.

Dakota Aggregates

Environmental Product Declaration

This document is a product-specific Type III Environmental Product Declaration (EPD) for three concrete aggregate products manufactured by Dakota Aggregates at the Dakota facility located in Rosemount, MN.

climate earth
EPDs made easy

General information

Environmental Product Declaration

This Environmental Product Declaration (EPD) reports the impacts for 1 US ton (dry weight) aggregates, for use in business-to-business (B2B) in accordance with ISO 14025, ISO 21930, and ASTM International's EPD program operator rules.

Product Name	Construction Aggregates
Manufacturer Name and Address	Dakota Aggregates 2025 Centre Point Blvd. Mendota Heights, MN 55120
Program Operator	ASTM International http://www.astm.org/EPDs.htm
General Program instructions and Version Number	ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions. Version 8.0, revised April 29, 2020.
Declaration Number	EPD 811
Reference PCR and Version Number	ISO 21930:2017 Sustainability in Building Construction – Environmental Declarations of Building Products serves as the core PCR. Product Category Rule for Environmental Product Declarations: Construction Aggregates – NSF/ASTM 1126-23 V2.0
EPD Type and Scope (facility/product/average)	Type III EPD Cradle-to-gate (modules A1 to A3) Facility specific
Defined functional or declared unit	1 US Ton of aggregate
Product's intended Application and Use	This EPD is intended for business-to-business (B-to-B) audiences.
Product RSL (Reference Service Life) *	Not Applicable (B modules not included in scope)
Markets of Applicability	United States and Canada
Date of Issue	October 7, 2024
Period of Validity	Five years – until October 6, 2029
Year of reported manufacturer primary data	January 1st, 2023 to December 31st, 2023
LCA Software and Version Number	Simapro 9.1
LCI Database and Version Number	USLCI, SmartData, Construction Aggregates – NSF/ASTM 1126-23 Annex A V2.0
LCIA Methodology and Version Number	TRACI 2.1 v1.04

Overall Data Quality Assessment Score	3
The sub-category PCR review was conducted by:	Industrial Ecology Consultants, Thomas P. Gloria, Ph.D t.gloria@industrial-ecology.com
This declaration was independently verified in accordance with ISO 14025: 2006. ISO 21930:2017 serves as the core PCR. Sub-category PCR: NSF/ASTM 1126: Construction Aggregates Product Category Rule	□ Internal ☑ External
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Nawal Shoaib nawal@climateearth.com Climate Earth, Inc. 137 Park Place, Suite 204, Point Richmond, CA, 94801 (415) 391-2725 ▪ http://www.climateearth.com
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, PhD t.gloria@industrial-ecology.com Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728 (617) 553-4929 http://www.industrial-ecology.com
Explanatory material may be obtained from the following:	Matt Mettling Operations Manager 651.905.4801 mmettling@dakotaaggregates.com
*Only applicable where the LCA/EPD includes Module B.	

Products covered in this facility average EPD are detailed in Table 1. All products contain 100% construction aggregate. No hazardous materials were used in the manufacture of these products.

Table 1: Products manufactured at the Dakota Quarry

Product Name	Product Description	ASTM Standard	Images
Mason Sand	Wash Plant Product	ASTM C144	
Concrete Sand	Wash Plant Product	ASTM C33FA	
Pea Rock	Wash Plant Product	ASTM C33 #8	
#67	Wash Plant Product	ASTM C33 #67	
1.5"	Wash Plant Product	ASTM C33 #4	
Select Sand/BA Sand	Crushing Plant Product	ASTM D1073	
Unwashed Manufactured Sand	Crushing Plant Product	ASTM D1073	

Washed Manufactured Sand	Crushing Plant Product	ASTM D1073	
1/2" Crushed	Crushing Plant Product	ASTM D692	
3/4" Crushed	Crushing Plant Product	ASTM D692	
3/4" Base Stone	Crushing Plant Product	ASTM D692	
1/2" Finish Stone	Crushing Plant Product	ASTM D692	
50/50 Mix (sand/rock)	Misc. Products	ASTM C33 FA & #67 (50/50 mix of coarse & fine)	
St. Paul BA	Misc. Products	ASTM D692 & D1073 (mix of coarse and fine Bit Aggregates)	

Salt/Sand Mix	Misc. Products	ASTM C33 FA	
Recycle Products	Misc. Products	ASTM D2940	
3" Recycle	Misc. Products	ASTM D2940	

LCA Study

System boundary

This study captures the following mandatory cradle-to-gate (A1-A3) life cycle product stages (as illustrated in Figure 1):

A1 - Extraction and processing of raw materials including fuels used in extraction and transport within the process.

A2 – Specific transportation of raw materials from extraction site or source to manufacturing site (including any recovered materials from source to be recycled in the process) and including empty backhauls and transportation to interim distribution centers or terminals.

A3 – Manufacturing of the product, including all energy and materials required and all emissions and wastes produced.

Product Stage			Construction Process Stage		Use Stage							End of Life Stage			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Raw material supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Figure 1. Life-Cycle Stages and Modules (Note: MND = module not declared; x = module included)

Except as noted above, all other life cycle stages as described in Figure 1 are excluded from the LCA study. The following processes are also excluded from the study:

1. Production, manufacture, and construction of manufacturing capital goods and infrastructure;
2. Production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
3. Personnel-related activities (travel, furniture, office supplies);
4. Fuel used to transport personnel around the mine and sand & gravel facility.
5. Energy and water use related to company management and sales activities.

The main processes included in the system boundary are illustrated in Figure 2.

System Boundary

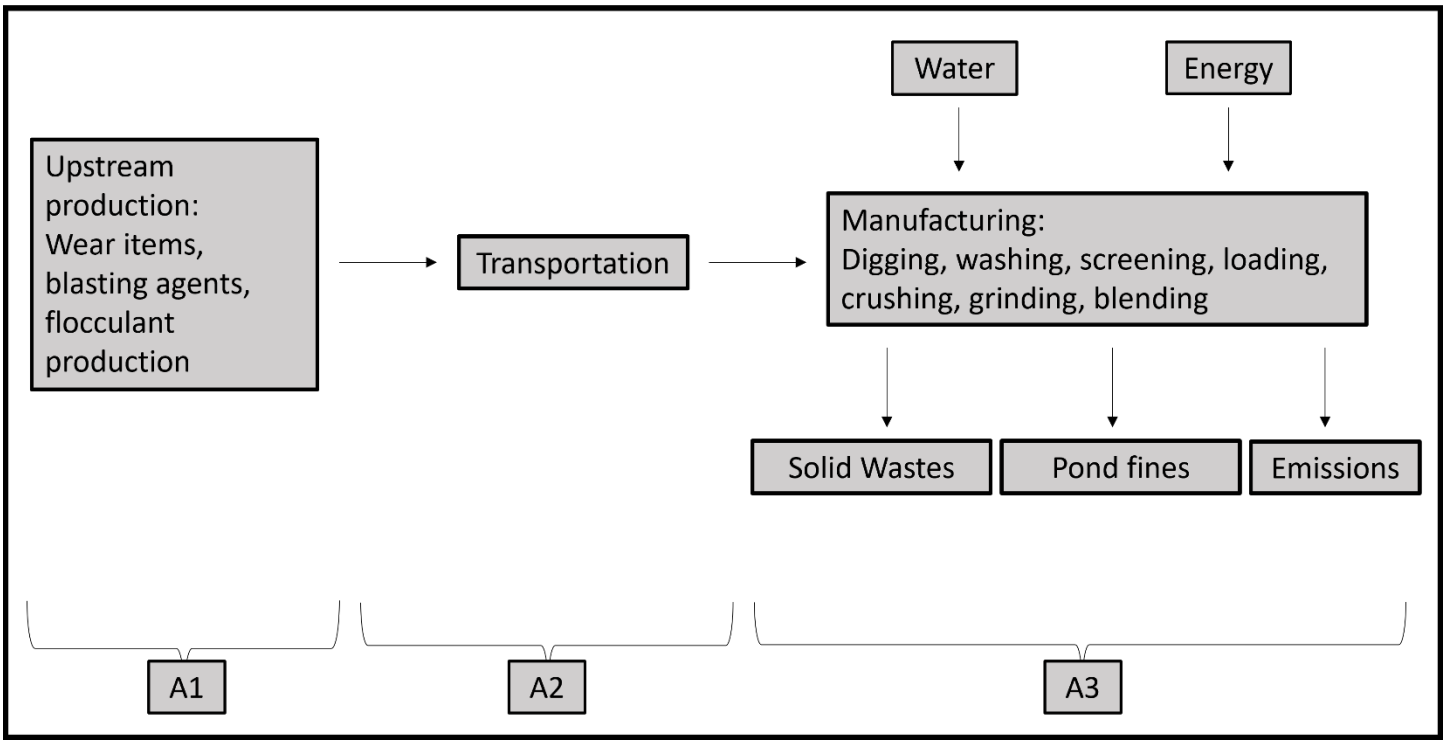

Figure 2. Main Processes Included in System Boundary

Explanatory materials may be requested by contacting:

Matt Mettling
Operations Manager
651.905.4801
mmettling@dakotaaggregates.com

Secondary data sources

A list of each secondary with its LCI data sources is provided below.

Antifreeze: EcoInvent 3.8 (2021): "Ethylene glycol {GLO}| market for | Cut-off, U" and USLCI process (2020): "Tap water, at user/US- US-EI U"
DEF Fluid: EcoInvent 3.8 (2021): "Urea {RoW}| market for urea | Cut-off, U" and USLCI process (2020): "Tap water, at user/US- US-EI U"
Diesel: USLCI process (2020): "Diesel, combusted in industrial equipment - Northern America"
Electricity: U.S. DOE NETL (2020)
Gasoline: USLCI process (2020): "Gasoline__combusted_in_equipment___RNA"
Lubricating oil: US-EI process (2021): "Lubricating oil, at plant/US"
Manganese: NSF PCR for Construction Aggregates (2024): "Manganese"
Natural gas: USLCI process (2020): "Operation of liquefied compressed natural gas equipment; industry average; > 56 kW and < 560 kW"
Propane: USLCI process (2020): "Operation of liquefied petroleum gas equipment; industry average; > 56 kW and < 560 kW"
Truck Transport: USLCI process (2020): "Transport, combination truck, short-haul, diesel powered, West North Central/tkm/RNA"
Tires: US-EI process (2021): "Synthetic rubber, at plant/US- US-EI U" and EcoInvent 3.8 (2021): "Synthetic rubber {RoW}| production | Cut-off, U"
Steel wear parts: US-EI process (2021): "Steel, low-alloyed, at plant/US- US-EI U" and EcoInvent 3.8 (2021): "Steel, low-alloyed {RoW}| steel production, electric, low-alloyed | Cut-off, U"
Rubber wear parts: US-EI process (2021): "Synthetic rubber, at plant/US- US-EI U" and EcoInvent 3.8 (2021): "Synthetic rubber {RoW}| production | Cut-off, U"
Waste: EcoInvent 3.8 (2021): "Municipal solid waste {RoW}| treatment of, sanitary landfill | Cut-off, U"

Data gaps, assumptions, and limitations

Electrical data collected for this plant included the entire plant. Some of the electricity reported may not be used directly in the production of the above mentioned products at Dakota Quarry.

Environmental Impacts

Cradle to Gate (A1-A3) facility average impact results per 1 US ton (short ton, TN.SH) for construction aggregates produced at Dakota Quarry (see Table 1) are outlined in Table 2.

Table 2: Cradle-to-Gate Impact Results for Dakota Quarry Covered in Study per 1 US ton

Impact category	Unit	A1	A2	A3	A1 to A3
Global warming	kg CO2 eq	0.09	1.15E-04	2.09	2.18
Ozone depletion	kg CFC-11 eq	5.94E-09	4.83E-15	3.00E-08	3.60E-08
Eutrophication	kg N eq	1.03E-03	8.30E-08	9.09E-04	1.94E-03
Acidification	kg SO2 eq	3.53E-03	1.38E-06	0.02	0.02
Smog	kg O3 eq	2.57E-03	3.52E-05	0.47	0.47
Abiotic depletion non-fossil mineral	kg Sb eq	4.86E-07	x	9.49E-10	4.87E-07
Abiotic depletion (fossil fuels)	MJ	0.82	1.64E-03	27.7	28.5
Renewable primary energy resources as energy	MJ	0.04	x	3.91E-03	0.04
Renewable primary resources as material	MJ	x	x	x	x
Non-renewable primary resources as energy	MJ	0.88	1.64E-03	27.8	28.7
Non-renewable primary resources as material	MJ	x	x	x	x
Consumption of fresh water	m3	8.98E-04	x	23.8	23.8
Secondary materials	kg	x	x	x	x
Renewable secondary fuels	MJ	x	x	x	x
Non-renewable secondary fuels	MJ	x	x	x	x
Recovered energy	MJ	x	x	x	x
Hazardous waste disposed	kg	x	x	x	x
Non-hazardous waste disposed	kg	x	x	4.10E-03	4.10E-03
High-level radioactive waste	m3	3.90E-11	x	5.09E-13	3.95E-11
Intermediate and low-level radioactive waste	m3	5.09E-10	x	2.32E-11	5.32E-10
Components for reuse	kg	x	x	x	x
Materials for recycling	kg	x	x	0.02	0.02
Materials for energy recovery	kg	x	x	4.54E-04	4.54E-04
Recovered energy exported from product system	MJ	x	x	x	x
Calcination	kg CO2 eq	x	x	x	x
Biogenic CO2 emissions	kg CO2 eq	x	x	x	x

This EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.

Cradle to Gate (A1-A3) facility average impact results per 1 metric tonne for construction aggregates produced at Dakota Quarry (see Table 1) are outlined in Table 3

Table 3: Cradle-to-Gate Impact Results for Dakota Quarry Covered in Study per 1 metric tonne

Impact category	Unit	A1	A2	A3	A1 to A3
Global warming	kg CO2 eq	0.10	1.27E-04	2.30	2.41
Ozone depletion	kg CFC-11 eq	6.55E-09	5.32E-15	3.31E-08	3.96E-08
Eutrophication	kg N eq	1.14E-03	9.15E-08	1.00E-03	2.14E-03
Acidification	kg SO2 eq	3.89E-03	1.53E-06	0.02	0.02
Smog	kg O3 eq	2.84E-03	3.88E-05	0.52	0.52
Abiotic depletion non-fossil mineral	kg Sb eq	5.35E-07	x	1.05E-09	5.37E-07
Abiotic depletion (fossil fuels)	MJ	0.90	1.81E-03	30.6	31.5
Renewable primary energy resources as energy	MJ	0.04	x	4.31E-03	0.05
Renewable primary resources as material	MJ	x	x	x	x
Non-renewable primary resources as energy	MJ	0.97	1.81E-03	30.7	31.7
Non-renewable primary resources as material	MJ	x	x	x	x
Consumption of fresh water	m3	9.89E-04	x	26.2	26.2
Secondary materials	kg	x	x	x	x
Renewable secondary fuels	MJ	x	x	x	x
Non-renewable secondary fuels	MJ	x	x	x	x
Recovered energy	MJ	x	x	x	x
Hazardous waste disposed	kg	x	x	x	x
Non-hazardous waste disposed	kg	x	x	4.52E-03	4.52E-03
High-level radioactive waste	m3	4.30E-11	x	5.61E-13	4.35E-11
Intermediate and low-level radioactive waste	m3	5.61E-10	x	2.56E-11	5.87E-10
Components for reuse	kg	x	x	x	x
Materials for recycling	kg	x	x	0.02	0.02
Materials for energy recovery	kg	x	x	5.00E-04	5.00E-04
Recovered energy exported from product system	MJ	x	x	x	x
Calcination	kg CO2 eq	x	x	x	x
Biogenic CO2 emissions	kg CO2 eq	x	x	x	x

This EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.

References

ISO 21930. (2017). *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.*

ACLCA. (2022). *ACLCA Guidance for Assessing Data Quality of Background Life Cycle Inventory (LCI) Datasets.*

EarthShift. (2014). *US-EI Database.* Huntington, VT: EarthShift, LLC.

Ecoinvent. (2021). *The ecoinvent Database v.3.8.* Zurich, Switzerland: The Swiss centre for Life Cycle Inventories.

EPA. (2012). *Tool for the Reduction of Assessment of Chemical and Other Environmental Impacts (TRACI).* http://www.epa.gov/ordntrnt/ORD/NRMRL/std/traci/traci.html.

EPA. (2022). *eGRID electrical data.*

Goedkoop M.J., H. R., & Struijs J., V. Z. (2009). *ReCiPe 2008, A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level; First edition Report I: Characterisa.* http//www.lcia-recipe.net.

ISO 14025. (2006). *Environmental labels and declarations, Type III environmental declarations, Principles and procedures.*

ISO 14040. (2020). *2006 / Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework.*

ISO 14044. (2020). *ISO 14044: 2006 / Amd 1:2017 / Amd 2:2020 Environmental management - Life cycle assessment - Requirements and guidelines.*

Long Trail Sustainability. (2021). *DATASMART (US-EI Database).* Huntington, VT: Long Trail Sustainability.

NREL. (2015). *U.S. Life Cycle Inventory Database.* National Renewable Energy Laboratory.

NSF International. (2024). *NSF/ASTM 1126-23 with Errata Product Category Rule for Environmental Product Declarations PCR for Construction Aggregates V2.0.*