Project Design Document (PDD): Enhanced Weathering

Protocol: Isometric Enhanced Weathering in Agriculture v1.1

Project ID: IDAHO-BASALT-001

Date: December 12, 2025

1. Project Setup

1.1 Essential Project Details

- **Project Name:** Idaho Basalt Deployment 001
- **Project Proponent:** Malama Labs (on behalf of Idaho Basalt Deployment 001)
- **Project Scale:**
    - **Feedstock Volume:** 500 tonnes (Basalt Rock Dust)
    - **Current Gross Removals:** 156.97 kg CO2e (Initial Phase)
    - **Material Amount:** 246.3 kg (Credited Material)
- **Project Locations:**
    - **Feedstock Source:** Premier Aggregates (43.4862°N, -116.1265°W)
    - **Staging (Malama Basecamp):** Idaho City (43.8055°N, -115.8672°W)
    - **Application (Field Location):** 2 Miles NW of Basecamp (43.8251°N, -115.8903°W)

1.2 Participating Farms

- **Farm Name:** [Field Location ID: Application Site]
- **Land Area:** 50 Acres
- **Crop Type:** [e.g., Alfalfa / Wheat Rotation] - *Note: Must be specified for Section 9.3.2 Field Management.*
- **Right of Use:** Contractual agreement verifying land access and carbon rights assignment to Project Proponent.

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2. Protocol & Monitoring Data

2.1 Uncertainty (Section 6.5)

- **Measurement Accuracy:**
    - **Mass:** Weighbridge tickets verified (Tx: *erw001we...*) at source and receiving.

    - **Chemical:** XRD/XRF Lab Analysis (Tx: *erw001la...*) with certified reference materials.
- **Sensitivity Analysis:** Variables assessed include rainfall variability (Section 9.3.3) and soil pH heterogeneity.
- **Conservative Approach:** Applied conservative deductions for any missing data or outliers (e.g., if soil pH variance is high).

2.2 Durability (Section 9.1)

- **Storage Mechanism:** Bicarbonate storage in ocean/groundwater via riverine transport.
- **Durability Horizon:** >10,000 years (Ocean residence time).
- **Evidence:** Mineralogy confirmed as Basalt (48% Silicate) via *Mineralogy & Safety Analysis* on Dec 12, 2025.

2.3 Reversals (Appendix 4)

- **Risk Assessment:**
    - **Physical Reversal:** Very Low Risk (Dissolved bicarbonate is stable).
    - **Project Specifics:** No deep ploughing scheduled that would disturb weathering zone significantly.
- **Buffer Pool:** Contribution determined by Risk Score (typically 2-5% for EW).

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3. Environmental & Social Impacts

3.1 Environmental & Social Safeguards (Section 5)

- **Heavy Metals Screening:**
    - **Event:** *Mineralogy & Safety Analysis* (Tx: *erw001sa...*).
    - **Status:** Ni and Cr levels confirmed below ISO 17294-1 safety thresholds.
- **Air Quality:** Dust mitigation used during *Variable Rate Spreading* (Tx: *erw001sp...*) to prevent community nuisance.
- **Soil Health:** Baseline pH and nutrient levels recorded via *Soil Baseline & Control Plot* (Tx: *erw001ba...*) to ensure no negative agronomic impact.

3.2 Stakeholder Input (Section 5.3)

- **Engagement:** Consultation with farm operators regarding application timing to avoid harvest disruption.
- **Community:** No negative feedback received regarding transport logistics from Boise to Idaho City.

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4. Pathway-Specific Requirements

4.1 Monitoring and Durability (Section 9)

- **In-Field Monitoring:**
    - **Approach:** 3-Plot Design (Control, Treatment, Deployment).
    - **Control Plot:** Established Dec 15, 2025 (Tx: *erw001co...*).
    - **Weathering Rate:** Monitored via cation depletion in soil and accumulation in porewater.
- **Climatic Monitoring (Section 9.3.3):**
    - **Sensors:** Rainfall and Soil Temp sensors online Jan 15, 2026 (Tx: *erw001io...*).
    - **Data:** Real-time stream of precipitation events driving the weathering reaction.

4.2 Pre-Existing Deployments (Section 9.6)

- **Status:** N/A. This is a new deployment starting Dec 12, 2025. All baseline data collected *prior* to spreading.

4.3 Quantification of Removals (Section 7)

- **Methodology:** Soil-Based Quantification (Section 7.4.1.2).
- **Mass Balance Equation:**
    - *Cations_Removed* = (*Cations_Start* - *Cations_End*) - *Losses*.
- **Current Status:**
    - **Gross Removals:** 156.97 kg CO2e.
    - **Embodied Emissions (LCA):** -2.47 kg CO2e (Transport/Ops).
    - **Net Creditable: 154.50 kg CO2e**.
- **Verification:** *Post-Spread Verification* (Tx: *erw001xr...*) using Titanium tracer confirms application rate matches reported weight (500 tonnes).

4.4 Variable Application Rate (Section 9.3.1.6.1)

- **Strategy:** Material applied at variable rates based on soil pH maps.
- **Evidence:** *Spreader GPS Log* (Tx: *erw001sp...*) tracks exact tonnage per acre.

4.5 Co-Benefits (Section 1.1)

- **Agronomic:** Potential for soil pH buffering (liming effect) and nutrient addition (Mg, Ca, K) recorded in *Baseline Lab Results*.

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5. Operational Timeline & Evidence

Date	Event	Evidence (Tx)

2025-12-12	Feedstock Sourcing & Safety Analysis	*erw001la...*, *erw001sa...*
2025-12-12	Weighbridge Verification (500t)	*erw001we...*
2025-12-13	Lab/Sensor Prep at Basecamp	*erw001ca...*
2025-12-15	Baseline Soil Sampling & Control Plot	*erw001ba...*, *erw001co...*
2025-12-15	Application (Spreading)	*erw001sp...*, *erw001op...*
2025-12-15	Post-Spread Verification (Tracer)	*erw001xr...*
2026-01-15	Climatic Sensors Online	*erw001io...*
2026-02-01	Net Credit Calculation	*erw001is...*