Environmental Product Declaration for DrySand aggregates from DrySand – Køge

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

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EPD Information

Declared unit:	1000 kg of DrySand aggregates
PCR:	Product Category Rules PCR 2019:14 Construction products, version 1.3.3 of 2024-03-01
Programme:	The International EPD® System, www.environdec.com

General product information

The declared product is an aggregate manufactured by NCC Industry, Division Stone Materials at the site DrySand in Køge, Denmark.

The declared product, manufactured in DrySand during 2023 (product list in Table 1), is used in e.g. concrete, district heating production, bentonite products, sand blasting and artificial turf.

The technical standards which the aggregates are compliant with are presented below. The aggregates consist of sand.

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

Registration number	Product names (English)	Product names (Danish)	EN-12620 1)	EN-13139 2)	EN-13043 3)
S-P-07801	DrySand	DrySand	X	X	X

1) EN-12620+A1:2008 - Aggregates for Concrete
2) EN 13139: 2002/AC:2004 – Aggregates for mortar
3) EN-13043/AC:2006 - Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

The process of extracting natural sand & gravel at sea starts with an empty ship that leaves the harbour and travels to a dredging area out at sea. Once at the dredging area, the ship uses either a stationary dredger or a trailing suction hopper dredger. A first screening of the material is done at the ship to remove oversize material. When the ship is full, it returns to the harbour and is unloaded with an excavator onwards to the production process. The production process set-up is illustrated in Figure 1.

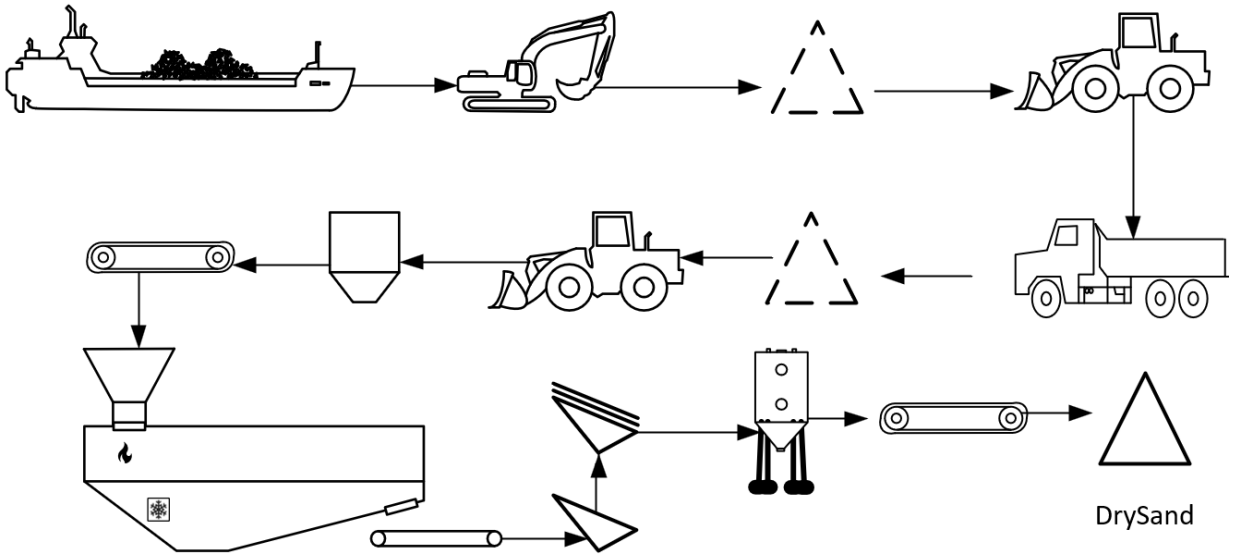

Figure 1: Process set-up for the production of aggregates at the declared site.

The declared product is classified according to the United Nations Central Product Classification (UN CPC) 15310. 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 DrySand 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”, 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 2023. 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.

The Reference Service Life (RSL) can only be declared if defined as part of the functional unit (FU) according to a c-PCR. Since no FU is used, and no c-PCR exist for the declared product, RSL is not defined in this EPD.

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	Reuse, recovery, recycling potential
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	29%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	N/A**			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Only declared for products used in other applications than asphalt and concrete.
**Not applicable since only one product is declared.

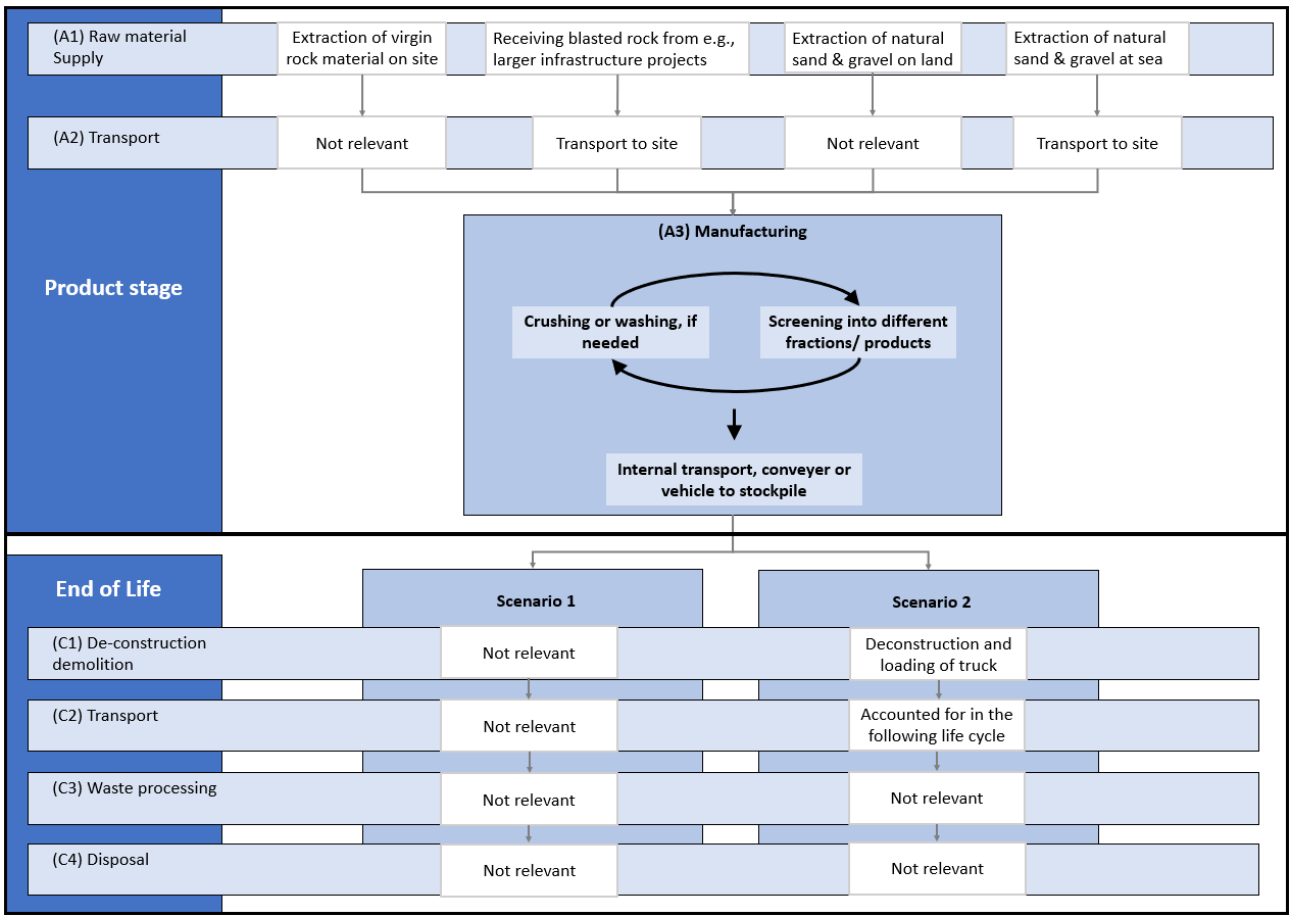

Figure 3: System boundaries for the studied product system.

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.

In those cases transport distances for raw material supply are unknown, an assumption of 100 km is made. This is mainly applied to materials which have a minor contribution in terms of weight compared to the total weight of the product.

A small part of the use of fuel derives from a subcontractor which there is no data available from. There is however information on the average fuel use per handled ton for these machines. In combination with the amounts of tons that is handled by these machines, a consumption for this part of the fuel use is known.

The usage of oils, lubricants, coolants, road salt, washer fluid, waste and foam, used for dust prevention, is small, and the data on these consumables are only available in aggregated form together with data from a neighboring site. It is therefore difficult to allocate specific data to the DrySand site regarding these consumables. Therefore, the consumption of these consumables is based on assumptions from an operational expert at the site.

Allocation

The production does not deliver any co-products.

The electricity consumption is known for the production process as a whole. Since the electricity consumption is known for the production process as a whole, and only one product is produced, all use of electricity is allocated to DrySand aggregates.

The fuel consumption is known at the site as a total. Allocation of the fuel consumption is made based on knowledge from the operational expert about which process steps the material goes through, the amount of material that pass each process step, and the fuel consumption of each step. Since only one product is produced, all fuel is allocated to DrySand aggregates.

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 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.
– Washer fluid used in machines are excluded from the calculation since it is used in a very small amount. As well, no suitable dataset could be found.
– The ancillary material foam for dust reduction is omitted since no appropriate dataset could be found. It is also estimated to have a minor contribution to the environmental impact because it is used in a low quantity (about 0,05 liter per ton product).

Software and database

The LCA software “LCA for Experts” (formerly 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 GWP-GHG results in modules A1-A3, the energy sources behind the electricity shall be documented, including the LCA data of grams CO_2 eq./kWh (using the GWP-GHG indicator). For transparency the information is given in Table 3 even though electricity in A3 accounts for less than 30% of the GHG-GHG in A1-A3. The LCA data in Table 3 are generic values from “LCA for experts”.

Table 3: Electricity in manufacturing (A3).

Energy source	LCA data (g CO_2 eq./kWh)
Wind power	6.3

Guarantees of origin (electronic certificates that guarantee the origin of electricity) have been bought for the electricity used at the site.

Scenario information

For modules other than A1-A3, scenario-based information shall be declared for the products, see Table 4.

Module A4
Module 4 is not declared.

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.

Scenario 2 is chosen for the declared product as well as for the other product groups. The two scenarios for module C correspond with the two scenarios for module D.

Table 4: 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	N/A	1000
	kg collected with mixed construction waste	N/A	0
Recovery system specified by type	kg for re-use	N/A	1000
	kg for recycling	N/A	0
	kg for energy recovery	N/A	0
Disposal specified by type	kg product or material for final disposal	N/A	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 is shown in Table 5.

Table 5: Net output flow for module D per declared unit.

Product/Product group	Mass (kg)
Drysand	1000

There are two scenarios for module D. The choice of scenario in module D correspond with the choice of scenario in module C.

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.

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 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 5.7 billion Euro and approximately 12 200 employees in 2023. 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

EPD owner

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Content declaration including packaging

The declared product does not contain any substances of very high concern (SVHC) according to REACH. Table 6 presents the content declaration for the declared product. The mass of biogenic carbon in the product is less than 5%. The packaging material is negligible.

Table 6: Content declaration of the declared product manufactured at the site.

Product/Product group	Product component	Weight, kg	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
DrySand aggregates	Sand	1000	0	0 resp. 0

Environmental performance

The results of the life cycle assessment, based on the declared unit, can be found in Table 7 (core environmental indicators), Table 8 (resource use) and Table 9 (output flows and waste categories).

The results have been calculated based on the characterization factors of EN 15804, version EF 3.1.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Table 7: Results of the LCA (modules A1-A3, C and D) – Core environmental indicators per declared unit of the declared product. S2=Scenario 2.

Core environmental indicators			DrySand aggregates					
Impact category		Unit	A1-A3	C1 (S2)	C2	C3	C4	D (S2)
Climate change	Total	kg CO_2 eq	25	0.94	0	0	0	-25
	Fossil	kg CO_2 eq	25	0.93	0	0	0	-25
	Biogenic	kg CO_2 eq	0	0	0	0	0	0
	Land use and land use change	kg CO_2 eq	1.6E-03	8.2E-03	0	0	0	2.1E-03
	GWP-GHG	kg CO_2 eq	25	0.94	0	0	0	-25
Ozone depletion		kg CFC 11 eq	2.3E-12	7.8E-14	0	0	0	-2.2E-12
Acidification		mol H^+ eq.	0.055	2.2E-03	0	0	0	-0.054
Eutrophication aquatic freshwater		kg P eq.	2.6E-06	3.2E-06	0	0	0	-1.2E-06
Eutrophication aquatic marine		kg N eq.	0.026	9.9E-04	0	0	0	-0.026
Eutrophication terrestrial		mol N eq.	0.28	0.011	0	0	0	-0.28
Photochemical ozone formation		kg NMVOC eq.	0.072	3.2E-03	0	0	0	-0.071
Depletion of abiotic resources - minerals and metals		kg Sb eq.	1.1E-06	5.8E-08	0	0	0	2.6E-08
Depletion of abiotic resources - fossil fuels		MJ, net calorific value	397	12	0	0	0	-392
Water use		m^3 world eq. deprived	0.063	0.010	0	0	0	-0.058

Table 8: Results of the LCA (modules A1-A3, C and D) – Resource use per declared unit of the declared product. S2=Scenario 2.

Use of resources		DrySand aggregates					
Parameter	Unit	A1-A3	C1 (S2)	C2	C3	C4	D (S2)
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value	53	0.86	0	0	0	-52
Use of renewable primary energy as raw materials	MJ, net calorific value	0	0	0	0	0	0
Total use of renewable primary energy	MJ, net calorific value	53	0.86	0	0	0	-52
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value	398	12	0	0	0	-392
Use of non-renewable primary energy as raw materials	MJ, net calorific value	0	0	0	0	0	0
Total use of non-renewable primary energy	MJ, net calorific value	398	12	0	0	0	-392
Use of secondary material	kg	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Use of net fresh water	m^3	2.4E-03	9.4E-04	0	0	0	-2.03E-03

Table 9: Results of the LCA (modules A1-A3, C and D) – Waste categories and output flows per declared unit of the declared product. S2=Scenario 2.

Waste categories & output flows		DrySand aggregates					
Parameter/Indicator	Unit	A1-A3	C1 (S2)	C2	C3	C4	D (S2)
Hazardous waste disposed	kg	2.0E-09	4.5E-11	0	0	0	-2.0E-09
Non-hazardous waste disposed	kg	0.16	1.7E-03	0	0	0	-0.16
Radioactive waste disposed	kg	2.7E-04	1.6E-05	0	0	0	-2.6E-04
Components for re-use	kg	0	1000	0	0	0	0
Materials for recycling	kg	0	0	0	0	0	0
Materials for energy recovery	kg	0.091	0	0	0	0	-0.091
Exported energy	MJ per energy carrier	0	0	0	0	0	0

Disclaimer: It is not recommended to use the results of modules A1-A3 without considering the results of module C.

Table 10: 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 11: 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.

Additional Environmental Information

General information

Sea aggregates is a finite resource. Dredging aggregates from the seabed will affect the environment which means changed conditions in existing habitats.

The dredging may have a negative impact on the local marine environment in the licensed areas. Both the sea and land-based operations requires 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, these types of operations 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.

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.

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 sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison.

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 12: Verification details.

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serve as the core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.3.3
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.
Life cycle assessment (LCA)
LCA accountability: Markus Johansson, Sofia Dahling, NCC
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006 via: ☒ EPD verification by EPD Process Certification* Internal auditor: Annika Johansson, Solveig Hestø & Rita Garção, NCC Third-party verification: Viktor Hakkarainen, Bureau Veritas is an approved certification body accountable for third-party verification. Third-party verifier is accredited by: SWEDAC, 1236. *For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see the GPI.
Procedure for follow-up of data during EPD validity involves third-party verifier. ☒ Yes ☐ 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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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

DS-EN 13139: 2002/AC:2004 – Aggregates for mortar

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). Including Amd 1:2020.

SS-EN ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines. Including Amd 1:2018 and Amd 2:2020.

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Differences versus previous versions

Table 13: Versions of this EPD.

Date of revision	Description of difference versus previous versions
2024-05-24	Original version