Environmental Product Declaration

This Environmental Product Declaration (EPD) is for 12 concrete aggregate products manufactured by Vulcan Materials Company at their Pleasanton, California Sand and Gravel facility.

Vulcan Materials Company, Western Division
500 North Brand Blvd.
Suite 500
Glendale, CA  91203-1923
Vulcan Materials Company
Environmental Product Declaration

General Information

Environmental Product Declaration
This declaration has been prepared in accordance with ISO 14025, ISO 21930, and ASTM International’s EPD program operator rules.

PCR review was conducted by:
Jamie Meil • jamie.meil@athenasmi.org
The PCR peer review report is available upon request: cert@astm.org

Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☑ external

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Industrial Ecology Consultants
35 Bracebridge Rd. • Newton, MA 02459-1728
(617) 553-4929 • http://www.industrial-ecology.com

Product Category Rule:

Declared Unit: 1 metric tonne (dry weight).

Program Operator:
ASTM International
http://www.astm.org/EPDs.htm

EPD Owner:
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Date of Issue:
October 16, 2017 (valid for 5 years until October 16, 2022).

ASTM Declaration Number: EPD-071

Products
The 12 concrete aggregates covered in this EPD are produced at:

Pleasanton Sand & Gravel
50 El Charro Road
Pleasanton, CA 94588

Each aggregate is compliant with the standards and specifications listed in Table 1.

Table 1: Aggregates Covered in this Study

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock Dust</td>
<td>D1073-11</td>
</tr>
<tr>
<td>1/4” Crushed</td>
<td>D692</td>
</tr>
<tr>
<td>3/4” Crushed</td>
<td>D692</td>
</tr>
<tr>
<td>3/8” Crushed</td>
<td>D692</td>
</tr>
<tr>
<td>Manufactured (MFG) Sand</td>
<td>D1073-11</td>
</tr>
<tr>
<td>Class II Base</td>
<td>D2940</td>
</tr>
<tr>
<td>Crushed Class II Perm</td>
<td>D2940</td>
</tr>
<tr>
<td>Class II Perm</td>
<td>D2940</td>
</tr>
<tr>
<td>1” x #4</td>
<td>ASTM C33</td>
</tr>
<tr>
<td>3/4” x #4</td>
<td>ASTM C33</td>
</tr>
<tr>
<td>3/8” Pea Gravel</td>
<td>ASTM C33</td>
</tr>
<tr>
<td>Top Sand</td>
<td>ASTM C33</td>
</tr>
</tbody>
</table>

Material Composition
The material composition of the aggregates covered in this study is 100% natural sand and gravel.
Vulcan Materials Company
Environmental Product Declaration

General Information

Pleasanton Rock Dust
A fine sand-like material which is a by-product of crushing aggregates. Material must have 100% passing the 3/8” sieve. Typically, an asphalt aggregate but can also be used in concrete and may be used in other applications.

Pleasanton 1/2” Crushed
A 1/2” crushed aggregate which must have 100% passing the 3/4” sieve and may have material retained on the 1/2” sieve. Typically, an asphalt aggregate but can also be used in concrete and may be used in other applications.

Pleasanton 3/4” Crushed
A 3/4” crushed aggregate which must have 100% passing the 1” sieve and may have material retained on the 3/4” sieve. Typically, an asphalt aggregate but can also be used in concrete and may be used in other applications.

Pleasanton 3/8” Crushed
A 3/8” crushed aggregate which must have 100% passing the 1/2” sieve and may have material retained on the 3/8” sieve. Typically, an asphalt aggregate but can also be used in concrete and may be used in other applications.

Pleasanton Manufactured Sand
A sand-like material that has 100% passing the 3/8” sieve and may be produced using crushed fine materials. Typically, an asphalt aggregate but can also be used in concrete and may be used in other applications.

Pleasanton Class II Base
A 3/4” Class II aggregate base using only natural materials. Used in roadways as a base course in pavements and may be used in other applications.

Pleasanton Crushed Class II Perm
A crushed permeable material used for drainage applications and may be used in other applications.

Pleasanton Class II Perm
A permeable material used for drainage applications and may be used in other applications. Conforms to the specifications of Caltrans Section 68 (State of California, n.d.)

Pleasanton 1” X #4
A 1” aggregate that has 100% passing the 1 1/2” sieve with 95-100% passing the 1” sieve. Typically used as a concrete aggregate and may be used in other applications. Sometimes referred to as #57 aggregate.

Pleasanton 3/4” X #4
A 3/4” aggregate that has 100% passing the 1” sieve with 95-100% passing the 3/4” sieve. Typically used as a concrete aggregate and may be used in other applications. Sometimes referred to as #67 aggregate.

Pleasanton 3/8” Pea Gravel
A 3/8” aggregate that has 100% passing the 1/2” sieve with 85-100% passing the 3/8” sieve. Typically used as a concrete aggregate and may be used in other applications.

Pleasanton Top Sand
A washed sand that has 100% passing the 3/8” sieve. Used for ready mix applications and may be used in other applications.
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 (including recycled 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.

<table>
<thead>
<tr>
<th>PRODUCTION Stage (Mandatory)</th>
<th>CONSTRUCTION Stage</th>
<th>USE Stage</th>
<th>END-OF-LIFE Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraction and upstream production</td>
<td>Manufacturing</td>
<td>Transportation to site, installation</td>
<td>Use</td>
</tr>
<tr>
<td>Transport to factory</td>
<td></td>
<td></td>
<td>B1</td>
</tr>
<tr>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
</tr>
<tr>
<td>B4</td>
<td>B5</td>
<td>C1</td>
<td>C2</td>
</tr>
<tr>
<td>C3</td>
<td>C4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Life-Cycle Stages and Modules

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.

Electricity impacts are calculated based on the 2012 resource mix at the level of North American Electricity Reliability Council (NERC) WECC region. The 2015 grid mix contains: 27.2% coal, 25.7% hydro, 28.4% natural gas, 8% nuclear, 5% solar, 2% geothermal.

Explanatory materials may be requested by contacting:

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Vulcan Materials Company
Environmental Product Declaration

Environmental Impacts

Cradle to Gate (A1-A3) impact results per 1 metric tonne (dry weight) of product are outlined in Table 2 for each aggregate.

Table 2: Cradle-to-Gate Impact Results for Aggregates Covered in Study

<table>
<thead>
<tr>
<th>Impact category</th>
<th>Unit¹</th>
<th>Rock Dust</th>
<th>1/2&quot; Crushed</th>
<th>3/4&quot; Crushed</th>
<th>3/8&quot; Crushed</th>
<th>MFG Sand</th>
<th>Class II Base</th>
<th>Crushed Class II Perm</th>
<th>Class II Perm</th>
<th>1&quot; x #4</th>
<th>3/4&quot;x #4</th>
<th>Pea Gravel</th>
<th>Top Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global warming potential</td>
<td>kg CO₂ eq</td>
<td>5.72</td>
<td>5.65</td>
<td>5.63</td>
<td>5.75</td>
<td>7.49</td>
<td>5.31</td>
<td>5.26</td>
<td>4.50</td>
<td>4.43</td>
<td>4.48</td>
<td>4.61</td>
<td>4.87</td>
</tr>
<tr>
<td>Acidification potential</td>
<td>kg SO₂ eq</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Eutrophication potential</td>
<td>kg N eq</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Smog creation potential</td>
<td>kg O₃ eq</td>
<td>0.72</td>
<td>0.71</td>
<td>0.71</td>
<td>0.72</td>
<td>0.80</td>
<td>0.71</td>
<td>0.70</td>
<td>0.69</td>
<td>0.67</td>
<td>0.68</td>
<td>0.69</td>
<td>0.72</td>
</tr>
<tr>
<td>Nonrenewable fossil</td>
<td>MJ (HHV)</td>
<td>77.4</td>
<td>76.5</td>
<td>76.2</td>
<td>77.8</td>
<td>100.4</td>
<td>72.0</td>
<td>71.5</td>
<td>61.7</td>
<td>60.6</td>
<td>61.4</td>
<td>63.1</td>
<td>66.6</td>
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<tr>
<td>Nonrenewable nuclear</td>
<td>MJ (HHV)</td>
<td>11.3</td>
<td>11.2</td>
<td>11.2</td>
<td>11.4</td>
<td>15.7</td>
<td>10.2</td>
<td>10.15</td>
<td>8.14</td>
<td>8.01</td>
<td>8.13</td>
<td>8.44</td>
<td>8.97</td>
</tr>
<tr>
<td>Renewable (biomass)</td>
<td>MJ (HHV)</td>
<td>1.04</td>
<td>1.02</td>
<td>1.02</td>
<td>1.04</td>
<td>1.44</td>
<td>0.93</td>
<td>0.92</td>
<td>0.74</td>
<td>0.72</td>
<td>0.74</td>
<td>0.76</td>
<td>0.81</td>
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<tr>
<td>Nonrenewable material resources</td>
<td>kg</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
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<tr>
<td>Renewable material resources</td>
<td>kg</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.09</td>
<td>0.06</td>
<td>0.06</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Net fresh water</td>
<td>L</td>
<td>0.63</td>
<td>0.61</td>
<td>0.60</td>
<td>0.64</td>
<td>0.72</td>
<td>0.67</td>
<td>0.64</td>
<td>0.66</td>
<td>0.61</td>
<td>0.63</td>
<td>0.63</td>
<td>0.70</td>
</tr>
<tr>
<td>Non-hazardous waste generated</td>
<td>kg</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.08</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>Hazardous waste generated</td>
<td>kg</td>
<td>3.01E-04</td>
<td>2.98E-04</td>
<td>2.97E-04</td>
<td>3.03E-04</td>
<td>4.18E-04</td>
<td>2.72E-04</td>
<td>2.70E-04</td>
<td>2.16E-04</td>
<td>2.13E-04</td>
<td>2.16E-04</td>
<td>2.24E-04</td>
<td>2.38E-04</td>
</tr>
</tbody>
</table>

This EPD only covers the cradle-to-gate impacts of aggregates using a declared unit and the results cannot be used to compare between products. EPDs from different programs (using different PCR) may not be comparable.

¹ Equivalence (eq)
Higher Heating Value (HHV)
Vulcan Materials Company
Environmental Product Declaration
Environmental Impacts

Air Permits, Dust Suppression
Air permitting is dedicated to maintaining full compliance with State and local air permit requirements. Pleasanton assures that dust suppression is applied to control fugitive dust from leaving the property. The Pleasanton facility maintains air permits under the Bay Area Air Quality Management District. Additional information on air permits can be found at: http://www.baaqmd.gov/

Universal Waste, Used Oil, Anti-Freeze, Used Batteries
Pleasanton’s used oil is picked up on site by our approved oil recycling vendor. The used oil is recycled at a CA-permitted recycling facility. Universal Waste such as fluorescent light bulbs and small batteries are picked up and removed by our approved vendor for recycle. All used large batteries are stored in a secure and monitored area. The used batteries are sent to approved battery recycling vendors. Additional information on waste recycling can be found at http://www.calrecycle.ca.gov/usedoil/ http://www.dtsc.ca.gov/HazardousWaste/UniversalWaste/index.cfm

Water Management
Pleasanton maintains a site specific National Pollution Discharge Elimination System (NPDES) general water permit to ensure control and handling of process waters and storm water. Pleasanton reuses water on site in the interest of water conservation. Pleasanton also contributes to beneficial basin water recharge by providing water to the State Zone 7 Water Agency. Additional information on NPDES permitting and the Zone 7 Water Agency can be found at: http://www.waterboards.ca.gov/sanfranciscobay/ http://www.zone7water.com/

Mining and Reclamation
The Pleasanton site operates under Surface Mining Permit-16, issued by Alameda County, California. Post-mining reclamation activities are governed by a County approved reclamation plan, which conforms to the State of California’s Surface Mining and Reclamation Act (SMARA). The reclamation plan assures the property is returned to a safe and stable condition, which will support secondary uses after mining is complete. Reclamation obligations are fully bonded per SMARA and reviewed and updated as warranted annually.