GUNLAKE QUARRIES

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Quarry Materials

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.epd-australasia.com

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AUSTRALASIA EPD
ENVIRONMENTAL PRODUCT DECLARATION

Contents

GUNLAKE QUARRIES

Program Information & Verification

An Environmental Product Declaration (EPD) is a standardised way of quantifying the potential environmental impacts of a product or system. EPDs are produced according to a consistent set of rules – Product Category Rules (PCR) – that define the requirements within a given product category. These rules are a key part of ISO 14025 as they enable transparency and comparability between EPDs. This EPD provides environmental indicators for Gunlake Quarry's materials produced at its quarry in Marulan, New South Wales. This EPD is a "cradle-to-gate" declaration covering production of the quarry products and their supply chain.

This EPD is verified to be compliant with EN 15804+A2. EPDs of construction products may not be comparable if they do not comply with EN15804. EPDs within the same product category but from different programs or utilising different standards or PCRs may not be comparable.

Gunlake Quarries, as the EPD owner has the sole ownership, liability, and responsibility for the EPD.

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CEN standard EN 15804:2012+A2:2019 served as the core PCR	
PCR:	PCR 2019:14 Construction Products, Version 1.11, 2021-02-05 (valid until 2024-12-20)
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Claudia A. Peña Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:	☐ EPD process certification (Internal) ☒ EPD verification (External)
Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

Introduction

Gunlake is the largest independent supplier of quarry products and concrete in the Sydney Region and NSW. Over the last 10 years Gunlake has developed a cycle of continuous growth, building state-of-the-art quarry processing plants and concrete batch plants.
The Gunlake Group are a proudly Australian owned, family company spanning four generations in the quarrying and concrete industry in Australia. We strive to deliver:

- Industry leading service
- High quality products, and
- Innovative solutions to support our customers' requirements.

Beginning with one concrete plant and plans for a quarry in 2007, Gunlake Group has grown in 2022 to five operational concrete plants and one of the largest quarries in Australia.

The quarry at Marulan is currently consented for 2.6 million tonnes per annum and supplies the concrete, asphalt, civil and infrastructure markets in Sydney and the Southern Highlands.

Quarry Products

The products outlined in this Environmental Product Declaration are manufactured at Gunlake's Marulan quarry located at 715 Brayton Road, Marulan (NSW). Our quarry produces a range of hard rock quarry materials.
The quarry produces a range of specified and non-specified materials listed in Table 1 below.

Table 1: Product types and description

Product Type	Description
Concrete aggregates	10mm and 20mm premium aggregates
Asphalt aggregates	7mm, 10mm, 14mm and 20mm premium aggregates
Rail Ballast	To required specification
Specialty rock	Gabion 75-150mm, hammered 50-750mm, oversize 300-2000mm and monument rock >1000mm
Drainage aggregates	7mm, 10mm, 14mm, 20mm and 40-70mm drainage aggregates
Manufactured Sand	Graded and shaped sand
Road base	10mm, 40mm, 20mm DGB, FCR
Quarry Dust	Crusher dust and 8mm crusher dust
Precoat aggregate*	7mm, 10mm, 14mm and 20mm aggregates

* Note that these products have a bituminous coating

Aggregates are classified under UN CPC 1513 (Granite, sandstone and other monumental or building stone) and ANZSIC 09190 (Aggregate quarrying).

Quarry Products

Table 2: Product composition, per declared unit of aggregates

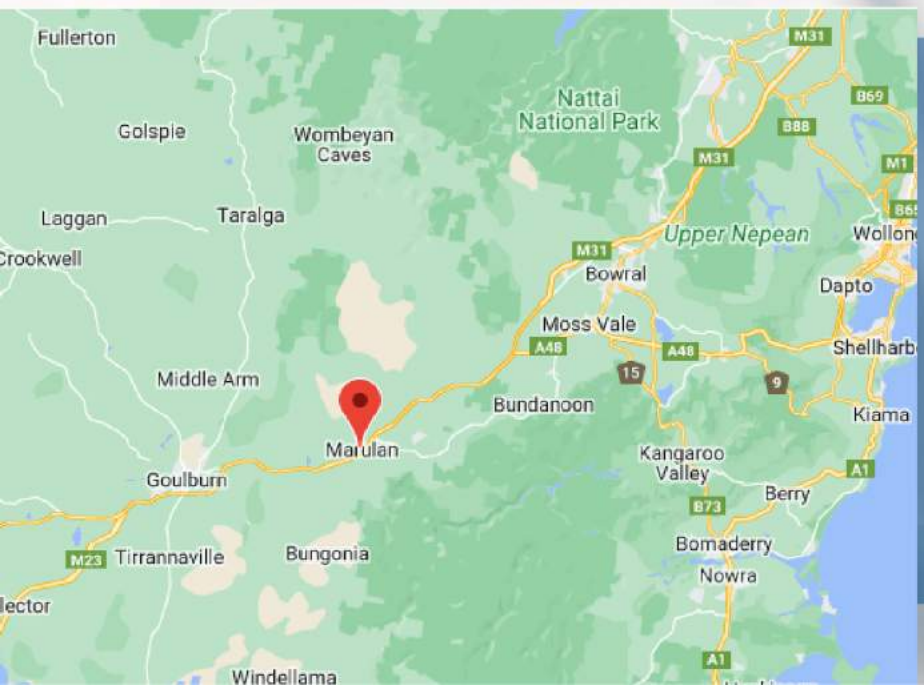
Product components	Mass, kg	Post-consumer recycled material (mass-%)	Renewable material (mass-%)
100% ignimbrite rock	1,000	0%	0%
TOTAL	**1,000**	**0%**	**0%**

Table 3: Product composition, per declared unit of pre-coated aggregates

Product components	Mass, kg	Post-consumer recycled material (mass-%)	Renewable material (mass-%)
Rock	995	0%	0%
Bituminous pre-coat	5	0%	0%*
TOTAL	**1,000**	**0%**	**0%**

*** Aggregates do not contain any biogenic carbon. The bituminous pre-coat used on pre-coated aggregates contains (20-40%) recycled oil, which could contain renewable (biogenic) material. For the LCA, the biogenic content is irrelevant, as the recycled material comes without prior environmental impact. Furthermore, the carbon in the pre-coat is not released later in life (e.g. through combustion) as it attaches to the stone as a glue.*

The information contained in this EPD applies to bulk products (i.e. no packaging is used).
The products included in this EPD do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m).



Technical Compliance

Gunlake's quarry materials are produced and tested using AS1141 in order to comply with the AS2758 specifications. The typical testing includes, but is not limited to:

- AS1141.4 – Bulk Density
- AS1141.5.1 – Particle Density & Water Absorption of Fine Aggregate
- AS1141.11 – Particle Size Distribution
- AS1141.12 – Material Finer than 75um
- AS1141.33 – Clay & Fine Silt

AS2758 is the Specification which lists the test methods for each application, such as:

- AS2758.1 – Specification for Concrete Aggregates
- AS2758.2 – Specification for Sealing Aggregates
- AS2758.3 – Specification for Gabion Baskets and Wire Mattresses

We also ensure that our production complies with relevant legislation, regulations and industry standards, and project specifications.

Gunlake Quarries are certified to AS/NZS ISO 9001-2016: Quality Management Systems – Requirements for the Manufacture and delivery of concrete.

Gunlake can produce concrete with various amounts of embodied CO2, however natural aggregates have a relatively fixed carbon footprint. Customers should work with their design engineers and Gunlake's technical team to develop suitable products to meet with project and stakeholder requirements.Our research and development culture is innovative and customer focussed.

G-Lab Materials Testing Pty Ltd is Gunlake's 100% owned in-house laboratory that is NATA accredited. G-lab drives the highest standards of concrete and quarry material performance.

Declared unit

1 tonne of aggregates (in bulk)

Scope of Environmental Product Declaration

This EPD covers the cradle-to-gate life cycle stages (modules A1-A3). Downstream stages have not been included as we cannot define a typical scenario for our quarry products. Aggregates meet the EN 15804 requirements for exclusion of downstream stages.

The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in table 4.

Table 4: Scope of EPD

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	AU	AU	AU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	>80%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Raw material supply, Transportation and Manufacturing (A1-A3)

We use explosives and energy (fuels, electricity) to drill and blast the rock at our quarry. Then we load and haul the shot-rock to the crushing and screening process which reduces and sorts the rocks into products of various particle sizes. The quarry's mobile plant includes excavators, dump trucks, loaders, graders, dozers and light vehicles.

Bituminous pre-coat material is produced by spraying bituminous emulsion onto the rocks. This is done by loading the material onto a conveyor which feeds it through a mixing box that applies the emulsion via spray bars at a calibrated rate. The product is typically made to order.

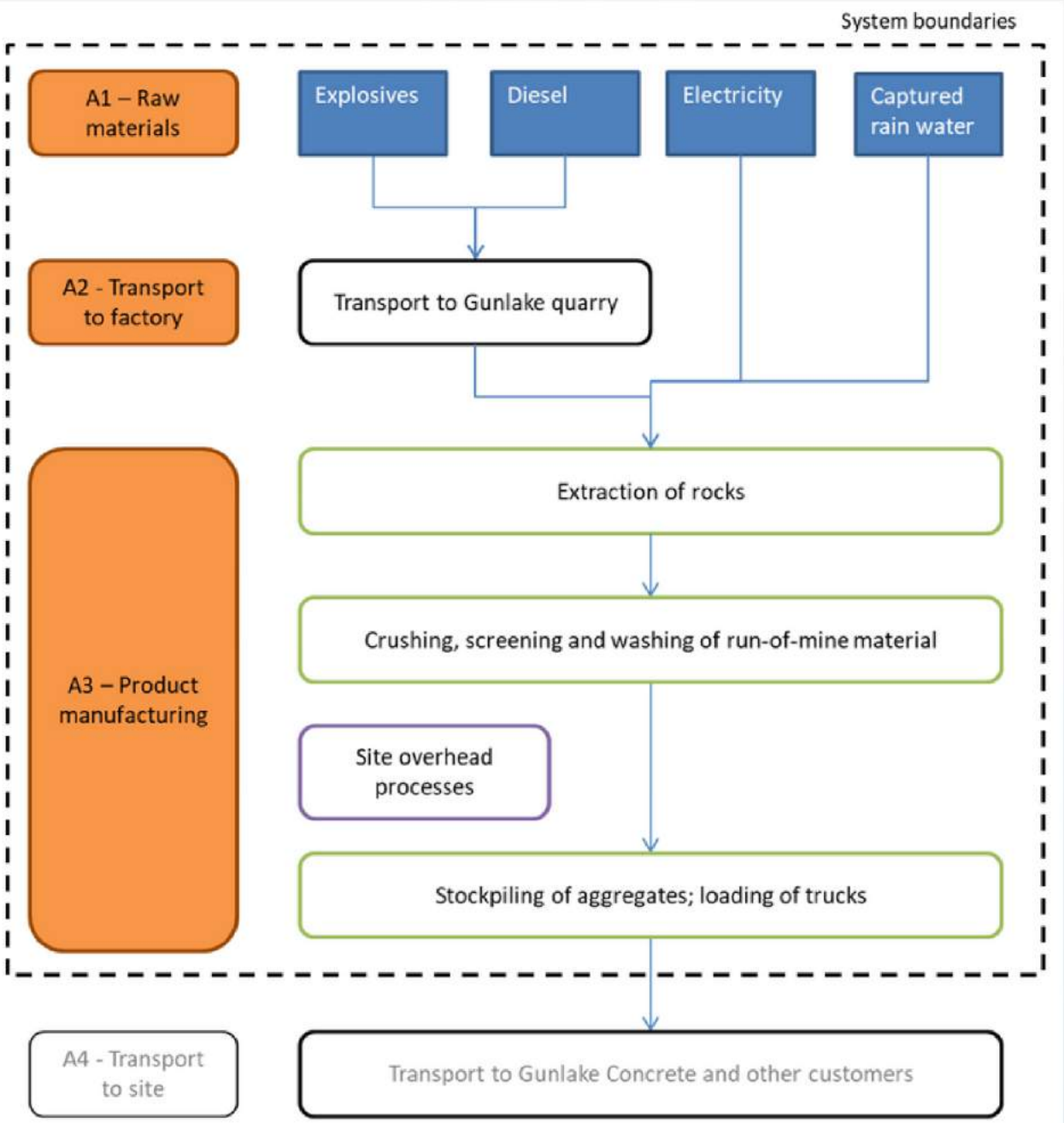


Figure 3: Cradle-to-gate life cycle of quarry products

Life Cycle Assessment (LCA) Methodology

Background Data

Gunlake has collected and supplied the primary data for the aggregates LCA based on the FY21 reporting period (1 July 2020 – 30 June 2021). Background data (e.g. for explosives, energy and transport processes) have predominantly been sourced from AusLCI and the AusLCI shadow database (v1.36) (AusLCI 2021). Background data used are either less than 10 years old or have been reviewed within this period.
Methodological choices have been applied in line with EN 15804; deviations have been recorded.

Allocation

The key process that requires allocation is the shared production of aggregates:

- aggregates are produced through crushing of rock, which is graded in different sizes. The energy required for the crushing and screening does not differentiate materially between products. Therefore, impacts are allocated to products (e.g. crushed rock, manufactured sand) based on the mass of product. In effect, all aggregates have the same environmental profile.

Cut-off Criteria

The cut-off criteria applied are 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of a process, while considering environmental impacts of small flows:

- Although explosives make up less than 1% of material flows, they contribute 20% to the greenhouse gas emissions of our aggregates and have therefore been included.
- Greases and lubricants used for our equipment have been included. The impact on the footprint of the aggregate products is negligible.
- The contribution of capital goods (production equipment and infrastructure) and personnel is excluded from the scope of the LCA, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

Key Assumptions

The key choices and assumptions in the LCA are:

- Product allocation: All crushed natural aggregate products coming out of the quarry are assigned the same impact on a per tonne basis. This is considered to be the most practical allocation approach.

Life Cycle Assessment (LCA) Results

The background LCA serves as the foundation for this EPD. An LCA analyses the environmental processes in the value chain of a product. It provides a comprehensive evaluation of all upstream (and sometimes downstream) material and energy inputs and outputs. The results are provided for a range of environmental impact categories, in line with EN 15804+A2.

We are also providing EN 15804:2012+A1:2013 compliant results to assist our customers who want to use this EPD in tools, such as the Green Building Council of Australia's Green Star Tool and the Infrastructure Sustainability Council's Sustainability Rating Tool that are currently based on this method.

Finally, the carbon footprint of our aggregate products is presented as the "GWP-GHG indicator" in a separate table at the end of each set of results. The GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). This indicator is determined using the IPCC AR5 Global Warming Potentials (GWP) with a 100-year time horizon and aligns closest to current Australian greenhouse gas reporting frameworks.

Environmental Profiles for Aggregates

Potential environmental impacts – mandatory indicators according to EN 15804:2012+A2:2019

Results per declared unit (1 tonne), modules A1-A3			
Indicator	**Unit**	**Crushed rock, Manufactured sand, Roadbase aggregates**	**Pre-coated aggregates**
GWP-total	kg CO_2 eq.	7.00	11.6
GWP-fossil	*kg CO_2 eq.*	*6.98*	*11.6*
GWP-biogenic	*kg CO_2 eq.*	*1.26E-02*	*1.61E-02*
GWP-luluc	*kg CO_2 eq.*	*1.98E-06*	*1.31E-05*
ODP	kg CFC 11 eq.	5.41E-07	4.24E-06
AP	mol H^+ eq.	5.82E-02	1.08E-01
EP-freshwater	kg P eq.	7.56E-06	1.13E-05
EP-marine	kg N eq.	1.84E-02	2.48E-02
EP-terrestrial	mol N eq.	2.09E-01	2.70E-01
POCP	kg NMVOC eq.	4.87E-02	6.48E-02
ADP-minerals&metals*	kg Sb eq.	4.70E-07	4.99E-07
ADP-fossil*	MJ	8.09E+01	4.33E+02
WDP*	m^3	1.90E+01	4.93E+01
Additional indicators			
PM	disease incidence	1.07E-06	1.32E-06
IRP**	kBq U235 eq.	1.07E-04	6.09E-04
ETP-fw*	CTUe	1.92E+01	1.16E+02
HTP-c*	CTUh	4.59E-10	2.52E-09
HTP-nc*	CTUh	2.32E-08	5.50E-08
SQP*	-	1.62E+02	1.63E+02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption, PM = Particulate matter emissions; IRP = Ionising radiation, human health; ETP-fw = Ecotoxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects; SQP = Land use related impacts / soil quality		

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

*** Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

Use of resources, waste production and output flows

Results per declared unit (1 tonne), modules A1-A3			
Parameter	**Unit**	**Crushed rock, Manufactured sand, Roadbase aggregates**	**Pre-coated aggregates**
PERE	MJ	1.72E+00	2.42E+00
PERM	MJ	0.00E+00	0.00E+00
PERT	MJ	1.72E+00	2.42E+00
PENRE	MJ	8.38E+01	4.56E+02
PENRM	MJ	0.00E+00	0.00E+00
PENRT	MJ	8.38E+01	4.56E+02
SM	kg	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00
FW	m^3	1.02E-01	1.62E-01
HWD	kg	0.00E+00	0.00E+00
NHWD	kg	2.66E-02	3.18E-02
RWD	kg	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Material for recycling; MER = Materials for energy recovery; EE = Exported energy, electricity and thermal		

Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (1 tonne), modules A1-A3			
Indicator	**Unit**	**Crushed rock, Manufactured sand, Roadbase aggregates**	**Pre-coated aggregates**
GWP	kg CO_2 eq	6.89	11.4
ODP	kg CFC11 eq	4.28E-07	3.35E-06
AP	kg SO_2 eq	3.13E-02	6.88E-02
EP	kg PO_4^{3-} eq	7.10E-03	9.65E-03
POCP	kg C_2H_4 eq	3.07E-03	8.45E-03
ADPE	kg Sb eq	4.73E-07	5.02E-07
ADPF	MJ_{NCV}	7.98E+01	4.24E+02
Acronyms	GWP = Global Warming Potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for elements; ADPF = Abiotic depletion potential for fossil resources		

Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (1 tonne), modules A1-A3			
Indicator	**Unit**	**Crushed rock, Manufactured sand, Roadbase aggregates**	**Pre-coated aggregates**
GWP-GHG	kg CO_2 eq	6.84	11.3

Additional Information

Waste and Recycling

Throughout Gunlake's operations some materials are re-used into our production processes, including concrete washout, which beneficially reuses materials that would otherwise require disposal.

Biodiversity Management

Gunlake has established over 200 hectares of biodiversity offset land at its Marulan Quarry. These areas are managed in accordance with both NSW and Commonwealth requirements and have been established to provide long term protection and enhancement of habitat and ecological communities.

Community Investment

Gunlake participates in numerous local community programs and events, including ongoing annual funding/grant commitments, community initiatives and memberships. Gunlake will continue to provide such community support and investment within the local and regional areas in which it operates.

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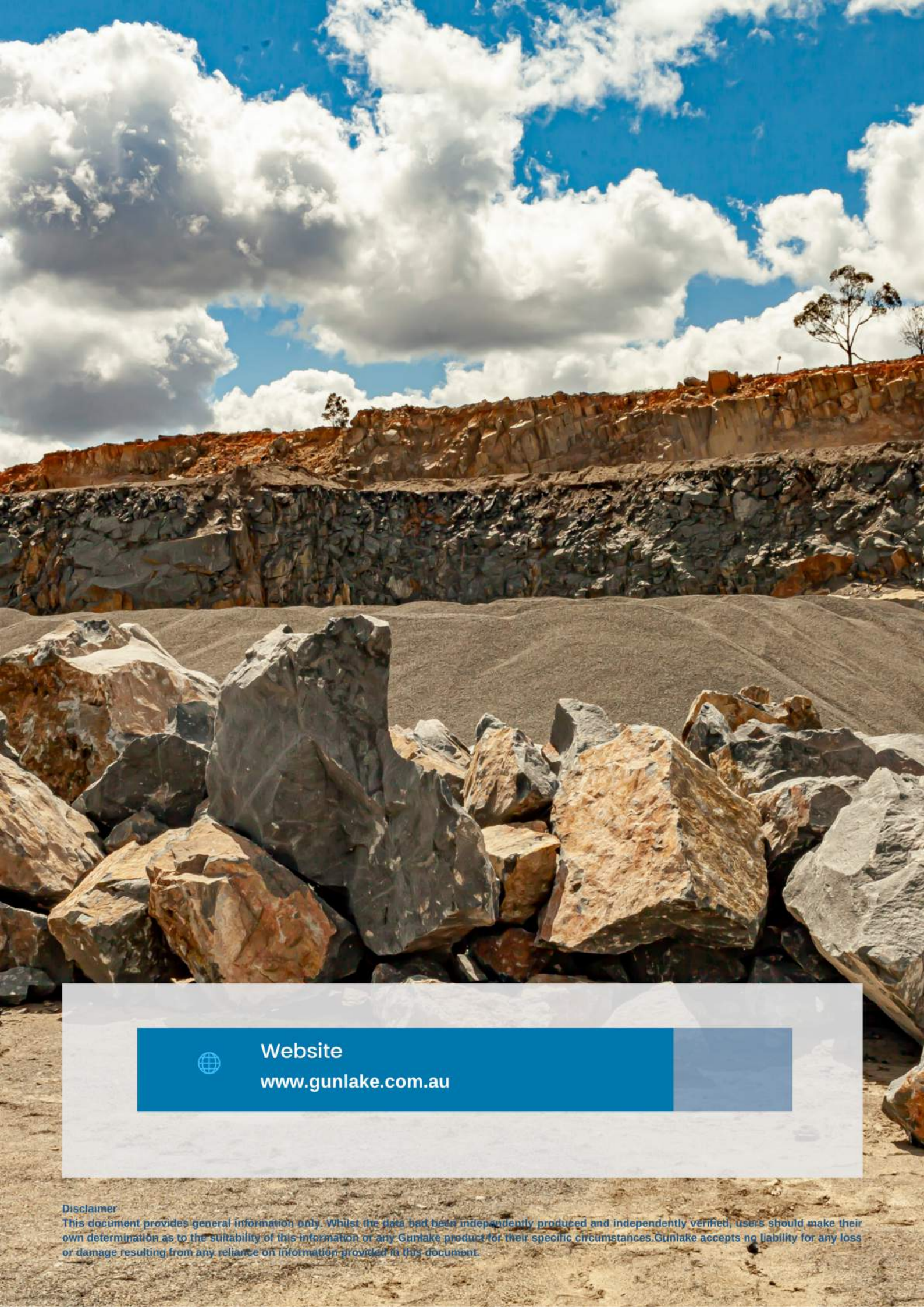

Website

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