

Athlas Verity — Project Design Document (PDD) — DEMO

GreenDelta Mangrove Restoration — AV Blue Carbon (BC001)

Document ref: AV-PDD-DEMO-002 · Version 1.0 (Demo for registration preparation) · © 2026 Athlas Verity

IMPORTANT NOTE — DEMO / ILLUSTRATION ONLY. This document is a hypothetical example that shows how an Athlas PDD is structured and populated. All project figures are illustrative and HAVE NOT been verified by a VVB (Validation/Verification Body). For an official submission, replace the examples with real project data and have it reviewed by an accredited auditor.

Project Summary

Field	Value
Project Name	GreenDelta Mangrove Restoration (Demo)
Project Type	BC — Blue Carbon (mangrove restoration)
Methodology	AV-BC001-MTH-01 · v2.0
Standard / Program	Verra Verified Carbon Standard (VCS) v4.3 (Article 6.4/PACM pathway optional)
Location (host country)	Indonesia — Demak Regency, Central Java; 6.89°S 110.44°E (polygon boundary)
Project Proponent	PT GreenDelta Karbon Nusantara (hypothetical entity)
Crediting Period	2026-2036 (10 years, 2 × 5-year periods)
Estimated Annual Removal	~48,500 tCO2e/year (net after buffer and leakage)
Total Estimated	~485,000 tCO2e over 10 years

1. Project Objective and Description

Restore 1,234 ha of degraded shrimp ponds into a functional mangrove forest along the Demak coastline. Activities: hydrological rehabilitation (opening pond bunds), planting native species (*Rhizophora mucronata*, *Avicennia marina*, *Sonneratia caseolaris*), and carbon monitoring via satellite and the Athlas AI engine.

Goal: restore blue carbon in biomass and sediment, protect the shoreline, and recover local fisheries.

2. Project Boundary and Baseline

Boundary: 1,234 ha georeferenced; scope = AGB (above-ground biomass), BGB (below-ground biomass), sediment SOC, and CH4/CO2 emissions from hydrological changes.

Baseline (quantified): business-as-usual = degraded ponds with ongoing emissions:

- Baseline SOC loss: $-2.4 \text{ tCO}_2\text{e/ha/yr}$ (sediment oxidation of open ponds) $\times 1,234 \text{ ha} = -2,962 \text{ tCO}_2\text{e/yr}$ (baseline emissions).
- Baseline AGB ≈ 0 (bare pond area).
- Baseline net = $+2,962 \text{ tCO}_2\text{e/yr}$ (i.e., an emission source).

Project (quantified): after restoration:

- AGB+BGB: estimated accumulation of +34 tCO₂e/ha/yr at growth-curve maturity (years 3-10), averaging ~28 tCO₂e/ha/yr.
- SOC: +8 tCO₂e/ha/yr accumulation.
- Residual hydrological emissions: -2.0 tCO₂e/ha/yr.
- Project net = (28 + 8 - 2.0) = 34 tCO₂e/ha/yr ≈ 41,956 tCO₂e/yr (1,234 ha).

Leakage boundary: ponds/reserves outside the boundary at risk of displacement — monitored via Sentinel-2 land-cover change within a 10 km radius.

3. Additionality

- Legal/regulatory test: mangrove restoration is not legally required, and no statutory incentive applies to this privately owned land.
- Investment/financial test: project IRR without carbon credits = 3.1% (below the sector hurdle rate of 12%); with credit revenue = 14.6% — the project is not viable without credits.
- Barrier test: documented technical barriers (damaged hydrology, sedimentation), institutional barriers (permits, land conflict), and practice barriers (high upfront capital).
- Verdict: ADDITIONAL — the activity is not business-as-usual and depends on carbon revenue.

4. Estimated Baseline and Project Emissions / Removals

Component	Baseline (tCO ₂ e/yr)	Project (tCO ₂ e/yr)
AGB+BGB	0	+34,552
SOC	+2,962 (loss) → -2,962	+9,872
Hydrological emissions	0	-2,468
Subtotal	-2,962 (emission)	+41,956 (removal)
Net removal	—	44,918

Leakage (estimated): -1,400 tCO₂e/yr (detected displacement of pond activity).

Buffer withholding (NPR 12%): -5,222 tCO₂e/yr.

Issuable credits: 48,500 tCO₂e/yr (44,918 + 2,962 baseline avoided - leakage - buffer = ~48,500).

5. Monitoring, QA/QC and Sampling

- Monitoring plan: Sentinel-2 imagery (10 m, 16-day) for cover and change detection; Sentinel-1 (SAR) for structural condition; field plots. Frequency: annual. Data retention: Athlas registry + on-chain.
- Sampling design: stratified random — 60 permanent plots (30×30 m) sized to achieve ±5% precision at 95% confidence.
- QA/QC: duplicate measurement on 10% of plots, traceable instrument calibration, outlier screening, reconciliation against independent GEDI L4A / imagery data. Gaps and anomalies are recorded and handled conservatively.

6. Permanence, Leakage and Buffer (nature-based and CDR)

- Risk assessment (NPR): risk-vector scores — fire (low, 3%), pests/disease (low, 2%), reversal to prior use (medium, 4%), climate/storm surge (medium, 3%), governance/political (low, 2%), total ~12%.
- Buffer withholding: 12% contribution to the pool at each issuance.
- Reversal monitoring: satellite change-detection (Sentinel-1/2) twice a year; a verified reversal triggers buffer drawdown in the current period.

7. SDG Contribution and Safeguards

- SDG targets: SDG 13 (Climate Action) — carbon capture; SDG 14 (Life Below Water) — habitat and fishery recovery; SDG 6 (Clean Water) — filtration and coastal water quality; SDG 15 (Life on Land) — biodiversity.
- Co-benefit indicators: restored mangrove area (ha), returning fish/shrimp populations, shoreline protection length (m), restoration jobs (headcount).
- Safeguards: FPIC and consultation with 12 coastal villages; protection of High Conservation Value Areas (HCVA); no-net-harm to fisheries and livelihoods; documented stakeholder engagement and compensation records.

8. Verification and Audit Trail

- VVB (Validation/Verification Body): [accredited VVB name — left blank for demo].
- Process: document desk review → field/on-site verification (primary data) → clearance → issuance.
- Registry and serial: unique unit `AV-BC001-[SERIAL]` + provenance hash of all datasets/models + on-chain record; retirement = burn (anti-double-counting).
- Double counting: exclusion statement + (for A6.4/PACM) Letter of Authorization and Corresponding Adjustment from the Government of Indonesia.

9. Registration Schedule, Fees and Timeline

Stage	Activity	Estimate	Status
1	Document validation + VVB desk review	3-6 months	Not started (demo)
2	Field verification (VVB)	2-4 months	Not started (demo)
3	Verra listing + fee	listing ~USD 5k	Not started (demo)
4	VCU issuance (per credit)	issuance fee/VCU	Not started (demo)

10. Required Annexes

- [x] Boundary map (GeoJSON/KML) — available (demo)
- [] Evidence of legal right to carbon rights — requires real data
- [] Letter of Authorization (LoA) from host country — required from KLHK/RI
- [] Additionality evidence (financial analysis, regulation) — demo draft
- [] Primary monitoring data + provenance — requires real data
- [] SDG/safeguard statement + stakeholder record — demo draft

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