Bobs Farm Sand Quarry

Economic Assessment

Prepared for

Newcastle Sand

By

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TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

Introduction

Newcastle Sand (the "Applicant") is seeking planning approval for a sand quarry, known as the Bobs Farm Sand Quarry (the Project). The Project is located in the Port Stephens Local Government Area (LGA) within Lot 254 DP 753204, 3631 Nelson Bay Road, Bobs Farm. The Project is seeking to access to high-purity sand to provide an ongoing reliable source of construction, manufacturing and domestic use sand to the Hunter, Port Stephens and Greater Sydney markets. The Project would replace the sand resource currently extracted by the Applicant at its existing quarry at 398 Cabbage Tree Road, Williamtown NSW. This sand resource will be exhausted within the next few years.

The Project is State Significant Development (SSD) and requires approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). An Environmental Impact Statement (EIS) is required to support the development application for the Project. This Economic Assessment has been prepared as part of the EIS and is focused on impacts in NSW.

From an economic perspective, there are two important aspects of the Project that can be considered:

- its economic efficiency (i.e. consideration of the economic costs and benefits of the Project) which is evaluated using cost benefit analysis (CBA).
- its effects on the local economy, which is evaluated using local effects analysis (LEA) and input-output (IO) analysis.

Cost Benefit Analysis

A CBA of the Project indicated that it would have net production benefits to NSW of $20M (present value at 7% discount rate) comprising $15M in quarrying benefits, and $5M in ex quarry transport benefits.

Provided the residual environmental, social, and cultural impacts of the Project that accrue to NSW (after mitigation, offset and compensation) are considered to be valued at less than the level of net production benefits, the Project can be considered to provide an improvement in economic efficiency and hence is justified on economic grounds.

The above estimate of NSW net production benefits of the Project includes capital and operating costs associated with biodiversity offsets and a new access point off Nelson Bay Rd. It also includes the costs of mitigation, monitoring, and management of other potential impacts. Externalities (including calculated costs of greenhouse gas impacts to NSW) which are not captured in operating or capital expenses have been assessed as being negligible. Consequently, the Project is estimated to have net social benefits to NSW of $20M and hence is desirable and justified from an economic efficiency perspective. Given the nature of predicted impacts, it is considered highly unlikely that residual environmental and social impacts would result in any significant change to the predicted net social benefits of the Project to NSW

Local Effects Analysis

The local area used for the Local Effects Analysis comprises the Local Government Area (LGA) of Port Stephens. The Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure. A summary of local economic effects of the Project is provided in **Table ES1**.

The Project will provide 55 direct jobs in the local area, comprising 15 quarry jobs and 40 ex-quarry transport jobs. Based on the residential location of people who work in the local area in the quarry sector and transport sector,[1] 65% of Project quarry workers and 47% of Project transport workers are assumed to reside in the local area, with the remainder commuting from outside the local area. Assuming that those that already reside in the local area would have otherwise been already employed and that job vacancies created by these people filling the Project jobs remain unfilled (i.e. no job chain effects), the incremental disposable wages accruing to the region from Project is $2.4M per annum. This is equivalent to 12 direct full time equivalent (FTE) jobs. This is a minimum estimate as it assumes full employment in the region and hence the jobs from which people come to fill the Project jobs remain vacant.

Standard regional economic impact assessment using IO analysis is not restricted to a focus on the existing labour force in the local area and does not assume an absence of job chain effects. In this framework, the Project is estimated to provide the following annual direct and indirect annual effects to the local economy:

- $39M in output.
- $22M in value-added.
- $7M in gross wages.
- 78 jobs.

The main local environmental impacts are internalised into the production costs of Newcastle Sand via mitigation, offset and compensation costs. Residual local environmental impacts after mitigation, offset and compensation are likely to be immaterial.

[1] ABS 2021 Census of Population and Housing 4-digit employment by industry by place of usual residence data.

Table ES1 - Summary of Effects on the Local Community

Annual Local Effects	**Quarry**	**Transport**	**Total**
Direct employment working in the local area (no.)	15	40	55
Direct employment filled by those who already reside in the local area (no.)	10	19	29
Total after tax income to those that already reside in the local area ($)	$827,366	$1,524,847	$2,352,213
FTE based on increase in net after tax income for workers that already reside in the local area ($)	4	8	12
Total non-labour expenditure in the local area ($M)	$3.6	$3.1	$6.7
Annual Regional Impacts	**Direct**	**Flow-on**	**Total**
Output ($M)	27	10	39
Value-added ($M)	14	8	22
Income ($M)	6	1	7
Employment	55	23	78
Other Local Economic Impacts			
Displaced activities	No material impact*		
Wage rise impacts	No material impact*		
Housing impacts	No material impact*		
Demand on local infrastructure and services	Newcastle Sand will fully fund the demand it has for local infrastructure and services for the production process e.g. a new intersection.		
Local Environmental Impacts			
Greenhouse gas emissions	$0.00002*		
Road Transport	Cost of new access point off Nelson Bay Rd included in capital costs		
Biodiversity	Impacts on local biodiversity are offset		

*This figure is the estimated impact on NSW households apportioned to households in the Local Area. The regional population is 0.9% of the NSW population.

** Unless otherwise specified monetary amounts are in 2026 dollars.

1 INTRODUCTION

1.1 Background

Newcastle Sand (the "Applicant") is seeking planning approval for a sand quarry, known as the Bobs Farm Sand Quarry (the Project). The Project is located in the Port Stephens Local Government Area (LGA) within Lot 254 DP 753204, 3631 Nelson Bay Road, Bobs Farm. The Project is seeking to access to high-purity sand to provide an ongoing reliable source of construction, manufacturing and domestic use sand to the Hunter, Port Stephens and Greater Sydney markets. The Project would replace the sand resource currently extracted by the Applicant at its existing quarry at 398 Cabbage Tree Road, Williamtown NSW. This sand resource will be exhausted within the next few years.

The principal elements of the Project would include the following:

- development of a new quarry to extract (using dry surface sand extraction) and process up to 530,000 tonnes of sand per year for up to 10 years.
- extraction of the resource using an excavator loading into articulated haul trucks.
- onsite processing, dry screening, washing and stockpiling.
- transport of material offsite via public roads.
- progressively rehabilitating the site.

The Project is State Significant Development (SSD) and requires approval under Part 4 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). A development application will be lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI). An Environmental Impact Statement (EIS) will be prepared to support the development application.

ADW Johnson has been engaged to prepare an Environmental Impact Statement (EIS) for the Project. Gillespie Economics was engaged to prepare an Economic Assessment of the Project for incorporation into the EIS.

1.2 Economic Assessment Requirements

Economic Assessment requirements arise from the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and the Secretary's Environmental Assessment Requirements (SEARs). While there are no specific economic assessment guidelines for extractive industries, the *Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2018) provide guidance on the economic assessment techniques that are appropriate for addressing the requirements under the EP&A Act. The requirements are briefly outlined below.

Environmental Planning and Assessment Act 1979

Section 4.15 of the EP&A Act requires the following two matters to be taken into consideration by the consent authority in determining a development application:

- the public interest (taken as the collective public interest of households in NSW).
- the likely impacts of the development, including environmental impacts on both the natural and built environments, and social and ***economic impacts in the locality***.

Economic Assessment Guidelines

The NSW Government (2015) Guideline provides information to assist applicants with providing the necessary economic information to meet the abovementioned requirements of section 4.15 of the EP&A Act. The Guideline identifies that:

- Cost Benefit Analysis (CBA) is used to assess the public interest by estimating the net present value of a project to the NSW community.
- Local Effects Analysis (LEA) is used to assess the likely economic impacts of the development in the locality. The Guideline identifies a specific method for assessing the direct local effects of a project. However, it also states that "*a range of techniques are available for estimating second round or flow-on effects. These include CGE (computable general equilibrium) modelling, Input-Output (IO) or multiplier analysis.*"

The NSW Government (2018) Technical Notes provides guidance on incorporating environmental, social, and cultural impacts in the CBA.

Secretary's Environmental Assessment Requirements

The SEARs for the Project dated 18 December 2025 require:

> a detailed assessment of the likely economic impacts of the development, paying particular attention to:
>
> - the significance of the resource;
> - the costs and benefits of the Project; identifying whether the development as a whole would result in a net benefit to NSW including consideration of fluctuation in commodity markets and exchange rates [sic]; and
> - the demand for the provision of local infrastructure and services."

Proposed Economic Assessment Methods

To meet the above requirements, two types of economic assessment of the Project are needed:

- a Cost Benefit Analysis.
- a Local Effects Analysis.

1.3 Structure of the Report

This report is structured as follows:

- Section 2 identifies the significance of the resource.
- Section 3 provides a CBA of the Project.
- Section 4 provides an overview of the regional economy.
- Section 5 provides a LEA of the Project.
- Section 6 identifies measures to manage economic impacts.
- Conclusions are provided in Section 7.

The individual SEARs requirements relevant to this Economic Assessment and where they are addressed in this report are provided in Table 1.1.

Table 1.1 SEARs Relating to the Economic Assessment

Assessment requirement from SEARs	Section of report where addressed
• the significance of the resource;	Section 2.0
• the costs and benefits of the Project; identifying whether the development as a whole would result in a net benefit to NSW	Section 3.0
• the demand for the provision of local infrastructure and services	Section 5.0. Also see the Social Impact Assessment

2 SIGNIFICANCE OF THE RESOURCE

Demand for sand is a derived demand. That is, demand for sand is dependent on there being a demand for some other product, such as glass, concrete, cement, asphalt, and construction materials, which in turn is dependent on demand for construction and population growth. With the significant increase in approved infrastructure projects in Sydney and other parts of NSW, the leading suppliers of sand are under pressure to meet this increased demand.

While there is strong and growing demand for sand products, their supply is limited to locations close to market, in specific areas where the required geological formations exist, and it is economic to extract. The Bobs Farm Sand Quarry is one of these locations.

A shortage in the supply of construction sand for the Sydney market has been predicted for many years as access to local onshore sources of construction sand has become increasingly difficult through resource depletion e.g. Penrith Lakes and increasing land use constraints surrounding potential alternative sources. The depletion of the sand resource at Newcastle Sand's existing Cabbage Tree Road, Williamtown sand quarry will add to the shortage of supply with associated price increases that flow through into building costs and house and infrastructure prices.

The Project will offset the loss of available sand resource from the Cabbage Tree Road sand quarry, through the extraction of up to 530,000 tonnes per annum (estimated 4.4 million tonnes in total) of high-quality sand resource from the Bobs Farm Sand Quarry.

Annual demand in the Greater Sydney Region (GSR) for natural sand in 2018 was estimated at approximately 5.9 Mt, with in the order of 38% produced from quarries located in the Stockton/Salt Ash/Williamstown area and Central Coast (Corkery, 2019). Proposed annual production from the project is approximately 9% of this annual demand, although part of production also services local/regional markets.

The sand quarry industry in NSW is highly concentrated, with a small number of major players controlling much of the market, which can limit competition and influence pricing. Smaller operators such as Newcastle Sand provide an essential counterbalance by offering local supply options, reducing transport costs, and introducing flexibility and responsiveness that large corporations often lack. Their presence helps maintain competitive pricing, ensures supply security, and fosters innovation, making them a critical component of a diverse and resilient construction materials market.

3 COST BENEFIT ANALYSIS

3.1 Introduction

CBA of the Project involves the following key steps:

- identification of the "with" and "without" Project scenarios.
- identification and valuation of the incremental benefits and costs of the Project relative to the "without" scenario or 'base case".
- consolidation of value estimates using discounting to account for temporal differences.
- application of decision criteria.
- sensitivity testing.
- consideration of non-quantified benefits and costs.
- consideration of the distribution of costs and benefits.

What follows is a CBA of the Project based on technical, financial and environmental information provided by ADW Johnson and Newcastle Sand.

3.2 Identification of the "Without" Project Scenario

A starting point for CBA is to establish the "without" Project scenario for the land impacted by the Project. This becomes the base case against which to assess the potential economic, social, and environmental impacts of changes due to the Project.

Without the Project, the land impacted by the Project would continue to be used for agriculture (olive and fig plantation) and as undeveloped land with vegetation.

3.3 Identification of the "With" Project Scenario

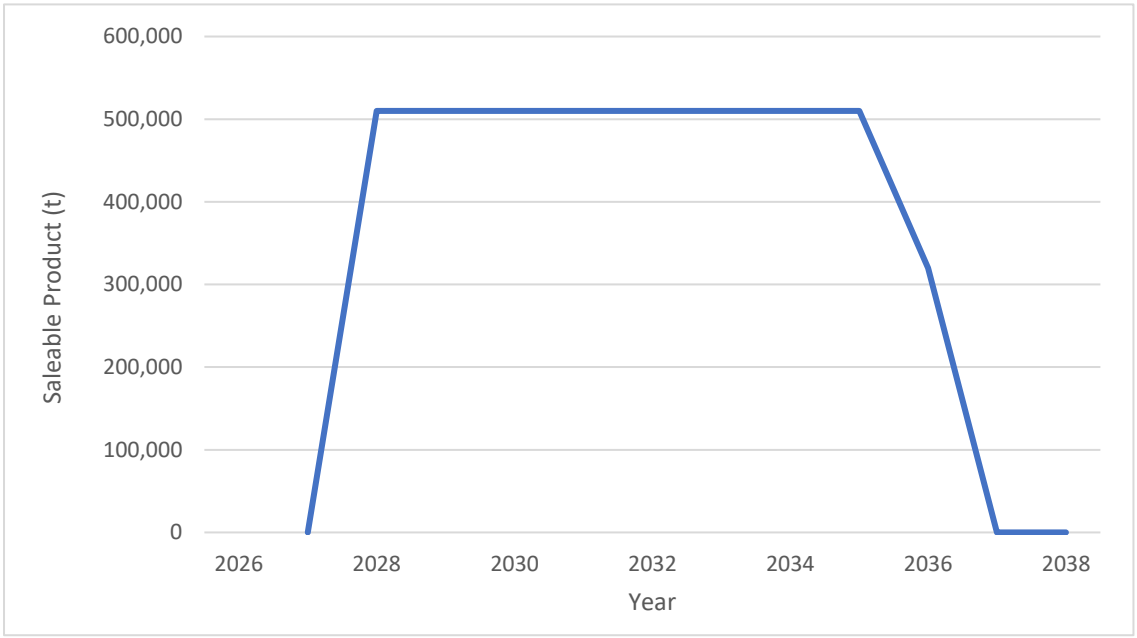
"With" the Project, there would be a progressive ramp up of production of sand to a limit of 530,000 tpa, with a total extraction over the quarry life of approximately 4.4 Mt. A summary of the key aspects of the Project are provided in Table 3.1.

Table 3.1 Summary of Key Project Aspects

Project Element	Description
Project life	10 years from commencement of operation
Infrastructure	Project-related infrastructure includes an extraction area, processing and stockpiling area, visibility barrier, infrastructure area and sediment and erosion control infrastructure.
Project site	An area of approximately 40.9ha which would incorporate all quarrying-related infrastructure.
Limit of Disturbance	Sand extraction will impact an area of 31.4 ha.
Resource	Approximately 4.4Mt of high-quality sand resource
Extraction method	Surface excavation
Material processing	Screening and washing.
Annual production	Up to 530,000 tonnes per annum.
Project site access	Access to the site is proposed via the construction of a new left-in-left-out intersection from Nelson Bay Road and would be used as the only access to and from the site.
Site infrastructure	Screening and sand washing, raw sand stockpile areas, processed product storage areas, loading zones for trucks, internal haul roads and upgraded site access. site office and staff amenities, weighbridge for load management, water management systems.
Product transportation	Sales would be by haulage truck at a maximum of ten (10) loaded trucks per hour equating to a maximum of 120 loaded trucks per day but with an average of 46 loaded trucks per day. All transport trucks would travel east along Nelson Bay Road and complete a U-turn at the Port Stephens Drive roundabout. Haulage trucks will be prohibited from using Marsh Road.
Rehabilitation	Progressive rehabilitation to include revegetated areas and land suitable for extensive agriculture.

Figure 3.1 illustrates the indicative incremental production of the Project relative to the base case.

Figure 3.1 – Indicative Incremental Production from the Project



Note: Approval is being sought for peak production of up to 530,000 tonnes per annum.

3.4 Identification of Benefits and Costs

Relative to the base case, or "without" Project scenario, the Project may have the potential incremental economic benefit and cost categories shown in **Table 3.2**. The scope of the CBA includes the delivery of saleable products to customers, since assessment of road transport impacts is a requirement of the SEARs.

It should be noted that the potential environmental, social, and cultural costs listed in **Table 3.2** are only economic costs to the extent that they affect individual and community well-being through direct use of resources by individuals or non-use. If the potential impacts do not occur or are mitigated, compensated or offset to the extent where community wellbeing is insignificantly affected (i.e. costs are borne by the Applicant), then no residual environmental, social or cultural economic costs should be included in the Project CBA apart from the mitigation, compensation or offsetting costs.

Table 3.2 - Potential Incremental Economic Benefits and Costs of the Project

Category	Costs	Benefits
Net production benefits from extraction and processing	• Opportunity cost of land • Opportunity cost of capital • Capital costs • Operating costs at quarry gate • Decommissioning and rehabilitation costs at cessation of the Project	• Sale value of quarry product at quarry gate • Residual value of capital and land at the end of the Project
Net production benefits from ex-quarry transport	• Capital and operating costs	• Revenues
Potential environmental, social and cultural impacts of extraction, processing and transportation, after mitigation, offsetting and compensation	• Air quality impacts • Greenhouse gas generation • Noise impacts • Road transport impacts • Groundwater impacts • Surface water impacts • Biodiversity impacts • Aboriginal heritage impacts • Historic heritage impacts • Visual impacts • Net public infrastructure costs • Loss of surplus to other industries	• Economic benefits to existing landholders • Economic benefits to suppliers • Wage benefits to employment

Framed in another but equivalent way, the potential incremental costs and benefits of the Project are as per **Table 3.3**.

Table 3.3 - Alternative Frame of Potential Economic Benefits and Costs of the Project

Costs	Benefits
Direct costs	***Direct benefits***
Nil	Net production benefits from extraction and processing • *Company tax* • *Net producer surplus* Net production benefits from ex quarry transport • *Company tax* • *Net producer surplus*
Indirect costs	***Indirect benefits***
Environmental, social, and cultural impacts of extraction, processing and transportation, after mitigation, offsetting and compensation	Economic benefits to existing landholders
Net public infrastructure costs	Economic benefits to suppliers
Loss of surplus to other industries	Wage benefits to employment

3.5 Quantification/Valuation of Benefits and Costs

Consistent with NSW Government (2015), the CBA was undertaken in 2025 real values, with discounting at 7 percent (%) and sensitivity testing at 4% and 10%.

The analysis period is 11 years, coinciding with the proposed duration of the development consent plus two years pre-commencement of operations. Any impacts that occur after this period are included in the final year of the analysis as a terminal value. Capital costs are assumed to occur in 2027.

Where competitive market prices are available, they have generally been used as an indicator of economic values. Environmental, cultural, and social impacts have initially been left unquantified and interpreted using the threshold value method.[2]

Environmental, cultural, and social impacts were then estimated using market data and benefit transfer[3] and incorporated into an estimate of the net social benefit of the Project. This estimated net social benefit of the Project provides another threshold value that any residual or non-quantified economic costs would need to exceed to make the Project questionable from an economic efficiency perspective.

3.5.1 Production Costs and Benefits of Extraction and Processing[4]

Opportunity Cost of Land and Capital

There is an opportunity cost associated with using land for the Project instead of its current use. Under the base case scenario, the land would continue to be used for agricultural purposes and as undeveloped land with vegetation. The value of this land in this alternative use is estimated at $1.2M based on NSW Valuer Generals land valuation.

Capital equipment from Newcastle Sand's existing quarry at Cabbage Tree Road, Williamtown NSW, will be utlised in the Project. The use of this equipment in the Project, instead of sale, has an opportunity cost, estimated at $2M.

Capital Cost of the Project

Capital costs of the Project are associated with establishment of site infrastructure, construction of the new access from Nelson Bay Road, progressive development of staged extraction areas and biodiversity offset costs. These capital costs over the life of the Project are estimated at $24MM.[5]

Annual Operating Costs of the Project

The quarry operating costs include those associated with labour costs, extraction, washing, progressive rehabilitation, general costs (including overheads and administration) and ongoing environmental, social, and cultural management and mitigation costs. Operating costs have not been reported for reasons of commercial confidentiality.

Decommissioning and Rehabilitation Costs

The site would be progressively rehabilitated to the approved landform with these costs included in the capital costs of the Project. At the end of the Project life the site would be decommissioned and rehabilitated These costs are estimated at $0.4M and included in the final year of the analysis.

Revenues

The main economic benefit of the Project is the market value of the sand products produced. An average unit price at the quarry gate has been applied to the output of the quarry based on advice from Newcastle Sand. This unit price has not been reported for reasons of commercial confidentiality.

[2]The threshold value method uses the value of quantified net production benefits as the amount that unquantified environmental, social and cultural costs would need to exceed to make a project questionable from an economic efficiency perspective.
[3] Benefit transfer refers to transferring economic values that have been determined for other study sites.
[4] All values reported in this section are undiscounted unless specified.
[5] Capital costs exclude GST and escalation. GST is recouped and the CBA is in real values.

There is uncertainty around future price of sand products and hence assumed values have been subjected to sensitivity testing (see Section 3.8).

Residual Value at End of the Evaluation Period

At the end of the Project, the land and capital equipment required for the Project may have some residual value. These have been assumed at $1.2m and $3M, respectively.

3.5.2 Production costs and benefits of product transport

The costs and benefits of quarrying considered in Section 3.5.1 include costs and revenues/benefits of activities up to the quarry gate. Since product transport externalities are a consideration of the EIS, economic benefits associated with transportation of quarry product to customers also needs to be considered. These net production benefits essentially relate to the net revenue that accrues to transport providers.

The annual net production benefit of product transport has been estimated based on the assumed incremental quarry production, average transport revenue of $22 per tonne and 9%[6] of total revenue to transport providers being net revenue.

3.5.3 External Costs and Benefits

The environmental, social, and cultural impacts of the Project are assessed in the EIS. This Section considers these impacts from an economic perspective.

Air Quality

The impact of the Project emissions can potentially be valued using the:

- the property value method, where the change in property value as a result of the air quality impacts are estimated.
- the cost of illness method where changes in health episodes as a result of emissions are estimated.
- the willingness to pay of impacted people to avoid the impacts.
- the defensive expenditure method, where the costs of mitigation are estimated.

However, the Air Quality Assessment the results of the modelling have shown that the TSP, PM10, PM2.5, RCS and dust deposition predictions comply with the relevant criteria and averaging periods at all sensitive receptors modelled for the Project in isolation.

TSP, RCS, dust deposition and annual average PM10 and PM2.5 predictions are also less than criteria for the Project including background at all sensitive receptors modelled. Whilst the 24-hour average PM10 and PM2.5 predictions are above the criteria, the exceedances are driven by the elevated background adopted for the assessment, which are already above their respective criteria. No additional exceedances of the criteria at these receptors are predicted to occur as a result of the proposed quarry operations. Additionally, a range of mitigation and management measures are provided and recommended to be implemented to minimise emissions as far as is practical, including the implementation of air quality monitoring. In the absence of the elevated background therefore, we would anticipate no exceedances of

[6] Based on the ratio of gross operating surplus to revenue for the road transport sector in the 2022-23 National Input-Output Table, adjusted for mixed income.

the criteria. As specified in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, under these circumstances no additional assessment is therefore required at these receptors.

Consequently, residual air quality impacts are considered to be immaterial from an aggregate economic efficiency perspective, and no economic costs are included in the CBA apart from the costs of proposed general mitigation and monitoring measures.

Greenhouse Gas

The greenhouse gas assessment concluded that the Project would be associated with approximately 2,170 tonne (t) of carbon dioxide equivalent (CO_2-e) emissions per annum.

To place an economic value on CO_2-e emissions, a shadow price of CO_2-e is required. The NSW Treasury (2023) Guide recommends using prices from the European Union Emissions Trading Scheme (EUETS). The Technical Note to the Guide (NSW Treasury 2023b) provides an Australian dollar value estimate for the year 2023 of $123/t CO2-e increasing in real terms by 2.5% per annum.

The EUETS permit price is an "exchange price" that reflects the regulations and rules of the trading scheme. It is also a financial price rather than an economic value i.e. no real resources are exchanged for payment. This price is therefore far removed from the appropriate value for CBA which is the value of emission impacts to the households and businesses that would feel the impacts. Notwithstanding, in an efficiently designed scheme the permit price may be a proxy for the global damage cost of carbon (i.e. the cost of carbon emissions to the population of the whole world).

Consistent with the NSW Government (2015) Guidelines, and NSW Government (2018) Technical Notes, the focus of CBA is on costs and benefits to the population of NSW. In the absence of any studies that have focused on the social damage cost of carbon emissions to NSW residents, some means of apportioning global damage costs borne by Australians is required. For the Economic Assessment, this has been undertaken using Australia's share of the global population (around 0.32%) and NSWs share of the Australian population (32%). NSW DP&E has previously supported this approach (NSW DP&E, 2017).

On this basis, the present value of the cost of greenhouse gas emissions from the Project to Australia and NSW is estimated at $8,000 and $2,500 dollars (present value), respectively.

Noise and Vibrations

The impact of the Project noise and vibration on nearby receptors can potentially be valued using the property value method, where the change in property value because of the noise impacts are estimated, or the defensive expenditure method and damage cost method where the costs of mitigation are estimated.

The Noise and Vibration Impact Assessment, undertaken in accordance with the SEARs, identified that:

- Construction activities have the potential to exceed noise-affected levels at a limited number of nearby sensitive receivers during some stages and under adverse meteorological conditions. These impacts would be temporary and manageable through standard construction hours and implementation of a Construction Noise and Vibration Management Plan.
- Operational noise from the quarry is predicted to comply with applicable day-time and night-time noise criteria at most nearby sensitive receivers. Potential exceedances are predicted at a small number of the closest receivers during later extraction stages in the absence of mitigation. A staged

verification approach, including an operational hold point following Stage 2 and refinement of mitigation measures, is proposed to ensure ongoing compliance.

- Additional heavy vehicle movements on Nelson Bay Road would result in negligible increases in traffic noise levels (generally up to approximately 0.3 dB(A)). Predicted traffic noise impacts comply with the NSW Road Noise Policy and are not expected to be perceptible.
- Construction and operational vibration levels are predicted to comply with human comfort criteria and cosmetic building damage thresholds at all nearby sensitive receivers.

Consequently, impacts are immaterial from an aggregate economic efficiency perspective and no economic costs are included in the CBA apart from the costs of proposed general mitigation and monitoring measures.

Road Transport Impacts

Road transport associated with the Project could be associated with several potential externalities including capacity and safety issues on the road network and local road wear and tear.

However, it is proposed that all heavy vehicle access to and from the Quarry would be via a new access point off Nelson Bay Road that allows left in and left out movements. This access will be designed and constructed by the Applicant in accordance with TfNSW and Council requirements. The trucks access routes were reviewed for impacts on other road users and road safety and the proposed access routes can operate in a safe and efficient manner with minimal delays for other road users.

The cumulative impacts will be negligible with this quarry designed to replace the existing Cabbage Tree Road quarry which is reaching the end of its life with the truck movements of one replacing those of the other.

The overall conclusion from the investigations is that traffic and access arrangements for the development proposal are satisfactory and that there is no traffic or access impediments to the development.

Consequently, the road transport externality costs of the Project have been internalised into the costs of the Project. The required capital works are included in the capital costs of the Project. There are no material residual road transport externality costs for inclusion in the CBA.

Surface Water and Groundwater

Use of any surface water or groundwater for the project can have an opportunity cost equivalent to its value in alternative uses. Adverse water quality impacts on surface water or groundwater resources or interference with water flows causing flooding can also have an externality cost. Interference with groundwater aquifers can also potentially have economic externality effects. However, the Surface Water Assessment identified that:

- the proposed surface water and sediment and erosion controls for the quarry development will result in minimal impacts to the surrounding environment.
- the quarry will not intersect groundwater and thus the impact to aquifers is considered negligible.
- there are no watercourses on the site, and none are proposed to be constructed.
- rainwater water received over the disturbed surfaces will infiltrate the sandy soils and recharge the groundwater with negligible change to the downstream flows and riparian communities.
- the proposed quarry extraction nearby the part of the site mapped as being subject to the 1% AEP will cease at the 8.5m AHD contour and batter down into the quarry pit. As a result the proposal will not increase the area of 1%AEP flooding at the site.

- adequate water supply can be provided by an existing 40 ML/yr Water Access Licence (WAL) from an onsite groundwater bore ie.
- a WAL will not be required for retention of surface water on the site.
- rainwater from the roof of the portable office and amenities will be collected in tanks to supplement the potable water requirements for this infrastructure.
- the amenities block waste will be self-contained and emptied by a licenced contracted as required
- the final landform will be a self-contained depression, where surface water captured will infiltrate the sandy soils.[7] There will be no surface water drainage lines leading off-site in the final landform that could impact the downstream environment.

Consequently, there are no material externality impacts for inclusion in the CBA, apart from the opportunity cost of the Application continuing to hold the 40 ML/yr WAL for the duration of the Project. This opportunity cost is assumed at $1,000 per ML i.e. $40,000 in 2027, with a residual value of $40,000 at the end of the project.

Biodiversity Impacts

The proposed development includes a number of avoidance and impact minimsation measures. However, residual impacts would include on:

- PCT 3544: Coastal Sands Apple-Blackbutt Forest (Mod-Good) – 24.50 ha
- PCT 3544: Coastal Sands Apple-Blackbutt Forest Regen) – 1.00 ha
- Exotic Vegetation – 1.87 ha
- Exotic Grassland – 5.77 ha
- Masked Owl (Tyto novaehollandiae) – 24.50 ha
- Powerful Owl (Ninox strenua) – 24.50 ha
- Squirrel Glider (Petaurus norfolcensis) – 24.50 ha
- Koala (Phascolarctos cinereus) – 24.50 ha

Offsets are required because of the residual impacts to vegetation and threatened species (and/or their habitat) in accordance with the Biodiversity Assessment Method.

From an economic perspective, the impacted vegetation, and associated fauna, is likely to have non-use values to the community that would be lost as a result of the Project. These values could potentially be estimated using non-market valuation methods. However, it is government policy that biodiversity offsets are provided that improve or at least maintain biodiversity values on a 'no net loss' principle. The provision of offsets is therefore likely to have non-use values to the community that would be gained as a result of the Project. On the basis that the NSW offset policy works on the principle of 'no net loss', no additional economic costs warrant inclusion in the CBA apart from the costs of providing offsets. An allowance for biodiversity offset costs has been included in the capital costs of the Project.

Aboriginal Heritage

Impacts on Aboriginal cultural heritage can have use and non-use values to both Aboriginal and non-Aboriginal people that can be potentially estimated using nonmarket valuation methods such as choice modelling.

The Aboriginal Cultural Heritage Assessment identified that the project will directly and totally impact five sites previously registered with the AHIMS. These sites comprise disturbed, low-density surface shell material with no substantial subsurface components. They have been assessed as having low scientific

[7] There will be no water bodies remaining in the final landform.

significance, being well represented locally and regionally, in poor condition, and retaining negligible research potential. Consequently, there are no material residual economic externality costs for inclusion in the CBA.

Historic Heritage

Impacts on historic heritage can potentially have non-use values to the community, that can potentially be estimated using nonmarket valuation methods such as choice modelling. However, no statutory historic heritage items, historic archaeological relics, or areas of confirmed archaeological sensitivity occur within the Project area. The proposal is assessed as resulting in little or no heritage impact. Consequently, there are no economic externality costs for inclusion in the CBA.

Visual Impacts

Visual impacts can potentially be estimated using the defensive expenditures method or property valuation method. However, the Visual Impact Assessment (VIA) identified that given the limited scale of the quarry, the surrounding vegetation screening and the relatively low elevation of the proposed disturbance area, the project is not expected to result in significant visual impacts on surrounding landowners or public vantage points. Consequently, there are no material residual economic externality costs for inclusion in the CBA.

Net Public Infrastructure Impacts

No net infrastructure costs to government are envisaged as a result of the Project. As identified above, the proposed access road will to be paid for by the Applicant. Given that employment for the Project will be filled by existing residents of NSW no additional demand for community infrastructure is envisaged.

Loss of Surplus to Other Industries

No loss of surplus to other industries is envisaged as a result of the Project.

Economic Benefits to Existing Landholders

All land required for the Project is owned by the Applicant. Benefits to the landholder are captured with the estimated net production benefits of the Project.

Economic Benefits to Suppliers

The focus of CBA is generally on primary costs and benefits i.e. first round impacts. In competitive markets, there are no real secondary benefits and costs either to suppliers to a project or purchasers of a project's output.[8] Conservatively, this convention is adopted and hence no secondary benefits to the economy are included in the CBA.

Market Benefits to Workers

The Project, when operating at full production, will result in employment of 15 full time equivalent (FTE) people in quarrying and processing operations, and 40 people in road transport i.e. 50 FTE in total.

[8] There are no net benefits to suppliers because in a competitive market, all resources are fully employed so increases in net benefits to suppliers will be offset elsewhere in the economy from the withdrawal of resource that allow the suppliers to increase their production. There are no net benefits to purchasers because in a competitive market, competition in the purchasing of the project output will result in no net income to the purchaser and the project fully capturing the marginal value product (Sinden and Thampapillai, 1995, p. 57).

As identified in the NSW Government (2015) Guideline, there may potentially be wage benefits associated with employment. Notwithstanding, there is considerable controversy about the measurement and inclusion of these benefits in NSW CBAs. Consequently, for the purpose of the CBA analysis, wage benefits have conservatively been left unquantified. Wage benefits are considered further in the LEA.

3.6 Consolidation of Value Estimates

3.6.1 Net Production Benefits

The present value of production costs and benefits, using a 7% discount rate, is provided in **Table 3.4**.

Based on the assumptions in Section 3.5, the Project is estimated to have net production benefits of $24M (present value at 7% discount rate), comprising $19M in quarrying net production benefits and $6M in ex-quarry transport benefits.

The net production benefits can be further apportioned to Australia and NSW based on Newcastle Sand being 100% NSW owned, an assumption that transport providers are 100% NSW owned, and company tax benefits (at a rate of 25%[9]) accruing to NSW based on its population share i.e. 32%. On this basis, the net production benefits of the Project that accrue to Australia and NSW are estimated at $24M and $20M (present value at 7% discount rate), respectively.

The estimated net production benefits that accrue to Australia and NSW can be used as a minimum threshold value or reference value against which the relative value of the residual environmental impacts of the Project, after mitigation, may be assessed. This threshold value is the opportunity cost to society of not proceeding with the Project. It is a minimum threshold value as it does not include any potential wage benefits, any potential benefits to suppliers, any allowance for real price rises for quarry product as future demand outstrips limited supply.

Provided the value of the residual environmental impacts of the Project, to Australian and NSW households, after mitigation, do not exceed the respective net production threshold values, then the Project will have net benefits to the Australian and NSW communities.

[9] To pay the 25% company tax rate in Australia (as of the 2024–25 income year), a company must qualify as a Base Rate Entity (BRE). The company and connected entities and affiliates must have an aggregated turnover of less than $50M and no more than 80% of the company's assessable income can be passive income.

Table 3.4 - Net Production Benefits of the Project ($M Present Values at 7% Discount Rate)

	Quarrying	Ex Quarry Transport	Total
Costs			
Opportunity cost of land	$1		
Opportunity cost of capital	$2		
Capital costs	$20		
Operating cost	$51	$56	
Decommissioning and rehabilitation costs	$0		
Sub-total	***$73***	***$56***	***$130***
Benefits			
Revenue	$90	$62	
Residual value of land	$1		
Residual value of capital	$1		
Sub-total	***$92***	***$62***	***$154***
Global Net Production Benefits	**$19**	**$6**	**$24**
Company Tax	$5	$1	$6
Residual Net Production Benefits	$14	$4	$18
Global Net Production Benefits	**$19**	**$6**	**$24**
Company Tax	$5	$1	$6
Residual Net Production Benefits	$14	$4	$18
Australian Net Production Benefits	**$19**	**$6**	**$24**
Company Tax	$1	$0.4	$2
Residual Net Production Benefits	$14	$4	$18
NSW Net Production Benefits	**$15**	**$5**	**$20**

*Differences in totals are due to rounding.

3.6.2 Externalities

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to qualitatively consider and where possible quantify the main environmental, cultural, and social impacts of the Project. **Table 3.5** summarises the results of the consideration of externalities in Section 3.5.3. Only GHG impacts differ between the Australian and NSW scope, albeit in a minor way.

Table 3.5 – Externality Impacts of the Project ($M Present Values at 7% Discount Rate)

Benefits	**Australia**	**NSW**
Wage benefits to employment	Unquantified	
Economic benefits to existing landholders other than Newcastle Sand	No impact	
Economic benefits to suppliers	Unquantified	
Sub-total		
Costs		
Greenhouse gas emissions (Scope 1 and 3)	$0.01	$0.002
Air quality	Meets relevant criteria - no material residual impact	
Noise and vibration	Meets relevant criteria with appropriate management – no residual material impact	
Road transport	Cost of new access point off Nelson Bay Rd included in capital costs No material residual impact	
Surface water	No material residual impact	
Groundwater	Opportunity cost of WALs - $0.02 No material residual impact	
Biodiversity	Impacts on biodiversity are offset – cost of offsets included in capital costs	
Aboriginal heritage	No impact to high significance items. Cost of mitigation included in capital costs.	
Historic heritage	No impact	
Visual	No material residual impact	
Net public infrastructure costs	No impact	
Loss of surplus to other industries	No impact	

From Section 3.5.3, it is evident that the main potential impacts of the Project are internalised into the production costs of the Project through access road construction, biodiversity offsets, and mitigation measures. Other quantified costs not already included in the production costs of the Project are associated with greenhouse gas costs and the continued holding of water allocations although from **Table 3.5** it is evident that these impacts to Australia and NSW are small or immaterial.

3.6.3 Net Social Benefits to Australia and NSW

The main decision criterion for assessing the economic desirability of a project to society is its net present value (NPV). NPV is the present value of benefits less the present value of costs. A positive NPV indicates that it would be desirable from an economic perspective for society to allocate resources to the Project, because the community as a whole would obtain net benefits from the Project.

The results from **Table 3.4** and **Table 3.5** are combined in **Table 3.6** to estimate the net social benefits of the Project to Australia and NSW, relative to the base case.

Table 3.6– Net Social Benefits of the Project ($M present value @ 7% discount rate)

Benefits	Australia	NSW
Net Production Benefits Quarrying		
Company Tax	$5	$1
Residual Net Production Benefits	$14	$14
Sub-total	***$19***	***$15***
Net Production Benefits Ex-Quarry Transport		
Company Tax	$1	$0.4
Residual Net Production Benefits	$4	$4
Sub-total	***$6***	***$5***
Other Benefits		
Economic benefits to existing landholders other than Newcastle Sand	No impact	No impact
Economic benefits to suppliers	Unquantified	Unquantified
Wage benefits to employment	Unquantified	Unquantified
Sub-total	***Unquantified***	***Unquantified***
Total Benefits	**$24**	**$20**
Costs		
Greenhouse gas emissions	$0.01	$0.002
Air quality	Meets relevant criteria - no material residual impact	
Noise and blasting	Meets relevant criteria with appropriate management – no residual material impact	
Road transport	Cost of new access point off Nelson Bay Rd included in capital costs No material residual impact	
Surface water	No material residual impact	
Groundwater	Opportunity cost of WALs - $0.02 No material residual impact	
Biodiversity	Impacts on biodiversity are offset – cost of offsets included in capital costs	
Aboriginal heritage	No impact to high significance items. Cost of mitigation included in capital costs.	
Historic heritage	No impact	
Visual	No material residual impact	
Net public infrastructure costs	No impact	
Loss of surplus to other industries	No impact	
Sub-total	***$0.03***	***$0.02***
Net Social Benefits	**$24**	**$20**

Overall, the Project is estimated to have net social benefits to both Australia and NSW and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Project CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than approximately $24M and $20M for the Project to be questionable from an Australian and NSW economic efficiency perspective, respectively.

3.7 Distribution of NSW Costs and Benefits

CBA is primarily concerned with the single objective of economic efficiency. CBA and welfare economics provide no guidance on what is a fair, equitable or preferable distribution of costs and benefits. Nevertheless, CBA can provide qualitative and quantitative information for the decision-maker on how economic efficiency costs and benefits are distributed.

The costs and benefits of the Project to NSW are potentially distributed among a range of stakeholders as identified in **Table 3.7**.

Table 3.7 - Incidence of NSW Costs and Benefits

BENEFITS AND COSTS	INCIDENCE OF COSTS AND BENEFITS	AUSTRALIA ($M)	NSW ($M)
Extraction and Processing Net Production Benefits			
Company tax (Newcastle Sand)	Australian and NSW Government and households	$5	$1
Residual net production benefits	Newcastle Sand	$14	$14
Transport Net Production Benefits			
Company tax (transport providers)	Australian and NSW Government and households	$1	$0.4
Residual net production benefits	Transport providers	$4	$4
Additional benefits			
Economic benefits to existing landholders other than Newcastle Sand	Owners of land (other than Newcastle Sand) used in the Project	No impact	No impact
Economic benefits to suppliers	Suppliers of inputs to production	Not quantified	Not quantified
Wage benefits to employment	People employed in extraction and road transport	Not quantified	Not quantified
Environmental, social, and cultural costs*			
Greenhouse gas emissions	Australian and NSW households	$0.01	$0.002
Air quality	Adjoining landholders	Meets relevant criteria - no material residual impact	
Noise and blasting	Adjoining landholders	Meets relevant criteria with appropriate management – no residual material impact	
Road transport	Users of local and arterial roads, Council and NSW Government	Cost of new access point off Nelson Bay Rd included in capital costs. No material residual impact	
Surface water	Other water users and Australian and NSW households	No material residual impact	
Groundwater	Other water users and Australian and NSW households	Opportunity cost of WALs - $0.02 No material residual impact	
Biodiversity	Australian and NSW households	Impacts on biodiversity are offset – cost of offsets included in capital costs	
Aboriginal heritage	Aboriginal people and Australian and NSW households	No impact to high significance items. Cost of mitigation included in capital costs.	
Historic heritage	Australian and NSW households	No impact	
Visual	Nearby landholders	No material residual impact	
Net public infrastructure costs	Australian and NSW Government	No impact	
Loss of surplus to other industries	Other local businesses	No impact	

* NSW regulations require many impacts to be borne by the Applicant via mitigation, offset and compensation. Where these measures perfectly mitigate, offset or compensate then no residual impacts occur, and all impacts are borne by the Applicant. This table identifies who bears residual impacts where mitigation, offset and compensation are imperfect.

3.8 Risk and Sensitivity Analysis

The main areas of environmental risk associated with Project relate to:

- the financial viability of a project from unexpected downturns in prices and any consequent environmental impacts from premature cessation of operations.
- ecological risk associated with whether the biodiversity offsets will adequately compensate for the direct ecological impacts.
- other environmental, social and cultural impacts estimations and required mitigation measures.

The Independent Planning Commission (formerly the Planning Assessment Commission) has previously identified that the financial viability of projects is a risk assumed by the project proponents (NSW PAC, 2018). Strong current and foreseeable demand for quarry products is likely to underpin the financial viability of the Project.

Any risks associated with funding rehabilitation costs in the event of early closure will be managed through lodgment of a security bond as required under the anticipated conditions of consent.

Risks associated with achieving intended biodiversity offsets requirements are assumed to be managed though the legislative scheme under the *Biodiversity Conservation Act 2016* which is managed by the NSW Government and through anticipated conditions of consent.

There is some risk associated with the estimation of environmental, social, and cultural impacts of the Project and the level of mitigation measures proposed. However, it should be noted that impacts have generally been assessed based on the maximum annual levels of production and hence are likely to be overstated. Ongoing monitoring will ensure that appropriate mitigation measures are implemented as required.

The NPV of the Project presented in **Table 3.6** is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a CBA can be dealt with through changing the values of critical variables in the analysis (James and Gillespie, 2002) to determine the effect on the NPV[10].

In this sensitivity analysis, the CBA results for NSW were tested for a 20% change to the following variables[11] at a 4%, 7% and 10% discount rate:

- Opportunity cost of land.
- Opportunity cost of capital.
- Quarry capital costs.
- Quarry operating costs.
- Quarry revenue.
- Residual value of land.
- Residual value of capital.
- Net transport revenue.
- Opportunity cost of WALs.
- Greenhouse gas emission costs.

[10] Quantitative risk analysis could also potentially be undertaken. However, this requires information on the probability distributions for input variables in the analysis. This information is not available and so the sensitivity testing is limited to uncertainty analysis.

[11] An assessment of sensitivity to exchange rate fluctuations as required by the SEARs is not applicable to this development as all product is sold for domestic use. Potential flow-on effects from exchange rates on supplies (e.g. fuel) or capital (e.g. equipment) are captured in the consideration of sensitivity to operating and capital costs

Results are reported in **Table 3.8**. What this analysis indicates, is that CBA results at the NSW level are most sensitive to sustained reductions in the value of quarry products and sustained increases in operating costs.

The strong demand for sand that underpins the Project, together with limits on financially viable supply in proximity to major markets, suggests that sustained reductions in sand product value is highly unlikely. Sustained reductions in the value of sand products, as assumed in the sensitivity analysis, is therefore highly improbable.

Operating cost estimates are based on detailed assessment of the geology, typical operating costs for quarries in this geological environment and the experience of Newcastle Sand at its nearby quarry at 398 Cabbage Tree Road, Williamtown NSW. Consequently, sustained increases in modelled operating costs, as assumed in the sensitivity analysis, are unlikely.

The sensitivity analysis also indicated that the CBA results are not sensitive to changes in other components of total costs and benefits of the Project, including greenhouse gas costs.

Under all scenarios examined, the Project has net social benefits to NSW at the central discount rate of 7%.

Table 3.8 - NSW CBA Results Sensitivity Testing ($M Present Value)

	4% Discount Rate	7% Discount Rate	10% Discount Rate
CENTRAL ANALYSIS	$27	$20	$15
INCREASE 20%			
Opportunity cost of land	$27	$20	$15
Opportunity cost of capital	$26	$20	$15
Quarry capital costs	$23	$17	$12
Quarry operating costs	$17	$12	$8
Final decommissioning and rehabilitation costs	$27	$20	$15
Value of quarry products	$45	$35	$27
Residual value of land	$27	$20	$15
Residual value of capital	$27	$20	$15
Net transport revenue	$28	$21	$16
Greenhouse gas emission costs	$27	$20	$15
Opportunity cost of WALs	$27	$20	$15
DECREASE 20%			
Opportunity cost of land	$27	$20	$15
Opportunity cost of capital	$27	$20	$15
Quarry capital costs	$30	$23	$18
Quarry operating costs	$37	$28	$22
Final decommissioning and rehabilitation costs	$27	$20	$15
Value of quarry products	$9	$5	$2
Residual value of land	$27	$20	$15
Residual value of capital	$26	$20	$15
Net transport revenue	$26	$19	$14
Greenhouse gas emission costs	$27	$20	$15
Opportunity cost of WALs	$27	$20	$15

GLOBAL GREENHOUSE GAS EMISSION COSTS	$24	$18	$13

4 THE REGIONAL ECONOMY

4.1 Introduction

This section characterises the regional economy from two perspectives, residents of the region and workers in the region.

4.2 Residents of the Region

Table 4.1 provides some characteristics of the usual residents of the regional economy based on the 2021 ABS Census of Population and Housing. In 2021, the region had a population of 75,276 and a labour force of 32,614, 0.9% and 0.8% of the population and labour force of NSW, respectively. The median age of the regional population was 47, compared to 39 for the NSW population. This reflects the higher proportion of the population aged 65+ in the region (25.9%) compared to NSW (17.7%). The region had a higher percentage of the population identifying as Aboriginal and/or Torres Strait Island (6.5%) than NSW (3.4%). The regional population had a lower level of educational attainment than NSW, with 13.7% holding a bachelor's degree or higher, compared to 27.8% for NSW.

In the 2021 Census, 5.0% of the total regional labour force (1,632 people) were unemployed compared to 4.9% of the labour force of NSW. The median weekly household income in the region was $1,372 compared to $1,829 for NSW. Median weekly rents in the region were $370 compared to $420 for NSW.

The main occupations of usual residents in the region (Figure 4.1) were Technicians and Trade Workers (17.1%), Professionals (15.5%), and Community and Personal Service Workers (14.0%). This compares to NSW where the main occupation of usual residents were Professionals (25.8%), Managers (14.6%), and Clerical and Administrative Workers (13.0%).

Figure 4.1 – Employment by Occupation of Usual Residents

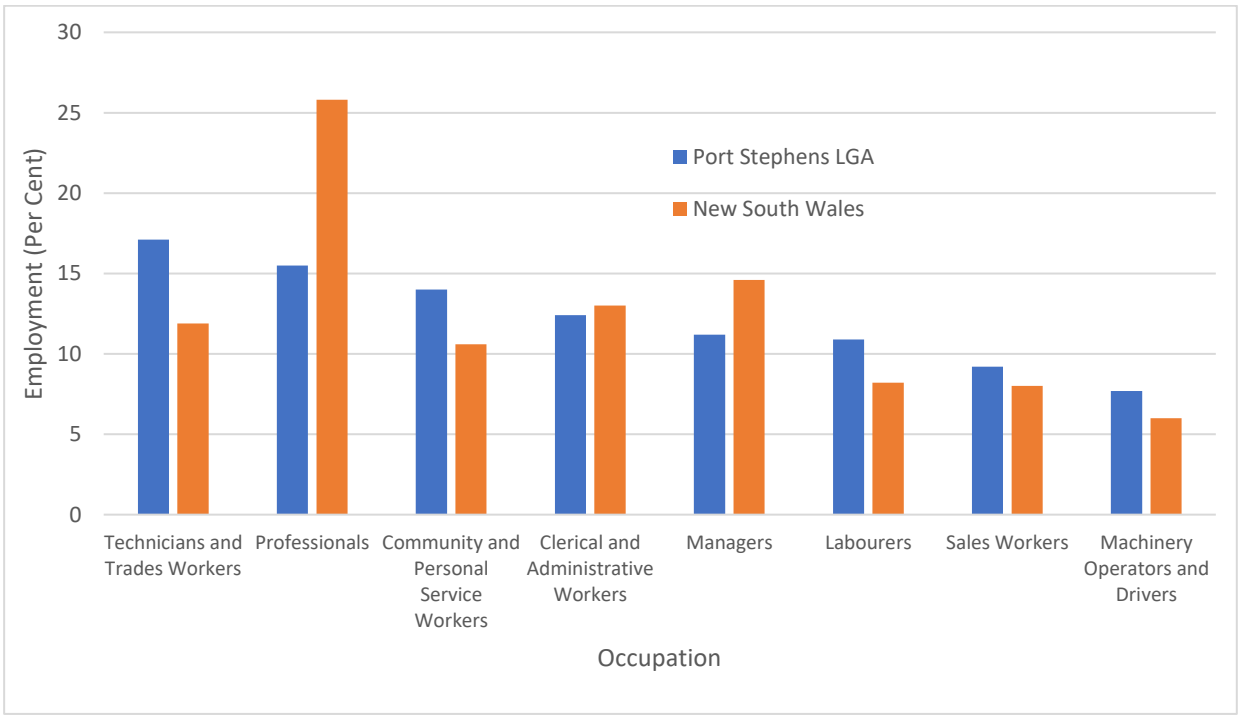


Table 4.1 - Characteristics of Usual Residents

		Port Stephens LGA		NSW	
Population		75,276		8,072,163	
% Aboriginal and/or Torres Strait Islanders		6.5		3.4	
Median Age		47		39	
% of population <15 years		17.1		18.2	
% of population 65+		25.9		17.7	
In labour force		32,614		3,874,012	
Unemployed	%	5		4.9	
	No.	1632		189852	
Labour force to population ratio		43.3		48.0	
Median household weekly income		$1,372		$1,829	
Unoccupied private dwellings	%	15.4		9.4	
	No.	5,236		299,524	
Median weekly rent		$370		$420	
Level of highest education attainment - 15+		**No.**	**%**	**%**	**No.**
Year 9 or below		6,094	9.8	487,855	7.4
Year 10		10,015	16.1	698,390	10.6
Year 12		7,037	11.3	954,987	14.5
Bachelor's degree and above		8,568	13.7	1,838,502	27.8
Occupations		**No.**	**%**	**No.**	**%**
Technicians and Trades Workers		5,310	17.1	436,589	11.9
Professionals		4,803	15.5	952,131	25.8
Community and Personal Service Workers		4,338	14.0	390,779	10.6
Clerical and Administrative Workers		3,840	12.4	480,612	13.0
Managers		3,472	11.2	536,820	14.6
Labourers		3,381	10.9	300,966	8.2
Sales Workers		2,848	9.2	294,889	8.0
Machinery Operators and Drivers		2,371	7.7	222,186	6.0

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Community Profiles

The main four-digit ANZSIC industry sectors in which usual residents were employed in 2021 is provided in Table 4.2. *Defence, Aged Care and Residential Services, Supermarket and Grocery Stores, Other Social Assistance Services* and *Takeaway Food Services*, were the most significant employment sectors for usual residents of the region.

Thirty-nine per cent of employed usual residents work outside the region, mainly in Newcastle (22%), Maitland (8%) and Lake Macquarie (4%) (REMPLAN, 2026).

Table 4.2 - Top 5 Industry Sectors of Employment for Usual Residents (Four Digit ANZSIC)

Port Stephens LGA	%	NSW	%
Defence	3.9	Hospitals (except Psychiatric Hospitals)	4.2
Aged Care Residential Services	3.4	Supermarket and Grocery Stores	2.5
Supermarket and Grocery Stores	3.2	Other Social Assistance Services	2.4
Other Social Assistance Services	3.1	Computer System Design and Related Services	2.3
Takeaway Food Services	2.7	Aged Care Residential Services	2.2

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Community Profiles

An indication of the health of an economy can be gained from population changes. This theory of regional economic growth suggests that places that can attract population immigration[12] create increased demand for goods and services and thus more jobs. This growth leads to increasing local multiplier effects, scale economies and an increase in the rate of innovation and capital availability (Sorensen, 1990). Conversely, population losses can contribute to a cycle of decline whereby reduced populations results in closure of services, which in turn makes it difficult to attract new populations (Sorensen, 1990).

Trends in regional economies of NSW because of globalisation and associated structural adjustment include:

- Loss of significant industries such as abattoirs and timber mills from many rural areas.
- Increased mechanisation of agriculture and aggregation of properties, resulting in loss of employment opportunities in this industry.
- Growth of regional centres at the expense of smaller towns.
- Preference of Australians for coastal living, particularly for retirement.
- Preference of many of today's fastest growing industries for locating in large cities (Collits, 2000).

The result is that there has been declining population growth rate in many rural LGAs that are in non-coastal areas in NSW. There has also been a decline in the population growth rate of smaller towns even in regions where the population has been growing.

Against this backdrop, it is evident that the population of the regional economy has been growing at an average annual rate of 1.4%% since 2006, compared to an average annual growth rate of 1.3% for NSW.

Table 4.3 - Population growth

	Population				Average Annual Growth Rate			
	2006	**2011**	**2016**	**2021**	**2006 - 2011**	**2011 - 2016**	**2016 - 2021**	**2006 - 2021**
Port Stephens LGA	62,132	67,214	71,115	75,282	1.6%	1.2%	1.2%	1.4%
NSW	6,742,690	7,218,529	7,732,858	8,093,815	1.4%	1.4%	0.9%	1.3%

Source: Australian Bureau of Statistics, 2023 Estimated Resident Population, Local Government Areas, Australia

The population of the region (Table 4.4) is predicted to grow at an average annual rate of 0.9%, less than that of NSW (1.2%) (NSW DoP, 2026).

Table 4.4 – Projected population growth

Local Government Area	2021	2041	Change	Annual %
Port Stephens LGA	75,328	88,721	13,393	0.89%
NSW	**8,097,062**	**10,070,467**	**1,973,405**	**1.22%**

Source: NSW Department of Planning (2026)

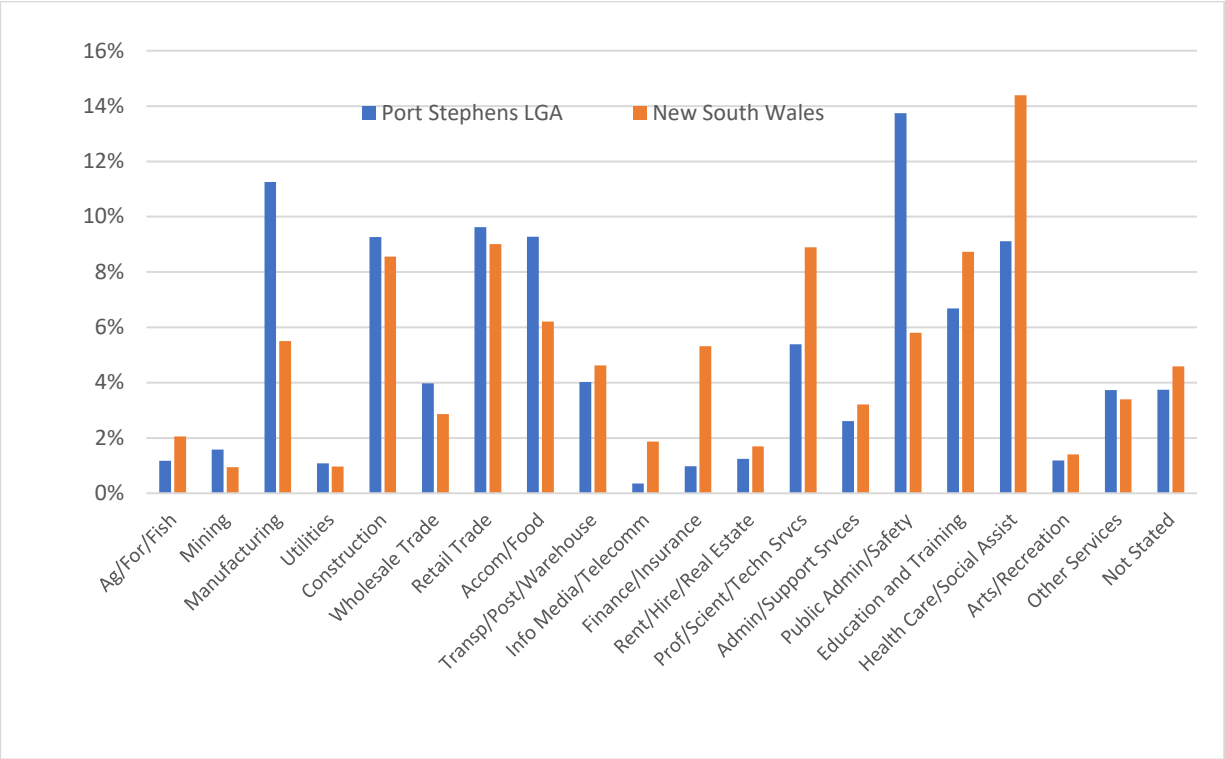
4.3 Economic Activity in the Region

An indication of the nature of the regional economy can be gained by examining one-digit ANZSIC place of work employment by industry data - refer to Figure 4.2. This indicates the significance of the *Public Administration and Safety, Manufacturing, Retail Trade, Accommodation and Food Services* and *Construction* sectors.

[12] Mainly due to natural endowments and comparative advantage in certain industry sectors.

Forty per cent of people who work in the region live outside the region, mainly in Newcastle (14%), Maitland LGA (10%), and Lake Macquarie LGA (9%) (REMPLAN, 2026).

Figure 4.2 - Place of work employment by industry (One-digit ANZSIC)



Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Working Population Profiles

At the more disaggregated level (place of work employment by four-digit ANZSIC) the main industry sectors of employment in the region are the *Defence, Supermarket and Grocery Stores, Aluminium Smelting, Takeaway Food Services* and *Other Specialised Industrial Machinery and Equipment Wholesaling* sectors.

Table 4.5 - Place of work Top 5 industry sectors of employment (Four-digit ANZSIC Sectors)

Port Stephens LGA	**%**	**NSW**	**%**
Defence	9.6	Hospitals (except Psychiatric Hospitals)	4.1
Supermarket and Grocery Stores	3.3	Supermarket and Grocery Stores	2.5
Aluminium Smelting	3.2	Other Social Assistance Services	2.4
Takeaway Food Services	2.7	Computer System Design and Related Services	2.3
Other Specialised Industrial Machinery and Equipment Wholesaling	2.6	Aged Care Residential Services	2.2

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Table Builder

Exporting sectors are based on a region's endowments and competitive advantages, and in regional economic development economics are the key drivers of the economy. The largest exporting industries (One-digit ANZSIC) are:

- *Manufacturing ($5,071 million)* mainly *Basic Non Ferrous Metal Manufacturing.*
- *Public Administration and Safety ($2,253 million)* mainly *Defence.*

- *Mining ($849 million)* mainly *Coal Mining.*
- *Construction ($376 million)* mainly *Construction Services.*
- *Accommodation and Food Services ($166 million)* mainly *Food and Beverage Services (REMPLAN, 2025).*

In combination these five industries accounted for $8,715 million in total or 93% of the total exports by industry in the region.

In terms of value-added, the ANZSIC one-digit industry sectors of *Public Administration and Safety, Rental, Hiring & Real Estate Services, Manufacturing, Mining and Construction,* had the highest value-added in total, equal to approximately 63% of the regional economy and 38% of regional employment - Table 4.6.

Table 4.6 - Gross value added for the 5 largest industries in the regional economy (ANZSIC One Digit)

Industry	Gross Value Added ($m)	Proportion of Regional Economy (%)	Proportion of Regional Employment (%)
Public Administration & Safety	1,493	22%	14%
Rental, Hiring & Real Estate Services	869	13%	1%
Manufacturing	724	10%	11%
Mining	664	10%	2%
Construction	633	9%	11%
Total	**$4,383**	**63%**	**39%**

Source: REMPLAN (2025)

5 LOCAL EFFECTS ANALYSIS

5.1 Introduction

The CBA in Section 3 is concerned with whether the incremental benefits of the Project exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Project compared to 'without' it. This section examines local effects. It focuses on the operational phase of the Project.

The local area is defined as the LGA of Port Stephens within which the Project is located and is the region considered likely to be main source of labour and non-labour inputs for the Project.

5.2 Direct Effects Related to Employment of Existing Residents Only

The Project will generate employment for approximately 15 full time equivalent (FTE) quarry workers and 40 transport jobs when operating at full production i.e. 55 FTE in total.

In estimating the effects related to local employment, the LEA method focusses on net income (net wages) that a project provides to the local area. It does this by focusing on the Project's employment that would ordinarily be resident in the locality and for these people estimating the net increase in income as the difference between income in the project compared to the average level of net income in the local area (i.e. what they might otherwise receive in an alternative job). The increase in net income is converted to net FTE jobs by dividing this incremental net income by the average net wage in the project. This is a minimum estimate as it assumes full employment in the region and hence employees ordinarily resident in the locality would always be employed in some capacity in the region, albeit at a lower wage, and the jobs in the region from which people come to fill the projects jobs remain vacant. On this basis, the net income to the local area and net jobs provided by the project are summarised in Table 5.1.

Table 5.1 - Analysis of Direct Jobs and Income

	Quarry	Transport	Total
a) Direct employment during operations phase (includes contractors)	15	40	55
Number that already reside in the region	10	19	28
b) Average after-tax income in sector	$84,858	$81,583	$166,441
c) Average after-tax income in other industries	$48,285	$48,285	
d) Average increase in net income per job (b-c)	$36,573	$33,298	
e) Increase in net income per year due to direct employment	$356,583	$622,357	$978,939
f) FTE (e/b)	4	8	12

5.3 Direct Effects Related to Non-Labour Expenditure

At full production, the total annual non-labour expenditure from the Project (operating costs of the Project after subtraction of wages) is $7.5M and $5.8M, respectively for quarrying and transport.

However, not all this expenditure will accrue to the local area. From a 2023 input-output table of the local area economy developed by Gillespie Economics, the percentage of this non-labour expenditure accruing to the local area is 49% and 54%, respectively i.e. $3.6M and $3.1M.

5.4 Second Round and Flow-On Effects

The expenditure by employees who reside in the local area, and non-labour expenditure that is captured by the local area, provides flow-on economic activity to the local economy.

Recognised methods for assessing regional economic impacts such as IO analysis (but also CGE analysis) are not limited to assessing direct employment and after-tax income effects to existing local residents as calculated above in accordance with the Guidelines (NSW Government, 2015). Instead, they initially focus on total employment working in the region and total wages generated in a region. They do utilise estimates of non-labour expenditure, however multiplier effects are not estimated in terms of non-labour expenditure but in terms of how this and labour (wage) expenditure contributes to the local area economy in terms of direct and indirect output, value-added, income and employment. This type of assessment is reported in the following section.

5.5 Regional Economic Impact Assessment

The direct and indirect economic impacts of the Project on the local area were assessed by:

- developing an IO table (regional transaction table) for the local area using the Generation of Regional Input Output Tables (GRIT) procedure developed by the University of Queensland.
- Identifying the direct impact or stimulus of the Project, in a form compatible with the IO equations, so that the IO multipliers and flow-on effects for the impacts or stimulus of the Project could then be estimated (West, 1993). The direct impact of the Project was estimated from data provided by Newcastle Sand and production ratios in the IO tables. Indirect effects were estimated using the *EconImp2* program.[13]

In this IO framework, the annual direct and indirect economic activity impacts in the local area from quarry operations, ex-quarry transport and in total are summarised in **Tables 5.2**, **5.3** and **5.4**, respectively.

Table 5.2 – Gross Annual Direct and Indirect Regional Economic Impacts of the Quarry

Indicator	Direct Impacts	Production Induced Flow-ons	Consumption Induced Flow-ons	Total Flow-ons	Total Impacts
Output ($M)	16	4	1	5	22
Type IIA Multiplier	1.00	0.28	0.06	0.33	1.33
Value Added ($M)	9	3	1	4	13
Type IIA Multiplier	1.00	0.36	0.09	0.46	1.46
Income ($M)	1.7	0.4	0.1	0.5	2.2
Type IIA Multiplier	1.00	0.21	0.06	0.27	1.27
Employment (No.)	15	9	3	11	26
Type IIA Multiplier	1.00	0.57	0.18	0.75	1.75

[13] The *EconImp2* program uses the Leontief Inverse Matrix and marginal technical coefficients to estimate indirect effects.

Table 5.3 – Gross Annual Direct and Indirect Regional Economic Impacts of Ex-Quarry Transport

Indicator	Direct Impacts	Production Induced Flow-ons	Consumption Induced Flow-ons	Total Flow-ons	Total Impacts
Output ($M)	11	4	2	5	17
Type IIA Multiplier	1.00	0.35	0.14	0.48	1.48
Value Added ($M)	5	3	1	4	9
Type IIA Multiplier	1.00	0.52	0.24	0.76	1.76
Income ($M)	4.4	0.3	0.2	0.5	4.9
Type IIA Multiplier	1.00	0.07	0.04	0.11	1.11
Employment (No.)	40	7	4	12	52
Type IIA Multiplier	1.00	0.19	0.11	0.29	1.29

Table 5.4 – Gross Annual Direct and Indirect Regional Economic Impacts of Quarrying and Transport

Indicator	Direct Impacts	Production Induced Flow-ons	Consumption Induced Flow-ons	Total Flow-ons	Total Impacts
Output ($M)	27	8	3	10	39
Type IIA Multiplier	1.00	0.29	0.09	0.38	1.42
Value Added ($M)	14	6	2	8	22
Type IIA Multiplier	1.00	0.40	0.16	0.56	1.56
Income ($M)	6	1	0	1	7
Type IIA Multiplier	1.00	0.12	0.04	0.16	1.16
Employment (No.)	55	16	7	23	78
Type IIA Multiplier	1.00	0.30	0.13	0.41	1.41

5.6 Other Effects

5.6.1 Regional Economic Impacts of Displaced Agriculture

The subject land is used for agriculture (olive and fig plantation) and as undeveloped land with vegetation. The local area economic activity associated with olive and fig plantation would be negligible relative to the economic activity associated with the Project.

5.6.2 Other Wage Impacts

In the short term, increased local demand for labour as a result of the Project (relative to the "without Project" scenario) could potentially result in some increased pressure on wages in other sectors of the economy. The magnitude and duration of these upward wages pressure would depend on the level of demand for labour, the availability of labour resources in the local area and the availability and mobility of labour from outside the local area. However, given the scale of the Project employment and the availability of labour inside and outside the local area, wage impacts would be negligible. Where upward pressure on local area wages occurs, it represents an economic transfer between employers and owners of skills and would in turn attract skilled labour to the region leading to future downward pressure on wages.

5.6.3 Housing Impacts

The Project will largely continue to provide employment for the existing workers at Cabbage Tree Road Quarry and so is not expected to result in any in-migration of workers and their families. Consequently, the impact on regional housing prices is expected to be negligible.

5.6.4 Demand on Local Infrastructure and Services

Demand for local infrastructure and services arises from the production process as well as demands of the workforce and their families. The Project will fully fund any demand it has for local infrastructure and services for the production process e.g. an intersection. It will not result in any changes in population levels in the local area and therefore will not generate any additional community demand for local infrastructure and services.

It is also noted that quarry products such as those that will be produced by the Project are often a key input to the provision of community infrastructure such as roads.

5.7 Environmental and Social Impacts on the Local Community (Externalities)

The distribution of costs and benefits of the Project are summarised in **Table 5.5**. The main potential effects on the local community are road transport impacts and biodiversity impacts – both of which will be mitigated and offset at Newcastle Sand's cost. Local greenhouse gas impacts are immaterial.

5.8 Summary of Local Effects

A summary of local effects of the Project is provided in **Table 5.5**.

Table 5.5 - Summary of Effects on the Local Community

Annual Local Effects	**Quarry**	**Transport**	**Total**
Direct employment working in the local area (no.)	15	40	55
Direct employment filled by those who already reside in the local area (no.)	10	19	29
Total after tax income to those that already reside in the local area ($)	$827,366	$1,524,847	$2,352,213
FTE based on increase in net after tax income for workers that already reside in the local area ($)	4	8	12
Total non-labour expenditure in the local area ($M)	$3.6	$3.1	$6.7
Annual Regional Impacts	**Direct**	**Flow-on**	**Total**
Output ($M)	27	10	39
Value-added ($M)	14	8	22
Income ($M)	6	1	7
Employment	55	23	78
Other Local Economic Impacts			
Displaced activities	No material impact*		
Wage rise impacts	No material impact*		
Housing impacts	No material impact*		
Demand on local infrastructure and services	Newcastle Sand will fully fund the demand it has for local infrastructure and services for the production process e.g. a new intersection.		
Local Environmental Impacts			
Greenhouse gas emissions	$0.00002*		
Road Transport	Cost of new access point off Nelson Bay Rd included in capital costs		
Biodiversity	Impacts on local biodiversity are offset		

*This figure is the estimated impact on NSW households apportioned to households in the Local Area. The regional population is 0.9% of the NSW population.

** Unless otherwise specified monetary amounts are in 2026 dollars.

6 ECONOMIC MANAGEMENT MEASURES

It is evident from Section 3 and 5 that construction and operation of the Project will have net social benefits to NSW and provide positive impacts on the level of economic activity in the local area economy.

Newcastle Sand proposes to work in partnership with the local Council and the local community to help maximise the projected economic local area benefits whist minimising any impacts. In this respect, a range of general economic management measures are proposed and would include for example:

- Employment of regional residents preferentially where they have the required skills and experience and can demonstrate a cultural fit with the organisation.
- Participating, as appropriate, in business group meetings, events or programs in the local community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.

7 CONCLUSION

A CBA of the Project indicated that it would have net production benefits to NSW of $20M (present value at 7% discount rate) comprising $15M in quarrying benefits, and $5M in ex quarry transport benefits.

The above estimate of NSW net production benefits of the Project includes capital and operating costs associated with biodiversity offsets and a new access point off Nelson Bay Rd. It also includes the costs of mitigation, monitoring, and management of other potential impacts. Externalities (including calculated costs of greenhouse gas impacts to NSW) which are not captured in operating or capital expenses have been assessed as being negligible. Consequently, the Project is estimated to have net social benefits to NSW of $20M and hence is desirable and justified from an economic efficiency perspective. Given the nature of predicted impacts, it is considered highly unlikely that residual environmental and social impacts would result in any significant change to the predicted net social benefits of the Project to NSW.

As well as providing net economic and social benefits to NSW, the Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure.

The Project will provide 55 direct jobs in the local area, comprising 15 quarry jobs and 40 ex-quarry transport jobs. Based on the residential location of people who work in the local area in the quarry sector and transport sector,[14] 65% of Project quarry workers and 47% of Project transport workers are assumed to reside in the local area, with the remainder commuting from outside the local area. Assuming that those that already reside in the local area would have otherwise been already employed and that job vacancies created by these people filling the Project jobs remain unfilled (i.e. no job chain effects), the incremental disposable wages accruing to the region from Project is $2.4M per annum. This is equivalent to 12 direct full time equivalent (FTE) jobs. This is a minimum estimate as it assumes full employment in the region and hence the jobs from which people come to fill the Project jobs remain vacant.

Standard regional economic impact assessment using IO analysis is not restricted to a focus on the existing labour force in the local area and does not assume an absence of job chain effects. In this framework, the Project is estimated to provide the following annual direct and indirect annual effects to the local economy:

- $39M in output.
- $22M in value-added.
- $7M in gross wages.
- 78 jobs.

The main local environmental impacts are internalised into the production costs of Newcastle Sand via mitigation, offset and compensation costs. Residual local environmental impacts after mitigation, offset and compensation are likely to be immaterial.

[14] ABS 2021 Census of Population and Housing 4-digit employment by industry by place of usual residence data.

8 REFERENCES

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ATTACHMENT 1 – COMPARISON OF INPUT-OUTPUT ANALYSIS AND THE LEA METHOD

IO analysis begins with identification of the direct gross regional economic activity footprint of a project for the region. If a project provides 100 jobs at the quarry site then all these jobs are counted in IO analysis as a direct effect i.e. direct employment in the region, because the jobs are located in the region. All income paid to employment is also included as it is generated in the economy and IO tables are based on place of work. However, in assessment of the impacts of a project on the regional economy only the income of employees living in the region are counted as direct income effects since it is only wages expenditure of those living in the region that flows through the regional economy. In IO analysis, if 40% of a project's jobs are filled by people who already reside in the region then the **total** wages of these people is counted as a direct regional income effect of the project. Similarly, if 40% of the new jobs are taken by people who migrate into the region this is also counted as direct income for the region, as it is income that will accrue to people living in the region even though they are new residents. In impact assessment using IO analysis, the income of those residing outside the region is excluded as most of their income will be taken home after shift and spent where they live or elsewhere.

These direct employment and income effects for the region are those **associated** with the project i.e. the gross footprint, rather than specifically an assessment of **incremental** effects. This is partly because assessment of incremental effects becomes highly contentious and difficult. However, as will be shown below, these gross direct effects associated with a project can also be a reasonable approximation of incremental effects when "job chain" effects are considered.

However, first is a comparison between how IO analysis treats direct employment and income effects (as explained above) and that in the NSW (2015) guideline.

The guideline splits labour into those ordinarily resident in the region and those not ordinarily resident in the locality. For those ordinarily resident in the region the guideline suggests calculation of incremental income as the difference between a quarrying income and the average level of income in other industries in the region. Incremental direct employment is then calculated by dividing this incremental income by the average wage in quarrying.

The guideline ignores workers who migrate into the region to work. However, using the rationale of the guideline, workers who migrate into the region to take jobs in a project provide a greater level of incremental income and spending in the region than those that take jobs in a project and who already reside in the region. The entire wage of those migrating into the region is additive to regional income in comparison to wage increments for those already residing in the region.

Table 1 provides an example of incremental wages using the guideline method and when income from those migrating into the region is counted. If only the incremental wages of those who already reside in the region are counted the incremental impact is $1.4M in annual wages. However, if the incremental wages to the region from those who migrate into the region are included, this increases to $5.4M.

Table 1 - Incremental Income when Immigrating Workforce is Included

Categories of Workers	Direct Empl	Current Wages @$65k	New Wages @$100k	Incremental New Wages for Workers	Incremental New Wages to the Region
Already Live in Region	40	2,600,000	4,000,000	1,400,000	1,400,000
Migrate into Region to Live	40	2,600,000	4,000,000	1,400,000	4,000,000
Commute from outside	20	1,300,000	2,000,000	700,000	0
Total Direct Empl	**100**	**6,500,000**	**10,000,000**	**3,500,000**	**5,400,000**

Even for those already living in the region who are already employed, the incremental income estimated using the guideline will substantially understate additional regional income effects. This is because new jobs in a region create a chain of job opportunities (referred to in the literature as the "job chain" - see Persky et al, 2004 What are jobs worth?, Employment Research Vol. 11 , p. 3).

An already employed person in the region moving into a quarrying job, creates a job vacancy, which can be filled by those in the region (already employed, unemployed or attracted into the labour force) or by in-migration. Where this job is filled by those already employed in the region this in turn creates another vacancy etc. Following the entire chain through, the cumulative increase in wages to a region would approach the wages of the total direct quarrying jobs. It would only be discounted if the chain ends with employment of those from local residents in the unemployment pool (who are receiving an allowance and hence already are spending income in the region), if jobs remain unfilled or if jobs are filled by a commuter workforce. The latter is less likely for lower paying jobs down the job chain. In periods of higher unemployment rates, jobs along the job chain remaining unfilled is unlikely. If the chain ends with in-migrating employment or employment of those in the region that are new to the workforce then the incremental wages is equal to the total wages of the new jobs.

Table 2 demonstrates the "job chain" effect in relation to 40 new quarrying jobs filled by already employed local workers. It shows that the total annual wages of the new quarrying jobs is $4M. Under the job chain approach where all jobs are backfilled including ultimately by 40 local residents from the unemployment pool the incremental wages to the region are $3.5M. If some of these jobs filled from the unemployment pool are ultimately filled by in-migration the difference between the incremental wages to the region and the total annual quarrying jobs wages will lessen.

The guideline does not take account of the "job chain" effect and essentially assumes that the previous jobs of "job movers" in the region remain vacant for the life of the Project.

Incorporation of consideration of the "job chain" effect means that the direct incremental income to a region approximates that assumed in IO analysis (i.e. the gross footprint of economic activity estimated using IO analysis is also an indicator of the net effect).

Table 2 - Demonstration of the Job Chain Effect for 40 Jobs Filled by Locals Who are Already Employed in the Region

	Total wages	Increment Wages Gain to Region
1. New quarrying wage for 40 workers @$100k	$4,000,000	$1,400,000 (1-2)
2. Current Wages for 40 workers @$65k	$2,600,000	$1,000,000 (2-3)
3. Wage of people filling above 40 positions @$40k	$1,600,000	$800,000 (3-4)
4. Wage of people filling above 40 positions @$20k	$800,000	$ 255,664 (4-5)
5. Wages of the unemployed filling above 40 positions (Newstart - single no children)	$544,336	
	Total	**$3,455,664**