dressed and treated timber which is widely distributed across NSW and Australia.

Each of the product groups and transport route requirements were assessed for their potential viability for rail operations, considering freight volumes, number of rail trips, regularity of service needs and comparative route distances. The input products are all delivered to Oberon, however the output products from both facilities are broadly distributed across NSW and other states. The modelling of comparative road and rail options for the

movement of incoming and outwards freight from the Oberon facilities was undertaken using the GHD *Strategic Transport Logistics Model* and estimated the potential rail freight demand as 1,040,030 tonnes per annum and comprises of logs, wood waste, imported goods (paper rolls, melamine and wax), urea and output products from the APP facility.

When compared to the original freight volumes generated by the facilities at Oberon the following opportunity for rail services provides an indication of potential return rail services which could be generated or the Tarana to Oberon corridor. The log traffic which would generate 127 return train journeys provides a core rail service requirement, with potential for an additional service for finished board product.

In undertaking the economic and financial analysis, GHD defined the base case and considered alternative options as part of this strategic assessment. The existing base case was assumed that no work will be conducted to reinstate Oberon to Tarana Railway and all freight will continue to be transported by road. Options considered at the strategic level included several variations of truck and train transport to and from Oberon factories assuming the same volumes that are projected under the base case. The main option being considered in this assessment is the reinstatement of the Oberon to Tarana rail line.

A financial analysis was then undertaken to assess the financial viability of reinstating and operating the Oberon to Tarana rail for freight transport. The analysis explores a number of scenarios that involves various level of government funding. The preliminary capital cost analysis indicates a required initial outlay of $76 million (including contingencies) over a two-year construction period. Reinstating and operating the Oberon rail as a freight rail will incur a financial cost with present value of $104 million (includes capex and ongoing opex) and the required amount of government support differs based on the number of routes to be induced to use the rail.

To understand the financial feasibility of reinstating the Oberon to Tarana rail line and how each freight operator may decide to use road or rail freight, GHD has considered the following scenarios where there would be a shift from road to rail or a combination of both and then calculated the total freight rate for each route under the scenario and completed sensitivity analysis on the assumptions relating to capital and operational costs.

A rapid cost benefit analysis was completed to assesses the economic viability of reinstating the Oberon to Tarana rail line. The purpose of this rapid CBA was to capture the material and quantifiable costs to the government and benefits associated with the potential reopening to provide a high-level feasibility assessment. The assessment is based on the net present value benefits and costs and benefit cost ratio to provide a basis for direct comparison between the project case and base case.

Scenario	Route options	Required Government Support ($m)	NPV ($m)	BCR
1	Six routes use the Oberon rail	$147	$527.49	4.59
2	Four routes use the Oberon rail	$96	$249.68	3.60
3	Three routes use the Oberon rail	$60	$160.77	3.67

In terms of economic analysis, Scenario 1 is expected to generate the most economic benefit. In Scenario 1, the total level of government support of $147 million will be required to compensate for the full cost of Oberon rail ($104 million) as well as above-rail cost or access ranges to recover the incremental cost from base case. Despite the large level of government support required, the change in freight method for all routes is expected to yield a total economic benefit of $674 million and deliver the highest BCR of 4.59.

A desktop planning and environmental constraints assessment was undertaken to identify any potential constraints around the reinstatement of the Oberon to Tarana rail line. As the majority of the study area has been heavily modified by past and ongoing disturbances associated with the non-operational Oberon to Tarana rail corridor and surrounding agricultural activities. A detailed environmental investigation would need to be undertaken to assess the potential impacts on biodiversity as part of future stages of the business case.

Conclusion

The Central West NSW Regional Forestry Hub is seeking to meet the priorities set out by the Commonwealth Government, the stated desires of the NSW Government and implement strategies developed in and around Oberon by Council and other stakeholders by investigating the reopening the Oberon to Tarana rail line.

This report is in support of the Central West NSW Regional Forestry Hub to determine if a full business case to confirm if the details of the proposed option and other options to maximise the net economic outcomes for NSW is justified. The full business case will seek to find commercial methods to progress the railway to shift the freight off the roads, saving lives and improving the welfare outcomes for regional Australia.

This Report outlines the opportunity for the reopening of the Oberon to Tarana rail line and identifies the reason for government intervention and supports the decision to proceed to further stages of the business case process.

The next stage would be to develop a Strategic Business Case which is the primary document for a Gate 1 review (under the NSW Gateway Policy).

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1. Introduction

The Australian Government has developed the policy “Growing a Better Australia, A billion trees for jobs and growth” which will create the setting to significantly increase new plantation forestry plantings to help support forestry dependent communities and provide stable, long-term employment in rural towns across Australia. A key component in the expansion of existing plantation forests and establishment of new plantations will be the creation of a series of industry hubs to address regional issues in the forestry sector.

Established in 2020, the Central West Forestry Hub (CWFH) is a beneficiary of funding under the National Forestry Industry Plan. The CWFH is focused on Oberon with its major wood processing facilities and the softwood plantation estate in the Central West region.

The CWFH has a number of key objectives aimed at improving the productivity and efficiency of the forestry sector. The key objectives of the CWFH are:

– Analysing the constraints that affect the productivity and efficiency of the forestry sector.
– Pinpointing opportunities for future investment in infrastructure and technology, and areas for potential expansion by forest industries.
– Identifying and support business cases for the investment in new infrastructure, such as roads, rail, bridges, ports, telecommunications and training facilities, thereby assisting forest service industries better plan their futures.
– Determining the potential for future plantation expansion within appropriate transport distances and near other existing sources of wood and fibre. This could include mapping potential land availability for plantations and engaging with farmers, indigenous communities and other landowners to establish forestry plantings.

One of the CWFH’s key objective is to investigate the potential of reopening the Oberon to Tarana rail spur to expand the resource catchment for the processing facilities in Oberon, optimise infrastructure investment and utilisation and improve the overall inbound and outbound logistics operations from an economic, social, environmental and safety perspective.

1.1 Purpose of this report

GHD has been engaged by the CWFH to undertake a high-level strategic options assessment to collate and analyse information on the viability of reopening the Oberon to Tarana rail line for commercial operations. Freight operations on this section of rail line ceased in 1979 and the reopening of the line is expected to have a range of benefits for the industry and the community, including but not limited to:

– Reduced truck movements on the main arterial roads into and out of Oberon improving safety and amenity
– Reduced heavy traffic and improved safety (less truck movements) over the Blue Mountains and across regional NSW
– Reduced road maintenance and upgrade costs
– Reduced risk and exposure to vital transport routes (for example, the extended closure of the Jenolan Caves Road at Hampton caused significant disruption and additional cost to industry and the community, forcing truck traffic onto longer routes)
– Introduce other industry and tourism opportunities to Oberon
– Explore opportunities to connect into the Inland Rail, a 1, 700km freight rail project connecting Melbourne and Brisbane via regional Victoria, New South Wales and Queensland.

This report outlines the case for change by providing some background context around the rail line, provides an understanding of the problem to be solved and clearly defines the base case and associated options. An economic and financial analysis has been completed which outlines the key benefits and costs including a quantification of the freight tasks and transport cost comparison between the current road service and the proposed rail option. In addition, a preliminary desktop engineering assessment was completed to provide an estimate of the capital expenditure required to reinstate the Oberon to Tarana rail line.

1.2 Scope and limitations

This report: has been prepared by GHD for Central West NSW Forestry Hub Inc and may only be used and relied on by Central West NSW Forestry Hub Inc for the purpose agreed between GHD and Central West NSW Forestry Hub Inc as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Central West NSW Forestry Hub Inc arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 11.3 and appendices of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has developed an assessment of indicative comparative costs for the operation of different supply chain outcomes on road and rail operations. Supply chain options are developed by GHD through assessment of road and rail access capabilities to meet the demand requirements between origin and destination locations. Costs are development through the GHD Strategic Logistics Model which builds the cost of operations from the ground up with publicly available data inclusive of direct operational costs and overheads (including labour, fuel, maintenance, vehicle infrastructure costs, insurance, access costs, taxes etc. rail costs include above rail and below rail track access costs). This model includes assumptions on the allocation of costs but is periodically compared with market rates to check validity when these are available.

– Train configurations for these assessments were restricted to 700 m in length with two locomotives to fit proposed rail infrastructure limitations.
– Tonne Axle Load for the Oberon to Tarana connection is assumed to be 19 tonne TAL
– Truck journeys do not always take the most direct route as road access limits for various truck configurations vary – where possible consultation guides these routes.

The Cost Estimate has been prepared for the purpose of estimating the cost of reinstating the Oberon-Tarana rail line including consideration of requirements for planning and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

GHD has prepared this report on the basis of information provided by Central West Forestry Hub and others who provided information to GHD, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.3 Assumptions

In completing this strategic options assessment report GHD has relied upon:

– Information forwarded from Central West Forestry Hub and Committee Members relating to freight and logistics numbers

- Discussions with the Oberon- Tarana Heritage Railway group to understand condition of existing rail infrastructure which informed the scope of the Engineering Assessment
- Desktop assessment of existing condition of infrastructure and no detailed engineering assessment undertaken to assess the suitability or structural integrity of existing infrastructure.
- Publicly available information that GHD has sourced or been provided
- GHD expertise and local knowledge including GHD's proprietary Transport Logistics Cost Model was used to prepare indicative transport and handling and costs across the supply chain

2. The Case for Change

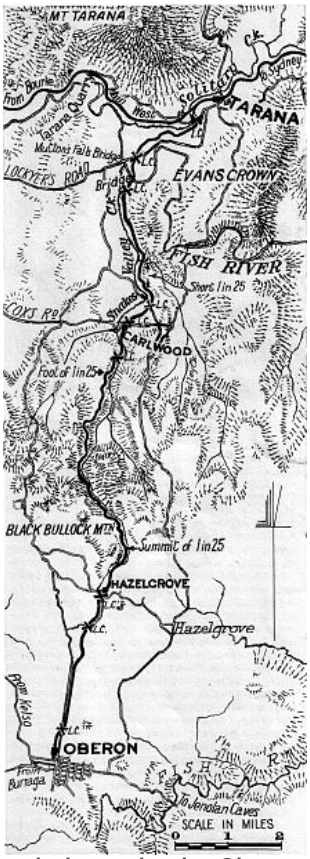
2.1 Project background

2.1.1 History of the railway

The Oberon to Tarana railway line is a short, disused branch railway line on the Central Tablelands of New South Wales, Australia. The line branches from the Main Western line at Tarana railway station and heads in a southerly direction to Oberon railway station, with a length of 24.3 km.

The line rises over 300 metres from the Tarana Valley to the Oberon Plateau with two intermediate stations at Carlwood and Hazelgrove along the line. Leaving the Main Western line at Tarana, the line meandered south to Carlwood where it began the 10km climb to Hazelgrove. This section featured some of the steepest (1 in 25 compensated) and tightest (5 chain radius) curves in the state. From there, the line proceeded toward the terminus at Oberon.

First opened in 1923, the Oberon to Tarana rail spur was a pioneer line operated by lightweight steam and then diesel locomotives. This line was used to transport local seasonal agricultural produce, timber and livestock, connecting into the main line at Tarana where it connects into the Main Western Line. Passenger services ended in 1971, with the last freight service running in 1979, when operations were suspended.



Historical map showing Oberon to Tarana Line (Source: Wikipedia)

This line is currently a non-operational line associated with the Country Regional Network (CRN) which is owned by Transport for NSW (TfNSW) and which John Holland Rail had responsibility for the operations and maintenance of rail infrastructure for the CRN under a 10-year contract until January 2022 at which point UGL has now taken over the operations and maintenance contract.

2.1.2 Current restoration

Since 2005, the Oberon-Tarana Heritage Railway Inc (OTHR) has been working towards restoring this spur line with the aim of one day running a heritage tourist train along the line and generating tourist related employment and volunteer opportunities for Oberon and surrounding regions. The restoration is being conducted under three stages with Stage 1 from Oberon to Hazelgrove (since 2007); Stage 2 to complete the section from Hazelgrove to Carlwood, and Stage 3 from Carlwood to Tarana.

In 2021, the OTHR issued tender documents to experienced railway contractors to carry out rail restoration works to reopen 5.8km of the non-operational railway line from Oberon to Hazelgrove. Following completion of restoration works planned for late 2022, the OTHR will be then seeking accreditation to operate along the line which will also include running trains to Hazelgrove.

The OTHR plans to have two regular train movements weekly with special event trains most likely running bi-monthly. In total they estimate approximately 110 train movements per annum increasing to meet demand in due course. The OTHR's best estimate of passenger movements would be approximately 80 for each regular service or approximately 8,320 per annum and an additional approximately 520 per annum on the special event train movements, a total of approximately 8,840 per annum.

2.1.3 Modern importance of the railway

In recent years, the Commonwealth and State governments have started to shift freight transport towards railways to take pressure off road transport routes and to reduce the risk of truck accidents. A key part of this strategy to shift freight onto railway is the Inland Rail investments. In December 2021, the Mid-Year Economic and Fiscal

Outlook (MYEFO) shows the expected budget for the Inland Rail has increased from $4.7 billion to $14.5 billion. The large investment in freight railways indicates the government's desire to reduce freight on roads.

"The Australian Government has committed up to $14.5 billion in equity for the Australian Rail Track Corporation (ARTC), enabling ARTC to deliver the Inland Rail project which provides a direct, high-performance freight rail corridor between Melbourne and Brisbane, as well as a new freight corridor between Brisbane and Perth (via Parkes)."[1]

The proposed project to re-establish the Oberon railway branch line will directly connect the Oberon community with the railway that leads to Sydney, Inland Railway and many other important national ports and distribution centres. Infrastructure NSW made it clear in their 2018 infrastructure strategy that the government is focused on using the Inland Rail project to assist regional NSW primary industries to move product to export hubs in NSW, Queensland and Victoria.

The NSW Government is working with the Commonwealth Government to develop the Inland Rail project, which provides an opportunity to reshape the regional freight rail network and the economic geography of the regions it serves. A key focus for NSW is to ensure that Inland Rail supports the State's primary industries by optimising the movement of freight in regional NSW to ports and gateways, regardless of whether those gateways are in NSW, Victoria or Queensland. Inland Rail seeks to deliver efficient links to these gateways and develop economically sustainable freight hubs – operated by the private sector – at appropriate locations along the route[2]*.*

The map below shows Oberon is strategically located between Sydney, the Inland Rail logistics hub at Parkes and connections through to Port of Newcastle (Newcastle), Port Botany (Sydney) and Port Kembla (Wollongong).

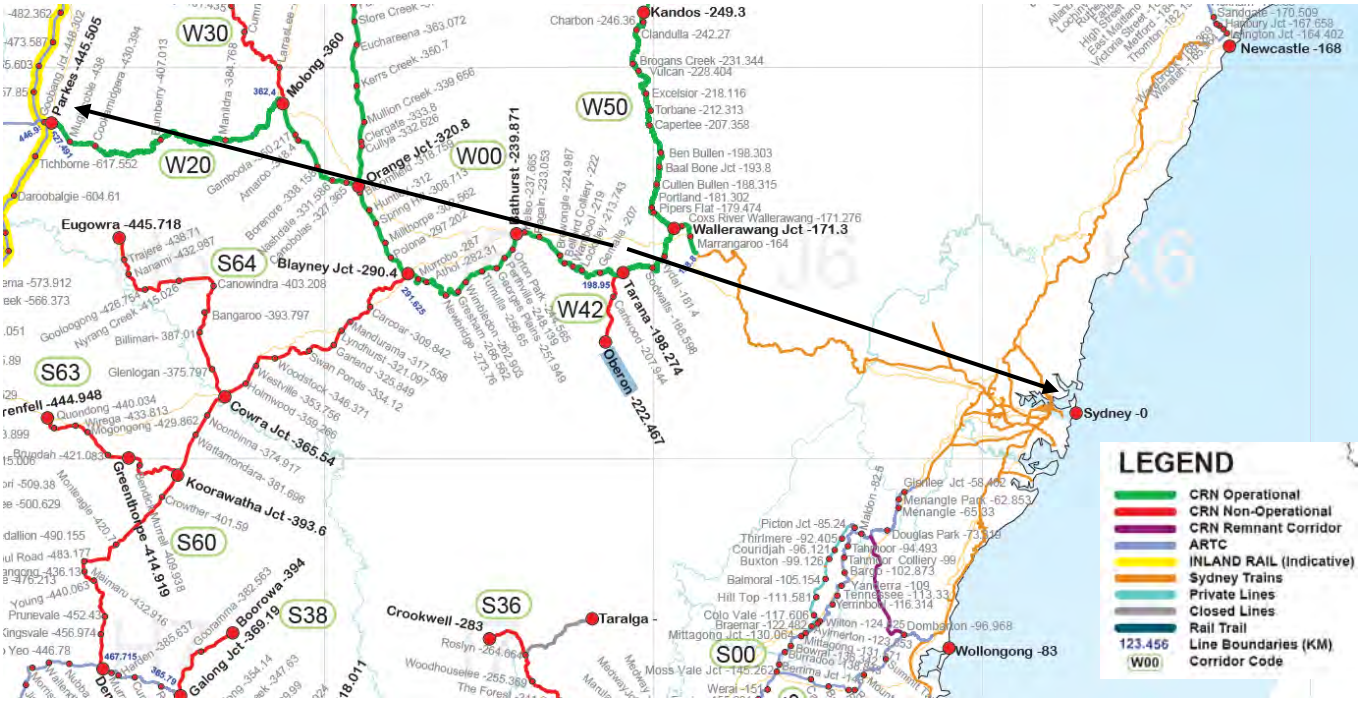


Figure 1 *Map of rail network in NSW related to Oberon*[3]

A Strategic Target of the NSW Freight and Ports Plan 2018-2023 is to increase the share of rail freight at Port Botany to 28 percent or 930,000 TEU by 2021 (against a 2016 baseline of 17 percent or 388,552)[4]. However, as can be seen in the graph below, since the July 2019 high of 20 percent of total freight being moved by rail, the trend has been downward to now be approximately 12 percent.

[1] Commonwealth Treasury, 16 December 2021, *Mid-Year Economic and Fiscal Outlook, Budget 2021-22*, Viewed 20 January 2022, https://budget.gov.au/2021-22/content/myefo/index.htm
[2] NSW Government, Infrastructure NSW, February 2018, *Building Momentum - State Infrastructure Strategy 2018-2038*, Viewed 20 January 2022, https://insw-sis.visualise.today/documents/INSW_2018SIS_BuildingMomentum.pdf
[3] John Holland, 2019, Railways of New South Wales
[4] NSW Government, Transport for NSW, December 2021, *Use of Rail Freight at Port Botany*, Viewed 20 January 2022, https://www.transport.nsw.gov.au/data-and-research/freight-data/freight-performance-dashboard/use-of-rail-freight-at-port-botany

Achieving the NSW Government goal of shifting road freight to rail will require investments that enable businesses to access competitively priced railway transport. Where the market price for truck transport is lower than the railway price the government may consider funding railway works to reduce the market price recognising the public benefit of less trucks on roads (other issues of transport reliability and goods arrivals time will also be relevant to this transition).

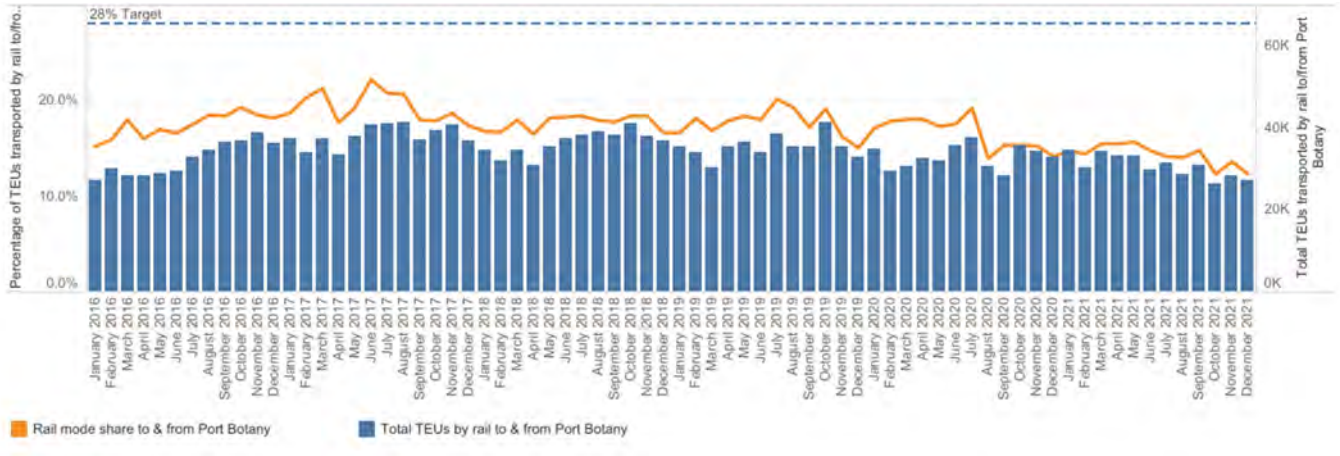


Figure 2 *NSW Port Botany Rail Freight Percentage and TEUs of Total Freight Moved*[5]

2.1.4 Regional Forestry Hubs

The National Forest Industries Plan includes an action to establish Regional Forestry Hubs. Eleven regional forestry hubs have been established across Australia. On 16 February 2019, nine Regional Forestry Hubs were announced to be established followed by the announcement of a further two hubs on 12 May 2021. Each Regional Forestry Hub has existing concentrations of wood supply resources; together with significant existing processing and/or manufacturing operations, established domestic and/or international transport links. Each hub has funding of $2.1 million through to June 2025. The hubs work with industry, state and local governments, and other key stakeholders to undertake strategic planning, technical assessments and analyses to support growth in the forest industries in their region.

The Central West NSW Regional Forestry Hub commenced operations in May 2020. Its host entity is the Central West NSW Forestry Hub Incorporated and priorities for the CWFH are[6]:

– Defining the boundaries of the region
– Completing strategic assessments of factors impacting forest growing and processing sectors in the region
– Undertaking detailed assessments of the priority issues to determine technical issues, needs and opportunities for progress of the industry into the future
– Consulting with industry in the hub.

Oberon is a major town within the Central West NSW Regional Forestry Hub and is home to two large businesses that depend on reliable supplies of logs and other wood based raw materials for the manufacture of goods, namely

Highland Pine Products (HPP) is a 50:50 Joint Venture between AKD Softwoods and Pentarch Forestry, employing approximately 225 people and mainly produces dressed timber and treated timber to be used as house frames and trusses.

Australian Panel Products (APP) manufactures medium density fibreboard (MDF) in the Oberon MDF facility. The current range of CUSTOMwood MDF products include standard MDF, Moisture Resistant MDF and E0 MDF. The Oberon facility also manufactures ULTRAprime MDF Mouldings and now produces STRUCTAflor flooring with the acquisition of Carter Holt Harvey's STRUCTAflor facilities. Alongside the MDF line,

[5] NSW Government, Transport for NSW, December 2021, *Freight Performance Dashboard*, Viewed 20 January 2022, https://www.transport.nsw.gov.au/data-and-research/freight-data/freight-performance-dashboard
[6] Australian Government, Department of Agriculture, Water and the Environment, 23 December 2021, *Regional Forestry Hubs*, Viewed 21 January 2022, https://www.awe.gov.au/agriculture-land/forestry/regional-forestry-hubs#new-south-walesvictoria

Australia's newest $110m continuous particleboard line was installed in Oberon in 2018 to enhance manufacturing capabilities to support the supply chain.

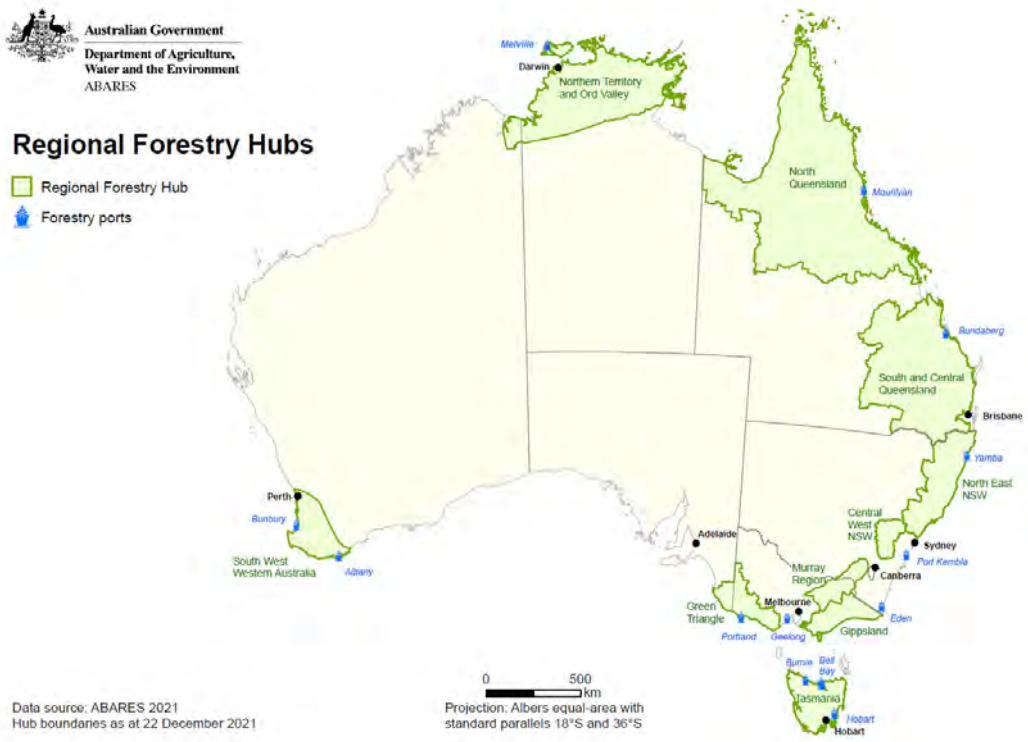


Figure 3 Regional Forestry Hubs[7]

The Central West NSW Forestry Hub is a key provider of forestry products for Australia's largest city of Sydney. The two construction timber product supply factories in Oberon, HPP and APP, need to transport some of their logs and other wood based raw materials long distances to maintain supply. The Commonwealth Government has correctly identified timber as a critical input to Australia's economy and the Regional Forestry Hubs are a part of their response to shortages by supporting supply.

Softwood plantations within the Central West region are based on approximately a 35- year rotation (between planting and final harvest) and as demand for timber products continues to grow, logs are often brought in from further afield depending on the plantation species and specifications. As demand for plantation timber products continues to increase, new logging areas are often in locations hundreds of kilometres away and the transport task is significant and growing. Access to good railway services can reduce the transport costs to society and increase the ability for the manufacturing businesses to increase production volumes.

2.1.5 Case Study: Jenolan Caves Road Closure, Hampton – August 2020 and March 2021

On 10 August 2020, a section of Jenolan Caves Road between the intersections of Duckmaloi Road and Hampton Road was closed after a landslide caused large boulders to fall onto the road. Transport for NSW closed the road for three days to enable a slope risk assessment, site investigation and work to remove vegetation, scaling of loose rocks and boulders. A detour was put in place via Hampton Road, Sodwalls Road, Mutton Falls Road, Mount Lowes Road to Oberon for light vehicles and will add around 50 minutes to journey times. Heavy vehicles were encouraged to travel via Bathurst.

[7] Australian Government, ABARES, December 2021, *Regional Forestry Hubs,* viewed January 20 2022, https://www.awe.gov.au/agriculture-land/forestry/regional-forestry-hubs

Figure 4 Initial landslip in August 2020[8]

In March 2021, NSW experienced a once in a 100-year weather event causing floods across many regional and metropolitan areas. This torrential rainfall event resulted in 346mm of rainfall falling over a five-day period causing landslips and erosion along the slopes and cutting off the Jenolan Caves Road at Hampton, as it was considered too dangerous to use for motorists. The Jenolan Caves Road is an important connection road for the Oberon region and provides a direct route from Oberon to Sydney via the Great Western Highway at Hartley for locals, tourists and the freight industry.

Following the closure of the Jenolan Caves Road, motorists were forced to take a 60-kilometre detour via Lithgow and Bathurst for a period of almost three months. For freight companies the detour via Bathurst proved to be a costly exercise with Oberon Quarries, a local supplier of blue metal products to the Sydney, estimated the road closure cost their business an additional $15,000 a week as they had contracts to deliver on and could not recoup costs[9]. Local timber mills estimated the cost as an additional $10 per tonne.

The disruption associated with the closure of this road, also resulted in additional costs for local businesses, with extra costs associated with the delivery of goods such as groceries and other supplies. Jenolan Caves, a major tourism drawcard for the local economy was also closed for an extended period due to a combination of bushfires which were followed by extreme weather events and road closures. The Five Mile access Road to Jenolan Caves still remains close.

The additional detour via Bathurst and Lithgow also resulted in longer working days for truck drivers. Local trucking companies estimated their drivers were working an extra two to four hours per day to factor in the additional trip time, with many now only able to undertake the single return trip daily. As a result, the trucking companies had to put on extra trucks in order to ensure the continuity of supply and to comply with regulations associated with Heavy Vehicle Fatigue Management. Driver fatigue is an important safety hazard for the road transport industry. Under the Heavy Vehicle National Law which applies in NSW, a driver must not drive a fatigue-regulated heavy vehicle on a road while impaired by fatigue.

In addition to the additional wages and fuel costs associated with the detour through Bathurst and Lithgow, there was also a deterioration of other local roads which were predominantly used by smaller vehicles and were now being used by heavier vehicles. These roads are predominately used by local traffic and there was concern for the safety of motorists due to increased traffic and narrower roads. For the duration of the road closures, light traffic was diverted from Hampton Road, onto Sodwalls, Lowes Mt Road, and vice-versa. Heavy traffic out of Oberon had

[8] Blue Mountains Gazette, 10 August 2020 *Landslide closes Jenolan Caves Road*
https://www.bluemountainsgazette.com.au/story/6872647/landslide-closes-jenolan-caves-road/
[9] Oberon Review, 25 May 2021 *Jenolan Caves Road reopens at Hampton two months after closure*
https://www.oberonreview.com.au/story/7267669/access-all-area-jenolan-caves-road-finally-reopens-at-hampton/

to re-route via O'Connell Road via Bathurst to the Great Western Highway. Traffic from the east was being diverted via Great Western Highway.

The Jenolan Caves Road at Hampton reopened at the end of May 2021 with reduced speed limits and a single-lane alternating access through this section in both directions. Works are currently underway to permanently repair the area affected downslope at Hampton and the road is expected to be reopened to two-lane traffic in late 2022.

Figure 5 Landslip at Jenolan Caves Road, Hampton[10]

[10] NSW Government, Roads and Maritime Service NSW, March 2020, *Jenolan Caves road remains closed,* viewed 20 January 2022, https://roads-waterways.transport.nsw.gov.au/about/news-events/news/ministerial/2020/200306-jenolan-caves-road-remains-closed-at-five-mile.html

2.2 Construction timber supply

Sawn timber is an important input to house construction and estimates suggest a dwelling can contain between 15 and 25 m^3 of timber[11]. Industrial and commercial buildings also require significant volumes of timber. Below estimates show typical distribution of timber uses:

– 75 percent of sawn timber produced is used in construction
– 20 percent of timber consumed is used by the furniture industry
– 5 percent of is used in the kitchen sector[12]

Australia's forests are subject to a range of pressures, including extreme weather events, drought and climate change, clearing for urban development, mining and infrastructure or agriculture. The sustainable management and conservation of Australia's forests is critical and requires a sound understanding of their broader impact, its sustainable use and management.

The forestry sector activity is impacted by key domestic indicators including[13]:

– Commercial plantation areas by type and jurisdiction
– Volume and value of logs harvested by type and jurisdiction
– Production and trade of wood products

The construction market continues to play a major role in the end use consumption of timber products.

The 2019-20 financial year has been challenging for the Australian forest and wood processing sectors. Beginning in September 2019, bushfires burnt across eastern and southern Australia, affecting large areas of both native forests and commercial plantations. This was followed shortly after by the COVID-19 pandemic which resulted in governments around the world, including Australia, instigating unprecedented restrictions to mitigate its spread[14].

Despite the 'shocks' to the market, there continues to be collective action by governments globally to increase stimulus for the broader economy which has led to an increase in activity for the home building and renovation market. In Australia, the HomeBuilder[15] program forms part of a range of Australian Government initiatives intended to support confidence in the residential construction sector and encourage consumers to proceed with purchases or renovations that may have been delayed due to uncertainty around the effects of the COVID-19 pandemic. Because of the collective action of many governments to follow on the same path of increasing stimulus for the housing industry the possibility of a shortfall is emerging. There have been reports that as a result of activity in the do-it yourself construction market, timber prices in the USA had doubled which has resulted in imports which were originally destined to Australia being diverted to USA and other countries that offer a higher price premium to the products.

[11] M. Kapambwe, F. Ximenes, P. Vinden, R. Keenan, Forest & Wood Products Australia Limited ,2008, *Dynamics of Carbon Stocks in Timber in Australian Residential Housing*, Viewed 2 October 2021, https://www.researchgate.net/figure/Trend-in-wood-volume-used-in-house-construction-across-Australia-For-actual-average_fig2_274639884
[12] Timber NSW – *Our Industry*, Viewed 20 May 2022 https://timbernsw.com.au/our-industry-2/
[13] Australian Government, Department of Agriculture, August 2021*, Australian forest and wood products statistics*, viewed October 31 2021, https://www.awe.gov.au/abares/research-topics/forests/forest-economics/forest-wood-products-statistics
[14] Australian Government, Department of Agriculture, August 2021, *Effects of bushfires and CVOID-19 on foresty and wood processing sector,* viewed October 31 2021, https://www.awe.gov.au/abares/products/insights/effects-of-bushfires-and-covid19-forestry-wood-processing-sectors
[15] Australian Government, The Treasury, September 2021, *HomeBuilder,* accessed September 2021, https://treasury.gov.au/coronavirus/homebuilder

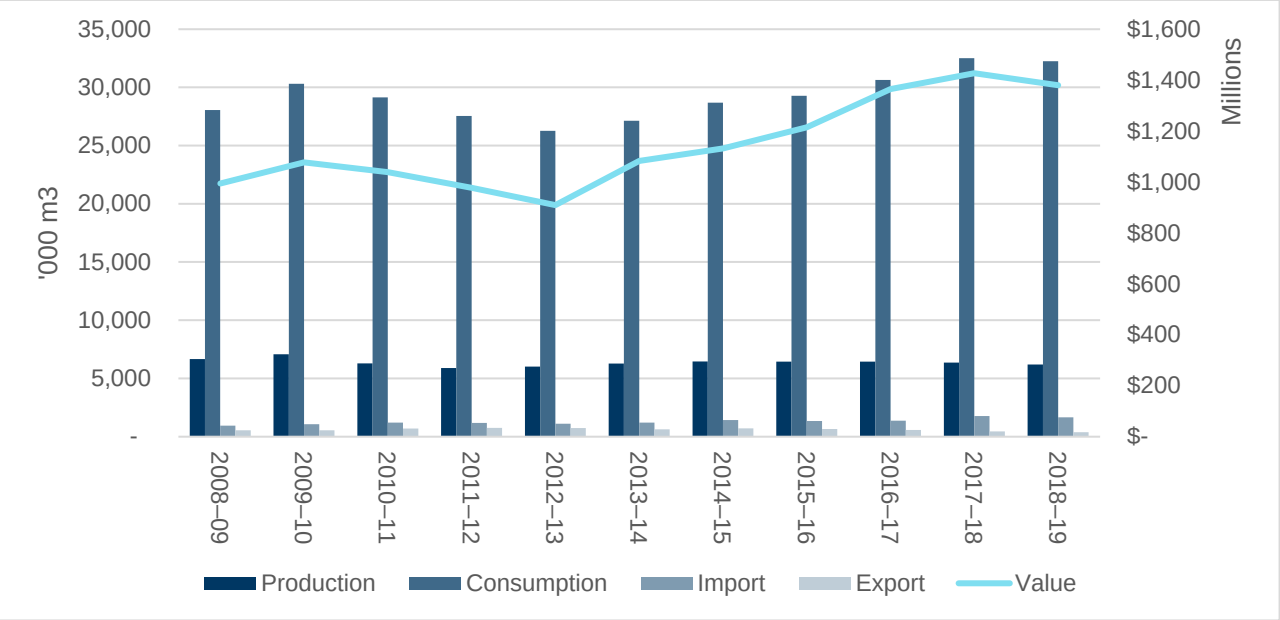


Figure 6 ***Value and volume timber (logs) that can be associated with construction in Australia[16]***

The consumption of timber in Australia that might be associated with construction activity has grown by approximately 15 percent between 2008 to 2019. Imports and exports of timber is relatively small part of the timber market and therefore, the assumption is that most of the construction timber is Australian grown.

The Australian construction timber supply will be driven by the plantations, as the growth of trees for timber production can take more than 10 years and therefore, there is the ability to project the supply capacity well in advance. The figure below shows the forestry areas in Australia by region and Australia as a whole. Clearly, since 2012 the total level of forestry in Australia has reduced. Over the same period that consumption in timber grew by 15 percent (2008 to 2019) the total forestry reduced by 4.4 percent.

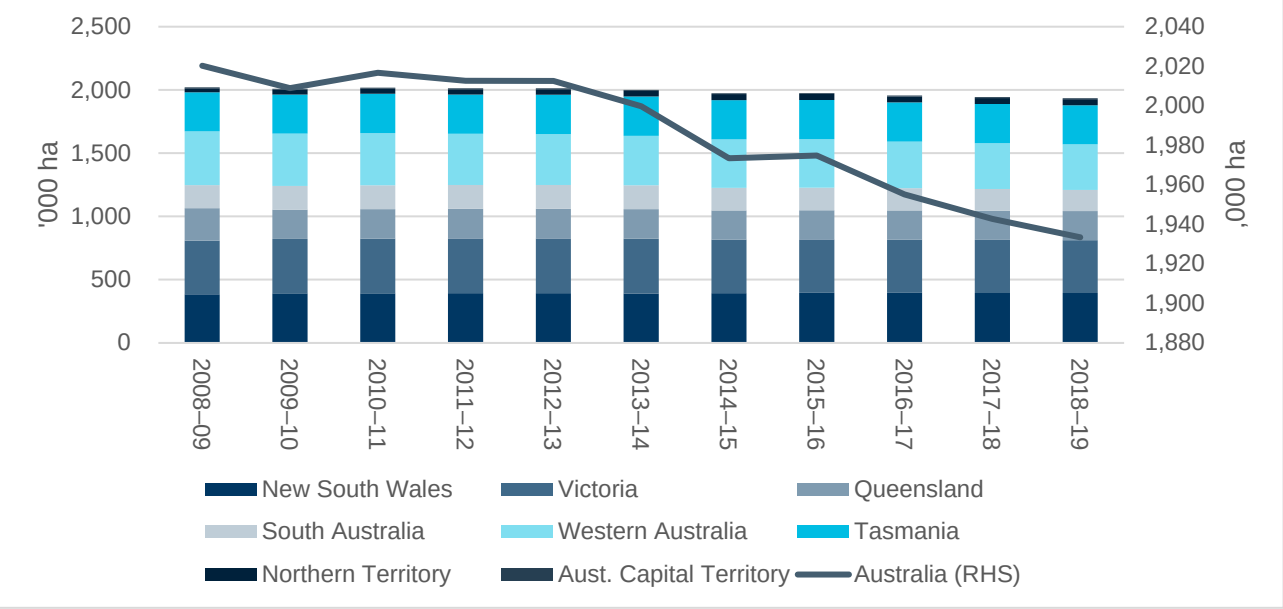


Figure 7 ***Total area of timber plantations by region in Australia[17]***

[16] Australian Government, Department of Agriculture, Water and the Environment, ABARES, *Forest data*, Viewed 01 October 2021, https://www.agriculture.gov.au/abares/research-topics/forests/forest-data#forest-maps
[17] Australian Government, Department of Agriculture, Water and the Environment, ABARES, *Forest data*, Viewed 01 October 2021, https://www.agriculture.gov.au/abares/research-topics/forests/forest-data#forest-maps

In addition to forestry plantations, the logging industry can access some timber from native forests. Australia has approximately 130 million hectares (ha) of native forest but much of this forest area is protected for nature parks and recreation areas.

2.2.1 Oberon railway and timber for construction

Oberon's production of large quantities of house construction related timber products supports large volumes of inputs for development of new homes and the alterations and additions market in Sydney and around Australia. Supporting more efficient and effective movement of goods to and from the Oberon factories will ensure better supply of construction inputs and improve the whole supply chain of housing development.

As demand for timber logs increases in the Oberon area, construction timber factories will need to bring in logs and other wood based raw materials from further away, which will increase costs both financially on the business and economically on the community. Further road safety and environmental implications will need to be considered as a result of increased heavy vehicle movements on local roads.

2.3 Alignment with State/Council objectives

2.3.1 Abercrombie Regional Economic Development Strategy 2018-2022

The Bathurst Regional and Oberon councils with the support of the NSW Government produced the Abercrombie Regional Economic Development Strategy 2018-2022 as part of the Regional Economic Development Strategies program to assist local councils and their communities in regional NSW. Six core strategies were identified to capture the opportunities, manage risks and deliver on the vision for the region:

1. Increase value-adding in agricultural products through innovation
2. Capitalise on Existing Strengths in Manufacturing
3. Optimise competitiveness in Agriculture, Forestry and Manufacturing through Transportation and Intermodal Networks
4. Optimise growth in the Development of Regional Infrastructure
5. Provide opportunities for Attracting and Retaining Entrepreneurs and Skilled Professionals
6. Develop the Region's Brand and Diversify Local Tourism Offerings

Many of these core strategies selected to meet the vision for the region align with the reopening of the Oberon to Tarana rail line, including supporting manufacturing, improving competitiveness of local industry with transportation networks, regional development with infrastructure, and diversifying local tourism offering.

2.3.2 NSW State Forestry Industry Roadmap objectives

The NSW government has developed the Forestry Industry Roadmap[18]. Key objectives of industry growth, job retention and environmental security. The Roadmap outlines how wood and manufacturing industries are strategically important for the state's growth. For instance, 660,000 homes need to be built in Sydney alone by 2031 to match demand, with timber the primary building source. Without government assistance, significant scope for imports to dislodge many domestic suppliers. Indeed, Australian wood and timber firms face strong competition from foreign firms with larger scale and lower cost bases[19]. High employment levels, especially for regional areas, drives the importance of the industry higher. The Roadmap makes commitments to funding research and development and retaining jobs in the industry.

The Roadmap also outlines ongoing environmental requirements for new tree harvesting developments. The Roadmap sets out a clear vision for the NSW forestry industry as 'a sustainably managed forest estate that

[18] NSW Government, Department of Primary Industry, *NSW Forestry Industry Roadmap,* viewed 01 October 2021. https://www.dpi.nsw.gov.au/forestry/industry-roadmap
[19]Barry, Matthew, IbisWorld, October 2021, *Timber Wholesaling in Australia*

underpins a dynamic, economically efficient forestry industry, which continues to support regional economies and delivers social and environmental benefits.' The Roadmap recognises that sustainably managed forests have the capacity to absorb greenhouse gases as they grow.

2.3.3 Oberon Council objectives

Oberon Council published its *Local Strategic Planning Statement 2038* in 2020[20]. Five priorities for the Council were identified:

– Growth
– Community wellbeing
– Infrastructure
– Environment
– Leadership

These priorities align with the Oberon to Tarana Railway objectives. The 'infrastructure' section acknowledges the need for reliable and safe transport options to support the wood and timber industry. 'Growth' also commits the Council to exploring any opportunities to further develop industries in the area. Forestry and timber are the most significant industries. Supply and infrastructure for the industry form a significant part of the council area. There is 89,757 hectares of softwood plantations across the CWFH region with the majority of the region's commercial plantation forests concentration in the Oberon Local Government Area (LGA)[21]. Additionally, the APP (Borg Manufacturing site underwent a $106 million upgrade in 2017, greatly improving capacity.

Tourism is also an important industry and is discussed extensively in the strategy document. Heritage railway travel for tourists can assist in further developing the industry. There are existing heritage railway lines in surrounding areas that the proposed rail link could feed into/be linked to in some way[22]. Also, Oberon is home to an existing heritage museum of the railway, housing old rolling stock, images, parts etc.

2.3.4 Alignment with other government strategies and policies

The Commonwealth Government's policy of "*Growing a Better Australia, a billion trees for jobs and growth".* The policy is to assist communities/towns dependent on forestry. The objective of reinstating the rail link is to increase the wood/resource catchment area for the wood processing facilities in Oberon. Therefore, the reopening of the Oberon to Tarana rail line falls under the remit of the policy. The policy also explicitly states the aim of growing existing softwood plantations and processing regions – which CWFH area is. Additionally, the policy has the aim of "future plantation expansion within appropriate distances and near other existing sources of wood and fibre". This rail link increases the area of plantations and improves the economic viability of log supply to the Oberon processing facilities.

2.3.5 Government support for manufacturing

The Federal Government established a $1.5 billion *Modern Manufacturing Strategy* to drive manufacturing development. This strategy includes whole-of-economy reforms in addition to funding, with a focus on tax, industrial relations, energy, and trade. The strategy comprised of three funding schemes: $1.3 billion *Modern Manufacturing Initiative*, $107.2 million *Supply Chain Resilience Initiative,* and $52.8 million *Manufacturing Modernisation Fund*.

Six 'priority sectors' are identified in the strategy:

– Resources technology and critical minerals processing
– Food and beverage
– Medical products

[20] Oberon Council, *Local Strategic Planning Statement 2038,* viewed October 01 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[21] Greenwood Strategy (202) *Development of a spatial database – Report prepared for the Central West NSW Forestry Hub*
[22] NSW Government, Transport Heritage NSW, viewed October 1, https://www.thnsw.com.au/

– Recycling and clean energy
– Defence
– Space

The *Modern Manufacturing Initiative* aims to assist in scaling, translation of ideas into operations and entry into value chains. Undertaken on a co-investment basis, with the government providing up to 50 percent of funding costs. The initiative is open to both new business and expansionary plans and also provides funding for collaborative ventures[23]. Timber and fibre products are currently excluded from the Government's Modern Manufacturing Strategy.

The Federal Government additionally launched the *Supply Chain Resilience Initiative* to provide up to $2 million per applicant in funding for manufacturing companies. The objective is to facilitate manufacturing firms scaling capability to address a supply chain vulnerability. According to the scheme, vulnerabilities in the supply chain harm Australian competitiveness as they result in import dependency and result in shortages during crises overseas. The scheme will provide funding to firms involved manufacturing that uses semiconductors, water treatment chemicals, telecommunications equipment, and other raw materials such as minerals[24].

Manufacturing Modernisation Fund supports manufacturers adopt new technologies and processes. Core objective is to drive jobs growth through expansion of capabilities. In addition to assisting in procurement of new manufacturing technology, the scheme will also support training, software integration and fit-out/alternations costs for the new technology.

The New South Wales State Government is also committed to developing its manufacturing capability. It has created the *NSW advanced manufacturing industry development strategy* with a focus on increasing research and development, advanced technology uptake, growing investment attractiveness and export levels[25]. Key rationale behind the strategy is NSW's competitive advantage in manufacturing. Already, the state is Australia's largest manufacturer in terms of value and employment. The strategy aims to utilise this strong base to drive development and create a more advanced manufacturing industry with a core focus on high-end manufacturing utilising cutting-edge technology. Given international competition in lower-end manufacturing, this is viewed as the major growth opportunity for Australian manufacturing. Increasing collaboration between industry and universities is regarded by the strategy as a method of establishing more advanced manufacturing.

[23]Australian Government, *Modern Manufacturing Initiative*, viewed October 01 2021, https://www.industry.gov.au/news/modern-manufacturing-initiative-and-national-manufacturing-priorities-announced
[24]Australian Government, *Supply Chain Resilience*, viewed October 01 2021, https://www.industry.gov.au/data-and-publications/sovereign-manufacturing-capability-plan-tranche-2
[25] NSW Government, *NSW advanced manufacturing industry development strategy,* viewed October 03 2021, https://www.business.nsw.gov.au/industry-sectors/industry-opportunities/advanced-manufacturing

2.4 Oberon Local Government Area

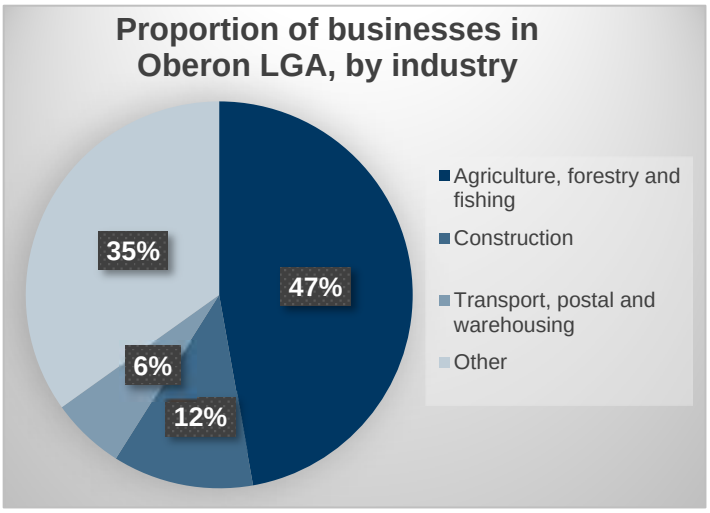
2.4.1 Overview of economy

The Oberon Local Government Area (LGA) is situated in NSW's Central West region. Oberon's economy is dominated by agriculture, manufacturing and tourism. Manufacturing is the largest employer in the town with 494 employees followed by the agriculture, forestry and fishing sector with an 412 employees[26]. Forestry is also a major part of the Central West region's economy and is the primary industry within Oberon. Agriculture and tourism also provide significant employment opportunities and economic output in the town and surrounding localities.

2.4.2 Key industries

2.4.2.1 Forestry

Forestry is Oberon's main industry and provides employment for hundreds of the town and region's residents. There is almost 90,000[27] hectares of pine plantations in the CWFH region with the majority of the region's commercial plantation forests concentrated in the Oberon LGA. These are managed by Forestry Corporation of NSW. The various forestry-related businesses in the Oberon LGA include Australian Panel Products, Highland Pine Products (Joint Venture between AKD Softwoods and Pentarch Forestry), and Australian United Timbers at Burraga which combined, comprise many stages of the timber value chain[28]. The APP manufacturing site also had a $106 million upgrade in 2017, ensuring its future capability and capacity. The Oberon Council has flagged the use of trucks by the industry as an issue for the community, with road safety and noise pollution throughout the town and surrounding arterial roads being the primary concerns. The Oberon Council is open to exploring options to reduce these issues and ensure the continued prosperity of the town's key sector.



2.4.2.2 Agriculture

According to the Australian Bureau of Statistics (ABS), out of 697 registered businesses in the Oberon LGA as of June 2020, 329 were in the agriculture, forestry, and fishing sector.[29] As of 2020, agricultural lands contributed $246 million (12 percent) to the local gross domestic product,[30] with agriculture considered central to the local council's vision for driving future prosperity in the town.[31]

The main crops produced are oats and pastures cut for hay and silage while brussel sprouts, broccoli, potatoes and peas are the main horticultural industries. Prime lambs and beef cattle are the predominant livestock industries.

[26] ABS, 2020, *Region summary: Oberon (A)*, viewed 03 October 2021, https://dbr.abs.gov.au/region.html?lyr=lga&rgn=16100
[27] Greenwood Strategy, 2022, *Development of a Spatial Database – Report prepared for the Central West NSW Forestry Hub*
[28] Oberon Australia, *Timber Industry*, viewed 03 October 2021, https://www.oberonaustralia.com.au/living-working-in-oberon/timber-industry/
[29] ABS, 2020, *Region summary: Oberon (A)*, viewed 03 October 2021, https://dbr.abs.gov.au/region.html?lyr=lga&rgn=16100
[30] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[31] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf.

2.4.2.3 Tourism

The Oberon area is popular for its cool summers, its snowy winters, and its four distinct seasons, with tourism an important industry for the town[32]. Tourists flock to Oberon to explore a multitude of unique attractions, towns and villages and iconic sites such as Jenolan Caves, Kanangra-Boyd National Park and Mayfield Gardens. The Oberon Council highlights the industry as a growth opportunity and commissioned a report into developing a strategy to further expand it. The report states that in 2016, there was a total of 11,264 visitors that engaged in tourist activity in the Oberon region. 35 businesses operated in the town, offering accommodation, with a total of 1,100 beds[33]. The Oberon Tarana Heritage Railway a heritage museum of the railway including old rolling stock, images, and parts. The report views the development of this attraction as an economic priority. Other heritage attractions include the Oberon District Museum which has a collection of items of local historical interest, while the Oberon Military Museum houses an array of weapons from the Boer War to the present day.

2.4.3 Employment

According to the Oberon LGA Census data, around 16.5 percent of the labour force is employed in agriculture, forestry and fishing industries[34]. 15.4 percent of the population is employed in the manufacturing sector, mainly in the town's forestry and related businesses. The most common specific industry of employment in Oberon is associated with log sawmilling, which, as of the 2016 census, directly employed 6.8 percent of the town's employed labour force. Wooden structural fitting and component manufacturing is also a key industry in the town, directly employing 4.1 percent of Oberon's employed labour force. Other major employers in the town are local government administration (directly employing 4.5 percent of the employed labour force), and road freight transport (directly employing 3.8 percent of the employed labour force).[35] Combined, the timber industry provides work for nearly 500 of Oberon's residents.[36] It is also worth noting that around 450 residents in Oberon work in nearby Bathurst. There is also trace employment in Orange, Upper Lachlan Shire, and Goulburn Mulwaree LGA's.

As at the last census in 2016, the largest employing Industry sector was Log Sawmilling (36%), followed by Reconstituted Wood Product Manufacturing (18%), Logging (17%) and Forestry (14%).

ForestWorks (2022) reports that the number might be unreported as the ABS Census data is based on workers self-declaring their industry of employment on their census form. Some workers may have declared that they belong to a different industry. For example, a truck driver may have indicated that they work in Transport and Logistics, rather than for an employer that belongs to Timber Reconstituted Products sector.

2.4.4 Inter-region activity and relationships

The *Central West and Orana Regional plan 2036* from the NSW Department of Planning highlights inter-region activity and relationships as vital for development[37]. The report argues that various municipalities will have to collaborate to ensure economic growth, the protection of the environment, and to assist in land management for agricultural activities including forestry.

The Central West region consists of 11 different LGA regions, of which Oberon is the second smallest by population. The population centres of the region include Orange and Bathurst, alongside less-populated towns such as Cowra, Mudgee, Lithgow, and Parkes[38]. The economic prosperity of these regional centres has a

[32] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[33]Oberon Council, September 2016, *Oberon Council Tourism Strategy,* viewed 05 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/Tourism%20Strategy%202016-17%20-%202020-21%20%28Adopted%2020.09.pdf
[34] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[35] ABS, 2016, *2016 Census QuickStats (Oberon, NSW)*, viewed 31 October 2021, https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC13068
[36] Oberonaustralia.com, n.d., *Timber Industry*.
[37] central-west-and-orana-regional-plan-2017-06.ashx (nsw.gov.au)
[38] http://rdacentralwest.org.au/about-us/

definitive ‘trickle down’ effect to smaller towns such as Oberon, by providing both employment opportunities and markets for Oberon’s goods[39].

The proximity of Oberon to Sydney also provides significant employment opportunities for a large proportion of Oberon’s working population, by providing a substantial nearby market for goods such as timber products that are produced in the town[40]. The local council sees leveraging the town’s strength in being close to Sydney, as well as to Bathurst and Lithgow, as core to future growth[41]. Only by continuing and growing the trade and engagement between Oberon and the Central West region and beyond, can the town ensure continued and increased prosperity.

2.4.5 Population

The Central West region of NSW is home to approximately 213,000[42] people according to ABS data from 2020. As of 2018, the population in Oberon was 5,408[43]. Population growth has been slow in the Central West in recent times. The ABS estimates population growth at below 1 percent for the past four years. Oberon’s population growth has been the same[44]. From the 2016 census, the median age in Australia was 37, while in the Central West it was 41 years old. In the same census, the median age of Oberon was recorded as 45[45] years old.

2.4.6 Development priorities

The NSW government developed the ‘Central West and Orana Regional Plan’ that focuses on development opportunities in the area[46]. Core focus of the plan is to protect and enhance the existing agriculture industry (including forestry). The plan highlights the potential of expanding supply chains, as well as food processing and manufacturing infrastructure in the region.

Furthermore, Regional Development Australia’s *Strategic Plan Framework 2021-2024* for the Central West region of NSW highlights five core development objectives. These are:

1- Building **regional competitiveness**, to ensure that the Central West builds on existing as well as emerging strengths,

2- Developing **human capital**, to ensure that the Central West has a future oriented skills base with the capability to embrace new industry opportunities,

3- Building **stable communities**, to ensure population growth and a high quality of life,

4- Enhancing **connectivity**, to ensure that the region has strong transport and information technology highways linking its people to the rest of the state, nation, and the world,

5- Developing **partnerships**, to ensure the region is united through collaboration between the private sector and all tiers of government[47].

The proposed reopening of the Oberon to Tarana rail line is in harmony with all of these development priorities. The Oberon council’s development priorities are focused on the forestry and tourism industry in the region[48]. The

[39]Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf.
[40] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[41] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[42] ABS, 2020, *Data by Region,* viewed February 21 2022, https://dbr.abs.gov.au/
[43] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf
[44] ABS, 2020, *Data by region,* viewed February 21 2022, https://dbr.abs.gov.au/region.html?lyr=sa4&rgn=103
[45] ABS, 2016, *2016 Census QuickStats (Oberon, NSW)*, viewed 31 October 2021, https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC13068
[46] NSW Government, Planning & Environment NSW, 2017, *Central West and Orana Regional Plan,* viewed 05 October 2021, https://www.planning.nsw.gov.au/~/media/Files/DPE/Plans-and-policies/central-west-and-orana-regional-plan-2017-06.ashx
[47] Regional Development Australia, 2020, *Strategic Plan Framework 2021-2024*, viewed 02 October 2021, https://rdacentralwest.org.au/wp-content/uploads/2020/05/Framework.pdf
[48] Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf.

council has also identified five broader ‘planning priorities’ to indicate the focus of future strategic development. These are listed as:

1- **Growth**, in terms of increasing the local population and boosting economic activity,
2- **Community well-being**, primarily in terms of increased services and an improved built environment,
3- **Infrastructure**, especially improved freight, and rail connections,
4- **Environment**, in terms of greater protecting environmental assets,
5- **Leadership**, including the active promotion of local business opportunities[49].

[49]Oberon Council, 2020, *Local Strategic Planning Statement 2040*, Viewed 02 October 2021, https://www.oberon.nsw.gov.au/sites/oberon/files/public/200422%20Oberon%20Draft%20Local%20Strategic%20Planning%20Statement%20GM%20Reviewed%20Draft.pdf.

2.5 Stakeholder consultation

2.5.1 Purpose of consultation

Consultation was carried out to inform this analysis particularly around freight tasks and the engineering assessment of reopening the Oberon to Tarana rail line. Consultation was undertaken with key CWFH Committee Members, a group of local stakeholders charged with ensuring the CWFH meets the Commonwealth Government's objectives in the context of the Central West NSW forest industry. In addition to these stakeholders, GHD also consulted with the Oberon-Tarana Heritage Railway Group to understand how reopening this line could be undertaken in conjunction with their objectives.

The following table presents a summary of stakeholder consultation carried out to inform this study. Additional consultation with other stakeholders including Rolling Stock Operators and other freight businesses should be undertaken as part of future investigation stages.

Table 1 Stakeholder consultation

Stakeholder	Relevance
Forestry Corporation NSW	Forestry Corporation of NSW manages the commercial native and plantation forests in NSW and produces around 14 per cent of the timber produced in Australia annually. The Softwood Plantations Division manages Australia's largest softwood plantation estate, responsible for more than 230,000 hectares of pine plantations in the central west, south and north of NSW. Consultation was undertaken to understand log supply and demand from Walcha and Grafton and the required train configurations.
Australian Panel Products	An Australian owned and vertically integrated business (owned by Borg) offering forestry management services through to the manufacturing of board products for all joinery and structural flooring applications. As part of the Borg group, consultation was undertaken to understand freight demand for logs, wood waste, chemicals, imported products and distribution of finished board products.
Highland Pine Products	Highland Pine Products (HPP) is a 50:50 Joint Venture between AKD Softwoods and Pentarch Forestry, employing approx. 225 people and produces dressed timber and treated timber to be used as house frames and trusses. Consultation involved understanding demand for logs and distribution and markets for finished timber.
Oberon Council	Local Government Authority responsible for local planning and decision making and for administering infrastructure, facilities and services for the Oberon community. Oberon Council was consulted in relation to annual expenditure on local roads and to understand business and tourism benefits associated with reopening the rail line.
Oberon – Tarana Heritage Railway Group	The Oberon-Tarana Heritage Railway (OTHR) Group is a volunteer association with the aim of restoring the Oberon Tarana branch line with the aim of generating tourist related employment and volunteer opportunities for Oberon and surrounding regions. The OTHR group were consulted to understand how reopening this line could be undertaken in conjunction with their objectives. Further information was supplied regarding the condition of the existing rail line and associated infrastructure.
John Holland	The then rail infrastructure manager with responsibility for managing the Country Rail Network linking regional NSW to cities and markets. The network spans 5,000km of rail infrastructure, including 2,386km of operational rail lines and 3,139km of non-operational lines. John Holland provided background information related to the line including a copy of the Dilapidation Report related to the Oberon to Carlwood section of the rail line.
CWFH Manager	Undertakes project management and administration, update reports, feedback and transfer of information.

2.6 Problem definition

The problem definition stage outlines the case for change and identifies reasons for government intervention in the decision to proceed to further stages of the business case process. The problem definition is the primary document for a Gate 0 review - under NSW Gateway Policy (TPP17-01)[50]. Several paradigms can be used to view the problem, including productivity, government objectives, tourism, forestry, and traffic safety.

Productivity of the forestry operations and the general impacts from additional traffic flows is impacted by limitations of the current road transport systems to cope with the current and expected truck trips. The Forestry Hubs were set up by the Commonwealth Government to find methods for improving the domestic supply of timber and related products that underpin much of the Australian construction industry. The Oberon to Tarana Railway is identified as a key asset that can assist in improving the operations of the region that produce large volumes of timber products. Timber used in construction is experiencing significant shortages in Australia, reducing the ability for construction industries to complete projects. Improving the supply chain with the Oberon to Tarana Railway would improve supply of construction timber Australia wide, especially into Sydney. Productivity gains are highly likely to come from reduced truck traffic, increased throughput of construction timber, improved construction industry access to timber products and through making a greater volume of raw materials economically viable for processing in Oberon.

Meeting government objectives is likely to maximise the community's welfare and deliver better economic outcomes. Government holds objectives that specifically target regional areas, manufacturing and other strategically important industries. The proposed rail link would support projects and strategies that are focused on developing the regional areas of Australia, moving freight off the road, improving productivity, reducing fiscal costs, and many other related objectives that are not currently being supported to the full extent possible. Government projects and strategies with these objectives include:

- Regional Forestry Hubs
- Inland Rail
- Supporting Australia's manufacturing industry
- NSW Freight and Ports Plan 2018-23
- Abercrombie Regional Economic Development Strategy 2018-22
- NSW State Forestry Roadmap
- Oberon-Tarana Heritage Railway and
- Oberon Council objectives

Tourism is an important part of the economic fabric of Australia, improving the welfare of citizens in several ways. Regional towns benefit from the redistribution of wealth from the cities to the regions. A portion of the tourists are inter-state and international, which improves the Gross State Product. Oberon has not fully achieved the tourism benefits it seeks. The proposed Oberon to Tarana Railway will allow the region to offer additional tourism services that directly connect to Sydney, the largest tourist source for NSW. The addition of the railway with the heritage railway operation will be a unique and highly attractive tourist asset that is expected to provide ongoing tourism business opportunities for decades to come.

Forestry is an important part of the Australian and NSW economy. A core challenge is managing the long-term supply-chain of trees and the short-term fluctuations in demand. The log processing centre and timber production factories cannot be moved without large costs. The increasing demand and reducing load supply has meant logs must be increasingly transported longer distances, increasing costs of the production. Oberon to Tarana Railway is a potential solution to alleviate some of these logistical issues.

Manufacturing in Australia is a key part of economic development policies set out by Commonwealth and NSW Government. Oberon is a centre for advanced manufacturing processes, delivering a range of modern construction products. The limitations of the road freight to feed the factories at the required rate and cost is limiting the expansion of the factories and therefore, reducing the manufacturing outputs and increasing manufacturing costs due to loss of scale of economies.

[50] NSW Government, Treasury, August 2018, *NSW Government Business Case Guidelines*, Viewed 20 January 2022, https://www.treasury.nsw.gov.au/sites/default/files/2021-05/TPP18-06%20%20NSW%20Government%20Business%20Case%20Guidelines.pdf

2.6.1 Road safety

One of the key issues being considered in this assessment is the prevalence of road vehicle accidents. Each year, one or two fatalities and around 20 other accidents occur in Oberon region. As the map below shows the roads from Oberon to Tarana, Oberon to Duckmaloi and Oberon to Bathurst are the three main areas for road crashes. The high volume of trucks transiting these country roads is a major concern for road safety and any increase in business activity for the timber manufacturing plants will increase the logging and other freight trucks moving through this area.

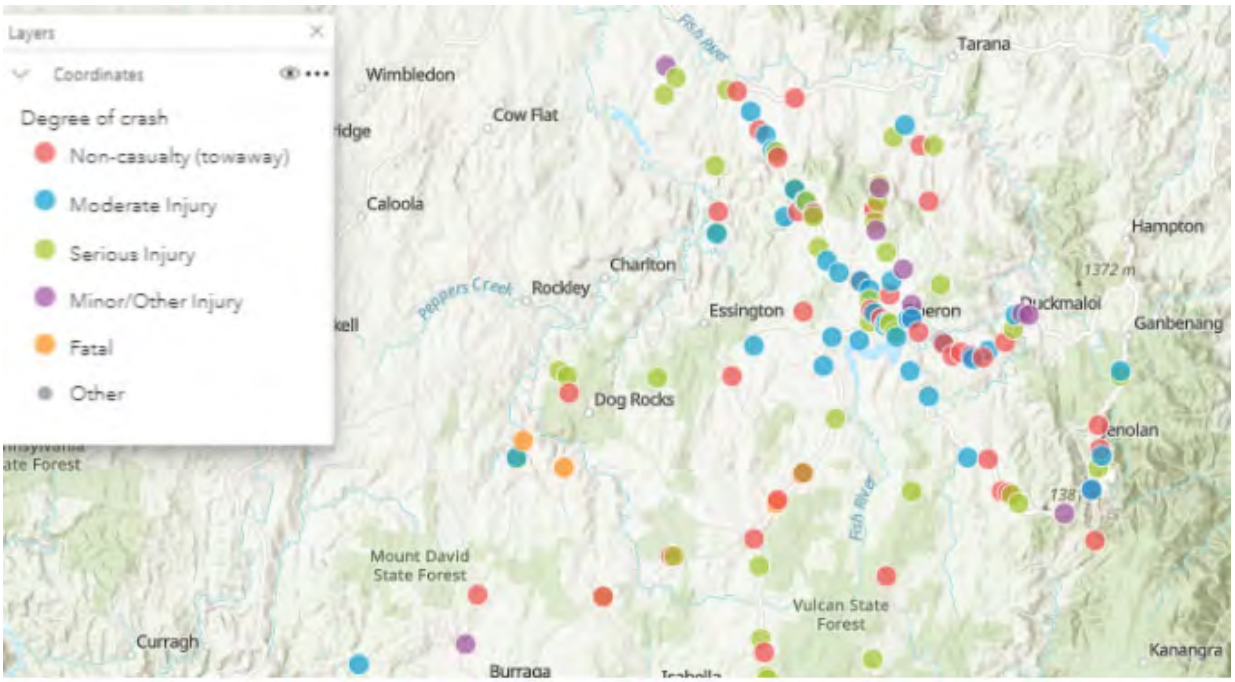


Figure 8 *Oberon region vehicle crash sites and degree of crash*[51]

Transport for NSW data shows the Oberon Council area is much more likely to have fatal and serious injury road crashes as shown in the graph below. Over the five-year period of 2016 to 2020 Oberon had 73 percent more fatal road crashes and 51 percent more serious injuries then the NSW wide percent[52].

[51] Transport for NSW, Centre for Road Safety, 2020, Crash and casualty statistics – LGA view, Viewed 17 March 2022, https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?r=eyJrIjoiMDA3OGRhN2UtZjRkNy00N2JmLWE0MjMtZmIyNzFiOTdmMjI3IiwidCI6ImNiMzU2NzgyLWFkOWEtNDdmYi04NzhiLTdlYmNlYjg1Yjg2YyJ9&pageName=ReportSection9f6cf5f75b8d2a5569a2

[52] Transport for NSW, Centre for Road Safety, 2020, Crash and casualty statistics – LGA view, Viewed 17 March 2022, https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?r=eyJrIjoiMDA3OGRhN2UtZjRkNy00N2JmLWE0MjMtZmIyNzFiOTdmMjI3IiwidCI6ImNiMzU2NzgyLWFkOWEtNDdmYi04NzhiLTdlYmNlYjg1Yjg2YyJ9&pageName=ReportSection9f6cf5f75b8d2a5569a2

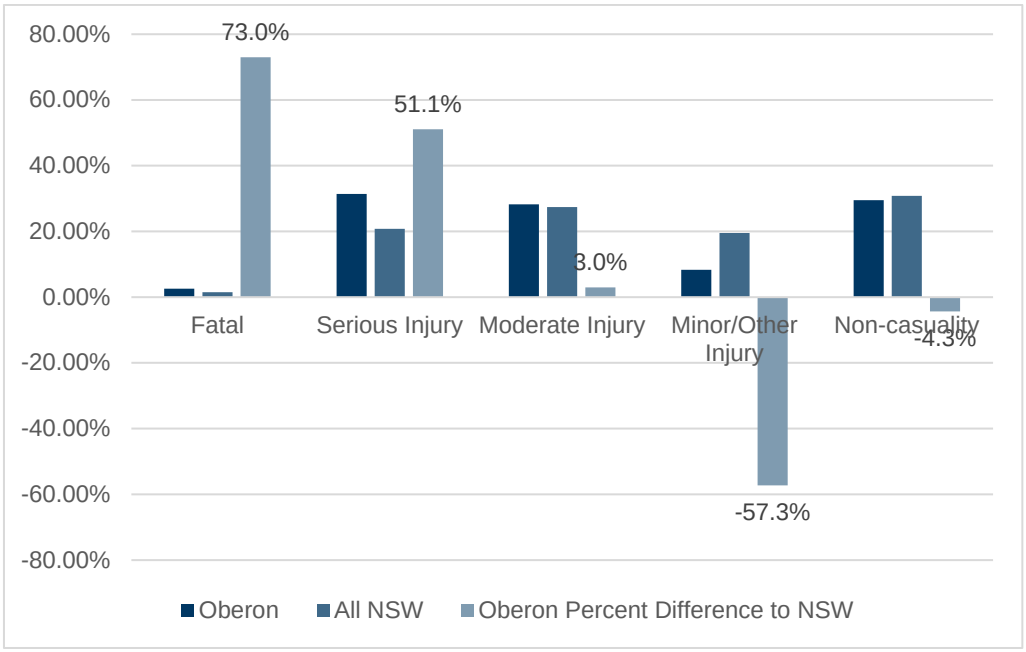


Figure 9 Oberon and NSW traffic accident data

Shifting the freight off the road to rail will reduce the potential for future death and injury caused by road crashes, not just in Oberon region but the entire way from Oberon to destinations.

2.7 Freight demand

The assessment of current and future freight demand for rail services between Tarana and Oberon was a key component of the input data to support future needs and the viability of the corridor. Effectively, the demand is driven by the input and output products required by major timber related production facilities at Oberon and not any intermediate location on the corridor.

The Oberon production facilities include Australian Panel Products (APP)[53], manufacturers of medium density fibreboard (MDF), mouldings and particleboard, and Highland Pine Products (HPP) a producer of dressed and treated timber used for house frames and trusses. Both of these facilities are located in the Oberon township adjacent to the rail corridor. The APP facility distributes these products locally in NSW and across Australia. Highland Pine Products produce timber for construction which is also widely distributed.

Both facilities utilise pine logs from plantation forests around NSW as inputs to their production facilities. Current sources for pine logs for both facilities are from the Oberon and Central West region, Walcha in northern NSW and from the northern rivers area north of Grafton. Contracts for logs sourced from Walcha and Grafton extend for the next ten years with a need for renewal beyond that time. There is currently a tender out for the supply of logs (100,000 tonnes per annum) from Grafton from 2025 for a 10-year period. These numbers have not been included in the below analysis, however would provide significant additional freight demand should that contract be awarded to one or both of the Oberon timber facilities. The APP facility also transports significant volumes of wood waste and a range of other production inputs (imported paper, wax, melamine) from the Sydney area and Urea from the Newcastle area. Outputs from the APP facility include approximately 700,000 tonnes of board products which are largely distributed through the Sydney metropolitan area.

As indicated above, consultation with management representatives of the two Oberon facilities provided inputs to relevant current freight demand and confirmation of overall freight volumes currently being transported to and from Oberon by road. Origin and destination locations vary across the product groups and are summarised below in Table 2, Table 3 and Table 4 below.

[53] APP undertakes a range of value adding processes in their Oberon facilities including for example manufacturing yellow tongue particleboard flooring.

Table 2 Australian Panel Products freight demand

Item	Route – Origin Destination	Product type	Task tonnes /month	Tonnes /annum
1	Walcha to Oberon	Logs	3,000	36,000
2	Northern NSW (Grafton) -Oberon	Logs	3,000	36,000
3	Glenlee to Oberon	Wood waste bulk	16,000	192,000
4	Newcastle to Oberon	Urea /bulk	2,300	27,600
5	Port Botany to Oberon	Paper rolls in containers	400	4,800
6	Port Botany to Oberon	Melamine containerised	800	9,600
7	Port Botany - Oberon	Wax containerised	320	3,840
8	St Mary's to Oberon	Wood waste bulk	25,000	300,000
9.	Oberon to St Mary's for onward distribution	Finished Board products (APP only)	25,000	300,000
Total				**909,840**

Table 3 Highland Pine Products freight demand

Item	Route – Origin Destination	Product type	Task tonnes /month	Tonnes /annum
1	Walcha to Oberon	Logs	10,000	120,000
2	Northern NSW/Stanthorpe (Grafton) to Oberon	Logs (variable timing)		10,500
3	Oberon to Sydney , central coast and rural	Cut timber in Truck loads (sometimes multiple drops – rail not feasible)		113,000
4	Oberon to Victoria	Cut Timber in truck loads (rail not feasible		27,000
5	Oberon to Queensland	Cut Timber in truck loads (rail not feasible		6,000
Total				**256,500**

The indicated demand volumes from consultation were adjusted to identify potential rail freight volumes which are indicated below in Table 4.

Table 4 Potential rail freight volumes

Item	Route – Origin Destination	Product type	Task tonnes /month	Tonnes /annum	TEU
1	Walcha to Oberon	Logs	13,000	156,000	8667 (@ 18 tonne /TEU
2	Northern NSW (Grafton) - Oberon	Logs	4,000	46,500	2583 (@18 tonne /TEU)
3	Glenlee to Oberon	Wood waste bulk	16,000	192,000	9,600 (@ 20 tonne /TEU)
4	Newcastle to Oberon	Urea /bulk	2,300	27,600	-
5	Oberon to St Mary's for onward distribution	Finished Board products (APP only)	25,000	300,000	11,538 (@26 tonne/TEU)

Item	Route – Origin Destination	Product type	Task tonnes /month	Tonnes /annum	TEU
6	Port Botany to Oberon	Paper rolls in containers	400	4,800	200 (@24 tonne /TEU)
7	Port Botany to Oberon	Melamine containerised	800	9,600	436(@22 tonne/TEU)
8	Port Botany - Oberon	Wax containerised	320	3,840	183 (@ 21 tonne/TEU)
9	St Mary's to Oberon	Wood waste bulk	25,000	300,000	15,000 (@20 tonne/TEU
Total				**1,040,340**	

Growth outlooks are based largely on current log contracts which provide for consistent log supplies for the next ten years although there is an opportunity for additional wood waste inputs for the Borg facility providing potential for growth in overall inputs and production in future years.

Each of the product groups and transport route requirements were assessed for their potential viability for rail operations, considering freight volumes, number of rail trips, regularity of service needs and comparative route distances. The input products are all delivered to Oberon, however the output products from both facilities are broadly distributed across NSW and other states. The relevant share of output products that could be considered for consolidation for rail transport to the Sydney area was discussed during the consultation phase with facility managers with an indicative volume available for rail agreed at 300,000 tonnes which would transit to Sydney for further interstate distribution (including Brisbane and Melbourne).

Modelling of comparative road and rail options for the movement of incoming and outwards freight from the Oberon facilities was undertaken using the GHD Strategic Transport Logistics Model which has been used extensively in rail and road-based transport modelling across mining, logistics industries and port supply chains for many years. The model builds up the input costs of the operation of the road and rail task including asset cost allocation, operational costs including fuel, labour, maintenance, taxes and overheads and has been aligned to market costs progressively during its operation. Rail related costs include above rail and below rail costs of track access charges by infrastructure managers

Train configurations for operation on a reconstructed Tarana to Oberon corridor have been assumed to take consideration of the current limitations of grade and curves which are generally outside of standards for new rail construction with grades of up to 1:25 and tight curves through the terrain. Accordingly, the assumed train configuration has a maximum length of 700m, two locomotives and wagons of 14 m length with a corridor Tonne Axle Load (TAL) assumed to be 19 tonnes.

The movement of logs from both Walcha and Northern NSW provide for a rail demand within the same train configuration utilising flat top container wagons and 20 foot flat rack containers (see Figure 10 below) allowing for the logs to be loaded on the flat racks and to be transported by road to rail where a direct lift of the load can be made from road onto the train for transit to Oberon. This process is currently utilised by the Forestry Corporation of NSW transporting logs from Walcha to areas of southern NSW / Victoria through the Werris Creek intermodal facility.

Figure 10 Example Flat Rack container for log transport[54].

2.7.1 Logs

The combined demand for log transport on rail to Oberon from Walcha (156,000 tonnes per annum) and Northern NSW (Grafton) (46,500 tonnes per annum) would result in 92 annual return trips from Walcha and a further 27 annual return trips from Northern NSW, totalling 119 annual return rail services. While road delivery to the rail terminal at Werris Creek or Grafton would be required, the mode shift would result in over 5,000 return truck journeys removed from roads over a major part of transport. As outlined above, there is the potential for another 100,00 tonnes per annum of logs to be delivered from Grafton for a 10-year period from 2025. As this tender is still to be awarded, these number have not been included in the freight demand analysis, however the above data provides an indication of the likely annual return trips should these logs be awarded to one of the Oberon timber facilities.

Comparative operational costs have been estimated comparing a direct road transport to a road trip to rail and rail transport to Oberon providing an opportunity for a cost per tonne reduction on transport because of a shift to rail. Comparative costs per tonne are indicated in Table 5 below indicating an opportunity for transition to rail for the log traffic.

Table 5 Comparison log traffic costs

Logs	Direct road $/tonne	Road and rail
Walcha to Oberon	$68.20	$62.10
Northern NSW/Stanthorpe to Oberon	$92.20	$70.40

[54] Seaco Global, viewed 17 March 2022, https://www.seacoglobal.com/

2.7.2 Wood waste

The transport of wood waste is currently understood to be sourced from a number of processing sites and in some cases there would be an opportunity for road transport direct from the source location to Oberon. Assessment of Glenlee to Oberon transport of wood waste was evaluated and was considered not viable for rail, due to:

– Additional road legs in consolidation to Glenlee
– Rail distance and access compared to road

However, we understand that the majority of the wood waste is transferred to a site at St Mary's where the waste is already consolidated and broken down and processed through a crusher to a smaller and more useable product. This is transferred to Oberon utilising moving floor trucks which assist in unloading products of this type which do not flow in normal bulk vehicles.

A rail alternative option for this product would replace the road journey with a direct rail transfer but will require the product to be loaded to containers for transfer to Oberon and add a handling step on empty and full container handling at either end of the journey. Containers used are likely to be 20 foot or 40 foot top load Hi Cube containers with a lid. This configuration will enable containerised wood waste products to use the same train set as the outbound finished board from Oberon to increase efficiency of the rail services. The same train configuration can effectively carry wood waste containers on three days per week and finished board products on alternative days.

Comparative costing over a distance of 140 km by road and km and rail distance 99 km by rail indicated the consolidation and packaging cost combined with a relatively short journey distance indicated this product was more efficiently carried by road. Comparative costs of $26.70/tonne for road direct and a road and rail option of $46.80 /tonne resulted in road direct being the preferred transport option for this product

2.7.3 Imported goods - Paper rolls, Melamine and Wax

The imported input products include melamine, paper rolls and wax which area all imported in containers through the port of Botany with varying arrival times and sources making these products difficult to consolidate directly to form a single train. The overall volumes are also small for dedicated rail transport loadings. However, if wood waste materials are using rail for transport to Oberon there is an option of delivering these containerised products to St Marys and adding these to the same train as the wood waste with other materials to Oberon.

2.7.4 Urea

Urea is currently sourced from the Newcastle area by road with a total volume of approximately 27,500 tonnes per annum. The product is understood to be transferred as a bulk product utilising truck and dog configurations as a direct road service. The volume of product on an annual basis represents approximately 12 trains per annum in volume and would require bulk unloading facilities at Oberon to support bottom dump rail wagons. The volume of product indicated here is considered less than viable from the rail perspective unless a rail operator has spare equipment which fits the need. Combined with an investment for bulk materials unloading at the Oberon site this was not considered a viable rail option.

Comparative costing of road and rail transport is penalised by the need for allocation of costs to rolling stock for such a comparatively small number of trips and the need for the rolling stock to be utilised elsewhere when not operating this service. Accordingly, road would continue to operate this service unless a subsidy (government support) or other assistance was provided.

2.7.5 Output products from the APP facility

The estimated volume of finished board product which could be transported on rail from the Oberon site was a volume of 300,000 tonnes which would be containerised for rail transport to Sydney (indicatively St Mary's) for onward transport across Australia. This volume represents approximately 122 train loads with a short distance transfer of approximately 140 kms.

The volume of products and the potential for onward transfer by rail provided some viability for mode shift for this product although the shorter distance of transport provides for similar comparative cost estimates for both modes

based on $19.90/tonne for road and $17.80 per tonne for rail. This provides for further consideration of this option for rail when externalities and associated costs are considered although further detailed assessment may be required

2.7.6 Output products from the HPP facility

The estimated volume dressed timber from HPP for distribution from Oberon to Sydney and interstate (Queensland and Victoria) is outlined in Table 3. As the cut timber is in truck loads and sometimes involves multiple stops, it was not considered feasible for rail although should the distribution channels be refined, there could be future opportunities to also convert some of this freight from road to rail.

2.7.7 Overall Opportunities for rail

When compared to the original freight volumes generated by the facilities at Oberon the following opportunity for rail services provides an indication of potential return rail services which could be generated or the Tarana to Oberon corridor. The log traffic which would generate 127 return train journeys provides a core rail service requirement, with potential for an additional service for finished board product.

Table 6 Potential rail volumes and return trips

Item	Route – Origin Destination	Product type	Task tonnes /month	Tonnes /annum	Potential return train trips/annum
1	Walcha to Oberon	Logs	13,000	156,000	98
2	Northern NSW (Grafton) -Oberon	Logs	4,000	46,500	29
3	St Mary's to Oberon	Wood waste		300,000	178
4	Oberon to St Mary's for onward distribution	Finished Board products	overall annual assumption	Est. 300,000	170
5	Newcastle – Oberon	Urea		27,600	12
6	St Mary's -Oberon	Melamine, Paper, wax		18,240	10
	Total			**503,500**	

3. Base case and options

The options set for this assessment were largely assessed at a strategic level where we were able to reduce the range of possible options for detailed assessment down to one main option. Considering only one option is not typical for a business case and the intention of this report is to offer sufficient information to the NSW Government to justify moving to a full business case with additional options considered at greater detail.

Options considered at a strategic level only are explained here with some detail to show why these were not pursued further at this stage. The final business case should include sufficient scope to reconsider these and other options for the solution.

3.1 Define base case

The existing 'do minimum' scenarios is to assume that no work will be conducted to reinstate Oberon to Tarana Railway and all freight will continue to be transported by truck including all logs from the Macquarie Region, as the distances are short and it would not be viable to transfer from road to rail. Table 7 outlines the one-way trucking distance between origination to destination for each route.

Table 7 Trucking distances

Origin	Destination	Commodity(s)	Trucking distance (km one way)[55]
Walcha	Oberon	Logs	545
Grafton & Stanthorpe	Oberon	Logs	750
Glenlee Intermodal, Spring Farm	Oberon	Wood waste	170
Newcastle	Oberon	Urea / Bulk	365
Oberon	St Marys	Finished board products	135
Port Botany	Oberon	Paper rolls in containers/Melamine in containers/Wax containerised	200
St Marys	Oberon	Wood waste	120

It is assumed that in the base case, all routes will continue with the existing annual load until FY2032. From 2023 onwards, the total freight volume will be growing by 5% per annum for 10 years before it remains constant until the end of evaluation period. The model has assumed a real growth of 0.7% in road and rail maintenance, haulage and handling cost throughout the evaluation period. Other detailed assumptions used for the financial and economic analysis are outlined in Appendix C and Appendix D respectively.

3.2 Options

Options considered at the strategic level included several variations of truck and train transport to and from Oberon factories assuming the same volumes that are projected under the base case. Strategic options considered include:

1. Reinstatement of the Oberon to Tarana rail line
2. Improving the road between Oberon and Bathurst
3. Setting up a truck/train loading area at Tarana to enable trucks to transport from Tarana to Oberon
4. Trucking freight to/from Bathurst/Oberon with a rail loading area
5. Moving the timber manufacturing facilities to a new location

[55] These distances assume the continual use of the Duckmaloi and Jenolan Caves Roads. This is an unreliable route with high tourist and local traffic use.

The options three, four and five were not considered suitable or achievable due to the high cost and low benefits. Option three, building a truck/train loading area at Tarana and then transporting freight to/from Oberon on trucks, would cause large transfer costs in time and money. The road between Oberon and Tarana would continue to be a high-risk travel zone, increasingly so as volumes increase over time.

Options one and two were considered possible and were considered with a greater level of detail. The option two that would improve the road to Bathurst was considered possibly suitable to reduce the road crash risks in the region but was not considered to meet the other needs or government objectives. The costs of road upgrade for the approximately 40 kilometres of road could include taking out significant corners, adding rumble strips, widening the road and over taking lanes. The cost of these upgrades is considered to be very high, and the benefits would be only a minor reduction in risk road crashes. Combined with the fact there is no way to force the trucks to use this road, the strategic assessment was the road improvement option would not be worth investigating further at this time. In addition, these options also do not factor in any upgrades to the existing Duckmaloi and Jenolan Caves Roads which are currently the main transport route for finished product from Oberon to Sydney. A major upgrade of this road would be considered very high due to the steep terrain.

3.2.1 Define options

The main option being considered in this assessment is the reinstatement of the Oberon to Tarana rail line, but this option is considered with a series of scenarios of how this asset could be used. Variations to the core option include considering the level of government support that would be required to enable different volumes of freight to move from road to rail over time. The expected demand for rail services is altered depending on the calculated cost per tonne for delivery from/to Oberon compared to the current costs per tonne. The higher the government support the lower the calculated price and the more volume that will be transported, which changes all the calculated financial and economic impacts.

3.2.1.1 Reinstatement of the Oberon to Tarana rail line

The physical infrastructure description of this option sets out the minimum requirements of the John Holland CRN Engineering Standards.

CRN Engineering Standard CRN CS 200 *Track Systems* shows the lowest mainline track class is Class 5 with the following operational criteria.

1. 19 tonne axle load.
2. Maximum train operating speed of 40 km/h.
3. Nominal maximum tonnage of 1 Million Gross Tons (MGT) per year.

CRN Engineering Standard CRN CS 200 nominates the following minimum track structure criteria for Class 5 mainlines:

4. Rail size 30 kg/m
5. Rail adjustment loose rails
6. Ballast depth 150 mm (fine ballast type)
7. Steel sleepers
8. Non-elastic fastenings

Track Speed

The Rail Access Corporation Version 2.0 Curve and Gradient diagram for the Tarana to Oberon line dated July 1999 show the minimum horizontal curve radius to be 5 chains which is equivalent to 100.584 m. There are numerous 5 chain radius curves over the length of the line.

Using the formula for the relationship between speed and radius contained in section 7.3.3.1 of CRN CS 210 *Track Geometry and Stability* the maximum design speed calculated for a 5 chain radius curve is 30 km/h. Note that the NSW Railways Weekly Notice No.41 announcing the opening of the Tarana to Oberon line on 3rd October 1923 advertised the maximum train speed as 23 mph which is the equivalent of 40 km/h. The Weekly Notice also noted the line was classified as a “Pioneer Line”.

Gradient

The Rail Access Corporation Version 2.0 Curve and Gradient diagram for the Tarana to Oberon line dated July 1999 show the maximum grade of the line to be 1 in 25 compensated for curvature for a total length of approximately 7 km opposing a train travelling to Oberon between 209 km and 216 km and located between Carlwood and Hazelgrove.

Detailed upgrade required for the project options are discussed in Appendix A

3.2.1.2 Freight routes

With the reinstatement of the Oberon to Tarana rail line, all routes will now have a choice to use rail freight other than road freight in the base case. For several routes, a direct rail access from/to Oberon is available, whereas for the others a combination of rail and road freight will be required if the freight is to travel on Oberon rail. Table 8 outlines the freight options that will be made available from the Oberon rail reinstatement for each route and their corresponding travel distance.

Table 8 Available freight option & One-way freight distances

Origin	Destination	Commodity(s)	Available freight option	Assumed trucking distance to rail (km one way)	Rail distance (km one way)	Total rail and road distance (km one way)
Walcha	Oberon	Logs	Road & Rail	135	488	623
Grafton & Stanthorpe	Oberon	Logs	Road & Rail	100	934	1,034
Glenlee Intermodal, Spring Farm	Oberon	Wood waste	Rail direct	15	199	214
Newcastle	Oberon	Urea / Bulk	Rail direct	0	517	517
Oberon	St Marys	Finished board products	Rail direct	0	144	144
Port Botany	Oberon	Paper rolls in containers/Melamine in containers/Wax containerised	Rail direct	64	222	286
St Marys	Oberon	Wood waste	Rail direct	0	140	140

4. Economic and financial analysis

4.1 Financial analysis

The section presents the findings from a financial analysis, which assesses the financial viability of reinstating and operating the Oberon to Tarana rail for freight transport. The analysis explores a number of scenarios that involves various level of government funding.

The analysis has evaluated:

– Full cost of reinstating and operating Oberon Rail
– Freight rate incurred by road freight under base case and rail/rail & road freight for various rail utilisation scenarios under the project case
– Government support required to reduce (where necessary) the required freight cost per tonne to match the current road freight costs per tonne
– Overall financial impact of reinstating and utilising Oberon rail for freight transport comparing to the base case

The purpose of this analysis is to capture the material financial cashflows associated with the reinstating and operating the Oberon rail to provide a strategic assessment of the possible financial outcomes. The assessment is based on comparing the net present value of financial cost of base case with project case.

4.1.1 Capital and operating cost of Oberon rail

The preliminary capital cost analysis indicates a required initial outlay of $76 million over a two-year construction period. The detailed capital cost breakdown is provided in Appendix E.

The operating cost is calculated based off parameters from *Australian Transport Assessment and Planning Guidelines – M3 Freight Rail.* The operating cost will consist of a variable and a fixed maintenance component. The variable cost calculated as the annual gross kilometres travelled (GKT) on the rail multiplied by $2.4 maintenance cost for every 1000 GKT. The fixed cost is calculated as the total Oberon rail length multiplied by $53,333 for every kilometre. The total operating cost is estimated to be $3 million to $4 million annually depending on the annual loads.

4.1.2 Freight rate and government support analysis

GHD firstly assessed the freight cost incurred under the base case, with all six routes utilising only roads to haul freight. The analysis then moved on to evaluate the project case freight cost, using a refurbished Oberon to Tarana rail link. Assuming the Oberon rail is operating, freight operators will have to select a route between continuing with road freight or utilising the rail. The choice will depend on, inter alia, the following factors:

– Risk of contracts for each – rail freight often requires ‘take-or-pay’ contracts that stipulate payment of capacity, whether the rail was used or not, which is a high-risk issue for small volumes
– Cost of rail/road and rail freight comparing to the base case (road freight)
– Amount of available government support

To understand the financial feasibility of reinstating the Oberon to Tarana rail line and how each freight operator may decide to use road or rail freight, GHD has considered the following scenarios.

Scenario 1 – all six routes use rail freight

There are six routes to/from Oberon as outlined and numbered in the following table:

Table 9 Transport routes

Route number	Origin	Destination	Commodity(s)	Base case freight method	Other potential freight option
1	Walcha	Oberon	Logs	Road	Road & Rail
2	Grafton & Stanthorpe	Oberon	Logs	Road	Road & Rail
3	Oberon	St Marys	Finished board products	Road	Rail direct
4	Port Botany	Oberon	Paper rolls in containers/Melamine in containers/Wax containerised	Road	Rail direct
5	Newcastle	Oberon	Urea / Bulk	Road	Rail direct
6	St Marys	Oberon	Wood waste	Road	Rail direct

GHD started with the assumption that all six routes will change their freight transport mode from road to rail or adopt a rail/road combination. The six routes are separated into two types: rail and rail/road combination. There are four rail-only routes and three road/rail routes. The model has calculated the total freight rate for each route under the scenario, including:

– Rail freight cost for all routes
– Full cost recovery of Oberon rail (capital and operating cost) allocated to each of the six routes based on their annual load volume
– Access charges for the reminder of the trips on rail (excluding the section between Oberon to Tarana)
– Above rail cost including rollingstock, crew, fuel and overhead
– Road freight cost for the three routes that will use road & rail combination

Figure 11 outlines the comparison of freight rate between base case (road freight) and the project case that assumes all six routes will use the Oberon rail. The error bars in the figure indicate the sensitivity range of the project case freight rates and highlights the Oberon – Tarana rail cost as a proportion of the total remaining freight cost.

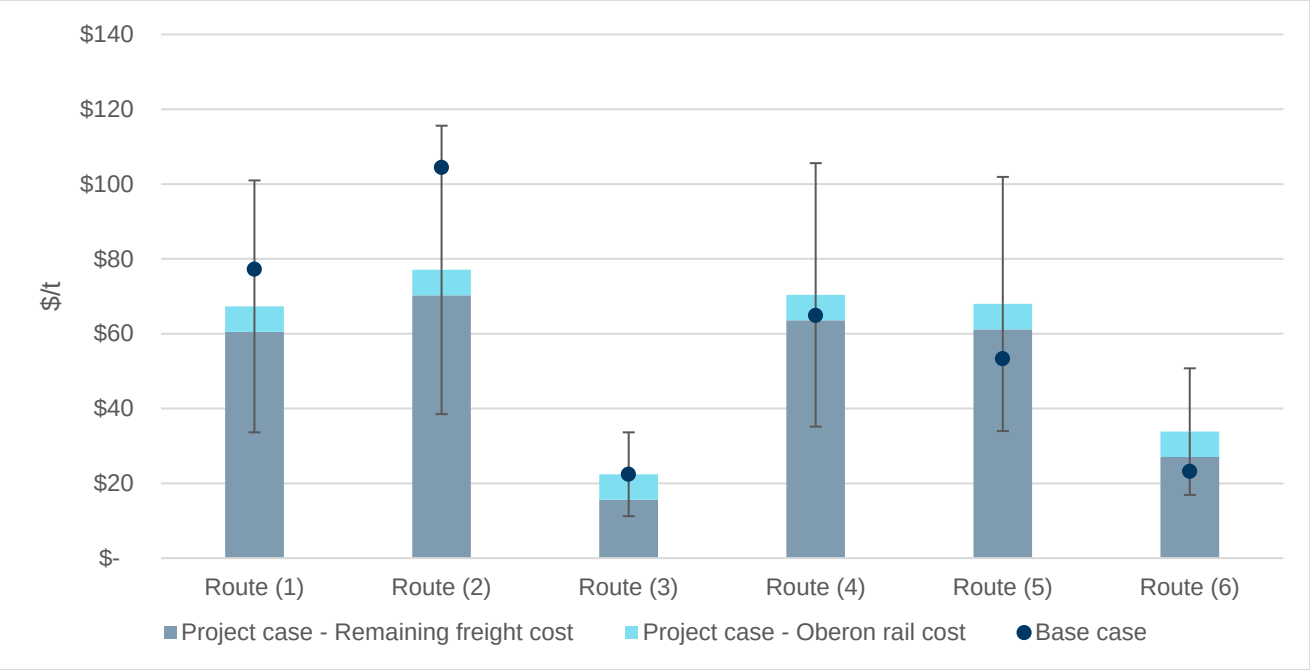


Figure 11 Freight rates using Oberon rail

The following observations can be taken from the figure:

– Route (1) & (2): The two routes will most likely use Oberon rail after reinstatement as it leads to a lower freight cost compared to the base case road freight

– Route (3) & (4): The two routes will likely use the Oberon if there is government support to fund proportion of the capital and operating cost of the Oberon rail, which will recover the difference between the higher project case rail freight rate and the lower base case road freight rate.

– Route (5) and (6): The two routes are unlikely to use Oberon rail after reinstatement even if the Oberon rail is fully subsidised. The two routes will most likely require extra compensation for operators to change from existing freight options.

To make it financially attractive for all six routes to utilise Oberon rail, the total government support required will range between $84 million to around $268 million based on current assumption of capital and operating cost. Table 10 outlines required support under various discount rate.

Table 10 Required support for all six routes to use Oberon rail (Dec-21$m)

	4%	7%	10%
Induce all routes to use Oberon rail ($M)	$251.18 M	$146.75 M	$98.45 M

Due to the high number of variables in this assessment and the fact this study is not a full business case, the model has only completed sensitivity analysis on the assumptions relating to capital and operational costs for the new Oberon rail section. Our model has also considered sensitivity of the rail demand related to the size of the support and associated per tonne cost of freight, and the range of outputs that are assessed from a financial and economic perspective using the range of discount rates (4%, 7% and 10%).

The capital and operational costs are individually increased by 50 percent to understand the sensitivity of the current cost estimates being too optimistic. Each of these variables are tested separately to estimate the change in the financial and economic outcomes. Table 11 outlines the sensitivity test result assuming Oberon rail will be utilised along the six routes.

Table 11 Sensitivity test result – Scenario 1 ($m)

	4%	7%	10%
Capital cost			
50% decrease	$233.98 M	$131.18 M	$84.31 M
No change	$251.18 M	$146.75 M	$98.45 M
50% increase	$268.38 M	$162.32 M	$112.59 M
Operating cost			
50% decrease	$244.14 M	$142.87 M	$96.02 M
No change	$251.18 M	$146.75 M	$98.45 M
50% increase	$258.22 M	$150.62 M	$100.88 M

Scenario 2 – four routes use rail freight

Scenario 2 re-runs the model with a reduction in routes from six to four routes. The omission of the two routes is because these routes would require more financial support than the cost of the new Oberon rail to reduce the per tonne fee down to a rate which is equal to or less than the current trucking rate. The three routes that require extra compensation (*Route 5 and 6)* are assumed to continue using road freight. Due to the reduction in rail freight in this scenario, the rail and road/rail freight rate for these routes increased from Scenario 1.

Figure 12 below outlines the comparison of freight rates between the base case (road freight) and the project case, assuming four routes will begin using the new Oberon rail.

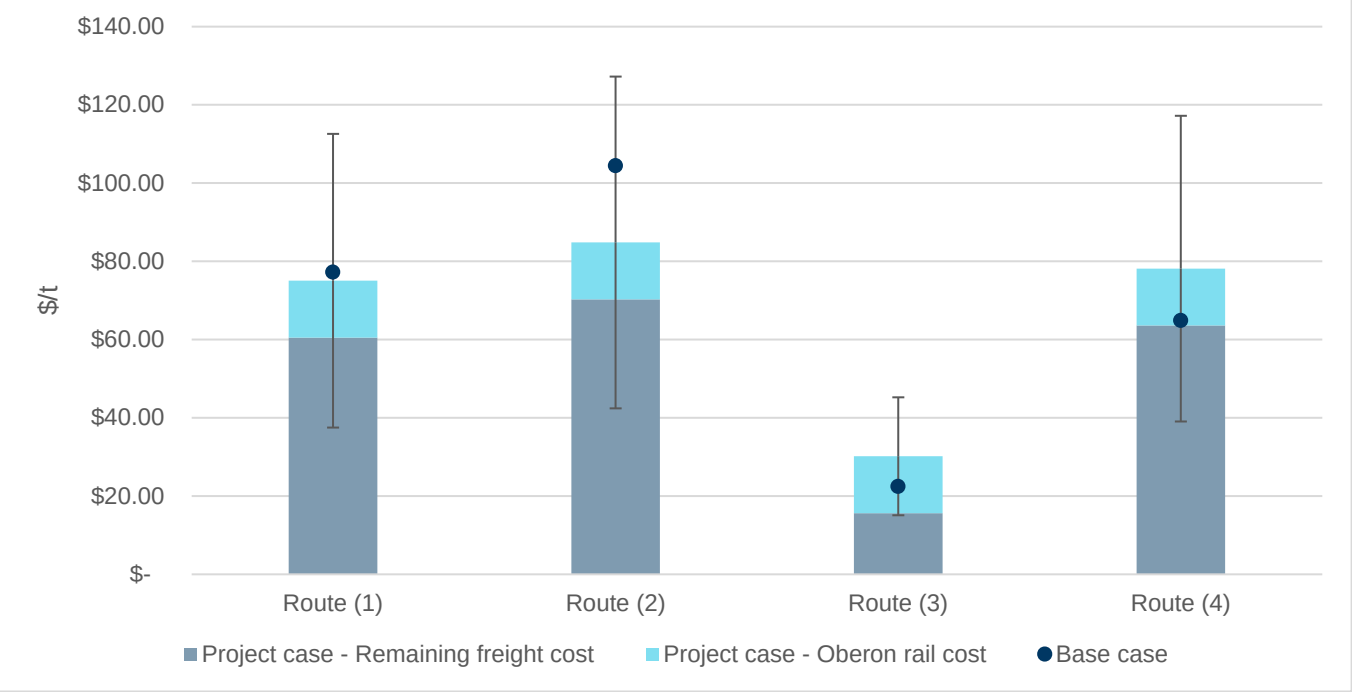


Figure 12 Freight rates using Oberon Rail

The following observations can be taken from the figure:

– Route (1) & (2): The project case freight rate will likely be lower than base case for the two routes. They are expected to use Oberon rail in this Scenario

– Route (3): The route will only use Oberon rail if the government support is to fund up to 91 percent of the total initial capital cost of the rail to compensate for the incremental cost from base case

– Route (4): The route will only use the Oberon rail if the government support is to fund around 91 percent of the total capital and operating cost of the rail to compensate for the incremental cost from base case

To make using the Oberon rail on the four routes financially viable, the total support required will range between $49 million up to around $167 million based on the current assumption of capital and operating cost. Table 12 outlines required support under various discount rate.

Table 12 Required support for four routes to use Oberon rail (Dec-21$)

	4%	7%	10%
Induce four routes to use Oberon rail ($M)	$132.56 M	$95.85 M	$76.83 M

Sensitivity test is also conducted to understand how changes in capital and operating cost of Oberon rail will impact the amount of support required. Table 13 outlines the sensitivity test result assuming four routes will use the Oberon rail.

Table 13 Sensitivity test result – Scenario 2 ($M)

	4%	7%	10%
Capital cost			
50% decrease	$98.20 M	$64.75 M	$48.58 M
No change	$132.56 M	$95.85 M	$76.83 M
50% increase	$166.92 M	$126.96 M	$105.08 M
Operating cost			
50% decrease	$118.49 M	$88.11 M	$71.98 M
No change	$132.56 M	$95.85 M	$76.83 M
50% increase	$146.63 M	$103.60 M	$81.69 M

Scenario 3 – three routes use rail freight

Scenario 3, the model assumes that *Route (4)* routes will not use the new Oberon rail and will continue using road freight as the support would need to be not only for the capital but also for the operating cost. The model then recalculates the freight cost with three routes using rail/road and rail freight.

Scenario 3 freight rate is expected to increase further compared to Scenario 2 as the full cost of Oberon rail is now allocated to volumes of three routes instead of four. Figure 13 below outlines the comparison of freight rate between base case (road freight) and the project case assuming three routes utilise Oberon rail.

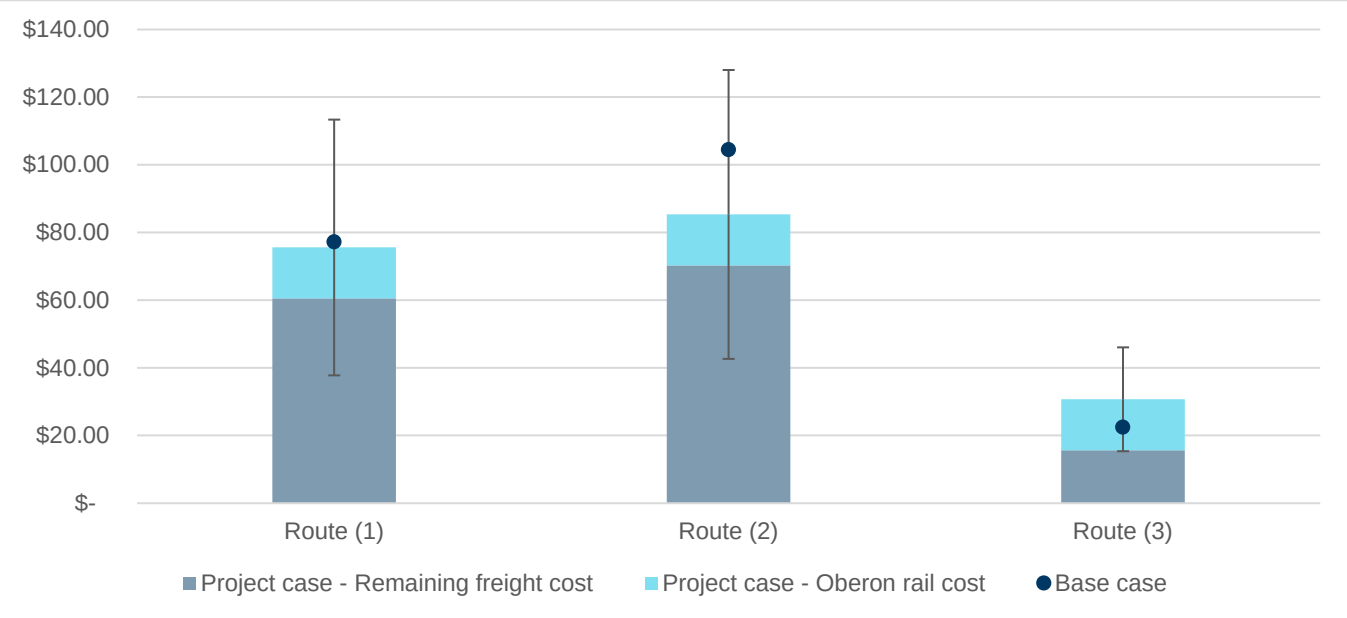


Figure 13 *Freight rates using Oberon Rail*

The following observations can be indicated from the figure:

– Route (1) & (2): The project case freight rate is still lower than base case road freight rate for the two routes. The two routes are expected to use Oberon rail in this Scenario

– Route (3): The route will only use the Oberon rail if the government support is to fund around 97 percent of the total capital cost of the rail to compensate for the incremental cost from base case

To make using Oberon rail financially viable, the total support required will range between $27 million up to around $110 million based on the current assumption of capital and operating cost. Table 14 outlines required support under various discount rate.

Table 14 *Required support for three routes to use Oberon rail (Dec-21$)*

	4%	7%	10%
Induce three routes to use Oberon rail ($M)	$64.24 M	$60.26 M	$55.89 M

Sensitivity test is also conducted to understand how changes in capital and operating cost of Oberon rail will impact the amount of support required. Table 15 outlines the sensitivity test result assuming three routes will use the Oberon rail.

Table 15 Support sensitivity test result – Scenario 3 ($M)

	4%	7%	10%
Capital cost			
50% decrease	$28.64 M	$28.02 M	$26.61 M
No change	$64.24 M	$60.26 M	$55.89 M
50% increase	$99.85 M	$92.49 M	$85.16 M
Operating cost			
50% decrease	$49.66 M	$52.23 M	$49.66 M
No change	$64.24 M	$60.26 M	$55.89 M
50% increase	$78.82 M	$60.26 M	$60.92 M

4.2 Economic analysis

This section presents the findings from a rapid cost benefit analysis that assesses the economic viability of reinstating the Oberon to Tarana rail line. GHD has adopted a rapid cost-benefit methodology (CBA) to aid the Oberon to Tarana railway reinstatement decision. The purpose of this rapid CBA is to capture the material and quantifiable costs to the government and benefits associated with the potential reopening to provide a high-level feasibility assessment. The assessment is based on the net present value benefits and costs and benefit cost ratio to provide a basis for direct comparison between the project case and base case.

Figure 14 displays GHD's preferred CBA methodology, comparing the project case to the base case to determine the incremental impact of the option. The CBA was completed in accordance with the *Transport for NSW Economic Parameter Values V.2.*

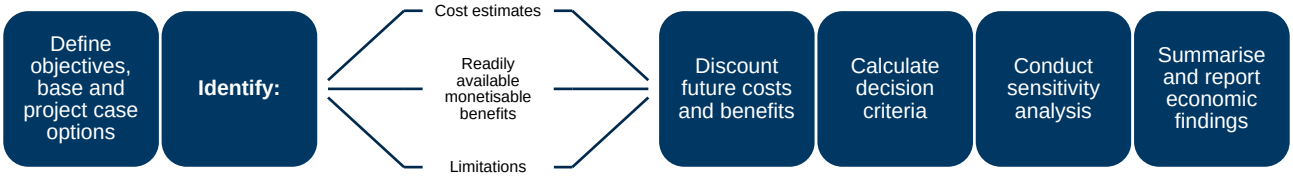


Figure 14 ***Cost-benefit analysis methodology***

4.2.1 Key economic cost and benefit

4.2.1.1 Cost

Cost considered in the analysis is calculated as the required government support to compensate for the Oberon to Tarana rail capex, opex and haulage cost. As discussed in the Section 4.1.2, the amount of support required depends on the number of routes that will make use of the rail. The following three subsidisation scenarios are considered for the analysis:

– Scenario 1 – all six routes to use Oberon Rail: $147 million required support
– Scenario 2 – four routes to use Oberon Rail: $96 million required support
– Scenario 3 – three routes to use Oberon Rail: $60 million required support

4.2.1.2 Benefit

CBA benefits stem from an incremental change between the base case and the project case. The core measures are the change in mode of transport, gross tonne kilometres travel (GTK), net tonne kilometre travelled (NTK), vehicle kilometre travelled (VKT), reduction in crashes and environmental externalities as well as growth in tourism. The following benefits were quantified:

– Haulage cost savings for some routes due to change in the transport mode from road freight to a road & rail freight combination
– Haulage cost reduction for some routes due to the allocated government support
– Saving on road maintenance cost (based on VKT) due to reduced distance travelled by heavy freight trucks in accordance with Transport for NSW Economic Parameter Values V.
– Crash reductions savings (based on GTK) due to reduced distance travelled by heavy freight trucks in accordance with Transport for NSW Economic Parameter Values V.2
– Reduction in environmental externalities (based on GTK) due to lower environmental externalities caused by rail freight compared to road freight in accordance with Transport for NSW Economic Parameter Values V.2

– Increase in tourist expenditure due to increase in number of tourists for visit from improved access to Oberon.
– Dis-benefits quantified, include:
– Income loss from truck registration and road access collected by the NSW Government due to fewer number of trucks required under project case

The economic benefit to be generated from reopening the Oberon to Tarana rail line will be different based on the number of routes that will be induced to use the rail. GHD assessed the expected economic benefit under the three scenarios in which various amount of government support will be deployed.

4.2.2 Calculate NPV and BCR

The CBA calculated total and present values of costs and benefits (using a discount rate of 7% and a time period of 55 years). The total value is the sum of all undiscounted cash flows, whereas present value is the sum of all discounted cash flows to December 2021 dollars.

In accordance with ATAP's *T2 Cost Benefit Analysis*, GHD calculated the following summary results:

– Net present value (NPV) – present value of net future cash flows – can be used to indicate improvement in economic efficiency from the base case
– Benefit cost ratio (BCR) – present value of benefits divided by the present value of costs (including operating costs) – can be used as a decision tool and to rank initiatives
– The NPV and BCR are calculated individually for each of the three scenarios

Scenario 1 – all six routes to use the Oberon rail

In this scenario, six routes will be encouraged to use the rail given a total of $147 million support from the government. Therefore, the total economic benefit will be expected from all six routes that change from road to rail freight either entirely or proportionally.

Table 16 outlines the total and present values of all costs and benefits monetised, and their respective totals for the project case.

Table 16 Project case costs and benefits – Scenario 1 (7% discount rate) (Dec-21$)

Cost / benefit	Undiscounted value ($m)	Discounted value ($m)
Costs		
Required support	$146.10	$146.10
Total costs	$146.10	$146.10
Benefits		
Haulage Cost saving	$1,252.30	$220.59
Road Maintenance Cost saving	$307.94	$54.07
Accident Cost Saving	$421.04	$102.66
Emission Cost Saving	$1,679.24	$295.79
Increase in tourism	$463.63	$43.06
Registration/vehicle access Income loss	$(260.20)	$(41.96)
Total benefits	**$4,024.86**	**$674.23**

Table 17 outlines each discount rate scenario's CBA results.

Table 17 Project case cost benefit analysis results – Scenario 1 (Dec-21$)

Result	4%	7%	10%
NPV ($m)	$1,138.68	$527.49	$257.71
BCR	8.79	4.59	2.76

From Table 17 the NPV is positive (thus BCR greater than one) when the discount rate is 4 percent, 7 percent and 10 percent. This indicates the project is economically viable at all three discount rates.

Sensitivity testing is also conducted to understand how changes in capital and operating cost of reinstating the Oberon to Tarana rail will impact the benefit to cost ratio. Table 18 outlines the sensitivity test result (BCR) assuming all six routes will use the Oberon rail.

Table 18 Benefit Cost Ratio sensitivity analysis – Scenario 1

	4%	7%	10%
Capital cost			
50% decrease	10.07	5.29	3.17
No change	8.79	4.59	2.76
50% increase	8.13	4.27	2.56
Operating cost			
50% decrease	9.61	5.04	3.03
No change	8.79	4.59	2.76
50% increase	8.46	4.44	2.66

Scenario 2 – four routes to use the Oberon rail

In this scenario, only four routes will use the rail given a total of $96 million support from the government. Therefore, the economic benefit will only be expected from the four routes that change from road to rail freight either entirely or proportionally.

Table 19 outlines the total and present values of all costs and benefits monetised, and their respective totals for the project case.

Table 19 Project case costs and benefits – Scenario 2 (7% discount rate) (Dec-21$)

Cost / benefit	Undiscounted value ($m)	Discounted value ($m)
Costs		
Required support	$95.85	$95.85
Total costs	**$95.85**	**$95.85**
Benefits		
Haulage Cost saving	$435.39	$76.69
Road Maintenance Cost saving	$158.03	$27.84
Accident Cost Saving	$251.68	$58.09
Emission Cost Saving	$949.33	$167.22
Increase in tourism	$463.63	$43.06
Registration/vehicle access Income loss	$(169.69)	$(27.36)
Total benefits	**$2,166.46**	**$345.54**

Table 20 outlines each discount rate scenario's CBA results.

Table 20 Project case cost benefit analysis results – Scenario 2 (Dec-21$)

Result	4%	7%	10%
NPV ($m)	$574.74	$249.68	$108.72
BCR	7.00	3.60	2.13

From Table 21, the NPV is positive (thus BCR greater than one) when the discount rate is 4 percent, 7 percent and 10 percent. This indicates the project is economically viable at all three discount rates.

Sensitivity testing is also conducted to understand how changes in capital and operating cost of reinstating the Oberon to Tarana rail will impact the benefit to cost ratio. Table 21 outlines the sensitivity test result assuming four routes will use the Oberon rail.

Table 21 Benefit Cost Ratio sensitivity analysis – Scenario 2

	4%	7%	10%
Capital cost			
50% decrease	10.46	5.39	3.19
No change	7.00	3.60	2.13
50% increase	5.36	2.76	1.64
Operating cost			
50% decrease	9.18	4.73	2.80
No change	7.00	3.60	2.13
50% increase	5.78	2.98	1.76

Scenario 3 – three routes to use the Oberon rail

In this scenario, only three routes will use the rail given a total of $60 million support from the government. Therefore, the economic benefit will only be expected from the three routes that change from road to rail freight either entirely or proportionally.

Table 22 outlines the total and present values of all costs and benefits monetised, and their respective totals for the project case.

Table 22 Project case costs and benefits – Scenario 3 (7% discount rate) (Dec-21$)

Cost / benefit	Undiscounted value	Discounted value
Costs		
Required support	$60.26	$60.26
Total costs	**$60.26**	**$60.26**
Total costs	**$60.26**	**$60.26**
Benefits		
Haulage Cost saving	$219.45	$38.66
Road Maintenance Cost saving	$154.23	$27.17
Accident Cost Saving	$246.38	$56.62
Emission Cost Saving	$925.43	$163.01
Increase in tourism	$463.63	$43.06
Registration/vehicle access Income loss	$(159.82)	$(25.77)
Total benefits	**$1,241.29**	**$221.03**

Table 23 outlines each discount rate scenario's CBA results.

Table 23 Project case cost benefit analysis results – Scenario 3 (Dec-21$)

Result	4%	7%	10%
NPV ($m)	$353.07 million	$160.77 million	$75.72 million
BCR	6.99	3.67	2.29

From Table 23 the NPV is positive (thus BCR greater than one) when the discount rate is 4 percent, 7 percent and 10 percent. This indicates the project is economically viable at all three discount rates.

Sensitivity testing is also conducted to understand how changes in capital and operating cost of reinstating the Oberon to Tarana rail will impact the benefit to cost ratio. Table 24 outlines the sensitivity test result assuming three routes will use the Oberon rail.

Table 24 Benefit Cost Ratio sensitivity analysis – Scenario 3

	4%	7%	10%
Capital cost			
50% decrease	15.06	8.08	4.92
No change	6.99	3.67	2.29
50% increase	4.55	2.44	1.49
Operating cost			
50% decrease	11.24	6.03	3.67
No change	6.99	3.67	2.29
50% increase	5.07	2.72	1.66

4.3 Economic result summary

The total impact of reinstating the Oberon to Tarana rail line is considered in combination with results from financial and economic analysis. Under financial appraisal, reinstating and operating the Oberon rail as a freight rail will incur a financial cost with present value of $104 million (includes capex and ongoing opex). The required amount of government support differs based on the number of routes to be induced to use the rail. The total required government support ranges from $147 million in Scenario 1 (induce all six routes to use Oberon rail), to $96 million in Scenario 2 (induce four routes) and $60 million in Scenario 3 (induce three routes).

In terms of economic analysis, Scenario 1 is expected to generate the most economic benefit. In Scenario 1, the total support of $147 million will be required to compensate for the full cost of Oberon rail ($104 million) as well as above-rail cost or access ranges to recover the incremental cost from base case. Despite the large support required, the change in freight method for all routes is expected to yield a total economic benefit of $674 million and deliver the highest BCR of 4.59.

Scenario 3 ranks second in terms of BCR at 3.67. The total support of $60 million will be required to compensate around 97 percent the capital of Oberon rail. Only three routes will be generating economic benefit under this scenario to deliver a total economic benefit of $221 million.

Scenario 2 ranks the last in term of BCR at 3.60. The total support of $96 million will be required to compensate around 91 percent the full cost of Oberon rail. Four routes in this scenario generate an economic benefit of $346 million.

5. Environment Analysis

5.1 Methodology

A desktop planning and environmental constraints assessment was undertaken to identify any potential constraints around the reinstatement of the Oberon to Tarana rail line for use as part of the forestry activities located in the Lithgow City and Oberon local government areas (LGAs).

Information for this desktop review included reference to:

– GIS and spatial data in GHD databases
– NSW e-planning spatial imagery
– NSW climate change projection maps
– SixMaps
– NSW EPA databases
– Biodiversity maps including SEED and Bionet.

Due to the desktop nature of the assessment, some further environmental investigations will be required as the project progresses including fieldwork to ground-truth desktop data. This high-level environmental assessment addresses some of the constraints which would need to be considered in further stages.

5.2 Existing environment and constraints

5.2.1 Locality

The rail spur is located across Oberon and Lithgow City Council areas and is approximately 25 kilometres long, travelling in a north-south direction between Tarana and Oberon. The Fish River forms the boundary between the two LGAs. The study area for this environmental assessment included a 250m buffer area each side of the existing Oberon to Tarana rail line.

5.2.2 Land zoning

Within the Lithgow City LGA in the north, the railway line is zoned *SP2 Rail Infrastructure Facility* from the merge point with the Main Western Railway line, south to the council boundary at Fish River.

Within the Oberon LGA, from the council boundary south to the line's end at Oberon, the railway corridor is unzoned.

Zones adjacent to the rail corridor are as follows and shown in Figure 15:

– RU5 Village
– R5 Large lot residential
– RU1 Primary production
– RU3 Forestry
– IN1 General industrial.

The majority of land along the line is zoned for rural purposes including forestry as shown in Figure 15. A small area of R5 zoning is located north of Oberon and coincides with the rural residential development discussed below. The southern end of the line is located within the IN1 General Industrial zone and coincides with operating timber mills including those of Highland Pine Products and APP (Australian Plantation Pine Products (Borg Panels / Borg Industries)).

5.2.3 Land uses

5.2.3.1 Potentially noise sensitive receivers

Land use along the rail corridor generally is consistent with the land use zoning as detailed in section 5.2.2. Most of the route consists of agricultural land which coincides with the RU1 zone shown on Figure 15. Isolated residential dwellings area located on the majority of the rural properties and are shown on Figure 15. The closest of these receivers is located about 30 metres from the rail line.

A rural residential subdivision (known as Rutters Ridge) is located about two kilometres north of Oberon and consist of about 40 to 50 receivers and is shown as the R5 zone on Figure 15. The nearest of these receivers is located about 30 metres from the rail line.

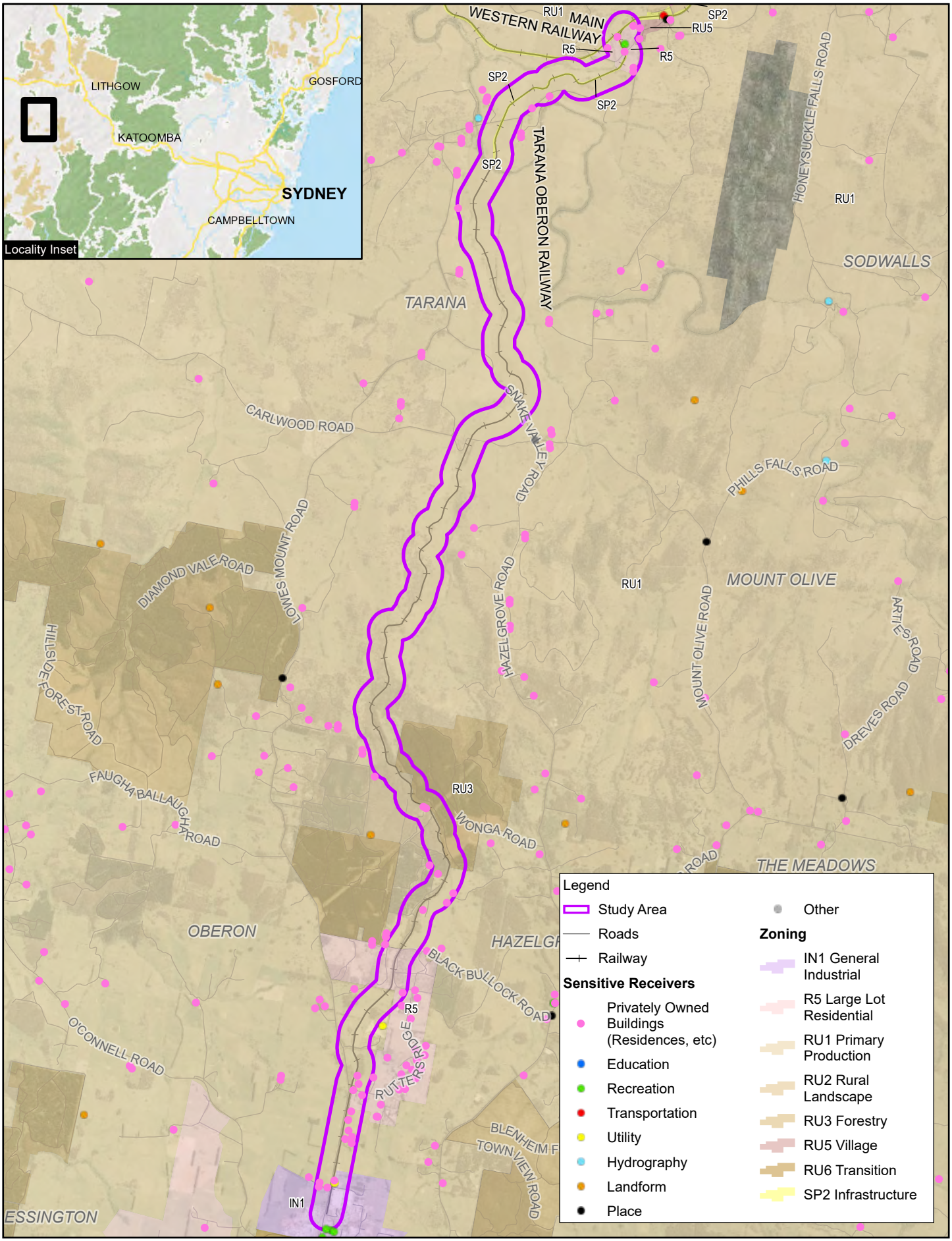
The location of sensitive receivers was identified using spatial data and visual categorisation with aerial photography from NSW government data sources. These were largely identified as homes or schools.

The above land uses would potentially be sensitive to noise and therefore any reopening of the rail line would potentially impact upon these receivers. This also depends on their distance from the rail line and their position in the landscape in relation to the line, where topographic shielding may mitigate some noise impacts.

5.2.3.2 Other land uses

The following other land uses were identified in the area:

– There are two State Forests in the study area, identified as Blenheim State Forest and Lowes Mount State Forest.
– Businesses operating in the industrial area to the north of Oberon town centre include Highland Pine Products, APP and other industrial businesses.
– There are small sections of Crown land as Crown Enclosure Permit areas intersecting with or adjacent to the railway easement route.
– A search of native title claims on 18 November 2021 returned two Native Title claims in the Lithgow City LGA, filed in 2013 and 2017. These claims are north of the route and Tarana, and outside the study area.
– There is a six-kilometre ‘rail trail’ path between Oberon and Hazelgrove. It is an open paved path largely separated from the railway line by a post and wire fence. The pathway is adjacent to the train line and runs from Oberon to Hazelgrove Station.
– There is a natural gas facility and an electricity substation at the southern end of Lowes Mount Road. The natural gas facility is about 15 metres west of the rail line and 50 metres north of the APP site in the industrial zone area at the north of Oberon. The electricity substation is about 250 metres north of the Australian Panel Products site and 50 metres west of the rail line.



Paper Size ISO A4

0 0.5 1 1.5 2

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Central West NSW Forestry Hub Inc
CWFH008: Oberon to Tarana Rail Line

Project No. **12559089**
Revision No. **C**
Date **17/11/2021**

Land use, zoning and sensitive receivers

FIGURE 15

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Data source: Other identified sensitive receivers - GHD, 2021; Roads, Railway, Zoning, Other Sensitive Receivers - LPI, 2021; Basemap/OEHBasemapNPWSHillshade: Basemap/OEHBasemapNPWSText:

5.2.3.3 Land uses with potential impacts on the noise environment

Cumulative noise impacts in the locality would depend on the nature of the anticipated rail noise and operating times. Relatively low (e.g. rural) background noise levels along the majority of the alignment mean that new noise sources (i.e. reopening of the rail line) may potentially create a constraint near sensitive receivers such as residences.

Existing ambient noise (usually from sources such as traffic, industrial activity and urban noise) tends to increase existing background noise levels and in some circumstances may act to reduce the impact of new noise from the proposed reopened rail line.

The following land uses are considered likely to more substantially impact on the noise environment:

– Highland Pine Products– operational noise at premises
– Australian Panel Products – operational noise at premises
– Transport to and from mill sites
– Existing train and railway line activity near Tarana on the main line.

5.2.3.4 Future land uses

A high-level search of zoning land use did not identified any specific future land uses within the study area.

A search for Major Projects register on the NSW Planning database in the Oberon area shows 18 projects currently determined or under assessment in the locality. The majority of these are associated with timber works and processing. They may contribute to the ambient noise environment experienced by local receivers.

5.2.3.5 Strategic land use

Oberon Council's *Local Strategic Planning Statement 2040* outlines the strategic land use in the area. This local strategic planning statement (LSPS) forms part of the *Central West and Orana Regional Plan 2036*. The Plan addresses rail and freight under Planning Priority Three – Infrastructure. Document notes the objective to enhance road and rail freight links. The intent of this project is aligned with the Plan and outlines improvements in improve freight by rail links to which the project would be an option.

Oberon Council has recently developed a concept plan for a modern sporting complex on land adjacent to Highland Pine Products (corner of O'Connell Road and Albion Street, Oberon) on land owned by APP. The plans involve new rugby league fields, synthetic hockey field, netball courts, clubhouse and grandstand facilities and car park and associated facilities.

5.2.4 Riparian lands and watercourses

The existing rail line spans up to 22 non-perennial waterways or drainage lines, and one perennial waterway. The Fish River is a perennial stream that is part of the Macquarie River catchment. The location of these waterways is shown on Figure 16.

Any proposed new or upgraded bridge crossings for perennial and non-perennial waterway crossings may need to be assessed for potential impacts on waterways, drainage lines, and associated impacts on habitat value or aquatic fauna.

5.2.5 Biodiversity

5.2.5.1 Presence of vegetation

Vegetation along the railway route is largely cleared, in association with rural land uses. Vegetation along the route remains cleared or disturbed in some sections within the corridor. Other areas may have regenerated since the cessation of rail operations.

Vegetation types in the study area vary between open grassland or pasture, State Forest and areas of native vegetation. These areas are not mutually exclusive for example areas of classified native vegetation communities

in mapped State Forest areas otherwise planted to pine plantations, or pasture / rural areas combined with native open woodland / forest areas.

Figure 16 shows the vegetation as Plant Community Types mapped by State and Federal biodiversity databases in the study area. These databases document native vegetation, and plantation areas are generally not mapped although native vegetation within State Forest areas may be included in the data. Some mapped areas that appear cleared may be native open woodland or native grassland. Further ecological assessment in the field would be required to verify the status and condition of this vegetation, including its fauna habitat value.

5.2.5.2 Significance of vegetation

The study area includes a number of Plant Community Types (PCTs) as shown in Figure 16. These PCTs have a total area of 236.70 hectares in the rail corridor study area.

Some of these PCTs are potentially associated with multiple Threatened Ecological Communities (TECs) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 25 shows these vegetation communities and their mapped areas within the study area, as well as the TEC associated with each PCT where applicable.

These communities are mapped as occurring within the rail corridor and in areas directly adjacent. Field surveys would be required to confirm the extent/presence of the TECs onsite to determine whether the vegetation meets the condition threshold and descriptions of the TEC listings. The presence and clearance of threatened vegetation would result in potential requirements to offset the clearance which would be assigned a monetary value that would be confirmed as part of future assessments.

Table 25 Vegetation communities

Vegetation	Area within rail corridor study area (hectares)	BC act listing	EPBC Act listing
PCT1103 - Ribbon Gum - Yellow Box grassy woodland on undulating terrain of the eastern tablelands; South Eastern Highlands Bioregion (Note: this PCT is associated with two TECs)	2.69	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions (EEC) **OR** White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)
PCT1330 - Yellow Box - Blakelys Red Gum grassy woodland on the tablelands; South Eastern Highlands Bioregion	14.29	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)
PCT649 - Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion	82.73	Mt Canobolas Xanthoparmelia Lichen Community (EEC)	

Vegetation	Area within rail corridor study area (hectares)	BC act listing	EPBC Act listing
PCT654 - Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	7.89	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)
PCT680 - Black Sallee - Tussock Grass open woodland of the South Eastern Highlands Bioregion	0.42	Mt Canobolas Xanthoparmelia Lichen Community (EEC)	
PCT732 - Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion	116.34		
PCT85 - River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion	12.35		

5.2.5.3 Flora and fauna

A desktop search was conducted on 19 November 2021 to review the precent of threatened flora and fauna in the study area. A search of the OEH Bionet Atlas returned a total of 7,687 records of 656 species for a wider locality including the study area. The linear shape of the study area required a bigger search area than would typically be used, which contributes to the high number of species records for this search.

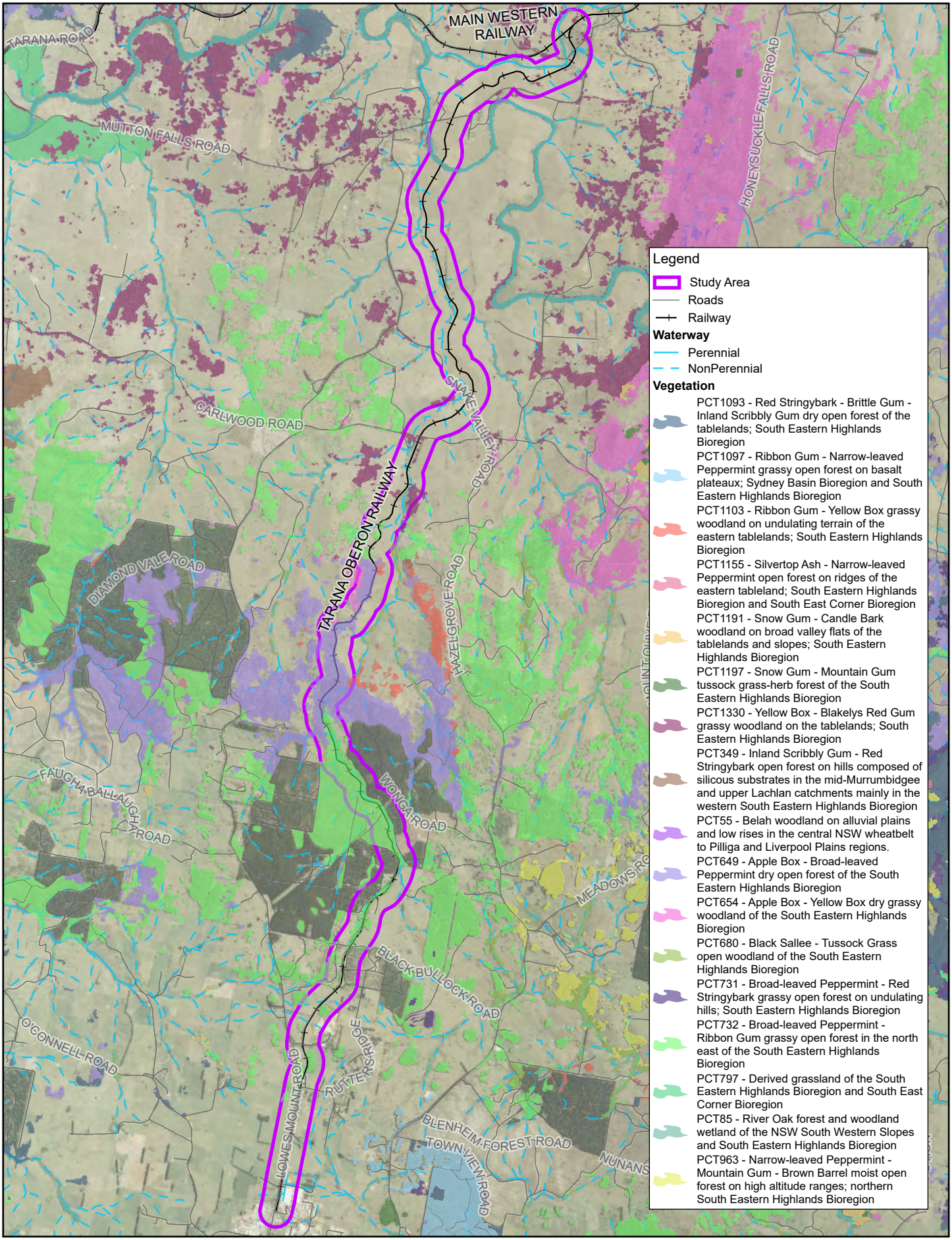
These species have been recorded as occurring or have the potential to occur in the study area and the rail line.

The clearance of any protected vegetation considered habitat for any threatened species would also potentially require offsetting. Mobile fauna species would be assessed for their likelihood of occurrence in or near the rail corridor, for example available habitat and likely habitat use.

5.2.5.4 Fish habitat

The Fisheries NSW Spatial Data Portal identifies the Freshwater Fish Community Status in the vicinity of the Fish River railway crossing as "poor". The waterway is not identified as key fish habitat.

As the majority of the study area has been heavily modified by past and ongoing disturbances associated with the non-operational Oberon to Tarana rail corridor and surrounding agricultural activities. A detailed environmental investigation would need to be undertaken to assess the potential impacts on biodiversity.



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Central West NSW Forestry Hub Inc
CWFH008: Oberon to Tarana Rail Line

Project No. **12559089**
Revision No. **C**
Date **17/11/2021**

Vegetation (Plant community types)

FIGURE 16

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Print date: 10 Jan 2022 - 15:05

Data source: Roads, Rail, Rivers - LPI, 2021; Vegetation - VIS 4778, DPIE;NSW_Imagery: © Department of Customer Service 2020. Created by: dschmidt

5.2.6 Climate change

Risks and constraints associated with climate change impacts were evaluated at a high level using the NSW Government's *Interactive Climate Change Projections Map* for the Central West and Orana region. The 2020-2039 timeframe was used and the 2060-79 scenario checked for substantial differences.

Rainfall is projected to vary to +/- 5 millimetres across all seasons except for March-May which showed a potential average rainfall increase of 5-10 millimetres. Spring Sept-Nov showed up to 10mm less rainfall, and up to 10mm more in the autumn March-May period for 2020-39. The long range scenario was similar.

Seasonal temperatures are projected to increase 0.5 to 1 degree Celsius 2020-2039 and 1-2 degrees Celsius in the far future scenario for 2060-79.

There was no notable change in the number of high fire danger days.

In the 2020-39 period, the number of cold nights under 2 degrees Celsius was predicted to decrease by 5-10 nights in the cool seasons. The number of hot days over 35 degrees C was predicted to increase by 1-5 days in summer and 5-10 days in the long range 2060-79 scenario.

5.2.7 Contamination

Search of Contaminated Land record of notices provided by the NSW EPA. Searches were conducted for Oberon LGA, Lithgow City LGA, and the suburbs of Tarana, Hazelgrove, and Oberon.

Results of this search are in Table 26. No regulated sites under the NSW *Contaminated Land Management Act* are located within the study area. As there are no identified contaminated site in the study area, contamination is not likely to be a constraint to the proposal.

Table 26 Results contaminated land record search (search date 18 November 2021)

Suburb	Site Name	Address	Contam. Activity Type	Management Class	Latitude	Longitude
OBERON	Caltex Service Station and Depot	Lowes Mount ROAD	Service Station	Regulation under CLM Act not required	-33.695	149.857
OBERON	CSR Ltd Property and King's Stockyard Creek	Off Endeavour STREET	Other Industry	Contamination formerly regulated under the CLM Act	-33.692	149.869
OBERON	Former Shell Depot	32 O'Connell ROAD	Other Petroleum	Regulation under CLM Act not required	-33.700	149.845
OBERON	Oberon Timber Complex	Lowes Mount ROAD	Other Industry	Regulation under CLM Act not required	-33.693	149.856

5.2.8 Heritage

5.2.8.1 Non-Aboriginal heritage

A search of the Local and State Heritage database identified the following heritage items in the study area:

The locally listed Heritage items are:

9. *Tarana-Oberon Rail Line*, Item *I57*, Local Heritage listing on Local Environmental Plan, as the rail route itself (Oberon LGA only)
10. *Oberon Railway Station Group*, Item *I28*, Local Heritage listing on Local Environmental Plan, located at the southern extent of the rail line in Oberon LGA. This is recorded as Listing No: 01215 on the NSW State Heritage Inventory.
    - This is also recorded as *Item I58* is identified on the NSW Heritage database.

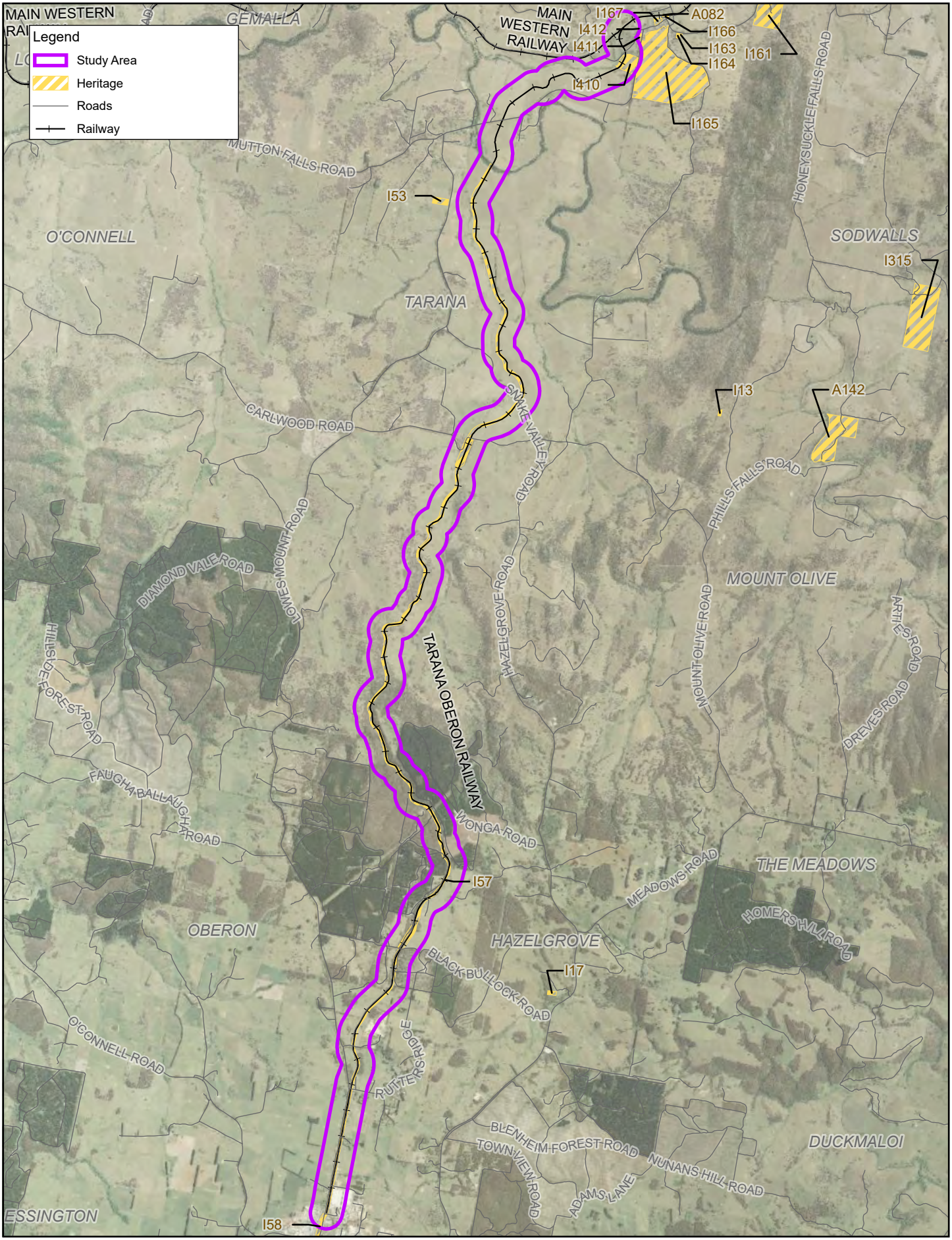
11. Crownlea, Item *I410*, Local Heritage listing on Local Environmental Plan (Lithgow City LGA). 110 Mutton Falls Road, Lot 4, DP 1171948, the site occupies land on either side of the rail corridor however the corridor itself is excluded.

The NSW State Heritage Register includes the Oberon Railway Station Group (Listing No. 01215) (see Figure 17). This is listed on the s170 Heritage Register and corresponds with item I58 on Figure 18. This item may require greater consideration in future Heritage assessments. The works however, are expected to stop about 100 metres north of this heritage area on the northern side of Albion Street.

Figure 17 Heritage item in study area, Oberon

The rail line is not indicated as a Heritage item north of Fish River in Lithgow LGA. At the main track merge point to the rail spur to the main line west of Tarana, the map shows an allotment marked as Heritage item No. 1410 spanning either side of the track. The track itself is excluded from the heritage curtilage.

A search of the s170 Heritage register for Oberon and Lithgow LGAs (25 January 2022) returned results in the study area. Most of these are associated with the rail line and related historical activity. No others are located within the study area other than the Oberon Railway Station Group which is described above.



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Central West NSW Forestry Hub Inc
CWFH008: Oberon to Tarana Rail Line

Heritage

Project No. **12559089**
Revision No. **-**
Date **16/11/2021**

FIGURE 18

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5.2.8.2 Aboriginal Heritage

The rail line is located on Wiradjuri land with the majority of the line located on land within the Pejar LALC and while the northern end of the line is within the Bathurst LALC. Native Title is included in Section 5.2.3.

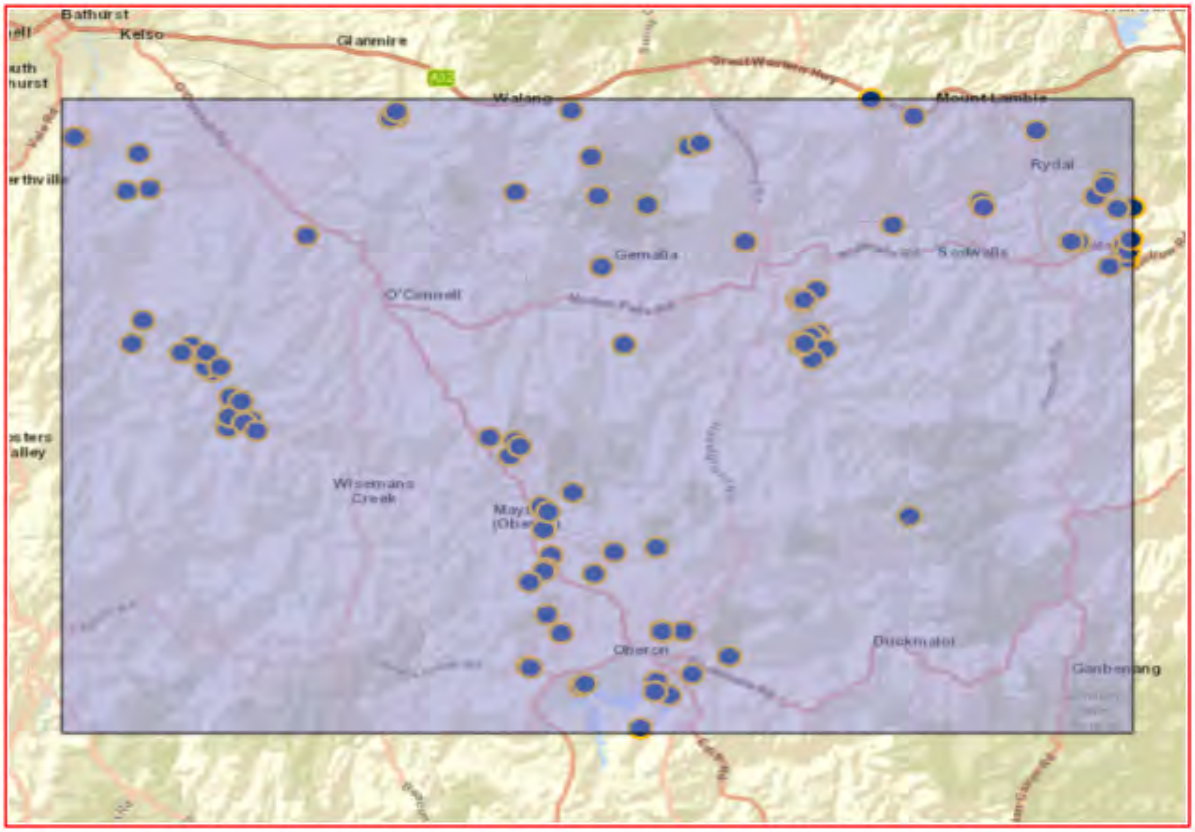
There are no Aboriginal Heritage items or places of significance in the study area mapped on the Atlas of Aboriginal Places on the NSW Heritage database (search date 18 November 2021).

A basic search of the AHIMS register (Aboriginal Heritage Information Management System, search dated 21 December 2021) returned 113 Aboriginal sites recorded in or near the search area, which was centred around the rail route location. As the search area could not take a linear form to follow the rail line, the current number of recorded sites is likely to be closer to 10 Aboriginal sites in or near the above location, based on a visual evaluation of the mapped results. There were no Aboriginal places currently declared in or near the search area.

The search results should be taken as indicative, and due diligence heritage assessments should be considered if further work takes place. The past disturbance within the rail corridor due to its construction is considered to reduce the risk of items being present.

AHIMS Web Service search for the following area at Lat, Long From : -33.74, 149.58 - Lat, Long To : -33.45, 150.08, conducted by Georgia De Biasi on 21 December 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

113	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Figure 19 Aboriginal Heritage Sites

5.2.9 Environmental Analysis Conclusion

The key potential constraints to further development of the proposal would entail noise impacts on sensitive receivers, heritage items associated with the railway line history and neighbouring sites, threatened vegetation close to the rail route, and protected fauna that may use or cross the rail route. Further detailed desktop or site assessments would be required to evaluate these constraints in greater detail, including:

– Evaluate likely rail noise impacts based on existing industry data.
– Determine the extent of the works and state and local assessment requirements for Heritage items, including the use of an Extensive search for Aboriginal Heritage items and potentially field assessment and ensuring all heritage results both Aboriginal and non-Aboriginal are current.
– Detailed desktop study of local protected flora and fauna and potentially field surveys for target species.

6. Risk identification

Risks related to this assessment of the Oberon to Tarana railway is mostly related to many of the assumptions that were made during the modelling and assessment that are often based on information provided by stakeholders, clients, and public reports. In an effort to consider the range of possible outcomes that could occur in reality GHD have taken a low-risk approach of increasing the costs and reducing benefits to be conservative and we have completed a range of scenarios which all have sensitivity analysis.

Large risks are related to the capital costs, operating costs, and freight contracting risks. Capital costs are currently estimated with the use of a qualified quantity surveyor that developed their assessment using information and assumptions about the current track conditions, current construction market and track standards required. The realities on the ground might be different to the assumptions made and therefore, the capital costs could increase. Bridging is a large part of the possible capital costs and there are some large bridges that have not been inspected for condition assessment that could need greater improvements than assumed.

Operating and maintenance costs of the railway could be more than assumed and the related commercial agreement with the train operator and/or freight company could be more costly than currently assumed in the model. GHD have taken due care to use known commercial rates and applied these to the model but this is only an estimate and could change depending on the actual contracted agreement at the time.

Rail freight contracts can be long term take-or-pay agreements that may not be attractive to a company with volatile needs for freight volumes. Take-or-pay contracts are an agreement that the railway company is paid for the train paths agreed to regardless of the use of those paths or not. Freight companies are often in the middle of the railway company and the end freight customer and take on this risk but may pass on higher fees for freight movements to compensate for the risk. GHD have sought to understand the range of possible rail freight outcomes with three scenarios that have different volumes to different locations that provide a range of sensitivity outcomes.

There are other risks in the assessment and the project that are assumed to some extent in this report but will need to be explored in more detail in the full business case.

7. Conclusion and Summary

The Central West NSW Regional Forestry Hub is seeking to meet the priorities set out by the Commonwealth Government, the stated desires of the NSW Government and implement strategies developed in and around Oberon by Council and other stakeholders by investigating the reopening the Oberon to Tarana rail line. Oberon is a major town within the Central West NSW Regional Forestry Hub and is home to two large businesses that depend on reliable supplies of timber for the manufacture of goods, namely Highland Pine Products and Australian Panel Products.

The current estimated support required to enable this project to be completed is approximately $60 million to $147 million which is expected to deliver a benefit cost ratio of between 3.60 to 4.59 with a central estimate of 3.7. That

is, the investment in this railway development is expected to deliver approximately 3.7 times as much benefit as cost to the NSW economy.

This report is in support of the Central West NSW Regional Forestry Hub to determine if a full business case to confirm if the details of the proposed option and other options to maximise the net economic outcomes for NSW is justified. The full business case will seek to find commercial methods to progress the railway to shift the freight off the roads, saving lives and improving the welfare outcomes for regional Australia.

In addition, shifting freight from road to rail will also have a number of other benefits including:

– Reduced road maintenance and upgrade costs
– Reduced risk and exposure to vital transport routes (for example, the extended closure of the Jenolan Caves Road at Hampton caused significant disruption and additional cost to industry and the community, forcing truck traffic onto longer routes) and
– Introduce other industry and tourism opportunities to Oberon (including opportunities for other businesses to expand or relocate to Oberon and promote tourism with the Oberon-Tarana Heritage Railway Inc.) in order to drive economic growth and prosperity in regional NSW.

This Report outlines the opportunity for the reopening of the Oberon to Tarana rail line and identifies the reason for government intervention and supports the decision to proceed to further stages of the business case process.

The next stage would be the develop a Strategic Business Case which is the primary document for a Gate 1 review (under the NSW Gateway Policy).

The purpose of the Strategic Business Case is to build on the work undertaken in this report and the purpose is to:

– Reconfirm the need for government intervention and the case for change outlined in the Problem Definition Stage.
– Consider the value for money and feasibility of a full range of options and based on that reduce the number of options to a shortlist.
– Seek the approval of decision-makers to proceed with the development of a Detailed Business Case.

The Strategic Business Case is the foundation for the development of a detailed business case and can be used to seek support for a trial or pilot proposal.

Appendices

Appendix A

Engineering Assessment

Current railway condition

The Oberon to Tarana railway line is currently a non-operational line owned by Transport for NSW (TfNSW) and managed as part of the Country Regional Network (CRN) by UGL as of January 2022.

The line was opened on 3 October 1923 after being constructed as a “Pioneer Line” (Weekly Notice No.41). After being open for 56 years rail services on this line were suspended in 1979 (Website: nswrail.net) and no trains have run on the line since that time except in the yard at Oberon Station where the OTHR has various locomotives and rolling stock.

With the exception of the Hazelgrove to Oberon section the railway is generally in a severely dilapidated condition. At some locations there are no signs of the railway track that previously existed while at other sites the track is intact. The track crossings are generally in poor condition and unsuitable for rail traffic including: underbridges, culverts and road level crossings. There is no current connection to the Main West line at Tarana.

Figure 20 Existing Oberon to Tarana railway near Oberon

Proposed restoration

To provide a railway line suitable for rail traffic a restoration of the line is required to achieve the minimum requirements of a track class 5 as per Transport for NSW Standard TS 01044:1.0 Track System.

The railway track should maintain its current alignment within the existing rail corridor. As a result, it is anticipated that no land acquisition will be required except for the western leg of a junction with the Main West line at Tarana.

Previously the Tarana to Oberon line had a single connection with the Down Main West line near Tarana Station with trains departing in the Up direction towards Sydney (heading east). Proposed rail traffic demands that some trains will have to depart in the Down Direction towards Bathurst (heading west). This movement will require construction of a triangle. The current boundaries of both the Main West and Tarana to Oberon rail corridors dictate that acquisition of land will be necessary to allow a triangle to be constructed. For this study the cost of land acquisition has not been included in the estimate,

To facilitate the loading and unloading of freight and moving locomotives from the rear to the front of a train at Oberon a run around siding (2 turnouts) has been included in the cost estimate. A similar siding has been included at Tarana to allow the passing of trains. The assumed length of both run around sidings is 700 m. The exact location of both run around sidings will need to be determined during further design development.

It is understood that the OTHR is upgrading the track between Oberon and Hazelgrove to allow running of tourist trains in that section at a speed of 10 km/h. It is anticipated that only minor works will be required in this section to allow trains to travel at speeds faster than 10 km/h.

Rail

After consultation with OTHR's engineering representative Ken Lingabala (KL) it is estimated that 70 percent of the existing rail on the line would be re-used and 30 percent new rail is required. KL indicated that the current weight of the existing rail is 80 lb/m. Any new rail should be the same or similar. The length of the Oberon to Tarana line was assumed as 24.193 km using the available kilometrage data that showed Oberon was located at 222.467 km and Tarana at 198.274 km.

Special trackwork

These new turnouts are required for the re-opening of the Oberon to Tarana line:

2 turnouts on the Main West line to connect to the Oberon to Tarana line. This allows trains to enter the line from either direction.

1 turnout on the Oberon to Tarana line to form a triangle configuration at the Main West connection point.

1 siding at Tarana and 1 siding at Oberon (4 turnouts in total) to allow locomotives to run around from one end of the train to the other. The final number of sidings will be dependent on the number of businesses requiring train operations into their premises.

1 turnout for the Oberon to Tarana Heritage Railway.

For the two proposed turnouts off the Main West line the preferred arrangement from CRN standards is a Standard Tangential 250:10.5. The preferred turnout type for the Oberon to Tarana line is a Standard Conventional 1 in 10.5.

Sleepers

New steel sleepers are needed between Hazelgrove and Tarana due to the existing timber sleepers being missing or in poor condition. To comply with Standard CRN CS 230 a 610 mm sleeper spacing (centreline to centreline) is required. It is understood that the OTHR will be doing partial re-sleepering between Oberon and Hazelgrove and only sleeper plates will be required in this section.

Ballast

Considering the Oberon to Tarana line was constructed as a "Pioneer Line" and from a review of the available photos there is no existing ballast on this line. To comply with CRN standards for class 5 track a new ballast profile (150 mm ballast depth, 250 mm ballast shoulder) will be required.

Earthworks

It is understood from consultation with KL and a review of available information that the track formation is generally in good condition and requires only minor upgrades to allow operation as a class 5 track. Vegetation is apparent in the railway corridor for that half of the line beyond Carlwood. Clearing of vegetation is required for 50 percent of the line less the 5 km already in use by the OTHR resulting in a total of 7.1 km requiring clearing. The upgrades for the earthworks are assumed to be replacement of the capping layer for the 7.1 km to be cleared and grubbed (150 mm thick capping layer of 8.5m width to comply with Standard CRN CS 410) and cess drainage and top drainage restoration for the entire length of all cuttings. Assuming half the length of the railway is in cut the total length of longitudinal drainage works is cess drainage on both sides of the cutting and one (high) side of the cutting for top drainage. Upgrades associated with the general fill and structural fill are not required as it has been assumed that the existing track formation has not failed.

These assumptions are made without reference to any field inspection or geotechnical investigation. It is essential that a geotechnical investigation be carried out prior to any design being carried out.

Culverts

To determine what upgrades are required to the existing culverts on the Oberon to Tarana line a review of the available information was undertaken. The sources of information used were a CRN asset register provided by John Holland Rail, a dilapidation report from 2019 covering the Oberon to Carlwood section provided by John Holland Rail and publicly available aerial imagery and marked waterways from Six Maps. The review process and findings are as follows:

Where possible the culverts in the CRN asset list were verified from a high-level review of Six Maps aerial imagery and the dilapidation report.

The type of culverts identified were predominately timber box culverts, with some steel and/or timber transom top culverts as well as concrete pipes.

All culverts were assumed to require replacement except for culverts which were specifically noted as being in good condition in the dilapidation report.

In cases where the type of culvert was identified in the dilapidation report, the same configuration for replacement was adopted i.e. existing timber box culvert replaced by a concrete box culvert.

For culverts where the type was unknown it was assumed that a box culvert was suitable. All box culverts were assumed to be a single 1200 mm wide x 300 mm high concrete box culvert (standard proprietary unit) which reflected the typical size of culverts shown in the photos.

The total number of culverts identified was 87 of which 5 of these were understood to be in good condition. Therefore upgrades (replacement) of 82 culverts are deemed to be required for this option.

Figure 21 Existing culvert

Bridges

The following three existing bridges were identified on the Oberon to Tarana line. The lengths of the bridges were estimated using six maps aerial imagery.

Fish River Bridge (length of 80 m) at kilometrage 202.5 km.

Snakes Valley Creek Bridge (length of 20 m at kilometrage 208.3 km.

Emu Valley Creek Bridge (length of 20 m) at kilometrage TBC.

The available data on the condition of the bridges was limited to the dilapidation report which included Snakes Valley Creek Bridge only and aerial photos of Fish River Bridge. It is understood from consultation with OTHR that Fish River Bridge is in good condition and is likely to require transom replacement only. Snakes Valley Creek Bridge is noted as being in poor condition with timber components severely rotted and therefore a bridge replacement at this location is nominated for this option. There was no current information on the condition of Emu Valley Creek but given it is also a timber bridge it is assumed that it will also require replacement.

These assumptions are made without reference to any structural inspection of the underbridges. It is essential that a structural inspection of the Fish River underbridge be carried out prior to any further studies and cost estimates being made.

Level Crossings

A level crossing is required at each intersection of the railway with a road to allow motor vehicles to cross rail tracks at grade. Several infrastructure upgrades to the approach roads are required to create a level crossing compliant with CRN standards. The amount and cost of upgrades required is dependent on the level crossing protection type i.e. active (control by flashing lights, bells or barriers) or passive (control by signs such as a stop sign).

Figure 22 Level crossing reinstated over existing track at Black Bullock Road

To determine the new infrastructure requirements for the level crossings, a review of the six maps aerial imagery and road labels was done to estimate of the number of private and public level crossings along the line. The quantity of level crossings was not in the CRN asset data provided. The following assumptions were made in this review:

A private level crossing is required for access between lots where the imagery showed evidence of vehicle movement across the track.

A private level crossing required for access to houses

A public level crossing required for all intersection between the track and a named road

Based on this review it was found that there were 19 level crossings (nine private crossing and ten public crossings) which would require upgrades. One level crossing on Albion Street in Oberon was believed to need active protection as it is a main road in Oberon. This would mean significant infrastructure upgrades particularly associated with railway signalling at that level crossing. For the remainder of the crossings a passive protection arrangement (stop signs) is considered suitable. Further analysis (ALCAM assessment) would be necessary to confirm the required protection type of the level crossings during further design development

Fencing

According to the Tarana to Oberon Railway Act (1919) the Tarana to Oberon Railway was decreed to be an unfenced line. This means there is no obligation to fence the line and as such no boundary fencing along the line is required.

As the line is unfenced four cattle stops are required at each public level crossing where stock is kept on adjoining land.

Signalling

There is currently no remaining signalling system in place on the Tarana to Oberon line.

One of the purposes of a signalling system is to maintain a safe distance between following trains on the same line so that, irrespective of train frequency, a train cannot collide with a preceding train which has stopped or is running more slowly. As the maximum number of trains expected to arrive at and depart from Oberon is 2 per day in each direction a very basic signalling system is required such as an Electric Staff system. This “system of safe-working is usually used on single lines in non track-circuited areas, to allow trains to travel safely in either direction. Under normal conditions the authority for a train to occupy the section is a metal token known as an electric staff obtained from an electric train staff instrument” (CRN Engineering Procedure - Signalling Glossary of Signalling Terms CRN SD 032). Further investigation of a suitable signalling system will be required during further design development.

An amount for a signalling system has been included in the estimate.

Appendix B

Logistics Assessment

Assumption

Haulage Cost

The following table outlines the general assumption used to derive the Haulage cost

Table 27 Assumption on general operation

Parameter	Unit	Value
Operating days per annum	*Days*	300
Hours worked per day	*Hours*	24
Diesel fuel price	*c/ltr*	124.1

Truck specific haulage cost assumptions are outlined in the following table.

Table 28 Haulage assumptions - road

Parameter	Unit	Value
Trailers		
Trailer configuration	*String*	B-double
Lifespan per trailer	*km*	5,000,000
Provision for spares	*%*	0%
Rate of return of trailers	*%*	10%
Residual value of trailers	*%*	10%
Maintenance on trailers	*$ axle km*	0.017
Number of axles	*Number*	8
Cost per axle	$	$16,000
Prime Movers		
Lifespan of prime mover	*km*	3,000,000
Provision for spares	*%*	0%
Rate of return on prime movers	*%*	10%
Residual value of prime movers	*%*	10%
Maintenance on prime movers	*$/km*	0.3
Fuel		
Fuel rebate	*c/ltr*	15.1
Fuel consumption	*Ltrs/km*	0.65
Drivers		
Drivers per prime mover	*Number*	1
Driver shifts	*Number*	2
Annual Wage per Driver	*$*	$100,000
Other		
Overheads and supervision	*%*	10.0%
OPEX profit margin	*%*	10.0%
Insurance	*%*	3.50%
Registration (trailers)	*$/yr*	$4,800
Registration (Prime Mover)	*$/unit/yr*	$10,500

Rail specific haulage cost including both above and below rail cost. Assumptions for above rail costs are outlined in the following table.

Table 29 Haulage cost assumption - rail

Parameter	Unit	Value
Operating Restrictions		
Maximum train length	*Metres*	700
Axle Load	*Tonnes*	19
Locomotives		
Locomotive type	*String*	Standard diesel 3000hp
Gross mass per locomotive	*Tonnes*	170
Cost per Loco	*$ million*	7.7
Maintenance on locos	*$/km*	1.30
Length per loco	*metres*	21
Number of Locomotives per consist	*locos*	2
Economic life	*yrs*	25
Half-life refit	*% of upfront capital*	30%
Residual value	*%*	10%
Discount rate	*%*	7%
Wagons		
Length	*metres*	14.7
Tare	*Tonnes*	18
Axles		4
Cost per wagon	*$*	157,500
Maintenance	*$ per thousand km*	70
Economic Life	*years*	30
Half-life refit	*% of upfront capital*	30%
Residual value	*%*	10%
Discount rate (dropdown)	*%*	7%
Drivers		
Drivers per train	*Number*	2
Number of shifts required for operation[56]	*Number*	3
Annual wage per driver	*$ per annum*	$160,000
Fuel		
Diesel fuel rebate	*$ per litre*	0.0
Fuel consumption	*Litres per gross tonne kilometre*	0.006
Other		
Operational mark-up - operations, supervision, train control, etc.	*%*	7.5%
Corporate mark-up — profit and head office administration, finance, marketing, etc.	*%*	17.5%

[56] Number of shifts required for train journey Grafton to Oberon increases from 3 to 4.

The below rail cost are primarily access charges, which comprise a fixed flag-fall component and a variable component. The charges attempt to offer different pricing according to the demands placed on the infrastructure with respect to quality of track, timing of usage, strategic location, type and size of train and competition from other above rail users for the available capacity

Table 30 Below rail cost parameter

Parameter	Unit	Value
Non-Grain, general freight access pricing - John Holland (CRN Access Pricing as of 1/07/2021)		
Variable price	*$/000 GTK*	0.52
Flag-fall price	*$ per train kilometre*	2.5

Handling costs

GHD assumed $50 per lift of container. The number of lifts required for various combination of transport mode are outlined in the table below.

Table 31 Number of lifts required

	Road direct	Road and rail	Rail direct
Lifts per trip per container	2	3	2

Logistics assessment

GHD's proprietary Transport Logistics Cost Model (TLCM) was used to prepare indicative transport and handling and costs across the supply chain for each freight product based on the transport distance, product form and annual demand volume. The modelled cost outputs are shown below for the various distribution scenarios between origins/destinations and Oberon.

A breakdown of the key operating and cost assumptions applied within the model are provided in Appendix E.

The land transport options can be undertaken either by direct road, direct rail or a combination of both. This is dependent on the location of origins/destinations and the existing infrastructure network. For example, a rail only scenario assumes direct rail siding access at both the origin of loading and destination of unloading. Figure 23 provides an overview of the supply chain elements considered in the modelling of landside transport options the proceeding tables depict a $/t cost of each of these supply chain steps.

Figure 23 Supply chain elements

Walcha to Oberon (Logs)

The estimated total cost of transporting logs from Walcha to Oberon via road is $73.8/t, which is 16.5% greater than a road and rail scenario at $63.3/t. Rail typically achieves cost efficiencies to road over longer haulage distances and large freight volumes where it can benefit from economies of scale in payload mass, reduced fuel costs and crewing costs.

There may be opportunity for further improvements to rail costs where rolling stock can be utilized by other proponents, particularly given this freight task only generates 98 trips on rail.

Scenario Summary			
Description	**Units**	**Walcha to Oberon**	
		Road Only	**Road and Rail**
Product		Logs	Logs
Annual Volume	*t/yr*	156,000	156,000
Truck type	-	B-Double	B-Double
Trucking distance	*km*	545	135
Trucking return trips	*Trips p.a*	4,457	4,457
Trucking emissions	*kg of CO2 / tonne transported*	56.3	13.9
Rail distance	*Km*		488
Rail return trips	*Trips. pa*		98
Rail emissions	*kg of CO2 emitted / tonne*		28.2
Leg 1 OD	-	Walcha to Oberon	Walcha to Werris Creek
Leg 2 OD	-		Werris Creek to Oberon
Total emissions	*kg of CO2 emitted / tonne*	56.3	42.1
COST BREAKDOWN			

Scenario Summary			
1. Truck cost - Leg 1	*$/t*	$71.0	$18.8
2. Rail cost - Leg 2	*$/t*		$40.3
A. Handling Cost #1	*$/t*	$1.4	$1.4
B. Handling Cost #2	*$/t*	$1.4	$1.4
C. Handling Cost #3	*$/t*		$1.4
TOTAL ($/t)	>>>	$73.8	$63.3
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 80% of rolling stock return costs have been allocated.			

Grafton to Oberon (Logs)

The estimated total cost of transporting logs from Grafton to Oberon via road is $99.9/t, which is approximately 39 percent greater than a road and rail scenario at at $71.6/t.

There is insufficient volume to consider a Grafton to Oberon rail scenario in isolation.

The primary reason for the results is based on the assumption that if logs were to be transported by rail from Walcha to Oberon, there is additional capacity for the rolling stock to be utilized for another freight task. To prevent ‘double counting’ of costs, as Grafton to Oberon only generates 29 rail trips per year the rail costs only include 20 percent of rolling stock return.

Scenario Summary			
Description	**Units**	**Grafton to Oberon**	
		Road Only	**Road and Rail**
Product		Logs	Logs
Annual Volume	*t/yr*	46,500	46,500
Truck type	-	B-Double	B-Double
Trucking distance	*km*	750	100
Trucking return trips	*Trips p.a*	1,329	1,329
Trucking emissions	*kg of CO2 / tonne transported*	77.5	10.3
Rail distance	*Km*		934
Rail return trips	*Trips. pa*		29
Rail emissions	*kg of CO2 emitted / tonne*		54
Leg 1 OD	-	Grafton to Oberon	Forrest location to Grafton rail station
Leg 2 OD	-		Grafton to Oberon
Total emissions	*kg of CO2 emitted / tonne*	77.5	64.3
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$97.0	$14.3
2. Rail cost - Leg 2	*$/t*		$53.0
A. Handling Cost #1	*$/t*	$1.4	$1.4
B. Handling Cost #2	*$/t*	$1.4	$1.4
C. Handling Cost #3	*$/t*		$1.4
TOTAL ($/t)	>>>	$99.9	$71.6
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 20% of rolling stock return costs have been allocated.			

Glenlee Intermodal, Spring Farm to Oberon (Wood Waste)

The estimated total cost of transporting wood waste from Glenlee Intermodal, Spring Farm to Oberon via road is $28.4/t, which is approximately 39 percent less than a road and rail scenario at at $46.9/t.

One of the primary reasons rail is less effective for this scenario is due to the low payloads achieved (20t) per wagon. Subsequently, the volume transported per trip is less compared to higher payload commodities (ie. logs) which in turn creates more rail trips. A greater number of rail trips results in a larger volume of fuel consumed, maintenance requirements and crewing costs. It also makes it unlikely for the rolling-stock to be utilized for other freight tasks meaning all rolling stock costs are allocated.

Scenario Summary			
Description	**Units**	**Glenlee to Oberon**	
		Road Only	**Road and Rail**
Product		Woodwaste	Woodwaste
Annual Volume	*t/yr*	192,000	192,000
Truck type	-	B-Double	B-Double
Trucking distance	*km*	170	15
Trucking return trips	*Trips p.a*	9,600	9,600
Trucking emissions	*kg of CO2 / tonne transported*	18.1	2.7
Rail distance	*Km*		199
Rail return trips	*Trips. pa*		218
Rail emissions	*kg of CO2 emitted / tonne*		23.2
Leg 1 OD	-	Glenlee to Oberon	Road transfer to Glenlee
Leg 2 OD	-		Glenlee to Oberon
Total emissions	*kg of CO2 emitted / tonne*	18.1	25.9
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$23.4	$3.2
2. Rail cost - Leg 2	*$/t*		$36.3
A. Handling Cost #1	*$/t*	$2.5	$2.5
B. Handling Cost #2	*$/t*	$2.5	$2.5
C. Handling Cost #3	*$/t*		$2.5
TOTAL ($/t)	>>>	$28.4	$46.9
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 100% of rolling stock return costs have been allocated.			

Newcastle to Oberon (Urea/Bulk)

The estimated total cost of transporting Urea and other bulk products from Newcastle to Oberon via road is $50.9/t, which is approximately 30 percent less than a rail direct scenario at $72.6/t.

Rail transport under this scenario is less attractive due to lower product volumes and additional distance required to travel when compared against a heavy vehicle road route.

Scenario Summary			
Description	**Units**	**Newcastle to Oberon**	
		Road Only	**Rail direct**
Product		Urea / Bulk	Urea / Bulk

Scenario Summary			
Annual Volume	*t/yr*	27,600	27,600
Truck type	-	B-Double	
Trucking distance	*km*	365	
Trucking return trips	*Trips p.a*	789	
Trucking emissions	*kg of CO2 / tonne transported*	37.7	
Rail distance	*Km*		517
Rail return trips	*Trips. pa*		18
Rail emissions	*kg of CO2 emitted / tonne*		31
Leg 1 OD	-	Newcastle to Oberon	Newcastle to Oberon
Leg 2 OD	-		
Total emissions	*kg of CO2 emitted / tonne*	37.7	31
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$48.0	
2. Rail cost - Leg 2	*$/t*		$69.8
A. Handling Cost #1	*$/t*	$1.4	$1.4
B. Handling Cost #2	*$/t*	$1.4	$1.4
C. Handling Cost #3	*$/t*		
TOTAL ($/t)	>>>	$50.9	$72.6
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 35% of rolling stock return costs have been allocated.			

Oberon to St Marys (Finished board products)

The estimated total cost of transporting finished board products from Oberon to St Marys via road is $21.3/t, which is approximately 19 percent more than a rail direct scenario at $17.8/t.

Modelling indicates that for the defined product volume and distances, rail and road costs are near an inflection point at where rail starts to become more efficient than road.

Scenario Summary			
Description	**Units**	**Oberon to St Marys**	
		Road direct	**Rail direct**
Product		Finished board products	Finished board products
Annual Volume	*t/yr*	300,000	300,000
Truck type	-	B-Double	
Trucking distance	*km*	135	
Trucking return trips	*Trips p.a*	7,500	
Trucking emissions	*kg of CO2 / tonne transported*	12.2	
Rail distance	*Km*		144
Rail return trips	*Trips. pa*		170
Rail emissions	*kg of CO2 emitted / tonne*		7.3
Leg 1 OD	-	Oberon to St Marys	Oberon to St Marys
Leg 2 OD	-		

Scenario Summary			
Total emissions	*kg of CO2 emitted / tonne*	12.2	7.3
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$18.8	
2. Rail cost - Leg 2	*$/t*		$15.3
A. Handling Cost #1	*$/t*	$1.3	$1.3
B. Handling Cost #2	*$/t*	$1.3	$1.3
C. Handling Cost #3	*$/t*		
TOTAL ($/t)	>>>	$21.3	$17.8
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 80% of rolling stock return costs have been allocated.			

Port Botany to Oberon (Paper rolls/ Melamine / Wax)

The estimated total cost of transporting paper rolls/ melamine / wax from Port Botany to Oberon via road is $62.0/t, which is approximately 24 percent less than a rail direct scenario at $81.2/t.

Due to small annual volumes for each of these products destined to Oberon from Port Botany, annual volumes have been aggregated for modelling purposes. This would unlikely occur in 'real life' 73 operations as the products would arrive in different shipments. Despite this optimisation process used in the modelling of rail to improve utilization of capital intensive rolling stock, modelling indicates road haulage to be a superior transport mode in this scenario.

Scenario Summary			
Description	**Units**	**Port Botany to Oberon**	
		Road direct	**Rail direct**
Product		Paper rolls / melamine / wax	Paper rolls / melamine / wax
Annual Volume	*t/yr*	18,240	18,240
Truck type	-	B-Double	
Trucking distance	*km*	200	
Trucking return trips	*Trips p.a*	456	
Trucking emissions	*kg of CO2 / tonne transported*	18.1	
Rail distance	*Km*		222
Rail return trips	*Trips. pa*		10
Rail emissions	*kg of CO2 emitted / tonne*		11.2
Leg 1 OD	-	Port Botany to Oberon	Port Botany to Oberon
Leg 2 OD	-		
Total emissions	*kg of CO2 emitted / tonne*	18.1	11.2
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$59.5	
2. Rail cost - Leg 2	*$/t*		$78.7
A. Handling Cost #1	*$/t*	$1.3	$1.3
B. Handling Cost #2	*$/t*	$1.3	$1.3
C. Handling Cost #3	*$/t*		
TOTAL ($/t)	>>>	$62.0	$81.2

Scenario Summary			
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 35% of rolling stock return costs have been allocated.			

St Mary's to Oberon (Wood Waste)

The estimated total cost of transporting wood waste from St Mary's to Oberon via road is $21.9/t, which is approximately 26 percent less than a rail direct scenario at $29.7/t.

Scenario Summary			
Description	**Units**	**St Mary's to Oberon**	
		Road direct	**Rail direct**
Product		Woodwaste	Woodwaste
Annual Volume	*t/yr*	300,000	300,000
Truck type	-	Walking floor trailer	
Trucking distance	*km*	120	
Trucking return trips	*Trips p.a*	15,000	
Trucking emissions	*kg of CO2 / tonne transported*	12.4	
Rail distance	*Km*		140
Rail return trips	*Trips. pa*		341
Rail emissions	*kg of CO2 emitted / tonne*		16.8
Leg 1 OD	-	St Mary's to Oberon	St Mary's to Oberon
Leg 2 OD	-		
Total emissions	*kg of CO2 emitted / tonne*	12.4	16.8
COST BREAKDOWN			
1. Truck cost - Leg 1	*$/t*	$16.9	
2. Rail cost - Leg 2	*$/t*		$24.7
A. Handling Cost #1	*$/t*	$2.5	$2.5
B. Handling Cost #2	*$/t*	$2.5	$2.5
C. Handling Cost #3	*$/t*		
TOTAL ($/t)	>>>	$21.9	$29.7
Note: With consideration to the utilization of rollingstock for this scenarios rail operations, 100% of rolling stock return costs have been allocated.			

Appendix C

Financial Analysis

Assumptions

General assumptions

Table 32Table 32 outlines the general assumptions used for the financial analysis.

Table 32 General assumption

Parameter	Assumption
Evaluation start	2022 financial year (FY)
Planning/Construction period	5 years from FY2022
Operation period	50 years from FY2027
Evaluation period	55 years (5 years planning/construction + 50 years operational)
Price year	Dec 2021
Weighted average cost capital	7% (4% & 10% for sensitivity analysis)
Material escalation factor[57]	3.2%
Inflation rate	2.5%

GHD has applied a real growth of 0.7% per annum to rail maintenance cost, haulage cost and handling cost throughout the evaluation period.

Capital & Maintenance cost

The preliminary capital cost analysis indicates a required initial outlay of $76 million over a two-year construction period according to Appendix E.

The operating cost is calculated based off parameters from *Australian Transport Assessment and Planning Guidelines – M3 Freight Rail*. The operating cost will consist of a variable and a fixed maintenance component. The variable cost calculated as the annual gross kilometres travelled (GKT) on the rail multiplied by $2.4 maintenance cost for every GKT. The fixed cost is calculated as the total Oberon rail length multiplied by $53,333 for every kilometre. The total operating cost is estimated to be $3 million to $4 million annually depending on the annual loads.

[57] *Australian Bureau of Statistics Producer Price Indexes - Road and bridge construction New South Wales*

Appendix D

Economic Analysis

Assumptions

The following section outlines the key assumptions used in this cost-benefit analysis.

General assumptions

Key assumptions were made in accordance with *Transport for NSW Economic Parameter Values V.2*

Table 33Table 33 outlines the key assumptions.

Table 33 Evaluation period

Parameter	Assumption
Evaluation start	2022 financial year (FY)
Planning/Construction period	5 years from FY2022
Operation period	50 years from FY2027
Evaluation period	55 years (5 years planning/construction + 50 years operational)
Price year	Dec 2021
Discount rate	7% (4% and 10% sensitivity analysis scenarios)

GHD assumed the railway a 50-year asset life after weighted averaging the economic lives of all major rail components. Since the evaluation period spans 50 years post construction, there is no residual value.

Real Dec 2021 dollars (Dec-21$) were used for this assessment. Table 34Table 34 outlines the inflation factors applied to cost and benefit unit values calculated in previous years to convert them to Dec-21$. This is to inflate the historic costs into Dec 2021 dollars to ensure the time value of the benefits is in line with the time value of costs.

Table 34 Inflation factors to Dec 2021 dollars (Australia Bureau of Statistics, 2021)

Benefit (dis-benefit)	From	To	Inflation factor	ABS index
Travel time saving	June 2020	Dec 2021	106.02%	A2325806K – CPI (all groups) Sydney
Vehicle operation cost saving	Dec 2021	Dec 2021	100%	
Freight benefit	June 2020	Dec 2021	106.02%	
Road maintenance	June 2020	Dec 2021	106.02%	
Crash cost	June 2019	Dec 2021	104.92%	
Externalities	June 2020	Dec 2021	106.02%	
Tourism	June 2014	Dec 2021	114.72%	
	June 2019	Dec 2021	104.92%	

Freight volume

Informed through the stakeholder meeting, GHD has assumed the total freight volume to be consistent over the next ten years (from FY 2022 – FY 2032) with existing contracts in place. For the following 10 years from FY 2033, GHD has assumed the 5% annual growth rate in freight volume.

Growth in freight volume was capped post 2042, due to difficulty in longer term forecasting and allowing for the analysis to remain conservative.

Road maintenance cost

Unit cost road maintenance is based off *Transport for NSW Economic Parameter Values V.2.* Unit cost of per VKT travelled a B-double truck is $0.25.

Crash cost

Crash cost assumptions were based on *Australasian Railway Association - Value of Rail 2020* parameters for comparison between unit crash cost between road freight and rail freight. *Table 5* outlines the crash cost rate per GTK for each freight type.

Table 35 Crash cost rate (Australasian Railway Association, 2019$)

Freight type	Crash cost rate ($/GTK)
Road	$0.014
Rail	$0.001

These values have then been inflated to 2021 dollars based on the inflation factors identified in Table 34.

Externality cost

Parameters for externality cost are based off rural freight vehicles model from *Transport for NSW Economic Parameter Values V.2*. Table 36Table 36 outlines the type of externalities considered in this analysis and their respective unit value in $/1000 GTK.

Table 36 Externality values (TfNSW, 2020$)

Vehicle Type	Heavy vehicle $/1000 GTK	Rail $/1000 GTK
Air pollution	0.280	0.000
Greenhouse	6.240	0.410
Noise	0.470	0.000
Water pollution	1.690	0.140
Nature and landscape	4.690	1.100
Upstream and downstream costs	24.990	0.000
Total	38.360	1.650

These values have then been inflated to 2021 dollars based on the inflation factors identified in Table 34Table 34.

Tourism

Existing number of tourist to Oberon, length of stay and tourism expenditure were provide from *Tourism Research Australia Local Government Area Profiles 2014 and 2019,* as outlined in

	Domestic – daytrip	Domestic - overnight	International
Annual Tourist count	100,000	106,000	3,000
Average night of stay	0	2	17
Spend per trip	$87		
Spend per night		$130	$52

GHD assumed that, under the base case, the growth in number of tourist to Oberon will increase in line with the projected population growth in NSW at 0.83 percent based off NSW Treasury 2021-22 NSW Intergenerational Report. In the project case, GHD assumed an additional 0.5 percent growth in tourist number to be induced by the reinstatement of the rail improving access to Oberon from the rest of the State.

Appendix E

Capital cost estimation

goeldnerconsulting
construction cost consultants

GHD

Oberon to Tarana Rail Line

Basis of Capital Cost Estimate

10421-BOE-001

9 March 2022

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SYNOPSIS

This document has been prepared to support the development of the Capital Cost Estimate for the Oberon to Tarana Rail Line.

Disclaimer

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REV	DESCRIPTION	ORIG	APPROVER	DATE	CLIENT APPROVAL	DATE
A	Issued for review	D Simone	C Goeldner	04-03-22		
B	Revised issue	D Simone	C Goeldner	09-03-22		

CONTENTS

Appendices

1 INTRODUCTION

1.1 Executive Summary

This document has been prepared to support the development of the Capital Cost Estimate for the Oberon to Tarana Rail Line as defined by the documents supplied by GHD. The basis of the estimate in terms of methodology and process in determining the capital cost value are the prime areas of focus of this document.

1.2 Evaluation and Summary of the Estimate

The total P50 estimated costs as detailed in this document, are summarised in Table 1.2.1 below. These amounts are based on March 2022 Australian dollars at a 50/50 probability of overrun/underrun (excludes, market forces, escalation and currency hedging).

Table 1.2.1 – Cost Estimate Summary

Description	Total $AUD
DIRECT COSTS	**47,795,328**
General Earthworks	2,313,498
Track Works	30,465,779
Structures	3,148,605
Level Crossings	1,541,478
Miscellaneous	8,050,000
Design Growth	2,275,968
INDIRECT COSTS	**10,992,925**
CONTINGENCY P50	**17,636,476**
TOTAL	**76,424,729**

2 BASIS OF ESTIMATE

2.1 Purpose and Objective

The Cost Estimate was prepared by Goeldner Consulting to produce a Capital Cost Estimate with a target accuracy of +/- 50% for the Oberon to Tarana Rail Line.

2.2 Extent of the Estimate

Goeldner Consulting has based the capital cost estimate on the conceptual design details, including MTO's, cost data from recent similar projects and manhour estimates.

2.3 Qualifications and Assumptions

The following qualifications and assumptions were noted when preparing the Capital Cost Estimate:

- Estimate base date is March 2022.
- The capital cost estimate is based on an Owners integrated project management team managing a single head construction contractor.
- Crew rates were included based on a 10 on 4 off roster working 10hrs per day, 7 days per week.
- No formal logistics study has been completed.
- No provision for delay costs with regard to permitting (e.g. excavation permits, confined space permits etc.) beyond what would be reasonably expected.
- The weather conditions are not of extreme proportions that may disrupt the continuance of safe work. No provision of 'force majeure' occurrences such as storms and resultant flooding or earthquakes are included in the cost estimate.
- All standards and procedures are in accordance with Australian Standards and codes of practice, together with good engineering practices.

2.4 Exclusions

- Owners Costs with the exception of procurement and construction services
- Cashflow and financial modelling.
- Treatment and/or removal of contaminated materials.
- Escalation beyond March 2022.
- Exchange rate variation.
- The impact of related concurrent projects which may affect the availability of skilled construction labour has not been assessed.
- Changes to labour or industrial relations laws.

- Impact of market forces on commodity pricing (e.g. steel fabrication, copper cabling, oil price variation).
- No allowance for additional costs due to abnormal weather such as El Niño events.
- No allowance for improvements to existing infrastructure or services outside the battery limits of the study.
- No allowance has been included for extended periods of industrial unrest.
- Finance and interest charges for project duration.
- GST.
- Costs of environmental testing.
- Any environmental requirement not identified in this estimate.
- No allowance for sunk costs (e.g. Cost of this and previous studies etc.).

3 QUANTITY AND COST BASIS

3.1 Quantity Basis

Quantities used in the estimate have been based on preliminary material take-offs (MTOs) provided by GHD's engineering department.

3.2 Material and Equipment Pricing

Bulk material pricing is generally based on pricing from similar projects in Goeldner Consulting's database.

3.3 Labour

Crew labour rates were included based on a 10 on 4 off roster working 10hrs per day, 7 days per week.

The direct labour manhours for installation have been based on Goeldner Consulting's database of similar projects and assessed according to current construction techniques, methodology and productivity of trades.

3.4 Subcontractors Distributables

These rates cover construction equipment and other support required to support and deploy installation labour.

Subcontractor's distributables were developed as a percentage of contract direct manual labour costs by major commodities and are based on historical data.

Costs included in these rates include:

- Contractor mobilisation and demobilisation.
- Temporary site facilities.
- Contractor's construction equipment.
- Small tools and consumables.
- Manual indirects (storeman, servicing of equipment, etc.).
- Non-productive time (inductions and toolbox meetings).
- Non-manuals (site supervision and QA/QC).

3.5 Labour Productivity

Productivity Factors have been applied to direct manhours to account for site specific conditions including brownfield construction, safety and access issues, working roster and labour availability.

Productivity Factor was applied in the cost estimate based on an average of 1.4.

3.6 Design Allowances

In preparing a capital cost estimate, it is a rare occasion when everything is known, specified and measurable. Design allowances are applied at the direct cost level to compensate for the degree of engineering that is incomplete.

Design growth has been applied based on 5% of the direct costs.

4 INDIRECT COSTS

4.1 Project Management Services

Project management services will be provided by a project management consultant and include the following services.

- Preparation of project management plan
- Project manager's costs
- Contract manager's costs
- Project engineers and project officers assisting the project manager
- Construction audits
- Site management
- Site surveillance and monitoring
- Environmental management and monitoring reporting by the project manager
- Workplace health and safety management and monitoring by the project manager
- Management of estimates
- Preparation of reports by the project manager
- Project and contract management outsourced advice and contractor claims management.

An allowance for project management services has been calculated as 10% of direct costs based on cost data from recent similar projects. This excludes project management fee which has been calculated separately below.

4.2 Project Management Fee

In addition to the above project management services, an allowance of 6.5% of direct costs is included for the project management consultants fee based on data from recent similar projects.

4.3 TfNSW Overheads

TfNSW will incur overheads that may be charged as capital costs to the project. This may include items such as:

- Finance and capitalised interest for project duration.
- Land Acquisition Costs
- TfNSW project team costs during the execution phase which includes travel and accommodation, miscellaneous business related costs.
- Cost of obtaining statutory and regulatory approvals for construction.
- Insurances, including those during construction (e.g. public liability, contractor's all-risks, workers compensation, public and professional liability).

- Staff/Operator recruitment and training ('Start Up' Operations Team).
- 3rd Party Consulting costs when engaged directly with the Principal.
- Commissioning Management and consumables costs.
- Utilities consumption
- Import duties and taxes.
- Sunk Costs
- Local community compensation.

An allowance for TfNSW has been calculated as 2.5% of direct costs based on cost data from recent similar projects. This may vary significantly depending on the financial structure of the project.

4.4 Detail Design

An allowance of 4.0% of direct costs is included for an engineering services provider to undertake the project detail design based on data from recent similar projects.

4.5 Escalation

No allowance has been included for escalation. This is the responsibility of the infrastructure owner.

4.6 Contingency

An allowance for P50 contingency is included based on 30% of the project costs

Appendix 1 Estimate Details

Estimate Details
Oberon to Tarana Rail Line

Description	Unit	Quantity	Net split rates						Unit Rate	Total Amount
			Labour	Materials	Plant&equip	Sub. Distr.	All In Rate	Indirects		
DIRECT COSTS										
General Earthworks										
Strip top soil (To a depth of 150mm)	CM	0								Excluded
Clear and grub construction area	SM	71,000	0.48			1.02			1.50	106,613.26
Cess drainage and top drain restoration	LM	36,290	8.49			17.83			26.31	954,898.77
Bulk Excavation										
Cut Bank	CM	0								Excluded
Bulk Filling										
General Fill	CM	0								Excluded
Structural fill	CM	1,575	65.82			23.77			89.58	141,094.80
Capping										
Capping	CM	10,328	83.54			24.02			107.56	1,110,890.67
Import Material										
Import from borrow	CM	0								Excluded
Import from quarry	CM	0								Excluded
Spoil	CM	0								Excluded
Track Works										
Rail										
Remove existing rails	LM	38,386	58.51						58.51	2,246,017.68
New Rails (41kg HH)	LM	17,916	126.74						126.74	2,270,633.28
Reinstall previously removed rails	LM	23,870	53.37						53.37	1,273,841.07
Welds										
Weld kits - Straight Track	EACH	0								Excluded
Weld Kits - Turnouts	EACH	0								Excluded
Sleepers										
Remove existing sleepers	EACH	30,586	30.91			64.92			95.83	2,930,970.74
Steel Sleepers - fastenings included	EACH	33,644	405.89						405.89	13,655,798.15
Timber sleeper plates	EACH	17,593	120.07						120.07	2,112,363.36
Ballast										
Ballast	CM	15,375	78.61			102.94			181.55	2,791,296.81
Special track work										
Supply new turnouts, assemble, place, top ballast, resurface, weld	EACH	8								Included
Removal of Turnouts	EACH	0								Excluded
1:10.5 Conventional Turnout, Straight	EACH	6	331,729.31						331,729.31	1,990,375.86
1:10.5 R250 Tangential Turnout, Straight	EACH	2	341,988.98						341,988.98	683,977.96
Catch points	EACH	2	255,252.00						255,252.00	510,504.00
Structures										
Bridges										
Snakes Valley Creek	LM	20					38,020.00		38,020.00	760,400.00
Western Connection	LM	20					38,020.00		38,020.00	760,400.00
Emu Valley Creek	LM	20					38,020.00		38,020.00	760,400.00
Fish River 80m - Transom replacement only (assumed 600mm centres)	EA	134	933.01						933.01	125,023.34
Culverts										

Estimate Details
Oberon to Tarana Rail Line

Description	Unit	Quantity	Net split rates						Unit Rate	Total Amount
			Labour	Materials	Plant&equip	Sub. Distr.	All In Rate	Indirects		
Culvert 221.451km	LM	0								Excluded
Culvert 221.200km	LM	0								Excluded
Culvert 220.970km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 220.710km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 220.380km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 219.870km	LM	0								Excluded
Culvert 219.385km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 219.180km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 219.073km: Allow to replace with box culvert	LM	0								Excluded
Culvert 218.620km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 218.450km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 218.250km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 217.290km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 217.000km	LM	0								Excluded
Culvert 216.500km: Allow to replace with box culvert	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 216.450km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 215.152km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 215.219km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 215.412km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 215.738km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 215.853km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 214.510km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 214.299km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 213.966km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 213.625km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 213.321km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 213.248km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 213.066km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 212.679km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 212.531km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 212.350km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 212.052km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.907km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.731km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.625km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.463km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.375km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.264km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 211.114km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 210.894km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 210.688km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 210.421km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 210.319km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 209.917km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 209.776km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 209.376km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 209.224km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 208.776km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 208.654km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 208.193km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44

Description	Unit	Quantity	Net split rates						Unit Rate	Total Amount
			Labour	Materials	Plant&equip	Sub. Distr.	All In Rate	Indirects		
Culvert 207.749km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 207.561km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 207.285km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.888km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.771km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.732km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.477km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.286km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 206.016km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 205.627km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 205.454km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 205.139km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 205.015km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 204.840km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 204.611km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 204.484km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 204.244km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 204.106km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 203.953km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 203.709km: Allow to replace with box culvert	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 203.787km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 203.560km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 203.373km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 202.899km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 202.221km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 201.923km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 201.899km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 201.572km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 201.305km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 200.725km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 200.512km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 200.032km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 199.902km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 199.633km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 199.398km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 199.390km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Culvert 199.204km 1200x300	LM	10	181.07	344.00		380.27			905.34	9,053.44
Level Crossing										
Private LX - Passive (stop signs)										
RX-2 Assembly	EACH	16	113.17		250.00	147.13			510.30	8,164.79
Steel panel for LX surface	SM	480	93.10	472.39		111.86			677.35	325,126.89
Asphalt 20m length + linemarking	EACH	960	39.34			45.44			84.78	81,387.88
Public LX - Active (Lights and bells)										
RX-5 Assembly	EACH	2	2,263.41			2,942.58			5,205.98	10,411.97
Signalling infrastructure for RX-5	EACH	1					1,000,000.00		1,000,000.00	1,000,000.00
Ashphalt 20m length + linemarking (allowed for 100mm base asphalt + 40mm topping)	EACH	120	39.34			45.44			84.78	10,173.48
W7-4B sign	EACH	4	56.59			73.56			130.15	520.60
W8-3B sign	EACH	2	56.59			73.56			130.15	260.30

Estimate Details
Oberon to Tarana Rail Line

Description	Unit	Quantity	Net split rates						Unit Rate	Total Amount
			Labour	Materials	Plant&equip	Sub. Distr.	All In Rate	Indirects		
Public LX - Passive (stop signs)										
RX-2 Assembly	EACH	18	113.17		250.00	147.13			510.30	9,185.39
W7-7B sign	EACH	18	56.59			73.56			130.15	2,342.69
W3-1B sign	EACH	18	56.59			73.56			130.15	2,342.69
Asphalt 20m length + linemarking - no.9 (allowed for 100mm base asphalt + 40mm topping)	SM	1,080	39.34			45.44			84.78	91,561.36
Miscellaneous										
Cattle Grid at LX	EACH	10					5,000.00		5,000.00	50,000.00
Signalling	EACH	1					8,000,000.00		8,000,000.00	8,000,000.00
Design Growth										
Design Growth - 5% of Direct Costs	LOT	1					2,275,968.00		2,275,968.00	2,275,968.00
DIRECT COSTS										**47,795,327.87**
INDIRECT COSTS										
Project management conusltant margin 6.5%	LOT	1						3,106,696.32	3,106,696.32	3,106,696.32
Project management conusltant overheads 10%	LOT	1						4,779,532.80	4,779,532.80	4,779,532.80
TfNSW overheads 2.5%	LOT	1						1,194,883.20	1,194,883.20	1,194,883.20
Detailed Design 4%	LOT	1						1,911,813.12	1,911,813.12	1,911,813.12
Escalation: Excluded	LOT	1								Excluded
INDIRECT COSTS										**10,992,925.44**
OWNERS COSTS										
Owners Costs: Excluded	LOT	1								Excluded
OWNERS COSTS										
CONTINGENCY										
Contingency - Allow 30%	LOT	1						17,636,475.90	17,636,475.90	17,636,475.90
CONTINGENCY										**17,636,475.90**
TOTAL										**76,424,729.21**

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