PROJECT DESIGN DOCUMENT (PDD)

A. PROJECT DETAILS

A.1 Project Title

MSR-X Verified Plastics Recovery & Recycling (XVRR) – Pilot Phase

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A.2 Project Participants

Project Developer:
Xworks Holdings Ltd (United Kingdom)

Digital Monitoring & Reporting System:
Xworks Digital MRV Infrastructure — a structured monitoring, reporting, and verification (MRV) system supporting data capture, evidence logging, chain-of-custody documentation, and audit traceability.

The system functions solely as a data management and compliance support tool. It does not constitute a public registry.

Validation and Verification Body (VVB):
Control Union — an independent third-party validation and verification body accredited under ISO 17029 and relevant greenhouse gas verification standards.

Marketplace (Post-Issuance Distribution Channel):
Carbonmark — an independent environmental asset marketplace used for listing and transfer of independently verified emission reductions.

Supplier (Pilot Facility):
Independent SME Recycler (Netherlands) — facility identity verified by the VVB under confidentiality agreement. Operational permits and compliance documentation are available to the VVB upon request.

A.3 Project Description

The MSR-X XVRR Pilot Phase supports the structured recovery and recycling of post-consumer plastic materials that would otherwise be:

- Disposed of in landfill;
- Incinerated (with or without energy recovery); or
- Managed through non-traceable pathways lacking auditable chain-of-custody documentation.

The project focuses on the following polymer categories:

- PET
- HDPE
- PP
- LDPE
- PVC
- ABS
- PS/EPS

The project establishes a monitored recovery pathway in which eligible plastic waste is:

- Collected and documented at source;
- Transported under traceable chain-of-custody procedures;
- Processed into secondary raw material suitable for documented market substitution;
- Independently validated and verified by the appointed VVB.

All material flows are subject to mass-balance reconciliation to prevent double counting and ensure emission reductions correspond exclusively to verified quantities of recovered plastic.

Emission Reduction Approach

Emission reductions are quantified using conservative substitution accounting as the difference between:

- Baseline emissions associated with disposal and virgin polymer production; and
- Project emissions associated with collection, transport, sorting, and reprocessing.

Emission factors are derived from:

- UK Government GHG Conversion Factors (2025 edition);
- Ecoinvent v3.11 lifecycle inventory database;
- Supplementary peer-reviewed or regulatory datasets where required.

The methodology is designed in alignment with ISO 14044 lifecycle assessment standards and ISO 14064 greenhouse gas quantification principles.

Verified emission reductions may be issued as independently verified reductions following successful third-party verification.

A.4 Project Location

Host Country:
Kingdom of the Netherlands

Primary collection and processing occur within the Netherlands.

Where applicable, secondary processing occurs only at authorised facilities compliant with:

- EU Waste Shipment Regulation
- Basel Convention
- Applicable OECD Decision procedures
- National permitting frameworks

All facilities operate under valid environmental and operational licences.

A.5 Crediting Period

The proposed crediting period is seven (7) years. Renewal may be considered subject to continued additionality, regulatory compliance, and independent verification.

B. BASELINE SCENARIO

B.1 Baseline Determination

In the absence of the project, eligible post-consumer plastic waste would follow prevailing waste-management pathways in the Netherlands:

- Landfilling; or
- Incineration (with or without energy recovery).

Under these pathways:

- No verified secondary raw material suitable for documented substitution is generated;
- No auditable chain-of-custody system demonstrates displacement of virgin polymer production.

The baseline is determined using conservative waste-sector accounting principles aligned with ISO lifecycle and greenhouse gas quantification standards.

B.2 Baseline Emissions

Baseline emissions include:

- Disposal emissions (landfill and/or incineration);
- Virgin polymer production emissions (polymer-specific lifecycle factors).

Emission factors are derived from UK Government GHG Conversion Factors (2025) and Ecoinvent v3.11.

B.3 Exclusion of Non-Traceable Recycling

Recycling pathways lacking documented mass-balance reconciliation or independently verifiable substitution evidence are excluded from the baseline on methodological and data-quality grounds.

C. PROJECT BOUNDARY

C.1 Geographic Boundary

The project is implemented within the Netherlands.
Material transported for further processing remains within legally authorised jurisdictions.

C.2 Material and GHG Boundary

Eligible polymers:

- PET
- HDPE
- PP
- LDPE
- PVC
- ABS
- PS/EPS

Included emission sources:

- Scope 1 (processing emissions)
- Scope 2 (electricity use)
- Relevant Scope 3 emissions necessary for conservative substitution accounting

Non-material sources are excluded transparently.

C.3 Temporal Boundary

Aligned with the seven-year crediting period.

C.4 Social and Environmental Safeguards

Safeguards are assessed in alignment with internationally recognised environmental and social due diligence principles. Monitoring is documented in project reporting.

D. DEMONSTRATION OF ADDITIONALITY

Additionality is demonstrated through financial, market, and operational barrier analysis aligned with internationally recognised carbon accounting frameworks.

Financial Barrier

SME recycling facilities operate under constrained margins. Carbon revenue improves economic viability and supports continued diversion from disposal pathways.

Market & Operational Barriers

Structured, independently verified substitution of virgin polymer production is not common practice among SMEs.

The project overcomes financial and operational barriers that would otherwise limit implementation.

E. EMISSIONS QUANTIFICATION

E.1 Quantification Approach

Emission reductions (ER) are calculated as:

$$ER = BE - PE - LE - UD$$

Where:

- ER = Emission Reductions
- BE = Baseline Emissions
- PE = Project Emissions
- LE = Leakage Emissions (if applicable)
- UD = Uncertainty Deduction (if required)

Substitution ratios are applied conservatively and may be less than 1:1 where full displacement cannot be demonstrated.

E.2 Key Parameters and Conservative Assumptions

Parameter	Approach	Notes
Virgin substitution factor	Polymer-specific conservative ratio	Justified through documented substitution pathway
Recycling yield	Measured facility data or 75% default	Conservative fallback
Material purity	Measured value or conservative default	Applied as correction

Transport emissions	Road and sea freight factors (UK Gov 2025)	Based on documented distances
Rejects	Excluded from substitution	Assigned disposal emission factor
Leakage	Assessed conservatively	Deduction applied where risk identified
Uncertainty	Data-quality based deduction	Applied only if variability exceeds thresholds

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E.3 Transparency

All emission factors, equations, and parameters are disclosed to the independent VVB during validation and verification.
Digital data systems do not alter methodological calculations.

F. Monitoring Requirements

F.1 Ongoing Monitoring

- Certified weighbridge measurements
- Transport documentation (mode and distance)
- Recycling yield data
- Material purity measurements
- Reject documentation

- Calibration certificates
- Mass-balance reconciliation records

All data are stored in a structured MRV system ensuring audit traceability.

F.2 Data Quality Assurance

- Calibration verification
- Material flow reconciliation
- Cross-checking logistics records
- Conservative defaults where necessary

F.3 Independent Verification

Independent verification includes:

- Review of monitoring reports
- Sampling and reconciliation
- Verification of calibration records
- Confirmation of emission reduction calculations

Conservative deductions are applied where data uncertainty exceeds acceptable thresholds.

G. Sustainable Development Impacts

The project contributes to the Sustainable Development Goals (SDGs) in alignment with Gold Standard for the Global Goals requirements. Contributions are assessed ex-ante and monitored during implementation.

SDG	Contribution
SDG 12 – Responsible Consumption and Production	Increased recovery and traceable processing of post-consumer plastics, improving resource efficiency and supporting circular material flows.
SDG 13 – Climate Action	Quantified and independently verified greenhouse gas emission reductions through substitution of virgin polymer production.
SDG 8 – Decent Work and Economic Growth	Support for SME recycling facilities, contributing to formal employment, income stability, and operational capacity development.
SDG 5 – Gender Equality	Target of at least 30% female workforce participation across participating facilities, subject to local labour market conditions.

SDG indicators, monitoring parameters, and performance tracking are documented in the Sustainable Development Monitoring Plan and Annual Reporting documentation.

H. Safeguards Summary

The project has undergone assessment in accordance with the Gold Standard Safeguarding Principles and Requirements.

Environmental Safeguards

- No significant adverse environmental impacts identified.
- Waste handling, transport, and processing comply with applicable environmental regulations.

- Pollution prevention and waste management controls are in place at participating facilities.

Social and Labour Safeguards

- Facilities operate under applicable labour laws and occupational health and safety regulations.
- Employment practices are consistent with national requirements, including wage compliance and worker protections.
- No evidence of child labour, forced labour, or discriminatory employment practices.

Human Rights

- Operations are conducted within OECD jurisdictional frameworks with established regulatory oversight.
- No human rights violations identified through due diligence and stakeholder engagement processes.

Where minor risks are identified, mitigation measures are documented and monitored in accordance with Gold Standard requirements.

I. Stakeholder Consultation Summary

Period: 28 July – 28 September 2025
Channels: Webpage form, webinar (6 Aug), outreach
Feedback: SME inclusion, MRV transparency, circular finance
Actions: Updated inclusion targets; published anonymised PDD

CREDIT INTEGRITY AND RETIREMENT

Each independently verified emission reduction is assigned a unique serial identifier at issuance.

Integrity controls include:

- Immutable serial numbers
- Batch-level linkage to verified material flow
- Transfer history logging
- One-time retirement logic
- Permanent cancellation upon retirement
- Prohibition of subdivision or re-issuance

Retired reductions cannot be transferred or reused.
Audit logs ensure full lifecycle traceability and prevention of double counting.

Disclaimer

This document describes an independently verified emissions reduction framework aligned with ISO standards. It does not imply registration under any specific carbon standard unless formally approved.