Environmental Product Declaration - Summary

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

Recycled aggregates

from

D.A MATTSSON AB

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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General information

Program information

Program:	The International EPD® System
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR), specifically EN 15804:2012+A2:2019 (henceforth EN 15804:A2)
Product category rules (PCR): PCR Construction Products (2019:14), version 1.1
PCR review was conducted by: *Claudia A. Peña*. Contact info@environdec.com for more information
LCA-analysis conducted by Linnea Lidén*, WSP*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Martin Erlandsson Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:
D.A. Mattsson AB

Contact:
Josefin Höglund

Company description:
D.A Mattsson is a company with longstanding experience in recycling aggregates and other types of construction materials in the Stockholm region, Sweden. Circularity and environmental care are the main business principles, and we are working hard to minimize energy use and environmental impact from our operations.

Production sites:
The product site is located in Upplands Väsby, outside of Stockholm, Sweden.

Product information

Products:
Recycled aggregates of varying dimensions

Product description:
Mixed constructions materials are transported to the D.A Mattsson facility where they are treated and sorted into new products. Some of the incoming materials, mixes of soil and rock, are transported through a washing system where soil and dirt are separated from the inert rock and sand and collected as clay. After this process, the inert materials are sorted in different fractions and resold. It is the products going through the washing process that are included in this EPD, excluding the clay.

Figure 1. A selection of included products (from the left: sand (0,2/2), gravel (8/16) and gravel (32/90))

The recycled aggregates can be used for several applications, including as concrete aggregates, as filling in excavations and for building foundations and as sand for golf courses and mortar use.

The products included in this EPD are shown in table 1. The soil that is washed off the inert masses is collected and sold as clay with a specific moist grade, the environmental impact of this clay is not

included in this report. The value of the clay is significantly lower than the recycled aggregates, and economic allocation has been used to assign the environmental burden from the washing process to the soil and the inert aggregates, in accordance with EN 15804:A2.

The environmental burden from the recycled aggregates differs by less than 10 %, and an average result is shown for all fractions.

Table 1. Included fractions in EPD

Fraction	mm	Application	Standard	Quality
Fine sand	0,063/0,5	Can be mixed with soil, used for beach refill	SS-EN 13242+A1:2007	4
Dress sand	0,2/2	Used on lawns to even out surface and provide mor oxygen	SS-EN 13242+A1:2007	4
Play sand	0/2	Used in sandboxes	SS-EN 13242+A1:2007	4
Mortar sand	0/4	Aggregates for mortar use, mixed with soils	SS-EN 13242+A1:2007	4
Concrete gravel	0/8	Gravel for concrete production	SS-EN 12620+A1:2008	+2
Pipe bedding	0/8	Used as filling for pipe excavations	SS-EN 13242+A1:2007	4
Gravel, NK, washed	2/8	Drainage layer around buildings	SS-EN 13242+A1:2007	4
Natural gravel, NK, washed	8/16	Concrete aggregate, drainage layer around buildings	SS-EN 12620+A1:2008	+2
Natural gravel, NK, washed	16/32	Aggregates for unbound and hydraulically bound materials for road and construction use	SS-EN 13242+A1:2007	4
Natural gravel, NK, washed	32/90	Aggregates for unbound and hydraulically bound materials for road and construction use	SS-EN 13242+A1:2007	4
Impact absorbing sand	2/6	Flexible, drainage sand/gravel for playgrounds	SS-EN 13242+A1:2007	4
Gravel, NK, washed	4/8	Drainage layer around buildings and gravel roads	SS-EN 13242+A1:2007	4
Mattsson mix	0/8	Anti-skid gravel (80% 2/8 gravel and 20% 0/8 pipe excavation gravel and 3 weigh-% salt.	SS-EN 13242+A1:2007	4

Product content:

The products consist only of inert aggregates and is delivered by truck without packing materials.

Table 2. Product content

Product content	Weight
Recycled aggregates	1000 kg

The product does not contain any substances on the Reach Candidate List (Substance of Very High Concern).

LCA information

Declared unit:

Declared unit is 1000 kg of recycled aggregates.

System boundaries:

The system boundaries for the LCA are set with respect to 1) the modularity principle and 2) the polluter pays principle.

Table 3. Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	-	-	-	-	-	-	-	-	-	X[1]	X[1]	X[1]	X[1]	X
Geography	SE	SE	SE	-	-	-	-	-	-	-	-	-	SE	SE	SE	SE	SE
Specific data used[2]	87-88 % depending on fraction			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0 %, only 1 facility			-	-	-	-	-	-	-	-	-	-	-	-	-	-

For all fractions except those which are used as concrete aggregates, the system boundaries are Cradle-to-grave with options, i.e. raw materials in the manufacture of the input goods (A1), transport of raw materials and components to factories (A2), energy and resource consumption in factories (A3), and the end-of-life stage and effects after the product has left the system boundary (C and D, respectively).

[1] Only relevant for fractions not used as concrete aggregates

[2] As % of GWP-GHG

For the fractions which are used as concrete aggregates, the system boundaries are cradle-to-grave (A1-A3), as all three criteria[3] for exclusion of end-of-life (C and D) are fulfilled, according to EN 15804:A2.

The production of the incoming aggregates and transport of the aggregates tot the D.A Mattson facility are allocated to the upstream product system.

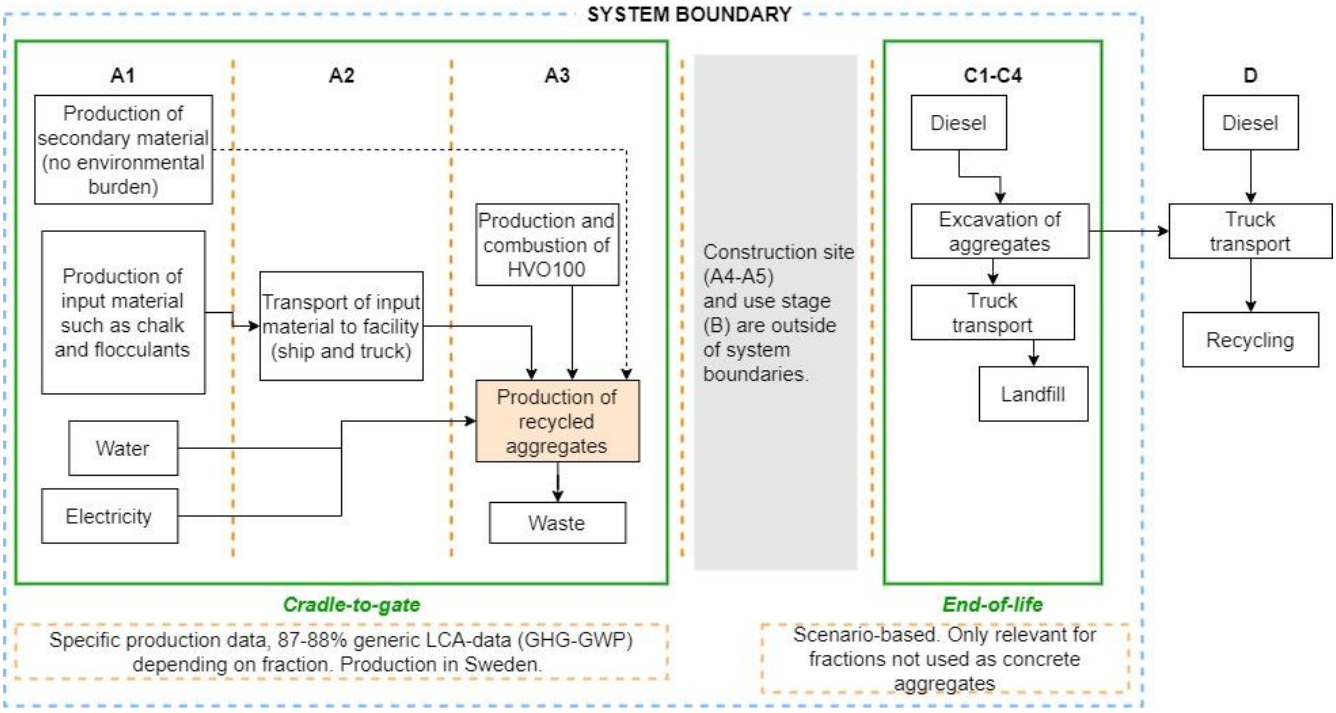

Figure 2. System boundaries categorized within the relevant modules

Geographical delimitations:

Foreground data is based on the company´s facility in Upplands Väsby. Sweden. Background data has, as far as possible, been geographically based on where the suppliers´ production takes place but includes several European and global processes that are considered representative.

Temporal delimitations:

All data has been collected for 4 years, 2018-2021, and average data for this period have been used consistently for production, energy, waste, and inputs.

[3] The product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life, and the product or material is no longer identifiable at the end of lie as a result of physical or chemical transformation process, and the product or material does not contain biogenic carbon

Delimitations to nature:
All known material has been calculated. The production of the infrastructure in the factories, such as the work machines, is excluded in accordance with the cut-off in EN 15804.

Cut-off:
All known inputs and outputs of the manufacturing process are included in the analysis. In accordance with EN 15804:A2, no less than 99% of all inflows (mass and energy) must be included, which is considered fulfilled in this study.

Allocation:
The clay that is washed of the inert aggregates is sold and is in this analysis considered as a full product. As the value of clay is lower than that of aggregates, economic allocation has been to divide the impact between the clay and the aggregates, in accordance with EN 15804:A2. Economic allocation is defined as the share of company revenues from each product, or product type, which has thus been used for allocation.

All fractions carry an environmental impact that varies by less than 10 %, and an average burden is therefore declared.

LCA-modelling:
LCA modeling has been done in the software SimaPro 9.1.0.11. The environmental impact of the activities covered by this LCA combines generic and specific data. Generic data (emission and impact factors) are taken from Ecoinvent v. 3.8 and cover most of the processes, specifically transport, waste and inputs.

During the years 2018-2021, D.A Mattsson purchased electricity from E.ON. As the electricity was not renewable and certified by a Guarantee of Origin, a Nordic residual mix for the specified years was used as defined by the Swedish energy market agency (Energimarknadsinspektionen, 2021). The origin and carbon intensity of the residual mix is shown below.

Table 4 Nordic residual mix for 2021.

Share	Origin	GWP	Ecoinvent process
1 %	Solar	0.0781 kg CO_2-Eq/kWh	Electricity, low voltage {SE}| electricity production, photovoltaic, 570kWp open ground installation, multi-Si | Cut-off, U
2 %	Biofuel	0.167 kg CO_2-Eq/kWh	Electricity, high voltage {SE}| ethanol production from wood | Cut-off, U
4 %	Wind power	0.0315 kg CO_2-Eq/kWh	Electricity, high voltage {DE}| electricity production, wind, >3MW turbine, onshore | Cut-off, U
1 %	Hydro	0.00624 kg CO_2-Eq/kWh	Electricity, high voltage {NO}| electricity production, hydro, reservoir, alpine region | Cut-off, U
39 %	Nuclear	0.00648 kg CO_2-Eq/kWh	Electricity, high voltage {FI}| electricity production, nuclear, pressure water reactor | Cut-off, U
22 %	Hard coal	1.05 kg CO_2-Eq/kWh	Electricity, high voltage {DE}| electricity production, hard coal | Cut-off, U
1 %	Lignite	1.22 kg CO_2-Eq/kWh	Electricity, high voltage {DE}| electricity production, lignite | Cut-off, U
1 %	Oil	0.832 kg CO_2-Eq/kWh	Electricity, high voltage {PL}| electricity production, oil | Cut-off, U
29 %	Natural gas	0.431 kg CO_2-Eq/kWh	Electricity, high voltage {PL}| electricity production, natural gas, combined cycle power plant | Cut-off, U

Generic data from Ecoinvent are considered conservative and the use of specific LCA data would likely result in lower environmental impact for the product in this study. The following assessment methods in SimaPro have been used:

- EN 15804 + A2 Method V1.00 / EF 3.0 normalization and weighting set as implemented in SimaPro, which is compatible with EN 15804: A2 in terms of characterization factors and impact categories
    - In this method, the emission factor for biogenic carbon dioxide is 1 kg CO2-eq / kg. Imports and exports of stored coal in wood products / materials are thus considered to contribute to global warming.
- The GHG-GWP indicator is calculated using the method EPD (2018) V1.02 as implemented in SimaPro.
    - This method uses characterization factors from IPCC AR5, which include all greenhouse gases except biogenic greenhouse gases and biogenic carbon stored in the product.

For assessments of resource use, waste flows and water use, the following methods are used in SimaPro:

- Cumulative Energy Demand V1.11
- AWARE V1.03

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

ENVIRONMENTAL IMPACT		PRODUCTION				END-OF-LIFE				
Impact categories	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change - Fossil	kg CO2 eq	1,35E+00	2,78E-02	4,55E-01	**1,83E+00**	5,30E-01	3,13E+00	0,00E+00	2,63E+00	-3,22E+00
Climate change - Biogenic	kg CO2 eq	4,12E-03	1,74E-05	-7,87E-01	**-7,83E-01**	1,87E-04	2,66E-03	0,00E+00	2,02E-02	-4,83E-01
Climate change - Land use and LU change[4]	kg CO2 eq	8,52E-03	1,27E-05	5,59E-04	**9,09E-03**	5,29E-05	1,23E-03	0,00E+00	2,67E-03	4,74E-03
Climate change – total	kg CO2 eq	1,36E+00	2,78E-02	-3,31E-01	**1,06E+00**	5,30E-01	3,13E+00	0,00E+00	2,65E+00	-3,70E+00
Ozone depletion	kg CFC11 eq	1,00E-07	6,22E-09	5,23E-08	**1,59E-07**	1,13E-07	7,23E-07	0,00E+00	8,01E-07	-7,97E-07
Acidification[2]	mol H+ eq	4,45E-03	3,05E-04	1,00E-02	**1,48E-02**	5,50E-03	1,27E-02	0,00E+00	2,22E-02	-4,05E-02
Eutrophication, freshwater[2]	kg P eq	4,67E-04	1,56E-06	1,27E-04	**5,96E-04**	1,64E-05	2,01E-04	0,00E+00	7,64E-04	1,03E-05
Eutrophication, marine[2]	kg N eq	1,38E-03	8,06E-05	9,35E-03	**1,08E-02**	2,44E-03	3,82E-03	0,00E+00	7,65E-03	-9,65E-03
Eutrophication, terrestrial[2]	mol N eq	1,11E-02	8,91E-04	4,26E-02	**5,46E-02**	2,67E-02	4,18E-02	0,00E+00	8,33E-02	-1,89E-01
Photochemical ozone formation	kg NMVOC eq	2,57E-03	2,43E-04	1,68E-03	**4,49E-03**	7,34E-03	1,28E-02	0,00E+00	2,41E-02	-4,81E-02
Resource use, minerals and metals[2]	kg Sb eq	4,49E-06	8,16E-08	3,31E-06	**7,88E-06**	2,72E-07	1,09E-05	0,00E+00	8,60E-06	-1,14E-05
Resource use, fossils[2]	MJ	4,68E+01	4,05E-01	4,13E+00	**5,14E+01**	7,26E+00	4,73E+01	0,00E+00	6,18E+01	-2,60E+01
Water deprivation potential[5]	m3 depriv.	9,61E-01	1,09E-03	2,97E-01	**1,26E+00**	1,14E-02	1,42E-01	0,00E+00	2,69E+00	-1,85E+00

Note that impact from packaging is included but embodied energy and biogenic carbon is directly balanced out.

[4] The results for this indicator should be interpreted carefully due to significant uncertainties

Other environmental indicators

Impact categories	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-GHG[5]	kg CO_2 eq.	1,32E+00	2,75E-02	4,30E-01	**1,78E+00**	5,24E-01	3,10E+00	0,00E+00	2,58E+00	-3,17E+00

[5] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Resource use

RESOURCE USE		PRODUCTION				END-OF-LIFE				
Impact categories	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	7,96E+00	5,04E-03	1,11E+01	**1,90E+01**	4,08E-02	6,66E-01	0,00E+00	1,06E+00	-6,18E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	7,96E+00	5,04E-03	1,11E+01	**1,90E+01**	4,08E-02	6,66E-01	0,00E+00	1,06E+00	-6,18E+00
PENRE	MJ	4,73E+01	4,30E-01	4,48E+00	**5,22E+01**	7,72E+00	5,02E+01	0,00E+00	6,57E+01	-8,00E+01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,73E+01	4,30E-01	4,48E+00	**5,22E+01**	7,72E+00	5,02E+01	0,00E+00	6,57E+01	-8,00E+01
SM	Kg	1,00E+03	0,00E+00	0,00E+00	**1,00E+03**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	Mj	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	Mj	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	M^3	0,00E+00	0,00E+00	8,84E-03	**8,84E-03**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste and outflows

WASTE AND OUTFLOWS		PRODUCTION				END-OF-LIFE				
Påverkanskategorier	**Enhet**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Waste production[6]										
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Output flows										
Components for reuse	Kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	7,50E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

[6] All waste flows are managed within the system limits in Ecoinvent processes, which is why there it is 0 kg of waste under these modules.

References

General Programme Instructions of the International EPD® System. Version 3.01.

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