

Environmental Product Declaration for aggregates from Løng gravel pit – Sorø



According to EN 15804:2012+A2:2019/AC:2021, ISO 14025, ISO 14040 and ISO 14044
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EPD owner: NCC Industry Nordic AB

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The aggregates declared in the EPD are divided into 4 product groups. See Table 1 for all declared products in this EPD.

EPD Information

Declared unit: 1000 kg product
PCR: Product Category Rules PCR 2019:14 Construction products, version 1.11 of 2021-02-05
Programme: The International EPD® System, www.environdec.com



Product information

General product information

The products declared are aggregates manufactured by NCC Industry, Division Stone Materials. The declared site is Løng gravel pit in Sorø, a large-sized gravel pit operated by NCC Industry in Denmark.

The declared products manufactured in Løng during 2021 (product list in Table 1) are intended to be used as, e.g. asphalt and concrete and filling material in civil engineering.

Aggregates are produced in various fractions; from 0/2 mm sand and pebbles to concrete, crushed rocks, gravel for subbase and base course. There are 21 types of aggregates declared in this EPD, representing the products manufactured at the declared site, see Table 1. The technical standards which the aggregates are compliant with are also presented. The aggregates consist of natural sands and stone.

Table 1: Products manufactured at the declared site, classified into product groups and standards applicable.

| Product group | Product names (English) | Product names (Danish) | EN-12620 ¹⁾ | EN-13043 ²⁾ | EN-13285 ³⁾ |
|---------------|--------------------------------|-----------------------------|------------------------|------------------------|------------------------|
| 1 | Sand 0/2 | Sand 0/2 | | | |
| 2 | Mixture of stone 0/500 | Blandingssten 0/500 | | | |
| | NCC Drænstabli | NCC Drænstabli | | | X |
| | Unprocessed gravel | Rågrus usorteret | | | |
| | Sandfill not graded | Sandfyld uharpet | | | |
| | Sandfill graded 0/4 | Sandfyld harpet 0/4 | | | |
| 3 | Pebble washed 4/8 | Perlesten vasket 4/8 | | | |
| | Pebble washed 8/16 | Ærtesten vasket 8/16 | | | |
| | Mix for concrete 0/16 | Støbemix 0/16 | | | |
| | Sand washed 0/2 | Vasket grus 0/2 | | | |
| | Sand washed 0/4 | Vasket grus 0/4 | | X | |
| 4 | Pebble washed 16/32 | Nøddesten vasket 16/32 | | | |
| | Gravel for concrete 0/8 | Betongrus 0/8 | | | |
| | Sand for concrete 0/4 | Betonsand 0/4 | | | |
| | Sand for concrete kl.P 0/4 | Betonsand kl. P 0/4 | X | | |
| | Gravel for roadside 0/16 | Rabatgrus 0/16 | | | |
| | Subbase gravel kv. II 0/20 | Bundsikringsgrus kv.II 0/20 | | | X |
| | Topsoil graded | Muldjord harpet | | | |
| | Sandfill graded | Sandfyld harpet | | | |
| | Base Course gravel kv. II 0/32 | Stabilgrus kv.II 0/32 | | | X |
| | GAB-gravel 0/16 | GAB-grus 0/16 | | X | |

1) EN-12620+A1:2008 - Aggregates for Concrete

2) EN-13043/AC:2006 - Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

3) EN-13285/2018 – Unbound mixtures. Specifications

The products are classified into product groups based on the consumption of diesel since it is the largest contributor to the environmental impact. Products in the same product group have the same diesel consumption and for energy, ancillary

materials and waste, a conservative approach has been taken, so the product with the highest value within the product group have been used in the LCA calculation. The sectioning of the products in product

groups simplifies the presentation of results in the EPD, which are declared per product group.

When extracting natural sand and gravel at the site, the first step is to remove the overburden, like soil, moraine and vegetations, with an excavator to uncover the hard rock. Consideration is taken to animals inhabiting the site by avoiding felling vegetations during the breeding season. The overburden is normally stored within the quarry to be

used in rehabilitation of the quarry at the end of life. After extraction, the raw material is fed into the production process using a combination of excavators, wheel loaders and/or dumper trucks.

The continued production process is a combination of material feeders, conveyor belts, crushers and screens that transports, breaks and sorts the material into different products. The production process set-up is illustrated in Figure 1.

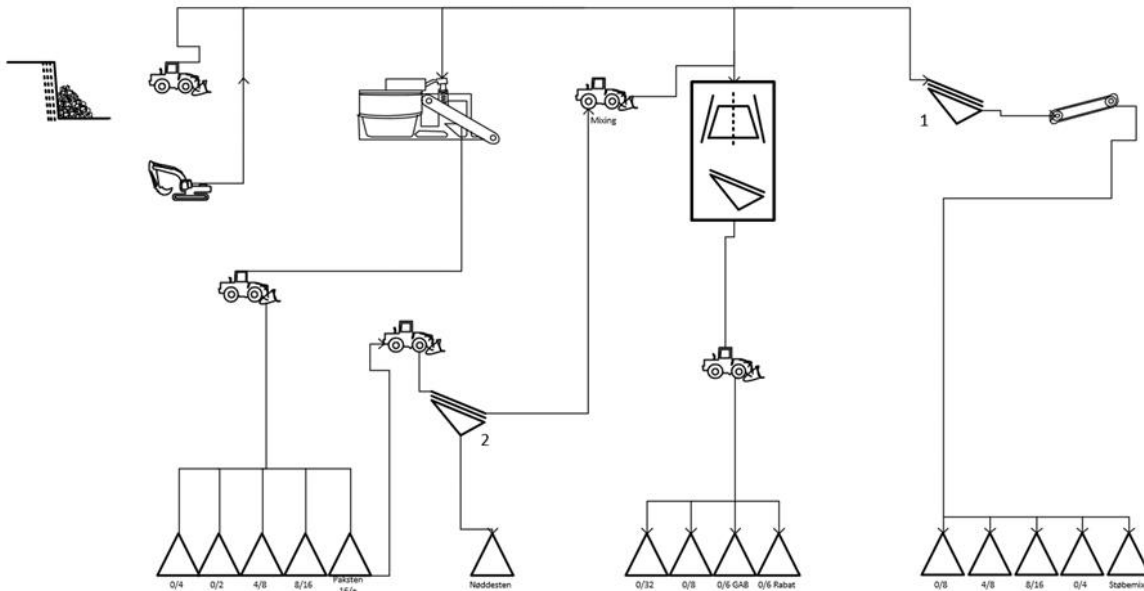


Figure 1: Process set-up for the production of aggregates at the declared site.

The products declared are classified according to the United Nations Central Product Classification (UN CPC) 15320. All materials are produced according to the Construction Products Regulation (CPR) within the EU regulation 305/2011.

The geographical location of the declared site is shown in Figure 2.



Figure 2: Map and picture showing the geographical location of the declared site.

Declared unit

The declared unit is 1 tonne (1000 kg) of aggregates.

System boundary

The system boundaries cover aspects such as temporal and geographical. The setting of system boundaries follows two principles according to EN 15804: (1) The “modularity principle” and (2) the “polluter pays principle”.

The EPD is based on an LCA model described in the background report and in the related annex (see reference list). The declared modules are A1-A3, C and D see Table 2. The product system under study is presented in Figure 3.

For aggregates used in asphalt and concrete the declared modules are A1-A3 (i.e. “cradle to gate”). Exemptions in EN 15804 (chapter 5.2) are fulfilled permitting not to declare module C and D.

For aggregates used in other applications the declared modules are A1-A3, C and D (i.e. “cradle to gate with, modules C1–C4, and module D”).

Data that represent the current production process at the site are used. All input data used in the LCA model (e.g. raw materials and production data) that NCC Industry has influence over are site specific data for the production year 2021. The geographical scope, i.e. location(s) of use and end-of-life performance, is Denmark.

The environmental impact from infrastructure, construction, production equipment and tools that are not directly consumed in the production process are not accounted for in the Life Cycle Inventory (LCI). Personnel-related impacts, such as transportation to and from work, are neither accounted for in the LCI.

Declaration of the RSL is only possible if B1-B5 are included, i.e. RSL is not assessed.

Table 2: Modules of the life cycle in the EPD, including geography, share of specific data (in GWP-GHG indicator) and data variation.

| | Product stage | | | Construction process stage | | Use stage | | | | | | | End of life stage | | | | Benefits and loads beyond the system boundary |
|----------------------|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|---------------------------|-----------|------------------|----------|-----------------------------------------------|
| | Raw material supply | Transport | Manufacturing | Transport | Construction installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules declared | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | ND | X* | X* | X* | X* | X* |
| Geography | DK | DK | DK | - | - | - | - | - | - | - | - | - | DK | DK | DK | DK | DK |
| Specific data | >90% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | <10%** | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | Not relevant | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

* Only declared for products used in other applications than asphalt and concrete.

**Within each product group. The variation between different product groups are bigger, see result tables.

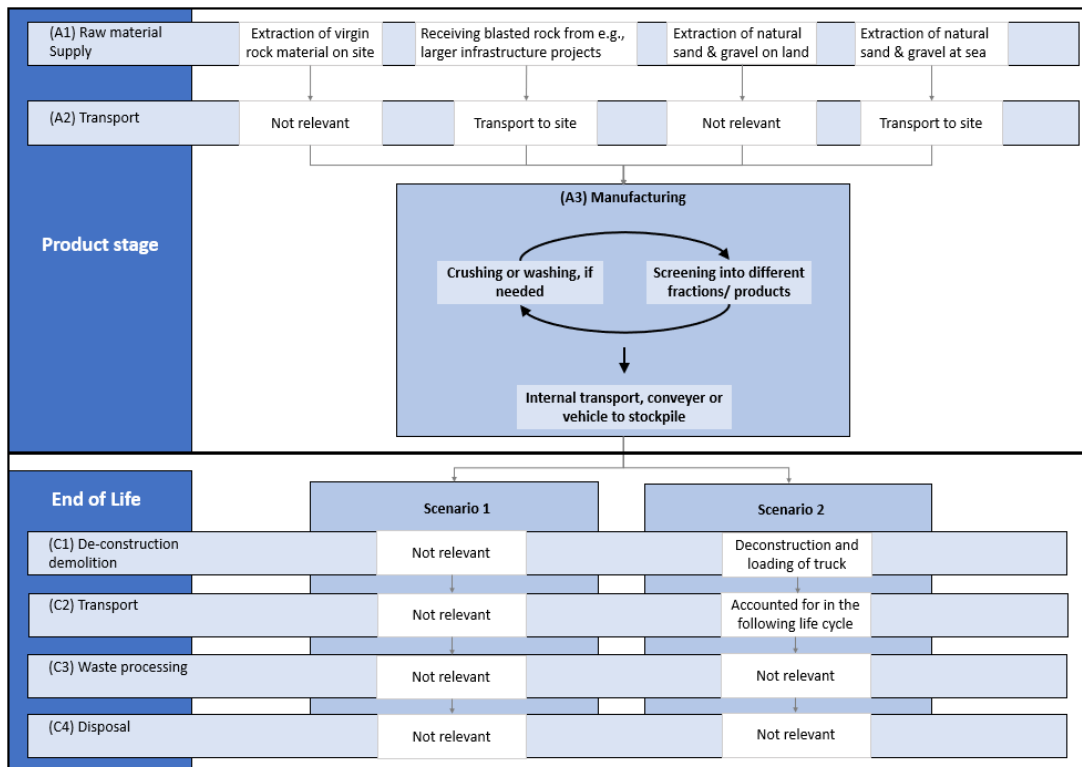


Figure 3: System boundaries for the studied product system.

Assumptions and approximations

Various oils and lubricants used in the production process, are approximated with a dataset for lubricants since no dataset or EPD were found for hydraulic oil or grease and the impact is judged to be similar.

Transport distances have been approximated together with operational experts at the site. When a transport distance is unknown, 25 km is used. This is mainly applied to materials which have a minor contribution in terms of weight compared to the total weight of the product. Thus, the impact from the transport work has minor contribution independent of the distance the raw material is transported.

Allocation

The production does not deliver any co-products.

The products are divided into different product groups (see Table 1) based on the consumption of diesel. Products in the same product group have the same diesel consumption and for energy, ancillary materials and waste, a conservative approach has been taken, so the product with the highest value within the product group have been used in the LCA calculation. The sectioning of the products in product groups simplifies the presentation of results in the EPD, which are declared per product group.

The electricity consumption is known for the production (crushing) process as a whole and allocation of electricity is made based on knowledge from the operational expert about the relative energy consumption of the machines using electricity.

The fuel consumption is known for the site as a whole. Allocation of the fuel consumption is made based on knowledge from the operational expert about which process steps each product goes through, and the amount of fuel consumed in each step during the data collection period. Fuel consumed in machines used for general activities on the site is allocated on all products produced, based on mass.

Cut-offs

The cut-off criteria are 1% of the renewable and non-renewable primary energy usage and 1% of the total mass input of the manufacture process (according to the EN 15804 standard).

In the assessment, all available data from the production process are considered, i.e. all raw materials used, utilized ancillary materials, and

energy consumption using the best available LCI GaBi datasets.

The following cut-offs have been made:

- The amount of oil-contaminated soil due to spillage from machines/vehicles is very difficult to estimate. Based on internal expert knowledge, this amount is deemed negligible and very rarely occurring.
- The packaging for the input materials used in the production process are negligible.

Software and database

The LCA software GaBi Professional and its integrated database from Sphera has been used in the LCA modelling. See the list of references.

Electricity in manufacturing

If the electricity in module A3 accounts for more than 30% of the total energy in stage A1 to A3, the energy sources behind the electricity grid in module A3 shall be documented, including the LCA data of grams CO₂ eq./kWh. For transparency the information is given in Table 3 even though electricity in A3 accounts for less than 30% of the total energy in A1-A3.

Table 3: Electricity in manufacturing (A3).

| Energy source | LCA data (g CO ₂ eq./kWh) |
|---------------|--------------------------------------|
| Wind power | 6.3 |

Data quality

The primary data collected by the manufacturer are based on the required materials and energy to manufacture the product. The data of the raw materials are collected per declared unit. All necessary life cycle inventories for the basic materials are available in the GaBi database or via EPDs. No generic selected datasets (secondary data) used are older than ten years. No specific data collected is older than five years and represent a period of about one year. The representativeness, completeness, reliability and consistency are judged as good.

About NCC

NCC is one of the leading construction and property development companies in the Nordic region, with sales of 5.2 billion Euro and approximately 13 000 employees in 2021. With the Nordic region as its home market, NCC is active throughout the value chain – developing commercial properties and

constructing housing, offices, industrial facilities and public buildings, roads, civil engineering structures and other types of infrastructure. NCC also offers input materials used in construction and accounts for paving and road services.

NCC's vision is to renew our industry and provide superior sustainable solutions. NCC aims to be the leading society builder of sustainable environments and will proactively develop new businesses in line with this.

NCC works to reduce both our own and our customers' environmental impact and continues to further refine our offerings with additional products and solutions for sustainability. In terms of the environment, this entails that NCC, at every step of the supply chain, is to offer resource and energy-efficient products and solutions to help our customers reduce their environmental impact and to operate more sustainably.

NCC's sustainability work is based on a holistic approach with all three dimensions of sustainability – social, environmental and economical. NCC's sustainability framework is divided into eight impact areas: Data and expertise, Natural resources and biodiversity, Materials and circularity, Climate and energy, Health and safety, People and team, Ethics and compliance and Economic performance. Our sustainability strategy includes the aim of being both a leader and a pioneer in these areas.

NCC reports on its sustainability progress each year and the report has been included in NCC's Annual Report since 2010. NCC applies Global Reporting Initiative (GRI) Standards, the voluntary guidelines of the GRI for the reporting of sustainability information. In addition to GRI, NCC also reports the Group's emission of greenhouse gases to the CDP each year. NCC is a member in BSCI (Business Social Compliance Initiative), which is the broadest business-driven platform for the improvement of social compliance in the global supply chain and has been a member of the UN Global Compact since 2010.

The UN Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with 10 defined and universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

Also visit: <https://www.ncc.com/sustainability>

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Content declaration including packaging

The products declared do not contain any substances of very high concern (SVHC) according to REACH. Table 4 presents the content declaration

for the various product groups. The mass of biogenic carbon in the products is less than 5%. The packaging material is negligible.

Table 4: Content declaration of the asphalt mixtures declared.

| Product group | Product component | Weight, kg | Post-consumer material, weight-% | Renewable material weight-% |
|---------------|-----------------------------------|------------|----------------------------------|-----------------------------|
| 1 | Natural sands and stone | 1000 | 0 | 0 |
| 2 | Natural sands and stone | 1000 | 0 | 0 |
| 3 | Natural sands and stone | 1000 | 0 | 0 |
| 4 | Natural sands and stone | 1000 | 0 | 0 |
| Product group | Packaging material | Weight, kg | Weight-% (versus the product) | |
| 1-4 | Negligible for all product groups | Negligible | Negligible | |

Environmental performance

The results of the life cycle assessment, based on the declared unit, can be found in Table 5 and 6 (core environmental indicators), Table 7 and 8 (resource use) and Table 9 and 10 (output flows and waste categories). The products are grouped into product groups depending on the consumption of diesel. Products within the same product group carry the same impact. The deviation within each product group is less than 10% for any core environmental indicators, resource use and waste category.

Table 5: Results of the LCA (modules A1-A3) – Core environmental indicators per declared unit of the respective product group

| Core environmental indicators | | Product group 1 | Product group 2 | Product group 3 | Product group 4 | |
|------------------------------------------------------|-----------------------------------|-----------------------|-----------------|-----------------|-----------------|---------|
| Impact category | Unit | A1-A3 | A1-A3 | A1-A3 | A1-A3 | |
| Climate change | Total | kg CO ₂ eq | 0.34 | 0.69 | 1.1 | 1.5 |
| | Fossil | kg CO ₂ eq | 0.34 | 0.69 | 1.1 | 1.5 |
| | Biogenic* | kg CO ₂ eq | 0 | 0 | 0 | 0 |
| | Land use and land use change | kg CO ₂ eq | 2.1E-05 | 4.2E-05 | 6.4E-05 | 9.3E-05 |
| | GWP-GHG** | kg CO ₂ eq | 0.34 | 0.69 | 1.1 | 1.5 |
| Ozone depletion | kg CFC 11 eq | 4.7E-15 | 9.4E-15 | 1.4E-14 | 7.0E-14 | |
| Acidification | mol H+ eq. | 8.8E-04 | 1.8E-03 | 2.7E-03 | 3.6E-03 | |
| Eutrophication aquatic freshwater | kg P eq. | 8.2E-08 | 1.7E-07 | 2.5E-07 | 3.6E-07 | |
| Eutrophication aquatic marine | kg N eq. | 3.9E-04 | 7.8E-04 | 1.2E-03 | 1.6E-03 | |
| Eutrophication terrestrial | mol N eq. | 4.3E-03 | 8.6E-03 | 0.013 | 0.017 | |
| Photochemical ozone formation | kg NMVOC eq. | 1.3E-03 | 2.5E-03 | 3.8E-03 | 5.1E-03 | |
| Depletion of abiotic resources - minerals and metals | kg Sb eq. | 1.5E-08 | 3.0E-08 | 4.4E-08 | 6.1E-08 | |
| Depletion of abiotic resources - fossil fuels | MJ, net calorific value | 4.7 | 9.5 | 14 | 19 | |
| Water use | m ³ world eq. deprived | 1.5E-03 | 4.1E-03 | 9.3E-03 | 0.015 | |

Table 6: Results of the LCA (modules C and D) – Core environmental indicators per declared unit of the respective product group.

| Core environmental indicators | | All product groups | | | | | |
|------------------------------------------------------|-----------------------------------|------------------------|------------|----|----|------------|------------|
| Impact category | Unit | C1 (S1/S2) | C2 | C3 | C4 | D (S1/S2) | |
| Climate change | Total | kg CO ₂ eq. | NR/0.91 | NR | NR | NR | NR/0.026 |
| | Fossil | kg CO ₂ eq. | NR/0.94 | NR | NR | NR | NR/0.024 |
| | Biogenic | kg CO ₂ eq. | NR/0 | NR | NR | NR | NR/0 |
| | Land use and land use change | kg CO ₂ eq. | NR/5.1E-03 | NR | NR | NR | NR/2.0E-03 |
| | GWP-GHG | kg CO ₂ eq. | NR/0.94 | NR | NR | NR | NR/0.023 |
| Ozone depletion | kg CFC 11 eq. | NR/5.5E-14 | NR | NR | NR | NR/1.8E-14 | |
| Acidification | mol H+ eq. | NR/2.4E-03 | NR | NR | NR | NR/5.2E-04 | |
| Eutrophication aquatic freshwater | kg P eq. | NR/2.7E-06 | NR | NR | NR | NR/1.0E-06 | |
| Eutrophication aquatic marine | kg N eq. | NR/1.1E-03 | NR | NR | NR | NR/2.8E-04 | |
| Eutrophication terrestrial | mol N eq. | NR/0.012 | NR | NR | NR | NR/2.9E-03 | |
| Photochemical ozone formation | kg NMVOC eq. | NR/3.4E-03 | NR | NR | NR | NR/9.4E-04 | |
| Depletion of abiotic resources - minerals and metals | kg Sb eq. | NR/7.6E-08 | NR | NR | NR | NR/1.6E-08 | |
| Depletion of abiotic resources - fossil fuels | MJ, net calorific value | NR/12 | NR | NR | NR | NR/0.16 | |
| Water use | m ³ world eq. deprived | NR/8.2E-03 | NR | NR | NR | NR/1.8E-03 | |

Table 7: Results of the LCA (modules A1-A3) – Resource use per declared unit of the respective product group.

| Use of resources | | Product group 1 | Product group 2 | Product group 3 | Product group 4 |
|--------------------------------------------------------------------------------------------------------|-------------------------|-----------------|-----------------|-----------------|-----------------|
| Parameter | Unit | A1-A3 | A1-A3 | A1-A3 | A1-A3 |
| Use of renewable primary energy excl. renewable primary energy resources used as raw materials | MJ, net calorific value | 0.12 | 0.23 | 0.35 | 0.50 |
| Use of renewable primary energy as raw materials | MJ, net calorific value | 0 | 0 | 0 | 0 |
| Total use of renewable primary energy | MJ, net calorific value | 0.12 | 0.23 | 0.35 | 0.50 |
| Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials | MJ, net calorific value | 4.7 | 9.5 | 14 | 19 |
| Use of non-renewable primary energy as raw materials | MJ, net calorific value | 0 | 0 | 0 | 0 |
| Total use of non-renewable primary energy | MJ, net calorific value | 4.7 | 9.5 | 14 | 19 |
| Use of secondary material | kg | 0 | 0 | 0 | 0 |
| Use of renewable secondary fuels | MJ, net calorific value | 0 | 0 | 0 | 0 |
| Use of non-renewable secondary fuels | MJ, net calorific value | 0 | 0 | 0 | 0 |
| Use of net fresh water | m ³ | 5.6E-05 | 1.4E-04 | 2.9E-04 | 4.9E-04 |

Table 8: Results of the LCA (modules C and D) – Resource use per declared unit of the respective product group

| Use of resources | | All product groups | | | | |
|--------------------------------------------------------------------------------------------------------|-------------------------|--------------------|----|----|----|------------|
| Parameter | Unit | C1 (S1/S2) | C2 | C3 | C4 | D (S1/S2) |
| Use of renewable primary energy excl. renewable primary energy resources used as raw materials | MJ, net calorific value | NR/0.70 | NR | NR | NR | NR/0.16 |
| Use of renewable primary energy as raw materials | MJ, net calorific value | NR/0 | NR | NR | NR | NR/0 |
| Total use of renewable primary energy | MJ, net calorific value | NR/0.70 | NR | NR | NR | NR/0.16 |
| Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials | MJ, net calorific value | NR/12 | NR | NR | NR | NR/0.15 |
| Use of non-renewable primary energy as raw materials | MJ, net calorific value | NR/0 | NR | NR | NR | NR/0 |
| Total use of non-renewable primary energy | MJ, net calorific value | NR/12 | NR | NR | NR | NR/0.15 |
| Use of secondary material | kg | NR/0 | NR | NR | NR | NR/0 |
| Use of renewable secondary fuels | MJ, net calorific value | NR/0 | NR | NR | NR | NR/0 |
| Use of non-renewable secondary fuels | MJ, net calorific value | NR/0 | NR | NR | NR | NR/0 |
| Use of net fresh water | m ³ | NR/7.9E-04 | NR | NR | NR | NR/2.6E-04 |

Table 9: Results of the LCA (modules A1-A3) – Waste categories and output flows per declared unit of the respective product group.

| Waste categories & output flows | | Product group 1 | Product group 2 | Product group 3 | Product group 4 |
|---------------------------------|-----------------------|-----------------|-----------------|-----------------|-----------------|
| Parameter/Indicator | Unit | A1-A3 | A1-A3 | A1-A3 | A1-A3 |
| Hazardous waste disposed | kg | 5.0E-05 | 2.8E-04 | 8.6E-04 | 1.5E-03 |
| Non-hazardous waste disposed | kg | 2.2E-03 | 9.7E-03 | 0.029 | 0.048 |
| Radioactive waste disposed | kg | 8.3E-06 | 1.7E-05 | 2.6E-05 | 4.4E-05 |
| Components for re-use | kg | 0 | 0 | 0 | 0 |
| Materials for recycling | kg | 0 | 0 | 0 | 0 |
| Materials for energy recovery | kg | 1.7E-03 | 8.5E-03 | 0.026 | 0.045 |
| Exported energy | MJ per energy carrier | 0 | 0 | 0 | 0 |

Table 10: Results of the LCA (modules C and D) – Waste categories and output flows per declared unit of the respective product group.

| Waste categories & output flows | | All product groups | | | | |
|---------------------------------|-----------------------|--------------------|----|----|----|-------------|
| Parameter/Indicator | Unit | C1 (S1/S2) | C2 | C3 | C4 | D (S1/S2) |
| Hazardous waste disposed | kg | NR/5.9E-11 | NR | NR | NR | NR/-5.0E-05 |
| Non-hazardous waste disposed | kg | NR/1.8E-03 | NR | NR | NR | NR/-1.5E-03 |
| Radioactive waste disposed | kg | NR/1.5E-05 | NR | NR | NR | NR/-2.3E-06 |
| Components for re-use | kg | NR/* | NR | NR | NR | NR/0 |
| Materials for recycling | kg | NR/NR | NR | NR | NR | NR/0 |
| Materials for energy recovery | kg | NR/NR | NR | NR | NR | NR/-1.7E-03 |
| Exported energy | MJ per energy carrier | NR/NR | NR | NR | NR | NR/0 |

Table 11: Additional environmental impact indicators are only declared in the Annex to the General background report.

| Impact category | Unit | Module A1-D |
|---------------------------------------|-------------------|--------------------------------------------------|
| Particulate matter emissions | Disease incidence | Not declared in EPD, see Background Annex Report |
| Ionizing radiation, human health | kBq U235 eq. | Not declared in EPD, see Background Annex Report |
| Eco-toxicity (freshwater) | CTUe | Not declared in EPD, see Background Annex Report |
| Human toxicity, cancer effects | CTUh | Not declared in EPD, see Background Annex Report |
| Human toxicity, non-cancer effects | CTUh | Not declared in EPD, see Background Annex Report |
| Land use related impacts/Soil quality | dimensionless | Not declared in EPD, see Background Annex Report |

Table 12: Classification of disclaimers to the declaration of core and additional environmental impact indicators.

| ILCD classification | Indicator | Disclaimer |
|---------------------|-----------------------------------------------------------------------------------------------------|------------|
| ILCD Type 1 | Global warming potential (GWP) | None |
| | Depletion potential of the stratospheric ozone layer (ODP) | None |
| | Potential incidence of disease due to PM emissions (PM) | None |
| ILCD Type 2 | Acidification potential, Accumulated Exceedance (AP) | None |
| | Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) | None |
| | Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine) | None |
| | Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | None |
| | Formation potential of tropospheric ozone (POCP) | None |
| | Potential Human exposure efficiency relative to U235 (IRP) | 1 |
| ILCD Type 3 | Abiotic depletion potential for non-fossil resources (ADP-minerals&metals) | 2 |
| | Abiotic depletion potential for fossil resources (ADP-fossil) | 2 |
| | Water (user) deprivation potential, deprivation-weighted water consumption (WDP) | 2 |
| | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-c) | 2 |
| | Potential Comparative Toxic Unit for humans (HTP-nc) | 2 |
| | Potential Soil quality index (SQP) | 2 |

Disclaimer 1 – 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.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

General information

Virgin aggregates, especially glaciofluvial sand and gravel, is a finite resource. To extract rock from bedrock or sand and gravel from natural deposits will affect the environment through use of land which means changed conditions in existing habitats.

The extraction may have a negative impact on surrounding freshwaters and underlying groundwaters and the operations require equipment and vehicles running on fossil and renewable energy. The operations, including transports, cause emissions to air, water and soil and disturbances such as noise, vibrations and dust.

Therefore, quarries, gravel pits and terminals need to be environmentally assessed in accordance with current legislation. During the application procedure consultations are held with interested parties. Decisions and permits can be appealed.

All sites in NCC Industry, Division Stone Materials, are operated according to a given permit/decision from actual authority which include different conditions. Those conditions might regulate e.g. distance to groundwater level, noise, vibrations, dust, emissions to water and air, and rehabilitation of the finalized operation area.

The sites in Denmark, Finland and Sweden are certified according to ISO 14001. The Business Management System in NCC Industry, including Norway, contains routines corresponding to this standard.

However, aggregates are important when building the future society since aggregates is a core building material in residential buildings, offices, public buildings and infrastructure. Building a normal sized single-family house requires about 100 tonnes of aggregates (SGU, 2018).

The average yearly European demand of aggregates is about 5 tonnes per capita (UEPG, 2018). In the Nordic countries the demand is higher; 8-13 tonnes per capita and year, mainly due to a lower population density.

If aggregates are not contaminated, they may be reused many times through recycling which is key in resource efficiency. At many of our sites NCC recycle smaller amounts of aggregates, concrete, asphalt, bricks and different soils. Recycled materials can then be used again. In the end of life, aggregates are usually reused as filling material in construction projects.

When a quarry/gravel pit is opened the existing habitats changes and the area looks sterile. The soil is normally poor in nutrients and different parts of the area are often exceptionally sunlit or shady, conditions that are appreciated by many species. Within a relatively small operational area that is disrupted continuously, like the quarry/gravel pit, the natural environments are often more varied than in the pristine neighboring area. This makes many of our sites unique and creates opportunities to benefit biodiversity both during operation and when rehabilitating.

Explanatory material is given in the background report to this EPD. To read more about NCCs general sustainability work, please refer to our webpage: <https://www.ncc.com/sustainability>

Release of dangerous substances to indoor air, soil and water during the use stage

According to EN 15804, the EPD does not need to give this information if the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available. This criterion is fulfilled for aggregates.

Scenario information

For modules other than A1-A3, scenario-based information shall be declared for the products, see Table 13.

Module C (not for aggregates used in asphalt or concrete)

Scenario 1:

The majority of the aggregates (excluding the asphalt and concrete applications) stay in the construction for a long time period (more than 100 years). Thus, it is assumed that the aggregates do not reach the end-of-life stage.

Scenario 2:

A minor part of the aggregates is relocated, for example at the road where it is located. The material could for instance be used to fill an embankment in the proximity. This is expected to occur within a 100-year time horizon.

Table 13: Scenario-based information for end of life.

| Scenario information | Unit (per declared unit) | Scenario 1 | Scenario 2 |
|-----------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------|------------|
| Collection process specified by type | kg collected separately | NA | 1000 |
| | kg collected with mixed construction waste | NA | 0 |
| Recovery system specified by type | kg for re-use | NA | 1000 |
| | kg for recycling | NA | 0 |
| | kg for energy recovery | NA | 0 |
| Disposal specified by type | kg product or material for final disposal | NA | 0 |
| Assumptions for scenario development, e.g. transportation | units as appropriate | Further scenario-based information is presented in the Annex of the Background Report | |

Module D

Information in module D aims at transparency of the environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g. as secondary materials or fuels.

Loads are assigned to module D for materials and fuels where further processing occur after the end-of-waste state is reached. This, in order to replace

primary material or fuel input in another product systems.

Benefits are assigned to module D for materials and fuels (that have left the system in any of the modules A4-C4) that can substitute primary material of fuels that do not need to be produced. A functional equivalence must be reached.

The substitution effect is only calculating the resulting net output flow. The net output flow for the aggregates declared are shown in Table 14.

Table 14: Net output flow for module D per declared unit.

| Product groups | Mass (kg) |
|----------------|-----------|
| 1 | 1000 |
| 2 | 1000 |
| 3 | 1000 |
| 4 | 1000 |

Scenario 1 (Net loads and net benefits):
Not relevant.

Scenario 2 (Net loads and net benefits):
The net load relates to the transport of the excavated material. This is assumed to be 3 km transported by a small truck (approximately 9 tonnes payload capacity).

The benefit gained is equal to the virgin aggregates that are substituted. This is assumed to replace the product group with the lowest environmental impact declared in the EPD (module A1-A3) (conservative assumption).

Programme information

This EPD is developed by NCC Industry Nordic AB. It is a result from an EPD certification process verified by Bureau Veritas. The EPD is valid for five years (after which it can be revised and reissued). NCC Industry Nordic AB is the declaration owner and has the liability and responsibility for the EPD.

EPDs of construction products may not be comparable if they do not comply with EN 15804.

EPDs within the same product category but from different programmes may not be comparable.

The aim of this EPD is that it shall provide objective and reliable information on the environmental impact of the production of the declared product.

The intended use of the EPD is for business-to-business communication.

Table 15: Verification details.

| | |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CEN standard EN 15804 serves as the core Product Category Rules (PCR) | |
| Product Category Rules (PCR): | PCR 2019:14 Construction products, version 1.11 |
| PCR review was conducted by: | The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact . |
| Independent third-party verification of the declaration and data, according to ISO 14025:2006: | <input checked="" type="checkbox"/> EPD process certification (Internal) <input type="checkbox"/> EPD verification (External) |
| Certification body: | Bureau Veritas |
| Accredited: | SWEDAC |
| Procedure for follow-up of data during EPD validity involves third party verifier: | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |

Address of programme operator: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com

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- Geological Survey of Sweden (2017) Grus, sand och krossberg. 2018:2.
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- Product Category Rules PCR 2019:14 Construction products, version 1.11 of 2021-02-05
- Regulation (EU) no. 305/2011 – Construction Products Regulation (CPR), <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:088:0005:0043:EN:PDF>
- DS-EN 12620:2002+A1:2008 - Aggregates for Concrete
- DS-EN 13043:2002/AC:2006 - Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
- SS-EN 13285:2018 – Unbound mixtures. Specifications.
- SS-EN ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006)
- SS-EN ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006)
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- The International EPD® System, EPD International AB, Stockholm, Sweden, <http://www.environdec.com/>
- United Nations Statistics Division (2015). Central Product Classification, version 2.1.
<https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf>.
- UEPG (European Aggregates Association) (2018). Annual Review 2017-2018, A Sustainable Industry for a Sustainable Europe.
<http://www.uepg.eu/uploads/Modules/Publications/uepg-annual-review-2017-2018.pdf>.

Differences versus previous versions

Table 16: Versions of this EPD.

| Date of revision | Description of difference versus previous versions |
|------------------|----------------------------------------------------|
| 2022-09-28 | Original version |