

MARINE CONSERVATION CREDITS

MCC-800

Registry Operations Standard

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1. Purpose and Scope

Article 1. This Standard establishes the operational requirements, technical specifications, and governance procedures for the MCC Registry, the authoritative system of record for all Marine Conservation Credits issued under the MCC Programme.

Article 2. The MCC Registry shall serve as the single source of truth for credit issuance, ownership, transfer, retirement, and cancellation across all three credit types: MCC-CC (Conservation Credits), MCC-HYB (Hybrid Credits), and MCC-MCU (Marine Conservation Units).

Article 3. This Standard applies to all registry participants including project developers, credit holders, VVB auditors, programme administrators, registry managers, and automated system accounts.

Article 4. The Registry Operator shall maintain the registry platform in compliance with this Standard, the MCC Programme Standard (MCC-100), and the MCC Governance and Appeals Standard (MCC-700).

Article 5. Nothing in this Standard limits the authority of the MCC Governance Board to issue binding directives regarding registry operations in accordance with MCC-700.

2. Definitions and Interpretation

Article 6. In this Standard, unless the context otherwise requires, capitalised terms have the meanings assigned in MCC-001, MCC-100, and the following additional definitions.

Article 7. Registry Account means a unique account within the MCC Registry assigned to a registered organisation or individual for holding, transferring, and retiring credits.

Article 8. Serial Number means the unique alphanumeric identifier assigned to each individual credit unit upon issuance, conforming to the MCC Serial Number Format specified in Section 4.

Article 9. Registry Transaction means any credit issuance, transfer, retirement, cancellation, or buffer pool allocation recorded in the MCC Registry.

Article 10. Vintage means the calendar year in which the emission reductions or removals represented by a credit unit were generated.

Article 11. Account Holder means the registered entity or individual that holds legal title to credits within a Registry Account.

Article 12. Buffer Pool Account means the dedicated registry account holding credits withheld as a risk buffer in accordance with the MCC Buffer Pool Management Policy.

Article 13. Public Ledger means the publicly accessible, read-only view of the registry that displays credit status, project information, and retirement records as required under Section 12.

3. Registry Architecture and Technical Requirements

3.1 System Architecture

Article 14. The MCC Registry shall be implemented as a web-based platform with a PostgreSQL relational database as the primary data store, an Express/Node.js API layer for business logic enforcement, and a React-based user interface for participant access.

Article 15. The registry platform shall implement role-based access control (RBAC) with the following principal roles: Programme Administrator, Registry Manager, Methodology Reviewer, Governance Board Member, Project Developer, VVB Auditor, Public Stakeholder, AI Service Account, and System Administrator.

Article 16. All registry transactions shall be recorded in an append-only audit log that captures the action type, actor identity, timestamp, affected entity, previous state, new state, and IP address.

Article 17. The registry shall expose a public read-only API conforming to the transparency endpoints specified in Section 12, accessible without authentication.

3.2 Availability and Performance

Article 18. The registry platform shall maintain a minimum uptime of 99.5% measured on a rolling 30-day basis, excluding scheduled maintenance windows.

Article 19. Scheduled maintenance windows shall not exceed 4 hours per month and shall be announced at least 72 hours in advance via the registry notification system and the MCC website.

Article 20. The registry API shall respond to read requests within 500 milliseconds and write requests within 2,000 milliseconds at the 95th percentile under normal operating conditions.

Article 21. The registry shall maintain automated backups with a Recovery Point Objective (RPO) of 1 hour and a Recovery Time Objective (RTO) of 4 hours.

3.3 Security Requirements

Article 22. All data in transit shall be encrypted using TLS 1.3 or later. All data at rest shall be encrypted using AES-256 or equivalent.

Article 23. Authentication shall require multi-factor authentication (MFA) for all accounts with write permissions. Public read-only access shall not require authentication.

Article 24. The registry shall implement rate limiting, input validation, SQL injection prevention, and cross-site scripting protection in accordance with OWASP Top 10 guidelines.

Article 25. An independent security audit shall be conducted at least annually and the summary findings published in the MCC Annual Report.

4. Serial Number Format and Assignment

Article 26. Each credit unit issued under the MCC Programme shall be assigned a globally unique serial number at the point of issuance that remains immutable for the lifetime of the credit.

Article 27. The MCC Serial Number Format shall conform to the following structure (canonical format adopted by FD-2026-08-24, item D13; reissue note of 24 August 2026 records the change history): MCC[-DEMO]-[CreditType]-[FamilyCode]-[CountryProjectCode]-[Vintage]-[SequenceNumber]-[CheckDigit], where the DEMO segment appears only on demonstration credits; CreditType is CC, HYB or MCU; FamilyCode is the methodology family F01–F05; CountryProjectCode is the host-country ISO 3166-1 alpha-3 code followed by the four-digit project number; Vintage is the four-digit vintage year; SequenceNumber is the eight-digit sequence within the project and vintage; and CheckDigit is the Luhn check digit computed over the base-36-expanded digest of all segments excluding the MCC/DEMO prefix, providing single-character tamper detection.

Component	Format	Description
Prefix	MCC	Programme identifier, always MCC
Credit Type	CC HYB MCU	Conservation Credit, Hybrid, or Marine Conservation Unit
Methodology	F01–F05	Methodology family code from MCC-200
Project Code	[A-Z]{2}[0-9]{4}	Country ISO code (2 letters) + 4-digit project sequence
Vintage	YYYY	Calendar year of emission reduction or removal
Sequence	[0-9]{6}	Six-digit sequential number within the batch, zero-padded

Article 28. Example serial number: MCC-MCU-F03-PHL0001-2026-00000001-5 represents Marine Conservation Unit number 1 from methodology family F03, project PHL0001 (Philippines), vintage 2026, with Luhn check digit 5.

Article 29. Serial numbers shall be generated automatically by the registry system during the issuance workflow. Manual assignment of serial numbers is prohibited.

Article 30. Once assigned, a serial number shall never be reused, reassigned, or modified, even if the credit is subsequently cancelled or the batch is voided.

5. Account Management

5.1 Account Types

Article 31. The registry shall support the following account types: (a) Project Developer Accounts for entities registered to develop MCC projects, (b) Holder Accounts for entities that acquire credits through transfer, (c) VVB Accounts for accredited validation and verification bodies, (d) Programme Accounts for MCC administrative functions including the Buffer Pool Account and Cancellation Account, and (e) Public View accounts for unauthenticated read-only access.

5.2 Account Registration

Article 32. Account registration shall require submission of the organisation registration form, legal entity documentation, authorised representative identification, and acceptance of the MCC Registry Terms of Use.

Article 33. The Registry Manager shall verify account registration applications within 10 business days and either approve the account, request additional documentation, or reject the application with written reasons.

Article 34. Each registered organisation shall designate at least one Primary Account Representative and may designate up to three additional Authorised Representatives. All representatives must complete MFA enrolment before accessing write functions.

Article 35. Account Holders shall notify the Registry Manager within 5 business days of any change to authorised representatives, legal entity status, or contact information.

5.3 Account Suspension and Closure

Article 36. The Registry Manager may suspend an account where there are reasonable grounds to believe that the account is being used in connection with fraud, misrepresentation, or breach of the MCC Terms of Use.

Article 37. Account suspension shall be communicated to the Account Holder within 24 hours and shall include the grounds for suspension and the process for remediation. Suspended accounts may not initiate transfers or retirements but remain visible in the registry.

Article 38. Account closure shall require all credit balances to be transferred or retired prior to closure. The Registry Manager shall maintain account records for a minimum of 10 years following closure.

6. Credit Lifecycle Operations

6.1 Credit Issuance

Article 39. Credit issuance shall proceed through the issuance workflow defined in the MCC Programme Standard (MCC-100) and implemented in the platform issuance state machine, comprising the following sequential steps: issuance request, verification confirmation, safeguards clearance, host country authorisation verification, corresponding adjustment confirmation, buffer pool calculation, serial number generation, governance approval, and issuance.

Article 40. Upon successful completion of all issuance steps, the registry shall atomically: (a) create credit unit records with ACTIVE status, (b) assign serial numbers per Section 4, (c) allocate buffer pool credits to the Buffer Pool Account, (d) credit the remaining issuable quantity to the Project Developer Account, and (e) record the issuance in the audit log with full provenance.

Article 41. Issuance quantities shall be determined by the verified quantification from the most recent verification report, less buffer pool withholding as calculated under the MCC Buffer Pool Management Policy.

6.2 Credit Transfer

Article 42. Credit transfers between Registry Accounts shall be initiated by the transferring Account Holder and shall require confirmation by an Authorised Representative of the transferring account.

Article 43. The registry shall validate that: (a) the transferring account holds sufficient credits of the specified type, (b) neither the transferring nor receiving account is suspended, (c) the credits being transferred have ACTIVE status, and (d) the transfer does not violate any applicable lock or encumbrance.

Article 44. Transfers shall be recorded in the audit log with the transferring account, receiving account, credit serial numbers, timestamp, and transaction reference number. Transfer records shall be publicly visible on the Public Ledger.

Article 45. The registry shall support batch transfers of up to 10,000 credit units per transaction. Transfers exceeding this threshold shall be split into multiple sequential transactions.

6.3 Credit Retirement

Article 46. Credit retirement shall be initiated by the Account Holder and shall proceed through the retirement workflow: retirement request, credit validation, credit locking, confirmation, and certificate generation.

Article 47. Upon retirement, the registry shall: (a) change the credit unit status from ACTIVE to RETIRED, (b) record the retirement purpose, beneficiary, and beneficiary country, (c) generate

a retirement certificate with a unique certificate number, and (d) publish the retirement on the Public Ledger.

Article 48. Retirement is irreversible. Once a credit unit has been retired, it may not be reactivated, transferred, or re-retired under any circumstances.

Article 49. Retirement certificates shall include: the certificate number, credit serial numbers, credit type, methodology family, project name and code, vintage, retirement date, retirement purpose, beneficiary name, and the corresponding adjustment status of each credit.

6.4 Credit Cancellation

Article 50. Credit cancellation is an administrative action that permanently removes credits from circulation without generating a retirement certificate or environmental claim.

Article 51. Cancellation may be initiated by the Programme Administrator in the following circumstances: (a) discovery of material error in the underlying verification, (b) revocation of methodology approval, (c) project developer fraud or misrepresentation, (d) Governance Board direction, or (e) voluntary cancellation requested by the Account Holder.

Article 52. Cancelled credits shall be transferred to the Cancellation Account with status CANCELLED and a recorded cancellation reason. The cancellation shall be publicly visible on the Public Ledger.

7. Buffer Pool Operations

Article 53. The Buffer Pool Account shall be a programme-controlled account that holds credits withheld at issuance as a risk reserve against reversal events, in accordance with the MCC Buffer Pool Management Policy.

Article 54. Buffer pool allocation shall be calculated automatically during the issuance workflow based on the project risk assessment score. The risk score shall determine the percentage of credits withheld, ranging from 10% (low risk) to 40% (high risk).

Article 55. Buffer pool credits shall have status BUFFER and shall not be available for transfer, retirement, or cancellation except through the buffer pool release or cancellation procedures defined in the MCC Buffer Pool Management Policy.

Article 56. The Registry Manager shall conduct an annual buffer pool adequacy assessment comparing the total buffer pool balance against the aggregate risk exposure across all active projects. The assessment results shall be published in the MCC Annual Report.

Article 57. Buffer pool release may occur when a project has demonstrated sustained permanence over a period of at least 10 years and the Governance Board approves release. Released credits shall be transferred to the Project Developer Account with status changed from BUFFER to ACTIVE.

8. Corresponding Adjustment Tracking

Article 58. The registry shall track the corresponding adjustment (CA) status of each credit unit in accordance with Article 6 of the Paris Agreement and the MCC Corresponding Adjustment and Double Counting Prevention Policy.

Article 59. Each credit unit shall carry one of the following CA statuses: NOT_APPLIED (no CA requested), REQUESTED (CA application submitted to host country), CONFIRMED (CA confirmed by host country authority), REJECTED (CA application rejected), or NOT_REQUIRED (credit used domestically or CA not applicable).

Article 60. The registry shall record the CA reference number, confirming authority, confirmation date, and NDC period for each credit with CONFIRMED CA status.

Article 61. Credit retirement certificates shall prominently display the CA status of each retired credit. Credits with CONFIRMED CA status may support international transfer claims under Article 6.4. Credits without confirmed CA may only support voluntary market claims with appropriate disclosure.

Article 62. The Registry Manager shall maintain a correspondence log tracking all CA applications and their outcomes, accessible to the Governance Board and host country authorities.

9. Audit Trail and Data Integrity

Article 63. The registry shall maintain a comprehensive, append-only audit trail recording every state change, transaction, and administrative action performed within the registry.

Article 64. Each audit record shall capture: (a) a unique audit record identifier, (b) the action type from the defined enumeration (CREATE, UPDATE, DELETE, TRANSITION, APPROVAL, REJECTION, SUBMISSION, ASSIGNMENT, ISSUANCE, RETIREMENT, CLAIM, UPLOAD, DOWNLOAD, LOGIN, LOGOUT), (c) the actor identity and role, (d) the timestamp in UTC, (e) the affected entity type and identifier, (f) the previous and new state values, and (g) the originating IP address.

Article 65. Audit records shall be immutable. No audit record may be modified, deleted, or overwritten after creation. The system shall enforce this through database-level constraints and application-level controls.

Article 66. The Registry Manager shall conduct quarterly audit trail integrity checks using cryptographic hash verification to confirm that no records have been tampered with.

Article 67. Audit records shall be retained for a minimum of 20 years from the date of creation. Archived audit records shall remain searchable and retrievable within 48 hours of request.

10. Notification and Communication

Article 68. The registry shall implement an automated notification system that alerts participants of relevant events including: credit issuance, transfer receipt, retirement confirmation, account status changes, workflow state transitions, and system maintenance windows.

Article 69. Notifications shall be delivered via: (a) in-platform notification centre, (b) email to registered representatives, and (c) webhook callbacks for organisations that have registered API integration endpoints.

Article 70. Critical notifications including account suspension, credit cancellation, and security alerts shall be delivered within 15 minutes of the triggering event. Standard notifications shall be delivered within 1 hour.

Article 71. The registry shall maintain a notification log recording delivery status, delivery timestamp, and any delivery failures. Failed notifications shall be retried up to 3 times before being escalated to the Registry Manager.

11. Workflow Engine

Article 72. The registry shall implement a state-machine-based workflow engine to enforce the sequencing, guard conditions, and role-based authorisations for all multi-step processes.

Article 73. The following workflows shall be implemented as formal state machines: (a) Project Registration, (b) Methodology Approval, (c) Validation, (d) Verification, (e) Issuance, (f) Retirement, (g) Claim Approval, (h) Dispute Resolution, (i) Methodology Revision, (j) Stakeholder Consultation, and (k) Governance Decision.

Article 74. Each workflow state machine shall define: (a) the complete set of states, (b) the permitted transitions between states, (c) the events that trigger transitions, (d) guard conditions that must be satisfied before a transition executes, and (e) the roles authorised to trigger each event.

Article 75. Workflow transitions shall be recorded in the audit trail and shall be visible to all participants with a role in the workflow.

Article 76. The workflow engine shall enforce timeout policies: if a workflow step has not been completed within the maximum permitted duration (defined per workflow type), the system shall issue escalation notifications and, where applicable, route the matter to the Programme Administrator.

12. Public Transparency and Open Data

12.1 Public Registry API

Article 77. The registry shall expose a public, read-only REST API providing access to: (a) credit unit search by serial number, project, methodology, credit type, vintage, and status, (b) project

details for all registered and active projects, (c) retirement records and certificates, and (d) aggregate registry statistics.

Article 78. The public API shall not require authentication and shall be subject to rate limiting of 100 requests per minute per IP address to prevent abuse while ensuring reasonable access for researchers and civil society.

Article 79. The public API shall return responses in JSON format with standardised pagination support (skip/take parameters) and shall include total record counts to support data completeness verification.

12.2 Public Dashboard

Article 80. The registry shall provide a public web dashboard displaying: (a) total credits issued, retired, and active by credit type and methodology, (b) issuance and retirement timelines, (c) geographic distribution of projects, (d) methodology distribution, and (e) vintage distribution.

Article 81. The public dashboard shall be updated in near-real-time, with a maximum lag of 15 minutes between a registry transaction and its reflection on the dashboard.

12.3 Data Export

Article 82. The registry shall provide downloadable data exports in CSV format for: (a) complete credit unit register, (b) project register, (c) retirement register, and (d) issuance register. Exports shall be regenerated weekly and made available on the MCC website.

Article 83. All publicly available data shall be released under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence to support research, verification, and civil society oversight.

13. Interoperability and External Integration

Article 84. The registry shall support interoperability with other crediting programme registries through standardised data exchange protocols, subject to bilateral agreements approved by the Governance Board.

Article 85. Cross-registry transfers, where a credit issued under MCC is transferred to an account in an external registry (or vice versa), shall require: (a) an active interoperability agreement between MCC and the external programme, (b) verification that no double counting will result, (c) confirmation of corresponding adjustment status, and (d) Governance Board approval for the specific transfer.

Article 86. The registry shall implement standardised metadata export conforming to the Climate Action Data Trust (CAD Trust) data model and the World Bank Climate Warehouse data schema, where technically feasible.

Article 87. The registry shall provide webhook endpoints for integration with external monitoring, reporting, and verification (MRV) platforms, subject to API key registration and access control.

14. Data Retention and Archival

Data Category	Retention Period	Archive Method
Credit unit records	Permanent	Primary database + encrypted archive
Audit trail records	Minimum 20 years	Append-only store + hash verification
Account records	10 years post-closure	Encrypted cold storage
Workflow records	10 years post-completion	Encrypted cold storage
Notification records	5 years	Compressed archive
API access logs	2 years	Log aggregation platform

Article 88. Archived data shall be stored in encrypted, geographically redundant storage and shall remain retrievable within 48 hours of an authorised retrieval request.

Article 89. The Registry Manager shall conduct an annual data retention review to confirm compliance with retention periods and to identify any data eligible for deletion under applicable data protection regulations.

Article 90. Personal data of account representatives shall be processed in accordance with applicable data protection legislation and the MCC Privacy Policy. Data subjects may exercise their rights of access, rectification, and erasure subject to the overriding retention requirements for registry integrity.

15. Disaster Recovery and Business Continuity

Article 91. The Registry Operator shall maintain a documented Disaster Recovery Plan (DRP) that is tested at least annually through a simulated failover exercise.

Article 92. The DRP shall provide for: (a) automated database failover to a standby replica within the RTO of 4 hours, (b) application-layer redundancy across at least two availability zones, (c) DNS failover to a secondary hosting environment, and (d) manual recovery procedures for catastrophic failure scenarios.

Article 93. In the event of a registry outage exceeding 1 hour, the Registry Manager shall: (a) notify all account holders of the outage and expected restoration time, (b) publish a status update on the MCC website, and (c) suspend all pending workflow deadlines until service is restored.

Article 94. Following any unplanned outage, the Registry Manager shall conduct a post-incident review within 10 business days and publish a summary of findings, root cause, and remediation actions.

16. Change Management

Article 95. All changes to the registry platform shall be subject to the MCC Change Management Process, which classifies changes as: (a) Standard (routine updates, bug fixes, dependency patches), (b) Significant (new features, schema changes, API changes), or (c) Emergency (critical security patches, production incident remediation).

Article 96. Standard changes shall be deployed during scheduled maintenance windows following code review and automated testing. Significant changes shall require written approval from the Programme Administrator and a minimum 5-day notice period. Emergency changes may be deployed immediately but shall be documented and reviewed within 48 hours.

Article 97. All registry platform source code shall be maintained in version control with a complete commit history. Production deployments shall be tagged and traceable to specific commits.

Article 98. The registry API shall follow semantic versioning. Breaking changes to the public API shall require a minimum 6-month deprecation notice and shall be communicated to all registered API consumers.

17. Registry Fees and Charges

Article 99. The MCC Governance Board shall approve a Registry Fee Schedule that sets the fees for: (a) account registration, (b) annual account maintenance, (c) credit issuance (per credit), (d) credit transfer (per transaction), (e) credit retirement (per credit), and (f) data export and API access above standard rate limits.

Article 100. Registry fees shall be set at a level sufficient to cover the operational costs of registry maintenance, security, support, and development, without generating excessive surplus.

Article 101. The fee schedule shall be reviewed annually and any changes shall take effect no earlier than 90 days after publication of the revised schedule.

Article 102. Fee waivers or reductions may be granted to least-developed country project developers and academic institutions at the discretion of the Programme Administrator, subject to Governance Board approval.

18. Compliance and Enforcement

Article 103. The Registry Manager shall monitor registry activity for anomalous patterns including: (a) unusual transaction volumes, (b) transfers between related parties that may indicate wash trading, (c) attempts to circumvent buffer pool requirements, and (d) unauthorised access attempts.

Article 104. Where the Registry Manager identifies a suspected compliance breach, the matter shall be reported to the Programme Administrator and, where appropriate, referred to the Governance Board under the dispute resolution procedures of MCC-700.

Article 105. The Registry Manager may impose temporary restrictions on an account pending investigation, including: (a) blocking outgoing transfers, (b) suspending retirement requests, or (c) requiring additional verification for transactions. Such restrictions shall be communicated to the Account Holder within 24 hours.

Article 106. Confirmed compliance breaches may result in: (a) permanent account suspension, (b) credit cancellation, (c) removal from the MCC Programme, (d) public disclosure, and (e) referral to relevant regulatory authorities.

19. Transitional Provisions

Article 107. This Standard shall take effect on 1 April 2026. During the Pilot Phase (Months 1–6), the registry shall operate with reduced availability targets of 95% uptime and extended response time thresholds of 2x the production targets specified in Section 3.2.

Article 108. During the Alpha Phase (Months 7–12), the registry shall progressively achieve production-grade performance targets. Full compliance with all requirements of this Standard shall be achieved by the commencement of the Beta Phase (Month 13).

Article 109. Credits issued during the Pilot and Alpha Phases shall carry the same serial number format and legal standing as credits issued during full production, unless the Governance Board determines otherwise.

Article 110. The Programme Administrator shall publish quarterly progress reports during the Pilot and Alpha Phases demonstrating the registry platform's progress toward full compliance with this Standard.

20. Amendment and Review

Article 111. This Standard shall be reviewed at least annually by the Programme Administrator and the Registry Manager, with recommendations for amendment submitted to the Governance Board.

Article 112. Amendments to this Standard shall be approved by the Governance Board in accordance with the decision-making procedures of MCC-700. Material amendments shall be subject to a 30-day public comment period before adoption.

Article 113. The effective date of any amendment shall be no earlier than 60 days after Governance Board approval, except for emergency amendments addressing critical security vulnerabilities, which may take immediate effect.