

Fulton Hogan Quarries (Vic)

Environmental Product Declaration
In accordance with ISO 14025 and EN 15804

EPD Registration no. S-P-04651 | Version 1.0
Issued 24 February 2022 | Valid until 24 February 2027
Geographical Scope: Victoria, Australia





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Program Information and 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 Fulton Hogan quarry products manufactured in Vic Australia. This EPD is a “cradle-to-gate” declaration covering production of the quarry products and the supply chain.

This EPD is verified to be compliant with EN 15804. EPD 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 PCRs may not be comparable. Fulton Hogan, as the EPD owner, has the sole ownership, liability and responsibility for the EPD.

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Introduction

Fulton Hogan

Fulton Hogan is a family-owned business, committed to ensuring the work we do today will make a real difference to the lives of our people and customers, the communities they call home, and the world we live in, tomorrow.

In 1933, Jules Fulton and Bob Hogan teamed up to form Fulton Hogan. From there, we've grown to over 7000 people. A family of real people dedicated to doing good work that connects and cares for communities across New Zealand, Australia and the South Pacific.

From concrete, asphalt and aggregates through to biodiesel, signs and graphics, we've been supplying top quality construction products to the industry for over 50 years.

Fulton Hogan started on roads. In the last 88 years we've gained vast experience across a range of sectors, including roads and transport infrastructure through to utilities and resources.

We're all about keeping it REAL (Respect, Energy & effort, Attitude & Leadership). These are the values at the core of everything we do.

We see sustainability as the only way to do business. That's why we invest in the communities we work in, bridging gaps and creating economic value. It's our way of improving the world we'll live in tomorrow.

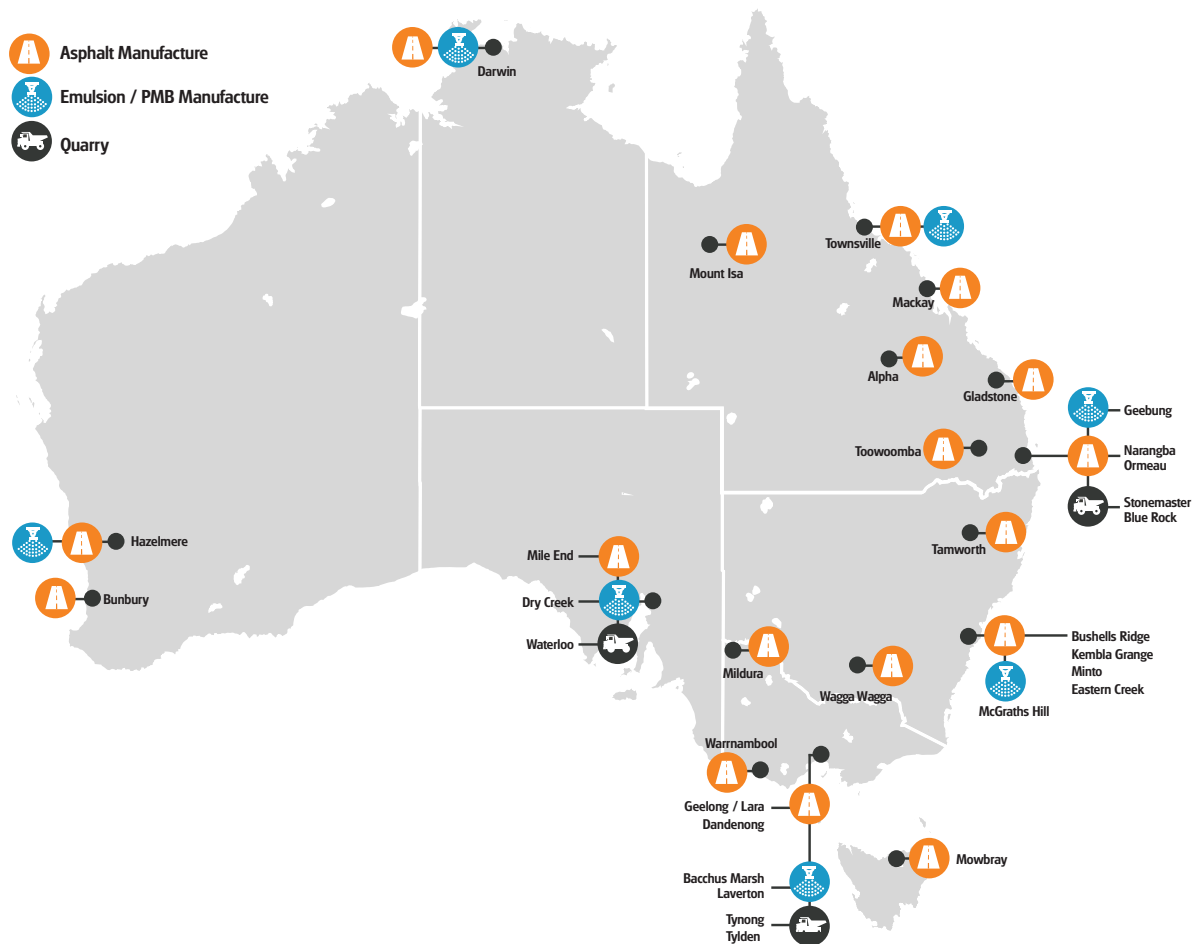
We care for the communities we operate in. Fulton Hogan and our people donate time, money and services to strengthen our communities. Through our partnerships we support wellbeing, diversity, environment, education and innovation.

Our decades of experience, combined with our wealth of plant and resources, give us the technical knowledge and skills to provide a wide range of construction services (including construction, surfacing, asset management, laboratories, transport and traffic management).

Fulton Hogan are industry leaders in the research and development of high-performance aggregates, asphaltic concrete, emulsions, spray seal, and polymer modified binders. Our technical staff are some of the best in the business, developing innovative road building materials, to ensure better long term performance of our client's pavements. Senior members of our technical team work closely with clients in the civil construction and government sectors, to ensure that the products we develop, are not only relevant to their needs, but meet or exceed their stated technical, performance and environmental requirements.



Figure 1: Fulton Hogan manufacturing and quarrying capabilities





Sustainability at Fulton Hogan

Sustainability in our industry means building and maintaining the critical infrastructure on which our nation depends. We do this in a manner that is cognisant of both the positive and negative impacts we may have on the community and the environment in the short and long term. In carrying out our duties, it is essential that we act with integrity and respect for the environment and communities in which we operate.

As a business our approach to sustainability focuses on the principles of **PEOPLE, PLANET, PROSPERITY** and **PARTNERSHIPS** that are aligned to the United Nation's Sustainable Development Goals. Using this framework, our locally empowered business operations are tasked with delivering positive contributions to the environment with solar installations that power our facilities or power purchase agreements to cap carbon emissions, as well as the community with traineeships, local sponsorships and partnerships.

Our product portfolio centres on developing and delivering quality, innovative products and services for our clients with the circular economy principles of; waste utilisation, reuse, recycling and repurposing. These are front of mind when undertaking research and development which has lead us to build an array of sustainable products. These include; high percentage recycled asphalt pavement using slag, glass and plastics, as well as crumb rubber asphalt and sprayseals.

We also commit to leaving a positive social impact for our people and communities by partnering with local business, increasing awareness of mental health, wellbeing and indigenous participation. Fulton Hogan's Infrastructure Services team, along with our clients and partners, are committed to taking tangible steps towards sustainability and making positive contributions to the communities in which we work, live and play now, so that future generations can benefit.



PEOPLE

Our People are at the heart of everything in Fulton Hogan. We understand the importance of hiring, developing and retaining great people who bring our REAL values to life every day. It is through maintaining a culture of safety, performance and growth that our people continue to do good work.



PLANET

Our operations can have an impact on the environment and communities in which we operate, we understand that. We also understand that it doesn't have to be a negative impact, that with intelligent planning and forethought we can contribute positively to the environment in which we operate and leave our world in a better place than when we started.



PROSPERITY

No company can succeed in a market where revenue doesn't equate to reasonable profits. Fulton Hogan has been in operation for over 85 years and has always taken the long term view of the business and its shareholders in to account. We re-invest heavily in research and development, plant, equipment and our people as we see this as the only way to remain truly sustainable.

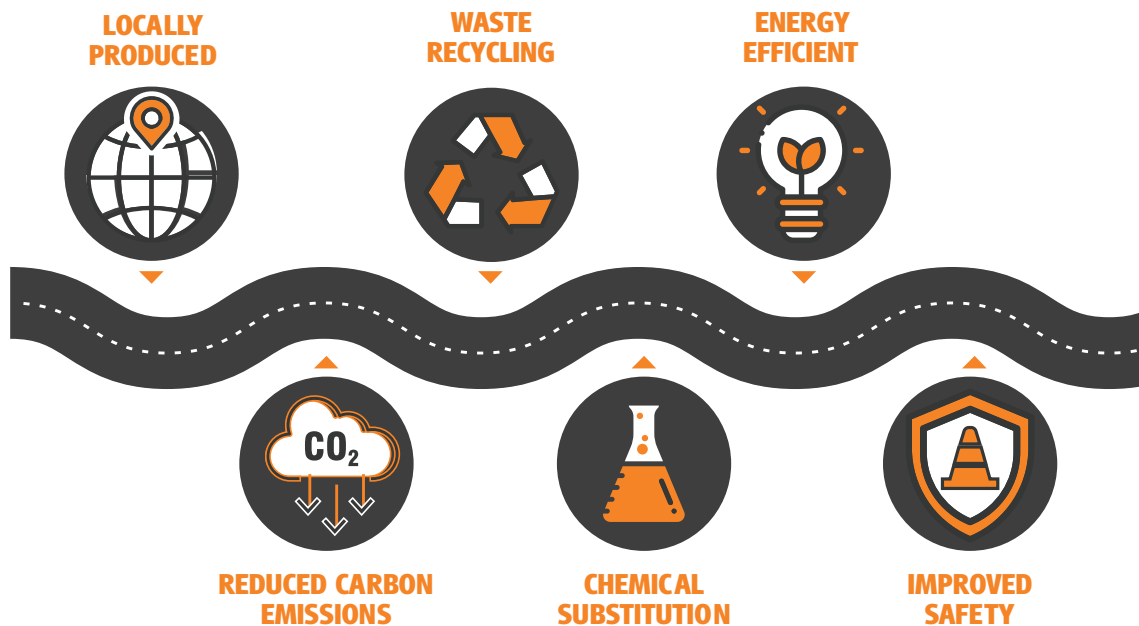


PARTNERSHIPS

We see and understand that a sustainable business is a stable business and is a key risk management strategy to our ongoing future performance. We cannot maintain our longevity nor succeed in our endeavours without the help and support of others along the way. Our good work philosophy rests with our people, their relationships, our clients and our partners as we strive to achieve shared value in the work that we do.



Figure 2: Fulton Hogan sustainable product development roadmap



Fulton Hogan is committed to continuing the transition of construction and maintenance in the road sector from a linear to a circular economy by reusing, recycling, creating and circulating. This evolution is well advanced in with Reclaimed Asphalt Pavement (RAP), warm mix, crumb rubber, pavement recycling, glass sand, and supplementary cementitious materials being introduced and used by the sector over the last 30 years.

We understand that our roads are not linear rubbish tips; they are highly complex engineering structures and a key to economic development. Any sustainable product or process used in pavements or other infrastructure works must maintain the performance of the pavement, have a consistent quality and supply and must be cost competitive to current processes.

Fulton Hogan offers the experience and expertise of its engineers supported by our dedicated Research and Development team. The intellectual property they have created over the years has consistently benefited for asset owners.

As a technical leader in its field, Fulton Hogan takes pride in developing innovative solutions that provide environmental, financial and functional benefits to our customers. As our customers are seeking evermore sustainable cost effective and functional solutions, Fulton Hogan is continually looking at new products and processes to increase sustainability.

Over the past 30 years, Fulton Hogan has used a high content of recycled pavements in our products, led the introduction of glass sand and wet blend crumb rubber asphalt, and has undertaken production and placement trials of pavements produced with recycled supplementary crushed rock and cementitious material.

Our in-house design support benefits our clients by optimising both pavement, structural and material design ensuring material solutions meet both operational and sustainability goals.

Many consider Fulton Hogan's greatest strength to be our ability to work in a collaborative manner with our customers and communities. We focus on creating long-term trust-based partnerships that develop innovative sustainable solutions that can work in with operational considerations that often exceed the environmental, quality and performance expectations.

Fulton Hogan offers a number of sustainable solutions for our customers, which can both improve performance and reduce cost, helping our customer's transition to the circular economy. At Fulton Hogan, we can work with our customers to optimise sustainable solutions based on available materials, economic and functional needs.

In 2020, Fulton Hogan joined several prominent Melbourne businesses and Universities in the Melbourne Renewable Energy Project (MREP2) deal which enables five facilities in Victoria including all asphalt, blending facilities and quarries at Tylden and Tynong to be powered using renewable wind energy. More than 6,000 tonnes of carbon are removed from the environmental footprint of the products we manufacture, and the roads and infrastructure we build across the state.



Quarry Products

Fulton Hogan's quarried aggregates are manufactured via the extraction and processing of naturally occurring rock deposits.

Extraction begins with the removal of overburden, which is the organic matter, soil and clay overlying the rock source. This overburden provides material that is utilised for the creation of bunds and landscaping around the quarry pit, as well as future rehabilitation works.

After the overburden has been removed and the rock deposit exposed, it is drilled and blasted, which enables smaller rock fractions to be removed from the quarry rock face. This is achieved using mobile excavators, which load blasted material into articulated dump trucks.

Dump trucks deliver this material to crushers and vibrating screen decks located nearby or inside the quarry pit, which reduce rock particle sizes and sort materials into specific size fractions.

This results in the production of high-quality materials that meet the stringent quality requirements of major infrastructure projects.

The products outlined in this Environmental Product Declaration are manufactured at Fulton Hogan's Tynong and Tylden quarries in Victoria, Australia, which supply granite and basalt aggregates respectively. The following table outlines the range of products available at our quarries and their applications.

Table 1: Range of quarry products and their applications

| Product Type | Description |
|---------------------------------|--|
| Concrete and Asphalt Aggregates | Inputs for the manufacture of asphalt and concrete: graded aggregates manufactured to meet specific particle size distribution specifications for use in asphalt and concrete manufacturing. Available from 5mm to 20 mm size aggregate. |
| Crushed rock | Structural material compliant to relevant DoT specifications with properties suited to use as subbase and base in road construction. Available in 20mm and 40 mm size. |
| Drainage material | Finer material used for drainage works, including pipe embedment. Size range 5mm-20mm. |
| Landscaping blends | High-quality decorative aggregates suited to use in landscape architecture and garden applications. Size range 200mm-600 mm. Only available at Tynong Quarry. |
| Fill | Material suitable for non-structural applications, including filling voids and creating level surfaces. Size up to 75mm. Only available at Tynong Quarry. |
| Beaching and rubble | Large-size stone used for stabilisation purposes. Size range 60mm-150 mm. |

Figure 3: Location of Fulton Hogan’s quarries included in the EPD





Technical Compliance

Fulton Hogan's quarries operate quality management systems that are accredited to ISO 9001:2015 and maintain industry-leading standards of practice. We manage all our quarries with an eye to the future, working under stringent environmental management plans that demonstrate our commitment to responsibly preserve our precious resources for future generations. Our record in quarry management is testament to our broad skills base and the pride we take in providing efficient, safe and environmentally-conscious resources.

Prior to dispatch, products are subject to inspection and testing by expert technical teams in NATA-accredited laboratory facilities. The products available at Tylden and Tynong quarries are designed to comply with the relevant specifications for their intended application:

- AS 2758 Aggregates and rock for engineering purposes
- Victorian Department of Transport Section 801 – Material Sources for the Production of Crushed Rock and Aggregates
- Victorian Department of Transport Section 812 – Crushed Rock for Pavement Base and Subbase
- Victorian Department of Transport Section 815 – Cementitious Treated Crushed Rock for Pavement Subbase
- Victorian Department of Transport Section 831 – Aggregates for Sprayed Bitumen Surfacing
- Victorian Department of Transport Section 702 – Subsurface Drainage (Filter Material)
- Victorian Department of Transport Section 610 – Structural Concrete (Aggregate)
- Water Services Association of Australia Product Specifications WSA PS-351, 360, 361

In addition to the manufacture of traditional quarry products, Fulton Hogan is also able to offer sustainable alternatives for virgin materials. These products replace part or all of the virgin component with recycled materials, whilst maintaining rigorous quality standards.

Product Composition

This EPD provides information for 100% rock products extracted from Tynong and Tylden quarries. These products vary in particle size and may be referred to using different names (e.g. crushed rock, manufactured sand, fill) but do not vary in material composition.

Table 2: Product composition

| All products from Tynong quarry | All products from Tylden quarry |
|------------------------------------|------------------------------------|
| 100% Granite rock | 100% Basalt rock |

Product Identification

The product identification codes for aggregates are UN CPC 1513 (Granite, sandstone and other monumental or building stone) and ANZSIC 09190 (Aggregate quarrying).



Scope of Environmental Product Declaration

This EPD covers the cradle-to-gate life cycle stages A1-A3. Downstream stages have not been included.

Table 3: Scope of EPD

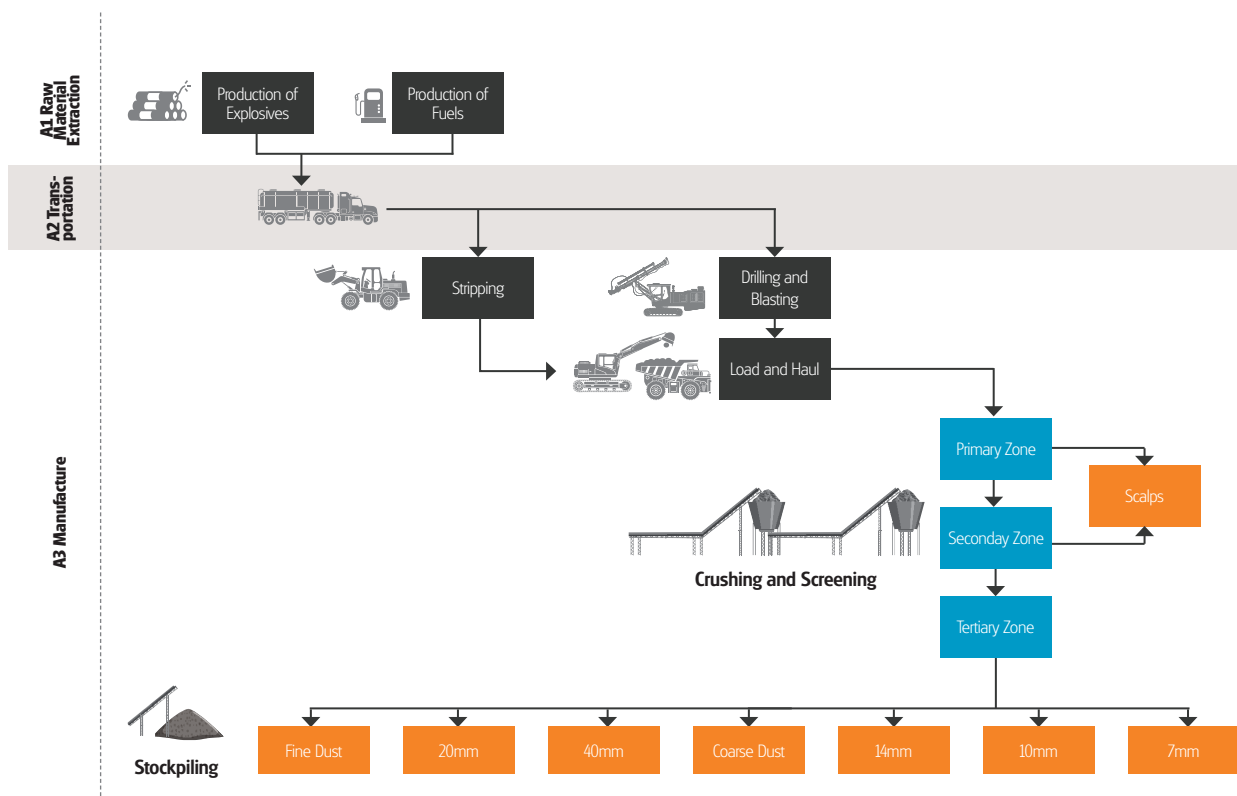
| Product Stage | | | Construction Stage | | Use Stage | | | | | | | End-of-life Stage | | | | Benefits beyond system boundary |
|---------------|-----------|------------|--------------------|--------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|---------------------------|-----------|------------------|----------|--------------------------------------|
| Raw Materials | Transport | Production | Transport | Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction/Demolition | Transport | Waste Processing | Disposal | Reuse, recovery, recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| | | | Scenario | | Scenario | | | | | | | Scenario | | | | |
| ✓ | ✓ | ✓ | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

✓ = module is included in this study

MND = module is not declared



Figure 4: Cradle-to-gate life cycle of quarry products





Product Stage

Raw Material, Transportation and Manufacturing Stages A1-A3

The raw materials and energies used for the manufacture of quarried products include explosives, which are used to break down the natural rock deposit; electricity, which powers the majority of crushing and screening equipment; and diesel, which is burnt as fuel in mobile plant including excavators, articulated dump trucks, and forklifts.

Specific quarry products, as described in the Quarry Products section of this document, are obtained by adjusting the equipment settings of crushing and screening equipment. This enables specific particle size distributions and maximum particle sizes to be manufactured, depending on the desired products or properties. The general steps involved in the manufacturing of quarry products are described as follows:

Stripping

The source rock required for aggregate production is revealed by the removal of the overlying sediments and decomposed rock (overburden) in a process known as stripping. Stripping may take a few days, or several months depending on the amount of material that needs to be removed. Overburden is stored on site in accordance with the work authority.

Drilling and Blasting

The exposed hard rock is drilled and blasted to produce the Primary Raw Feed to the crushing and screening plant. The drilling patterns used can be varied to optimise the fragmentation of the rock and minimise the production of oversize material.



Load and Haul

The Primary Raw Feed (PRF) is loaded into dump trucks with appropriate loading equipment and is transported to the primary crusher for processing.

Crushing and Screening


A combination of primary, secondary and tertiary crushing is employed at FH Quarries to reduce the rock size for screening into discrete aggregates of nominal size.

Pugmill Operation and Material Processing

Some products required for construction activities require the mixing of several different aggregates and other additives such as water and or cement. This mixing is done in the pugmill, essentially a giant mixer.

Stockpiling

Products are maintained in discrete stockpiles which have been tested to ensure compliance with specifications. Stockpiling procedures are in place to ensure there is no cross-contamination of products and segregation is minimized.



Life Cycle Assessment (LCA) Methodology

Background Data

Fulton Hogan has collected and supplied the primary data for the LCA. In Victoria, the primary data cover the operation of two quarries (Tylden and Tynong). 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).

The operational and production data have been collected for FY20 (1 July 2019 – 30 June 2020). Environmental profiles of our products are based on life cycle data that are less than five years old. Background data used are less than 10 years old or have been reviewed within this period.

Methodological choices have been applied in line with PCR 2012:01 Construction Products and Construction Services (Envirodec 2020), which aligns with EN 15804.

Fulton Hogan's Victorian sites participate in MREP2, a renewable electricity Power Purchase Agreement (PPA). In line with the PCR, we have modelled the contracted electricity using the specific electricity mix from the electricity supplier as documented by Renewable Energy Certificates (RECs) or Guarantees of Origin. In this case, Fulton Hogan is supplied with wind power for which we have used ecoinvent 3 data for onshore wind power. This electricity dataset has a greenhouse gas intensity of 0.002 kg CO₂e/kWh.

Allocation

The key process that requires allocation is the production of aggregates of different particle sizes. The crushing process in the quarry produces aggregates of various particle sizes. As all products go through the same processing, they have been attributed the same environmental impacts on a per tonne basis (i.e. mass allocation). As a result, manufactured sand and crushed rock have identical environmental profiles.

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.

- The contribution of capital goods (production equipment and infrastructure) and personnel is outside the scope of the LCA, in line with the PCR (Envirodec 2020).
- Greases, lubricants and other minor ancillary materials used during aggregate production have been excluded. The impact on the footprint of the aggregate products is negligible.

Note: Although explosives make up less than 1% of material flows, they contribute between 5% and 12% to the greenhouse gas emissions and have therefore been included.

Key Assumptions

The key choices and assumptions in the LCA are:

- **Product allocation:** All products coming out of a quarry are assigned the same impact on a per tonne basis. This is considered to be the most practical allocation approach.
- **Electricity use:** Site electricity use is modelled on the basis of contracted renewable electricity, as explained before.

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.

Declared Unit

1 tonne of aggregates

Environmental Indicators

The environmental indicators presented in this EPD are in line with EN 15804:2012+A1:2013.

Table 4: Environmental indicators

| Environmental Indicator | Acronym | Unit | Description |
|--|---------|-------------------------------------|---|
| Global Warming Potential | GWP | kg CO ₂ eq | Global warming impact of greenhouse gases such as carbon dioxide (CO ₂), measured in kg CO ₂ equivalents using a global warming potential over a 100-year time horizon. |
| Ozone Depletion Potential | ODP | kg CFC-11 eq | Relative impact that the product can cause to the stratospheric ozone layer, measured in kg trichlorofluoromethane (CFC-11) equivalents. |
| Acidification Potential | AP | kg SO ₂ eq | Increase of soil and water acidity that the product can cause, measured in kg sulphur dioxide (SO ₂) equivalents. |
| Eutrophication Potential | EP | kg PO ₄ ³⁻ eq | Potential impact of nutrification by nitrogen and phosphorus to aquatic and terrestrial ecosystems, for example through algal blooms, measured in kg phosphate (PO ₄ ³⁻) equivalents. |
| Photochemical Ozone Creation Potential | POCP | kg C ₂ H ₄ eq | Also known as summer smog, the potential impact from oxidising of volatile compounds in the presence of nitrogen oxides (NO _x) which frees ozone in the low atmosphere, measured in kg ethene (C ₂ H ₄) equivalents. |
| Abiotic Depletion Potential (elements) | ADPE | kg Sb eq | Economic impact from the depletion of scarce non-renewable resources such as metals, measured in kg antimony equivalents. |
| Abiotic Depletion Potential (Fossil Fuels) | ADPF | MJ | Economic impact from depletion of fossil fuel resources such as oil or natural gas, expressed using their net calorific value. |



Table 5: Parameters describing resource use, waste and output flows

| Parameter | Acronym | Unit |
|--|---------|-------------------|
| Parameters describing resource use | | |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | PERE | MJ _{NCV} |
| Use of renewable primary energy resources used as raw materials | PERM | MJ _{NCV} |
| Total use of renewable primary energy resources | PERT | MJ _{NCV} |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | PENRE | MJ _{NCV} |
| Use of non-renewable primary energy resources used as raw materials | PENRM | MJ _{NCV} |
| Total use of non-renewable primary energy resources | PENRT | MJ _{NCV} |
| Use of secondary material | SM | kg |
| Use of renewable secondary fuels | RSF | MJ _{NCV} |
| Use of non-renewable secondary fuels | NRSF | MJ _{NCV} |
| Use of net fresh water | FW | m ³ |
| Waste categories | | |
| Hazardous waste disposed | HWD | kg |
| Non-hazardous waste disposed | NHWD | kg |
| Radioactive waste disposed | RWD | kg |
| Output flows | | |
| Components for re-use | CRU | kg |
| Materials for recycling | MFR | kg |
| Materials for energy recovery | MER | kg |
| Exported energy | EE | MJ |



Environmental Profiles of Quarry Products

The cradle-to-gate (module A1-A3) environmental profiles and environmental parameters are expressed per tonne (1,000 kg) of quarry product.

Table 6: Environmental profiles of quarry products, stages A1-A3, per tonne

| Indicator | Unit | Tylden quarry products | Tynong quarry products |
|-------------------------------|-------------------------------------|------------------------|------------------------|
| Global warming (total) | kg CO ₂ eq | 5.1 | 7.8 |
| Ozone layer depletion | kg CFC-11 eq | 6.0E-07 | 9.7E-07 |
| Acidification, soil and water | kg SO ₂ eq | 0.011 | 0.016 |
| Eutrophication | kg PO ₄ ³⁻ eq | 0.0014 | 0.0017 |
| Photochemical ozone creation | kg C ₂ H ₄ eq | 0.0013 | 0.0020 |
| Abiotic depletion - elements | kg Sb eq | 8.4E-08 | 6.7E-08 |
| Abiotic depletion - fossil | MJ _{NCV} | 68 | 110 |

Table 7: Environmental parameters of quarry products, stages A1-A3, per tonne

| Parameter | Unit | Tylden quarry products | Tynong quarry products |
|-----------|-------------------|------------------------|------------------------|
| PERE | MJ _{NCV} | 1.9E+00 | 6.5E+00 |
| PERM | MJ _{NCV} | 0.0E+00 | 0.0E+00 |
| PERT | MJ _{NCV} | 1.9E+00 | 6.5E+00 |
| PENRE | MJ _{NCV} | 7.3E+01 | 1.2E+02 |
| PENRM | MJ _{NCV} | 0.0E+00 | 0.0E+00 |
| PENRT | MJ _{NCV} | 7.3E+01 | 1.2E+02 |
| SM | kg | 0.0E+00 | 0.0E+00 |
| RSF | MJ _{NCV} | 0.0E+00 | 0.0E+00 |
| NRSF | MJ _{NCV} | 0.0E+00 | 0.0E+00 |
| FW | m ³ | 1.7E-01 | 1.4E-01 |
| HWD | kg | 0.0E+00 | 0.0E+00 |
| NHWD | kg | 6.6E-04 | 1.1E-03 |
| RWD | kg | 0.0E+00 | 0.0E+00 |
| CRU | kg | 0.0E+00 | 0.0E+00 |
| MFR | kg | 0.0E+00 | 0.0E+00 |
| MER | kg | 0.0E+00 | 0.0E+00 |
| EE | MJ | 0.0E+00 | 0.0E+00 |

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| | |
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