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Newcastle Sand Pty Ltd

Bobs Farm Sand Quarry

Greenhouse Gas Assessment

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Executive Summary

Vipac Engineers and Scientists Ltd (Vipac) was commissioned by Newcastle Sand (the Proponent) to conduct an Air Quality Impact and Greenhouse Gas Assessment of the proposed Sand Quarry (the Project) located on Deposited Plan DP753204 (40.9ha), Bobs Farm NSW.

The purpose of this report is to calculate the greenhouse gas emissions of the construction and operation of the new facility over the 10-year life of the Project.

Table ES-1 presents the annual emissions and the life of project emissions.

The following can be determined:

- The annual emissions are estimated as 2,169.8 tonnes CO₂-e. This is below the 25,000 tonnes CO₂-e threshold and therefore emissions do not need to be reported.
- The Life of Project emissions are estimated to be 21,698 tonnes CO₂-e; and
- When compared to Australia's reported greenhouse gas emissions for 2024 (446.4 million tonnes), the estimated Project annual emissions are approximately 0.00049% of Australia's total emissions.

Table 1-1: Summary of Annual Emissions

Activity	Annual Emission (t CO ₂ -e/year)	Life of Project Emissions (t CO ₂ -e)
Equipment Fuel	945	9,450
Transport Fuel (Staff)	24	244
Electricity	6.84	68.4
Haulage	1,194	11,941
Total	2,169.8	21,698

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1 Introduction

Vipac Engineers and Scientists Ltd (Vipac) was commissioned by Newcastle Sand (the Proponent) to conduct an Air Quality Impact and Greenhouse Gas Assessment of the proposed Sand Quarry (the Project) located on Deposited Plan DP753204 (40.9ha), Bobs Farm NSW.

The purpose of this report is to calculate the greenhouse gas emissions of the construction and operation of the new facility over the 10-year life of the Project.

Greenhouse gases (GHG's) are a natural part of the atmosphere; they absorb and re-radiate the sun's warmth, and maintain the Earth's surface temperature at a level necessary to support life. Human actions, particularly burning fossil fuels (coal, oil and natural gas), agriculture and land clearing are increasing the concentrations of the greenhouse gases. This is the enhanced greenhouse effect, which is contributing to warming of the Earth.

Greenhouse gases include water vapour, carbon dioxide (CO₂), methane, nitrous oxide and some artificial chemicals such as chlorofluorocarbons (CFCs). Water vapour is the most abundant greenhouse gas. These gases vary in effect and longevity in the atmosphere, but scientists have developed a system called Global Warming Potential to allow them to be described in equivalent terms to CO₂ (the most prevalent greenhouse gas) called equivalent carbon dioxide emissions (CO₂-e). A unit of one tonne of CO₂-e (t CO₂-e) is the basic unit used in carbon accounting. An emissions inventory, or 'carbon footprint', is calculated as the sum of the emission rate of each greenhouse gas multiplied by the global warming potential.

2 Project Description

2.1 Overview

The Proponent seeks development consent for the establishment of an extractive industry as a sand quarry which involves:

- development of a new quarry to extract 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; and
- progressively rehabilitating the site.

No dredging is proposed with only dry (surface) sand extraction being employed.

Extraction will be staged with progressive rehabilitation of exhausted areas. The proposed extraction staging plan during the Project life is shown in Figure 2-1.

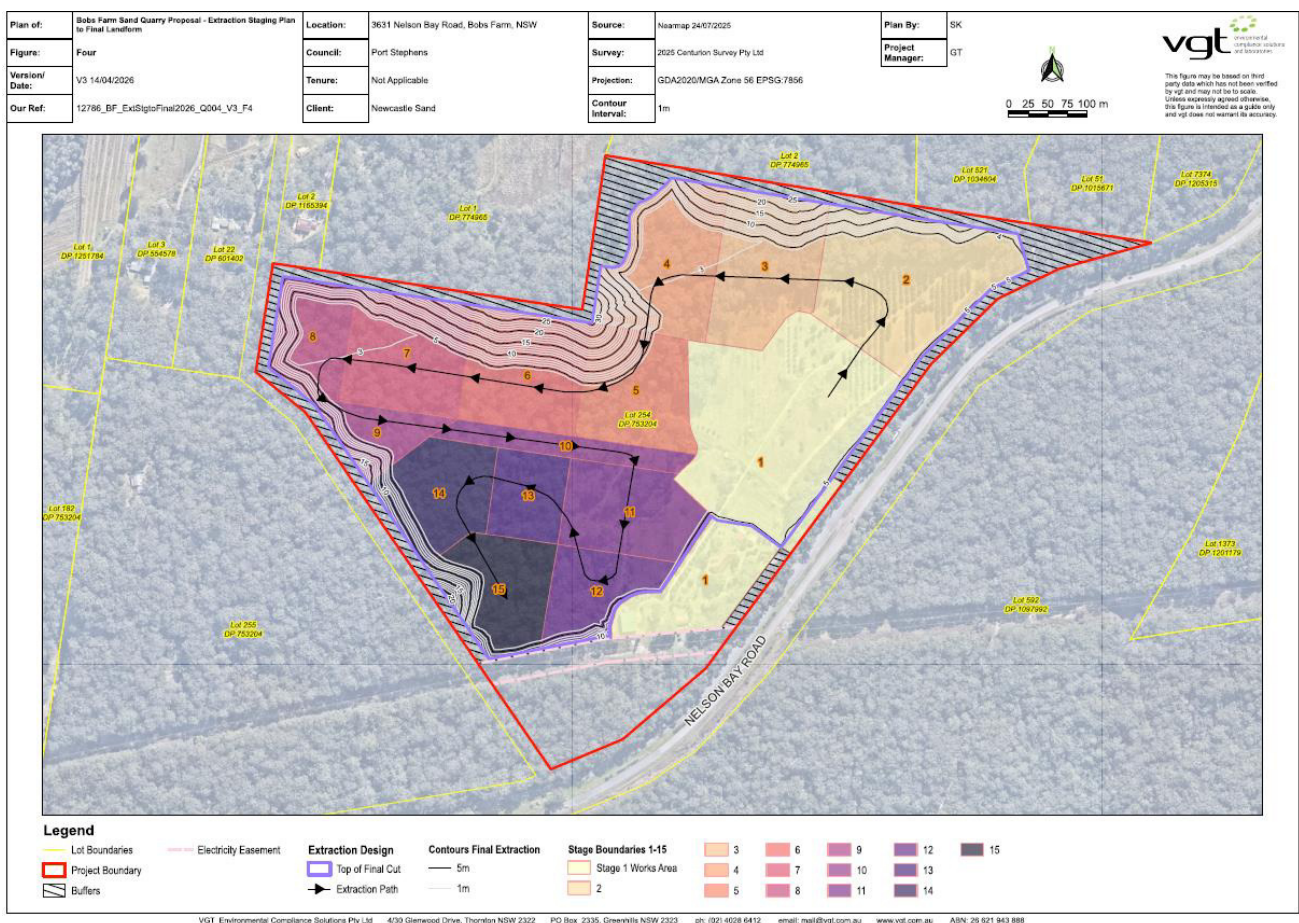


Figure 2-1: Bobs Farm Quarry Extraction Staging Plan

Preparation of the site and proposed sand quarry operations would broadly comprise:

- Construction of a new left-in left-out intersection
- Establishment of processing and sales area including installation of onsite office (Atco structure), installation of screening and wash facilities, designation of stockpiling areas, and use of the existing dwelling at the site for a manager's residence
- Staged vegetation clearing and topsoil stripping in accordance with the approved staging plan with topsoil stored onsite to be used for future rehabilitation works
- Dry extraction methods only down to a maximum of 0.7m above the ground water table
- Ongoing rehabilitation.

Day-to-day operations would require two (2) articulated haul trucks (Volvo A40G) loaded by a hydraulic excavator (Volvo EC350) to transport sand from the extraction area to the on-site processing facility being a full electric screen and wash plant. Equipment will include excavators, front-end loaders, haul trucks, conveyors and water carts. Operations will utilise modern, well-maintained equipment incorporating advanced noise attenuation and water saving measures as well as fuel efficiency technology to reduce operational impacts on the surrounding environment.

The site benefits from a Water Access Licence (WAL5960) for 40ML per annum which is proposed to be used for sand washing purposes. Approximately 85% of extracted sand will be washed requiring a total of approximately 32ML per annum which is within the current Water Access Licence.

All essential services are available, or able to be made available, at the site including electricity, water tanks for potable water, pump-out system for sewage management, stormwater drainage and suitable vehicular access.

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.

The site will be accessed by way of a new left-in left-out intersection onto Nelson Bay Road. The existing access to the site at the electricity easement is proposed to be retained for light vehicle access for the quarry as well as for access to the manager's residence.

Progressive rehabilitation of exhausted areas will take place in accordance with the approved rehabilitation plan. The proposed post-quarry use of the site is to return the site to its current condition, being the same ratio of vegetated land and land used for the purpose of extensive agriculture.

2.2 Hours of Operation

The Project's proposed equipment relevant to the GHG assessment and hours of operation are summarised in Table 2-1. It is noted that the proposed equipment use is generally consistent across different stages.

Table 2-1: Proposed hours of operation

Activity	Equipment	Operating Hours
Sand processing, washing and production	- Volvo EC350E Excavator - Volvo A40G x 2 Articulated Dump Truck - Conveyor System - Sales Loader (Volvo L220 x 2) - McLanahan Wash Plant - McLanahan De-watering Screen	7:00 am to 5:00 pm, Monday to Friday 7:00 am to 4:00 pm, Saturdays - Closed Sundays and public holidays
Sales	- Sales Loader (Volvo L220 x 2) - Export Road Truck	6:00 am to 6:00 pm, Monday to Friday 7:00 am to 4:00 pm, Saturdays - Closed Sundays and public holidays

3 Regulatory Framework

The *Commonwealth National Greenhouse and Energy Reporting Act 2007* (NGER Act) introduces a single national reporting framework for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production. The NGER Act requires facilities to submit an annual report in energy consumption, energy production and greenhouse gas emissions, if any of the following thresholds are met:

- 25,000 tonnes or more of carbon dioxide equivalence (CO₂-e) (scope 1 and scope 2 emissions)
- production of 100 terajoules (TJ) or more of energy, or
- consumption of 100 TJ or more of energy.

A facility is an activity or series of activities (including ancillary activities) that generate greenhouse gas emissions and produce or consume energy. A facility will need to form a single undertaking or enterprise and meet the requirements of the Regulations.

4 Methodology

The Department of the Climate Change, Energy, the Environment and Water (DCEEW) monitors and compiles databases on anthropogenic activities that produce greenhouse gases in Australia. The DCEEW has published greenhouse gas emission factors for a range of anthropogenic activities. The DCEEW methodology for calculating greenhouse gas emissions is published in the National Greenhouse Accounts (NGA) Factors workbook (DCEEW, 2025). This workbook is updated regularly to reflect current compositions in fuel mixes and evolving information on emission sources.

The scope that emissions are reported, as defined by the NGA Factors Workbook is determined by whether the activity is within the organisation's boundary (Scope 1 – Direct Emissions) or outside the organisation's boundary (Scopes 2 and 3 – Indirect Emissions). The scopes are described below:

- Scope 1 Emissions: Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO₂-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc.);
- Scope 2 Emissions: Indirect emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO₂-e per unit of electricity consumed; and
- Scope 3 Emissions: Indirect emissions for organisations that:
 - Burn fossil fuels: to estimate their indirect emissions attributable to the extraction, production and transport of those fuels; or
 - Consume purchased electricity: to estimate their indirect emissions from the extraction, production and transport of fuel burned at generation and the indirect emissions attributable to the electricity lost in delivery in the transmission and distribution network.

Scope 1 emissions include those from fuel use by vehicles, coal burnt in boilers and methane from wastewater systems. Scope 2 emissions are from any purchased electricity. Scope 3 emissions are from the emissions resulting from the energy required to manufacture products such as diesel and equipment.

Emission factors used in this assessment have been derived from either the Department of Environment, site-specific information or from operational details obtained from similar emission sources.

The majority of the emission factors used in this report has been sourced from the NGA Factors Workbook (DCEEW, 2025) as indicated in Table 4-1.

Table 4-1: Emission Factors

Scope	Emission Source	Emission Factor	Source
1	Combustion emissions from diesel	2.71 t CO ₂ -e / kL	NGA Factors Workbook, 2025
	Combustion for transport (gasoline)	2.31 t CO ₂ -e / kL	NGA Factors Workbook, 2025
2	Electricity (purchased in NSW)	0.64 kg CO ₂ -e / kWh	NGA Factors Workbook, 2025
3	Combustion for transport (gasoline)	0.59 t CO ₂ -e / kL	NGA Factors Workbook, 2025
	Electricity (purchased in NSW)	0.03 kg CO ₂ -e / kWh	NGA Factors Workbook, 2025
	Combustion emissions from diesel	0.67 t CO ₂ -e / kL	NGA Factors Workbook, 2025

For this assessment Scope 1, Scope 2 and Scope 3 emissions have been calculated in accordance with the NGA Factors Workbook methodology.

5 Quantification of Emissions

This section will quantify the carbon dioxide equivalent emissions associated with the annual CO₂-e emissions and Life of the Project CO₂-e emissions are presented.

5.1 Purchased Power

The proposed Project will use electricity from the grid. At present the expected amount of electricity is unknown, however for the purposes of this assessment, a usage of approximately 10,200 kWh per year consumption has been assumed based on the annual usage data from Newcastle Sand's Williamtown Quarry for 2025. The emissions are presented in Table 5-1.

Table 5-1: Electricity Consumption (CO₂-e tonnes)

Emission Source	Scope	Annual Usage (kWh/year)	Annual Emissions (t CO ₂ -e)
Purchased Electricity	2	10,200	6.53
	3 (embodied)	10,200	0.31
Total CO ₂ -e Emissions (tonnes) per Annum			6.84
Project Total CO₂-e Emissions (tonnes)			68.4

5.2 Quarry Equipment Fuel

The equipment list and associated fuel consumption has been derived based on the annual usage data from Newcastle Sand's Williamtown Quarry for 2025. The emission are presented in Table 5-2.

Table 5-2: Equipment Fuel Emissions (CO₂-e tonnes)

Emission Source	Scope	Total Diesel Consumption (L/year)	Emissions (t CO ₂ -e per annum)
Quarry Equipment	1 (Direct)	279.667	758
	3 (Embodied)	279.667	187
Total CO ₂ -e Emissions (tonnes) per Annum			945
Project Total CO₂-e Emissions (tonnes)			94,500

5.3 Transport Fuel Emissions (Staff Movements)

The transport fuel emissions have been calculated for staff transport to and from work. The following assumptions have been made for this assessment:

- Seven staff will be employed for the Project;
- Average fuel consumption per vehicle is 10 litres per 100 km travelled; and
- Average distance is 40 km round trip per day for 300 days per annum.

Table 5-3 presents the estimated CO₂-e emissions from staff movements.

Table 5-3: Transport Fuel Emissions from Staff Movements (CO₂-e tonnes)

Emission Source	Scope	Annual Usage (kL)	Annual Emissions (t CO ₂ -e)
Staff Movements	1 (direct)	8.4	19.4
	3 (embodied)	8.4	5.0
Total CO ₂ -e Emissions (tonnes) per Annum			24.4
Project Total CO ₂ -e Emissions (tonnes)			244

5.4 Haulage Fuel (from Quarry to Customers)

Haul trucks with a payload of 44 tonnes will transport the material from the Project to customers located in the Newcastle or Sydney areas. Some material will be exported out of Australia; these emissions have not been calculated.

The following assumptions have been made for this assessment:

- Average fuel consumption per vehicle is 36 litres per 100 km travelled;
- Average distance is 235 km round trip (assumes average distance between Newcastle and Sydney); and,
- Operational days per year are 300 days.

Table 5-4 presents the estimated CO₂-e emissions from haul truck movements.

Table 5-4: Haulage Truck Emissions (CO₂-e tonnes)

Emission Source	Scope	Diesel Consumption (L/100 km)	Emissions (t CO ₂ -e/year)
Haul Truck	1 (Direct)	36	1,870
	3 (Embodied)	36	462
Total CO ₂ -e Emissions (tonnes) per Annum			2,332
Project Total CO ₂ -e Emissions (tonnes)			23,320

6 Summary of Emissions

The purpose of this report is to evaluate the greenhouse gas emissions from the operation of the proposed Project. Table 6-1 presents the annual emissions and the life of project emissions.

The following can be determined:

- The annual emissions are estimated as 2,169.8 tonnes CO₂-e. This is below the 25,000 tonnes CO₂-e threshold and therefore emissions do not need to be reported.
- The Life of Project emissions are estimated to be 21,698 tonnes CO₂-e; and
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Activity	Annual Emission (t CO ₂ -e/year)	Life of Project Emissions (t CO ₂ -e)
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7 References

Department of Climate Change, Energy, the Environment and Water, 2025. Australian National Greenhouse Accounts Factors 2025