ASES ON-CHAIN PROTOCOL

MANUAL

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ACRONYMS

aOCP	ASES nature-positive climate action on-chain protocol
CDM	Clean Development Mechanism
CO$_2$	Carbon dioxide
GHG	Greenhouse gas
KYC	Know your client
NbS	Nature based solutions
LSC	Local stakeholder consultation
PSF	Project submission Form
SDGs	Sustainable Development Goals
UN	United Nations
VCAC	Verified Climate Action Credit
VCC	Verified Carbon Credit
VBBC	Verified Biodiversity Based Credit
VNPC	Verified Nature Positive Credit
VWC	Verified Water Credits
VSC	Verified Soil Credit

I. INTRODUCTION

In this sequence, carbon credits play a compensatory role, serving as the final step after efforts to avoid and reduce emissions have been implemented. Once organizations have taken measures to minimize their emissions, they can invest in carbon credits to offset the remaining unavoidable emissions. Carbon credits, or offsets, represent quantifiable reductions in greenhouse gas emissions achieved through projects that prevent or remove carbon dioxide from the atmosphere. This compensatory action allows businesses to support projects that contribute to emissions reductions beyond their own operations, such as renewable energy projects, reforestation initiatives, or energy efficiency measures. By participating in the carbon credit market, businesses not only mitigate their environmental impact but also promote sustainability, innovation, and accountability in the broader context of climate change mitigation.

There are two main categories of carbon credits:

Voluntary carbon credits: Voluntary carbon credits refer to a type of carbon offset that is generated through voluntary initiatives and programs aimed at reducing greenhouse gas emissions. These credits are typically purchased by individuals, organizations, or businesses on a voluntary basis to take responsibility for their carbon footprint, beyond what is required by regulations or compliance obligations, and support projects that contribute to mitigating climate change. The voluntary carbon markets allows for the transfer of these credits from project developers to buyers, facilitating the funding and expansion of sustainable projects.

Compliance carbon credits: also known as regulatory carbon credits, are a type of carbon offset that is generated to comply with mandatory emission reduction regulations and programs. These credits are required by law and are typically obtained by companies or entities that exceed their allocated emission allowances. These carbon credits are typically traded on regulated markets or platforms established by government bodies or international organizations, such as the European Union Emissions Trading System (EU ETS) or the United Nations Clean Development Mechanism (CDM), among others.

Yet, carbon markets and credits have faced significant criticism due to various factors, including:
● **Lack of transparency and accountability:** One of the primary concerns raised about the carbon market is the perceived absence of transparency and accountability. Critics argue that the market lacks clear regulations, making it susceptible to manipulation by businesses seeking to exceed their emission limits and acquire excessive carbon credits. Additionally, the complexity of the carbon credit system and the challenges in verifying emissions data contribute to the potential for fraud and corruption. Instances of misconduct can arise when entities falsify emission records to obtain an unjustifiable number of credits, engage in unregulated trading of carbon credits on illicit markets, or exploit credits for money laundering purposes. These issues undermine the credibility and integrity of carbon markets.
● **Ineffectiveness in reducing emissions:** Critics argue that carbon credits are ineffective in driving emissions reductions as they allow businesses to offset their emissions rather than actively reducing them. This approach can create a misleading sense of accomplishment and discourage meaningful action towards emission reduction. The availability of carbon credits may

lead businesses and individuals to perceive that they are actively addressing climate change when, in fact, they are merely compensating for their emissions through financial transactions. This has the potential to foster a "permission to pollute" mindset, where businesses rely on carbon credits as a temporary solution instead of implementing sustainable emission reduction measures. Consequently, the reliance on carbon credits may hinder the adoption of permanent emission reduction strategies, undermining the overall effectiveness of mitigation efforts.

The integrity of the market and its capacity to efficiently cut greenhouse gas emissions can both be compromised by the overallocation of allowances. This is the practice of granting more emission allowances than what is required to achieve the market-set emission reduction goals. As a result, there may be an excess of allowances on the market, which might lead to lower allowance prices and fewer incentives for businesses to cut their emissions.

- **Inequity:** carbon markets can contribute to inequity by favoring wealthier nations and businesses that have the financial capacity to purchase credits, while leaving poorer nations and companies to bear the disproportionate burden of climate change's transitional effects. This inequality stems from the allocation of emissions limits and the issuance of carbon credits, which often lack a solid scientific foundation and may be arbitrary in nature. Consequently, certain entities are granted the flexibility to maintain high levels of greenhouse gas emissions, while others face mandatory emission reductions. This can result in a lack of accountability for emissions generated by larger organizations, while less affluent nations and small businesses may face more severe penalties for their emissions, as they may be unable to afford less carbon-intensive technologies and the acquisition of carbon credits.
- **Price volatility:** is a significant problem for carbon credits as it hinders effective planning and budgeting for emissions reductions. The unpredictable fluctuations in carbon credit prices make it challenging for businesses and project developers to allocate resources and accurately estimate the costs associated with achieving emission reduction targets. This volatility creates uncertainty and can undermine the stability and effectiveness of carbon markets, potentially discouraging investments in emissions reduction projects and hindering the overall goal of mitigating climate change.
- **Leakage:** carbon markets can result in "leakage," a situation where emissions are shifted between regions or industries rather than being genuinely reduced. This occurs when companies or sectors in regions with strict emission regulations relocate their operations to areas with more lenient regulations.
- **Limited scope:** Carbon markets have a limited scope as they primarily focus on mitigating greenhouse gas emissions. While carbon credits effectively incentivize emission reductions and promote sustainable practices, they do not address other significant sources of environmental degradation. Environmental concerns, such as deforestation, habitat destruction, water pollution, and biodiversity loss, are not directly tackled within the framework of carbon markets. These issues require comprehensive approaches that encompass a wider range of environmental impacts beyond greenhouse gas emissions. Failure to address these broader concerns may lead to unintended consequences, such as the displacement of environmental harm from one sector to another or neglecting crucial conservation efforts.

Blockchain technology offers a decentralized and transparent ledger that can enhance the tracking and verification of carbon credits. By utilizing blockchain, the accuracy and legitimacy of

carbon credits can be safeguarded, mitigating concerns such as double counting, double claiming and manipulation. The process of tokenizing carbon credits on a blockchain platform transforms them into digital tokens, facilitating transparent and efficient trading on a blockchain network. This tokenization improves the availability and liquidity of carbon credits, enabling more effective exchanges.

Additionally, blockchain technology enables the development of smart contracts that autonomously enforce the laws and regulations of the carbon market. Smart contracts can handle tasks such as issuing, transferring and retiring carbon credits, reducing the need for manual intervention and enhancing the effectiveness of the carbon market. Overall, blockchain technology and tokenization create a secure and efficient infrastructure for trading and tracking carbon credits, addressing the issues and criticisms associated with carbon credits and the carbon market.

Nature Tech marketplaces leverage blockchain technology to facilitate secure and transparent transactions for trading carbon credits and other environmental assets. These marketplaces encompass diverse sectors, including waste management, water treatment, sustainable agriculture and forestry, and renewable energy. Their objective is to offer economically viable and environmentally sustainable products and services. The adoption of Nature Tech approaches is increasingly recognized as an effective strategy to tackle urgent global issues such as climate change, resource scarcity, and ecological degradation. The utilization of blockchain technology in these marketplaces enhances trust, traceability, and efficiency in the trading of environmental assets, contributing to the overall advancement of sustainable practices.

The preservation and restoration of natural ecosystems, both terrestrial and aquatic, are crucial in addressing the global challenges of climate change, biodiversity loss, and land desertification, the 3 global crises humanity faces today. These are referred to as nature-based solutions and they are essential for mitigating these pressing issues. Nature tech, which leverages nature-based solutions and technologies, aligns to address environmental challenges, such as reducing greenhouse gas concentrations in the atmosphere. This connection between nature tech and carbon markets is evident.

Projects focused on ecosystem restoration can receive financial incentives through carbon markets. These initiatives play a significant role in reducing atmospheric carbon dioxide, which can be quantified, credited, and traded within the carbon market. This approach enables carbon markets to simultaneously reduce greenhouse gas emissions and promote the preservation and restoration of natural ecosystems. Nature tech and carbon markets synergistically contribute to the transition towards a low-carbon and more sustainable economy.

Regenerative Finance (ReFi) is a financial model integrated into Nature's technology markets, which aims to foster a sustainable and equitable economic system that prioritizes human and ecosystem welfare. This approach places the highest importance on investments in sustainable agriculture, ecosystem restoration, renewable energy, affordable housing, and conservation activities as a means to create prosperity and wealth, as opposed to exploitative investments with negative impacts on society and nature.

ReFi seeks to establish a closed-loop system where financial resources are continually recycled and directed towards initiatives that promote local economies and environmental advancement. It places a strong emphasis on long-term sustainability rather than short-term profitability, emphasizing the creation of resilient communities and the support of local economies. Collaboration among investors, entrepreneurs, and community organizations is fundamental to this approach. ReFi contributes to the preservation of natural resources and facilitates the shift towards a low-carbon future.

The Nature-positive climate action on-chain protocol (aOCP), developed by ASES, utilizes blockchain, tokenization, and smart contracts to facilitate transparent, efficient, and secure funding for ecosystem restoration initiatives. This protocol focuses on various projects that align with the ReFi philosophy, including regenerative agriculture, silvopastoral management, afforestation, reforestation, soil restoration or preservation, biochar for agroforestry waste management.

ASES recognizes the challenges faced by project developers in securing financing and addresses this issue through the aOCP, by introducing a variety of Verified Nature positive credits (VNPCs). These include not only Verified Carbon Credits (VCCs), but also Verified Biodiversity Based Credits (VBBCs), Verified Climate Action Credits (VCACs), Verified Soil Credits (VSCs), and Verified Water Credits (VWCs). This suite of credits acknowledge and reward the value of ecosystem services enhanced by Project activities and promote cash flow to continue supporting them. The monitoring and verification of Project's impacts (GHG emission reductions and removals, benefits to biodiversity, enhanced soil health, reduced soil erosion, improved groundwater recharge), followed by the corresponding issuance of VNPCs takes place on a quarterly basis.

To ensure transparency and accountability, the aOCP conducts thorough field and satellite monitoring of registered Project activities. VCCs are issued only if greenhouse gas emissions have been effectively reduced or eliminated. Similarly, biodiversity and water credits are granted based on verified positive impacts. Projects' documentation (including, PSF, monitoring, verification and issuance reports) are made accessible to the public, allowing interested parties to review them.

Furthermore, aOCP's blockchain-based carbon registry, NAT5, enhances transparency and traceability. VNPCs are issued as non-fungible tokens (NFTs), registered on blockchain, utilizing smart contracts, which ensures transparency, security, and immutability. The blockchains in which VNPCs are registered are Binance Smart Chain and Polygon (each VNPC is registered only in 1 blockchain). Each NFT represents 1 VNPC, therefore, each VNPC is unique and has its own serial number, which allows its issuance and transaction history, authenticity and ownership to be easily verified by anyone at any time using tools such as *https://bscscan.com* and *https://polygonscan.com/*. This makes possible the public observation of the amount of credits issued, transferred and retired, reducing the risk of double counting, double claiming, and issuance of ghost credits.

I.1. ᴀOCP ᴘʀᴏɢʀᴀᴍ ᴏʙᴊᴇᴄᴛɪᴠᴇꜱ

The aOCP provides criteria and procedures to effectively verify Nature Positive Projects and GHG emission reductions and removals that can be used in both voluntary and compliance markets. The aOCP's framework and standards were created with the following goals in mind.

a) To make it possible for nature-positive projects to be developed successfully and for high-quality carbon, biodiversity, soil, and water credits to be issued and traded, further supporting Project developers;

b) Encourage innovation in the creation and use of GHG mitigation technologies and strategies, as well as in the preservation and restoration of biodiversity and the restoration of water flows;

c) Assure high standards of reliability and transparency by implementing internationally applicable procedures and norms that call for independent third-party verification;

d) Establish a safe registry for Verified Nature Positive Credits that prevents double counting and ensures openness;

e) Assure that Project activities do not harm the community or the ecosystem;

f) Encourage Project Proponents to ensure that their projects contribute to achieving the United Nations Sustainable Development Goals (SDGs);

g) Provide oversight to ensure that investors, buyers, and the market recognize that Verified Nature Positive Credits are real, adequately measured, unique, additional, and permanent;

h) Contribute to the development of emission reduction/removal unit equivalency, which enables participation in carbon and Nature Tech markets globally through a reliable and uniform framework;

i) To establish a certification scheme for NbS projects, where independent verifiers ensure issued Verified Nature Positive Credits adhere to applicable guidelines and regulations;

j) To establish an exchange where businesses and individuals can purchase and trade Verified carbon, biodiversity, soil, and water credits to offset their GHG emissions and promote sustainable development;

k) To create a program that rewards individuals, organizations, and communities for taking action to support NbS.

I.2. Pᴜʀᴘᴏꜱᴇ ᴏꜰ ᴛʜᴇ ᴀOCP ᴘʀᴏɢʀᴀᴍ ᴍᴀɴᴜᴀʟ

The aOCP Program Manual is the program's governing document. It introduces other aOCP documents that establish the standards, procedures, and operating regulations governing the aOCP. This manual outlines the essential components of the program, including the aOCP framework, Program processes, Project Standard, other standards, project-related Baseline and monitoring methodologies, as well as the registry system.

II.   AOCP PROGRAM GENERIC CONSIDERATIONS

The aOCP requirements for Project activities are in line with international standards ISO 14064-2 and ISO 14064-3. Additionally, to assure compliance with accreditation standards, all projects are assessed using a geoprospective methodology by CDS[1], a project to analyze the impact of climate change on biodiversity, or other aOCP-approved validators and verifiers. A careful Registration and Issuance process followed by the aOCP Operations Team guarantees that aOCP Project Activities:

(a) Increase GHG emission reductions/removals and have a positive impact on biodiversity, in additional to what would occur in the absence of the Project activity;

(b) Are awarded Verified Nature Positive Credits for the emission reductions and /or removals, biodiversity, soil, and water benefits that they generate: Verified Carbon Credits, Verified Biodiversity Based Credits, Verifies Soil Credits, Verified Water Credits or Verified Climate Action Credits;

(c) Result in no net harm to ecosystems and society by applying the aOCP Environment and Social Safeguards Standard;

(d) Receive Biodiversity credits based on the ecological communities or taxocenoses they contribute to preserve, including:
  i.   Endangered species or ecosystems
  ii.   Strategic ecosystems
  iii. Endemic species
  iv.   Vegetation
  v.   Pollinators
  vi.   Birds
  vii. Reptiles
  viii. Amphibians
  ix.   Fish

(e) Have been evaluated using the SDG Impact Assessment Tool[2] created by the Gothenburg Centre for Sustainable Development, which is a public tool, or with a similar technique, to explain how they contribute to the achievement of the UN Sustainable Development Goals.

The aOCP Framework describes the components of the aOCP as well as its architecture, governance, documentation structure and hierarchy.

II.1. PROGRAM SCOPE

The aOCP acknowledges the positive impacts Project activities generate on ecosystem services beyond GHG reductions and removals.

These are the 5 **aOCP-Scopes** Project activities can be assessed and credited for:

  ✓ Greenhouse gas reductions and removals (further classified in CDM GHG-Scopes)

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[1] https://www.cdstoolbox.shop/

[2] https://sdgimpactassessmenttool.org/

✓ Biodiversity preservation and restoration
✓ Soil health improvement and erosion prevention
✓ Water balance enhancement
✓ UN Sustainable Development Goals (this does not generate a specific credit, but VNPCs are tagged with the Project's contribution to UNSGDs).

Concerning greenhouse gas reductions and removals, Project activities falling under the CDM **GHG Sectoral Scopes** 13 (Waste handling and disposal – for the aOCP, only agroforestry waste), 14 (Afforestation and Reforestation) and 15 (Agriculture) are eligible for participating in the aOCP.

Particularly, the following 5 project categories qualify for registration and accreditation under the aOCP (figure 1):
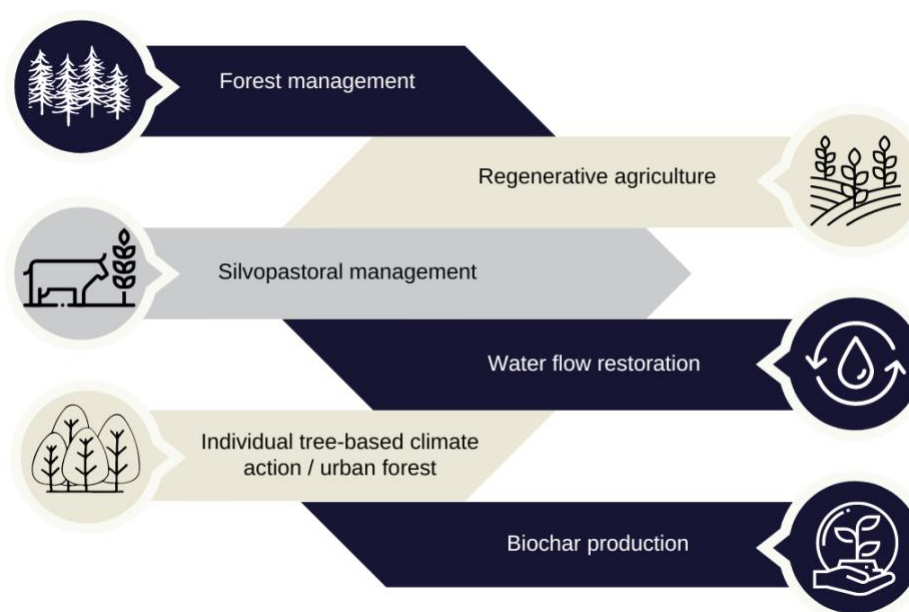
Figure 1. Categories of projects that can participate in the aOCP.

According to the aOCP Framework, the aOCP focuses on the emission reduction and removal of 3 greenhouse gases:

(a) Carbon-dioxide (CO_2);
(b) Methane (CH_4);
(c) Nitrous oxide (N_2O).

The aOCP gives biodiversity a central role. All Projects activities shall have a positive impact on biodiversity. This will be assessed as a condition *sine qua non* for registration and monitored along the life of the project. Successful outcomes will be recognized with Verified Biodiversity-Based Credits (VBBC).

Optionally, Project activities will be assessed for the impact they have on improving soil health, reducing soil erosion, and increasing groundwater recharge. Verified Water and/or Soil Credits will be issued for these contributions.

The impact of projects' contributions to the UN SDGs will also be taken into account, either through the use of an external tool (aOCP recommends this: https://sdgimpactassessmenttool.org/) or a similar methodology proposed by the project proponent that helps to clearly identify and quantify Projects' contribution to the achievement of UN SDGs.

II.2. PROGRAM DOCUMENTS

The program materials outline the guidelines and requirements for the aOCP. All documentation concerning the aOCP can be consulted on the NAT5 website[3]. The aOCP manual (this document), which contains links to other aOCP publications that contain the regulations governing the aOCP, is the overarching program document. The aOCP Framework provides the hierarchy of regulatory documents, including standards, procedural documents, templates, and forms, as an addition to the aOCP Manual. The aOCP will continue to evolve through time and develop new strategies for supporting Nature-based Solutions projects, methodologies for assessing benefits delivered by Project activities, and informative documents, as needed. The framework for aOCP documentation is shown in Figure 2.

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[3] https://www.nat5.bio/index.php/what-is-aocp/#section
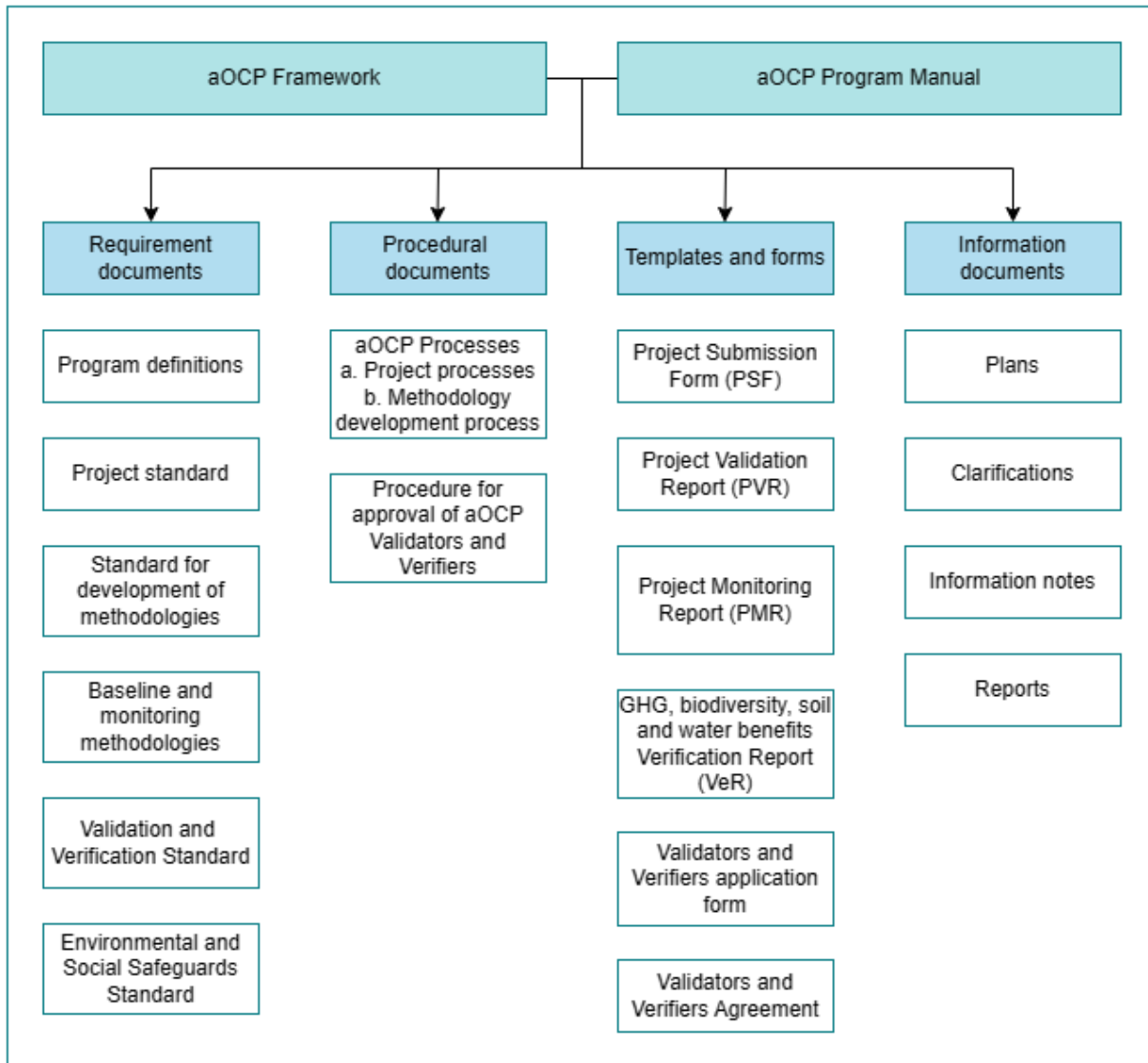
FIGURE 2. AOCP DOCUMENTATION FRAMEWORK

The following documents in the aOCP Program serve as normative (referenced) documents:

(a) ISO 14064-2, Greenhouse gasses – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements;

(b) ISO 14064-3, Greenhouse gasses – Part 3: Specification with guidance for the verification and validation of greenhouse gas statements;

(c) ISO 14065, Greenhouse gasses – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition; and

(d) References to applicable Clean Development Mechanism (CDM) tools[4] and methodologies[5].

The standards indicated above are part of the requirements for the aOCP, and both Project proponents (ISO 14064-2) and aOCP Validators must meet these requirements (ISO 14064-3 and ISO 14065). If there is a discrepancy between the aOCP documentation and the above standards, the aOCP documentation shall prevail. On the basis of the document hierarchy established in the aOCP Framework, it will be determined to what extent the rules and requirements, as stated in the approved aOCP Documents, apply or supersede one another.

II.3. DOCUMENT VERSION CONTROL

The ASES Climate Action On-Chain Protocol (aOCP) is presented in its initial form, and subsequent releases will be distinguished by version numbers. Updates to the document will be explicitly stated in the version control section at the end of each document, including their effective dates. Users of aOCP will be informed about upgrades and should ensure they refer to the latest version of all aOCP papers. It should be noted that occasional errata documents may be issued to address typographical errors in text, equations, or graphics, while clarification documents may provide additional information on aOCP regulations or methodological specifications. These documents, along with the relevant program materials, will be published on the aOCP website and take effect on their publication date. Project Proponents, aOCP Validators, and Verifiers must adhere to the published errata and clarification documents when applying and interpreting aOCP rules and methodological criteria. Subsequent editions of the aOCP will be released periodically to incorporate significant modifications, and the process may involve public stakeholder consultation at the request of the Steering Committee. Information regarding such consultations will be made available on the aOCP website and communicated to aOCP stakeholders.

Older versions of aOCP documents can be found at https://www.ases-eco.com/project-developers.html and should be consulted for the specifications of those prior ASES Protocol iterations. VNPCs contain information that links them to the Project from which they were issued, but they are not identified in the NAT5 registry with a particular version of the aOCP documents.

II.4. LANGUAGE

The aOCP's primary functioning language is English. aOCP documents will eventually be translated into additional languages to aid in local use.

II.5. DEFINITION OF TERMS

The terminologies used in the operationalization of the aOCP Program are defined in the aOCP Program Definitions document. However, ISO 14064-2, ISO 14064-3, ISO 14065, and the other aOCP documents (including the aOCP Framework) might also include definitions that are relevant primarily to each document's particular context.

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[4] https://cdm.unfccc.int/Reference/tools/index.html

[5] https://cdm.unfccc.int/methodologies/index.html

III. NATURE POSITIVE PROJECT REQUIREMENTS

The aOCP's general requirements are based on International Standards ISO 14064-2 and ISO 14064-3, but its particular requirements are outlined in:

a) **Project Standard:** provides specific requirements for developing aOCP Project Activities and is relevant primarily to Project Proponents.

(a) **Validation and Verification Standard:** provides specific requirements for validating and verifying aOCP Project Activities and is relevant primarily to aOCP Validators and Verifiers.

(b) **Standard for the development of methodologies:** Provide the aOCP requirements and rationale for various sections and elements of baseline and monitoring methodologies.

(c) **Methodologies and Tools:** include methodologies and tools developed by the internal expert panel and approved by the aOCP Steering Committee and the external Scientific Committee.

(d) Other specific rules as indicated and defined by the aOCP.

III.1. NATURE POSITIVE PROJECT ELIGIBILITY CRITERIA

The Project Standard contains the requirements for projects to be registered as aOCP Project Activities. The aOCP Procedures paper outlines the steps involved in creating, submitting, and applying for project registration. The Standard for Development of Methodologies provides the guidelines for the creation of new baseline and monitoring methodologies within the aOCP framework. These methodologies contain additional the criteria for determining eligibility of projects based on their specific project types within the aOCP.

III.2. REQUIREMENTS FOR PREPARING NATURE POSITIVE PROJECT SUBMISSIONS

The Project Standard and the Project Submission Form both include precise instructions on how to prepare project submissions.

Project Proponents must develop and submit the project documentation if they want to register and issue carbon, biodiversity, soil or water credits (all different forms of Verified Nature Positive Credits or VNPCs) for their initiatives under the aOCP.

The Project Submission Form contains the project information needed to submit projects for registration. Monitoring Reports contain detailed information about how the project was implemented and the observed impacts. aOCP Validators and Verifiers get access to these documents throughout project validation and verifications in order to perform the corresponding tasks.

The aOCP will not release to the public any documents Project Proponents declare to be confidential. PSFs and monitoring reports, projects' impacts calculation spreadsheets that have been completed are not treated as confidential information, except for sensitive personal information, which will be masked in documents made public.

III.3. REQUIREMENTS FOR CONDUCTING GHG, BIODIVERSITY, SOIL AND WATER VERIFICATIONS

Project registration and the issuance of VNPCs under the aOCP are contingent upon the validation of project documents by authorized aOCP Validators and Verifiers.

The Validation and Verification Standard provides instructions and requirements for Project Validation, prior to registration, and Emission Reduction/Removal, Biodiversity, Soil and Water Verifications. The Validation and Verification Standard, Project Standard, ISO 14064-2, ISO 14064-3, and applicable baseline and monitoring procedures shall be followed when performing validations and verifications.

aOCP Validators and Verifiers shall present their findings in templates referred to as Project Validation Reports and Emission Reduction/Removal, Biodiversity, Soil and Water Verification Reports, as applicable.

IV.   VALIDATOR AND VERIFIER APPROVAL REQUIREMENTS

The Procedure for Accreditation of aOCP Validators and Verifiers provides a comprehensive framework for the approval and accreditation of individuals or organizations seeking to become aOCP Validators and Verifiers. To obtain accreditation, prospective Validators and Verifiers must follow a series of steps, including completing the Validators and Verifiers Application Form, submitting it for thorough review, and successfully completing the required aOCP training courses. Approval is granted upon meeting all accreditation criteria, after which the Validators and Verifiers Agreement can be signed.

V.   PROJECT STANDARD

The aOCP Program has developed methodologies for the assessment of the 5 aOCP-Scopes (GHG, biodiversity, soil, water and SDGs) that cover the 5 Project types currently accepted (figure 1). These methodologies were developed according to the aOCP Standard for Development of Methodologies and have the following characteristics:

- ✓ are applicable worldwide,
- ✓ are based on scientific methodologies adapted from peer-reviewed research articles,
- ✓ promote the use of satellites or other monitoring and verification techniques based on remote sensing, which allows the rapid identification of positive or negative results in the project area and facilitates the issuance of VNPCs or the implementation of necessary corrective measures, as appropriate,
- ✓ its application can be automated through the use of IT tools for data analysis, which reduces human error and facilitates repeatability during the verification process.

The Standard for Development of Methodologies outlines the elements that must be considered when creating new methodologies, along with guidelines for creating each section of a methodology. These elements include relevant scopes, methodology applicability criteria, project boundaries, baseline scenarios, proving additionality, calculating Project's impacts, and monitoring requirements.

Approved aOCP methodologies are publicly accessible on the official NAT5 website[6]. Complementarily, the aOCP enables the use of tools proposed by the CDM, when adequately justified in the methodology that recommends so.

VI. ECOSYSTEM AND SOCIAL SAFEGUARDS STANDARD & SDG CONTRIBUTION

The aOCP requires Project Proponents to demonstrate that their Project Activity does not adversely affect ecosystems or society in any way, while lowering GHG emissions and improving biodiversity status. Project Proponents can demonstrate this accomplishment by following the Environment and Social Safeguards Standard. As a result, all approved Projects and their associated VNPCs are designated as being Harmless for Ecosystems and Society. This standard also outlines the criteria for evaluating the contributions to the SDGs.

VII. TYPES OF CREDITS AWARDED TO PROJECTS

In the aOCP, credits are awarded to projects based on their contributions to environmental sustainability and ecosystem restoration. Each credit represents a specific ecological benefit achieved through Project activities. They constitute the portfolio of Verified Nature Positive Credits (VNPCs) proposed by the aOCP. The following types of credits are awarded to projects within the aOCP, depending on the ecological benefits delivered and assessed:

Verified Carbon Credits (VCC):

Each VCC represents the holder's right to claim that a reduction or elimination of one metric ton of CO_2-equivalent has been achieved due to the implementation of Project activities. These credits are awarded based on verified carbon removals or reduction in greenhouse gas emissions resulting from Project activities. 1 VCC = 1 ton CO_2-eq. removed or prevented from being emitted. When emission reductions correspond to GHG other than CO_2, the equivalence is calculated using the Global Warming Potential to 100-years, as recommended by the International Panel on Climate Change.

Verified Biodiversity Benefit Credits (VBBC):

Each VBBC represents the holder's right to assert that biodiversity has benefited from project development. Improvement of the ecological and landscape conditions in the restoration and/or preservation area(s) determines the allocation of VBBC. The *aOCP methodology for biodiversity assessment* provides guidelines to compute the multifactor biodiversity index, adjust it to project area surface and compare it through time to detect changes. 1 VBBC = 1 point increase in the multifactor index for each 100 m^2. Since having a positive effect on biodiversity is a pre-requisite for Project registration, all projects participating in the aOCP are expected to generate VBBCs.

Verified Water Credits (VWC):

Each VWC represents an increase in rainfall water infiltration into the soil. This impact is driven by improvements in the hydrological response of soils, specifically the reduction of runoff, through

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[6] https://www.nat5.bio/index.php/what-is-aocp/#section

vegetation cover increase. As a consequence of Project activities, groundwater recharge increases, and flood risks reduce. 1 VWC = 1 m³ of water that is infiltrated, additional to what would happen without the project.

Verified Soil Credits (VSC):

VSC represents the account holder's claim that soil health has improved and/or erosion has been reduced by project activities. These credits can be awarded based on verified improvements in soil health, assessed according to the *aOCP Methodology for soil health and erosion assessment.* In this case 1 VSC = 1 percent point increase in the Soil Quality Index for each 100 m^2. VSC can also be awarded based on reductions in soil loss due to hydric erosion resulting from sustainable land management practices and vegetation cover increase. In this case 1 VSC = 1 ton of soil that has been prevented from eroding.

These 4 types of credits serve as tangible indicators of the ecological benefits generated by projects participating in the aOCP. Through the issuance and trading of credits, the program incentivizes and rewards sustainable practices that contribute to climate change mitigation, biodiversity conservation, and water and soil restoration.

VIII. NAT5 CARBON LEDGER

The aOCP employs a blockchain-based digital record known as NAT5 to manage issuances, transfers, withdrawals, and cancellations of Verified Nature-Positive Credits (VNPC). NAT5 utilizes blockchain technology, which is decentralized, immutable, and distributed, enabling transparent and secure tracking of transactions. This technology ensures the integrity and reliability of carbon offset and credit tracking, preventing duplicate counting and ensuring their proper and efficient use.

Key Aspects of the Carbon Ledger:

1. Decentralization: The blockchain-based carbon ledger operates on a decentralized network of nodes, ensuring that no single entity has control over the entire ledger. This decentralization enhances transparency and reduces the risk of manipulation or fraud.

2. Immutability: Once recorded on the blockchain, transactions are immutable and cannot be altered or tampered with. This feature ensures the integrity and trustworthiness of the carbon ledger, providing a reliable record of credit issuances and transactions.

3. Transparency: The blockchain allows for transparent tracking of credit ownership and transactions. All transactions are visible to participants on the network, enabling stakeholders to verify the authenticity and legitimacy of credits.

4. Security: Blockchain technology employs cryptographic techniques to secure transactions and data on the ledger. This ensures that credits are protected from unauthorized access or modification, enhancing security and trust in the system.

5. Elimination of Duplicate Counting: The use of blockchain technology eliminates[7] the risk of double-counting carbon offsets and credits. Inherent to its nature as non-fungible tokens (NFTs), each VNPC is uniquely identified and recorded on the ledger. The metadata associated to each VNPC allows its traceability back to the project originating it, the verification of the number of issuances and the transaction history of each one of them. This improves the avoidance of duplication and ensures accurate accounting.

6. Ownership Tracking: After issuance and minting as non-fungible tokens (NFTs), VNPCs are transferred to the ownership's blockchain wallet/account. From this point on all transactions are secured and can be tracked as with any blockchain-based asset, with the owner being the only one who can initiate a transaction using their private and public keys. This transparent ownership tracking enables stakeholders to trace the journey of credits from issuance to utilization, ensuring accountability and transparency. Moreover, this information can also be visualized on the NAT5 platform.

The utilization of blockchain technology in the NAT5 carbon ledger provides a robust and reliable mechanism for managing Verified Nature-Positive Credits within the aOCP. By ensuring transparency, security, and accuracy in credit tracking, the NAT5 carbon ledger facilitates the effective implementation and monitoring of sustainable initiatives, contributing to the program's overarching goals of climate action through ecological restoration.

VIII.1. SECURITY PROTOCOLS FOR THE NAT5 REGISTRY

The aOCP has put in place security procedures and protocols to ensure the confidentiality, integrity, and availability of data within the NAT5 registry, maintaining the highest standards of security and compliance.

HARDWARE AND SOFTWARE MAINTENANCE

Regular maintenance schedules are in place for hardware components to ensure optimal performance and reliability.

Software updates and patches are promptly applied to address vulnerabilities and enhance system security.

DATABASE SECURITY

Access controls and encryption mechanisms are implemented to safeguard sensitive data stored in the database.

Regular audits and monitoring are conducted to detect and prevent unauthorized access or data breaches.

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[7] The risk of double-counting is eliminated thanks to blockchain, but only from the VNPCs issued by the aOCP. Double counting could still take place if the same project activities are registered under another program, for which other strategies are to be implemented.

NETWORK SECURITY

Firewalls, intrusion detection systems, and encryption protocols are implemented to protect the network infrastructure from external threats.

Network traffic is continuously monitored for suspicious activity and potential security breaches.

SERVER SECURITY

Access controls and strong authentication mechanisms are in place to secure server access.

Regular security assessments and audits are conducted to identify and address vulnerabilities in server configurations.

APPLICATION SECURITY

Secure coding practices and application-level controls are implemented to prevent common security threats such as SQL injection and cross-site scripting (XSS) attacks.

Regular security testing and code reviews are conducted to identify and remediate vulnerabilities in the application code.

END-USER SECURITY

User authentication and authorization mechanisms are implemented to control access to system resources based on user roles and permissions.

End-user training and awareness programs are conducted to educate users about security best practices and mitigate risks associated with social engineering attacks.

DISASTER RECOVERY SECURITY

Backup and recovery procedures are in place to ensure data integrity and availability in the event of a disaster or system failure.

Regular testing and validation of disaster recovery plans are conducted to verify effectiveness and minimize downtime in case of emergency.

PHYSICAL SECURITY MEASURES

Physical security controls, such as access control systems and surveillance cameras, are in place to prevent unauthorized physical access to hardware and infrastructure.

DATA ENCRYPTION

Data encryption techniques are utilized to encrypt data in transit and at rest, ensuring sensitive information remains protected from unauthorized access.

TWO-FACTOR AUTHENTICATION (2FA)

Two-factor authentication is implemented for user access to critical systems, requiring users to provide two forms of verification to authenticate their identity.

SECURITY INCIDENT RESPONSE PLAN

A comprehensive security incident response plan is in place, outlining procedures for detecting, responding to, and mitigating security incidents.

VENDOR SECURITY MANAGEMENT

Security requirements and standards are established for third-party vendors and service providers, with regular security assessments conducted to ensure compliance.

EMPLOYEE TRAINING AND AWARENESS

Ongoing security training and awareness programs are provided to employees to educate them about security best practices and recognize potential security risks.

REGULAR SECURITY AUDITS AND ASSESSMENTS

Regular security audits and assessments are conducted to identify vulnerabilities and weaknesses in the registry infrastructure and processes.

SECURITY MONITORING AND LOGGING

Robust security monitoring and logging mechanisms are in place to track system activity, detect anomalies, and respond to security incidents in real time.

VIII.2. INTER-REGISTRY OPERATIONS

Inter-registry operations entail the interaction and transfer of carbon credits and associated data across various carbon registries or platforms, for the aOCP it can comprise also other types of Nature-Positive Credits. Such operations encompass activities like transferring credits, tracking retirements, and issuing credits across multiple registries.

Under the current policy and operational structure, Nature-Positive Credits held within the NAT5 Registry are not eligible for transfer outside of the NAT5 registry. This limitation is implemented to uphold the integrity, traceability, and uniqueness of Nature-Positive Credits until robust enough mechanisms are put in place.

The aOCP is engaged in exploring avenues for inter-registry operations if this can help to scale climate action and ecosystem restoration. In doing so, the aOCP will continue to adhere to industry norms and regulatory mandates.

The NAT5 registry has been constructed so that it can be integrated into the Climate Action Data Trust; with the infrastructure in place, it is currently undergoing the administrative process to become fully operational.

The aOCP foresees the development of its procedures for operations between registries in the medium term and acknowledges the critical importance of alignment with international data exchange standards. The aOCP is dedicated to watching industry advancements, regulatory shifts, and best practices concerning inter-registry operations. The organization stands dynamic to adapt and adjust its policies and protocols as necessary to support such operations, ensuring adherence to the highest standards of transparency and accountability.

IX. ᴀOCP PROGRAM CONSULTATION POLICIES

The aOCP follows rigorous protocols for public and stakeholder participation. There is compliance with the following aOCP stakeholder consultation policies:

VIII.1. LOCAL STAKEHOLDER CONSULTATION

Preparing project registration submissions (in the PSF template) requires local stakeholder consultation (LSC), without which further processing of submissions—including global stakeholder engagement and third-party verification—is prohibited.

The specifications for local stakeholder consultations are contained in the project standard and the project submission form, which also offers guidance on how to carry them out.

X. ᴀOCP PROGRAM SAFEGUARD POLICIES

The aOCP program safeguards its integrity against environmental integrity issues that can arise during the life of Project Activities.

SAFEGUARDS FOR POST-REGISTRATION CHANGES IN BASELINES AND.

Natural systems are subject to variation due to environmental, social and geopolitical factors. The same problems the aOCP strives to solve -climate change, biodiversity loss and land degradation-can lead to outcomes different to those expected. The aOCP uses climate and species distribution modelling in order to assess the possible changes a Project area can go through, which can potentially alter core processes such as ecosystem services: carbon capture and storage, vegetation growth, biodiversity distribution, soil erosion, water balance. However, uncertainty cannot be completely abated.

The aOCP acknowledges the possibility of post-registration changes in baselines and puts in place a mechanism that safeguards conservativeness on the calculation of the amount of VNPCs to issue. For carbon credits, forecasts on Projects' GHG emissions reductions/removals are soundly assessed via different techniques: theoretical (setting the net primary productivity -NPP-as a threshold and considering species-specific growth tables reported in scientific literature), quarterly monitoring and verifications (which allow early detection of changes and adjustments), in-situ biometric and drone measurements, satellite monitoring. The comparison of these techniques allows an accurate calculation of the amount of VCC to issue.

Soil erosion, for instance, depends on the volume, intensity and temporality of rainfall events; which evidently, cannot be foreseen. The amount of Verified Soil Credits registered in the PSF and first baseline report uses as threshold an area within the same region of the Project area, where vegetation has the vigor and intensity expected to be achieved by the Project.

For Verified Water Credits, an approach similar to that for Soil Credits is followed.

Verified Biodiversity-Based Credits are issued in two phases. For vegetation, biodiversity is calculated after project implementation, given that the number and species of trees are known, as well as their expected survival. For fauna, only the baseline can be assessed, but the impacts cannot be forecasted until the Project starts to mature and monitoring starts.

In order to stay on the conservative side of calculations, a buffer ranging from 10-20% of the total credits of each category is kept from issuance. The size of the buffer is calculated based on the environmental and social risk assessment. In case of any unforeseen event that causes the loss of Project impacts that have already been credited, the buffer will be used to compensate this loss.

SAFEGUARDS FOR OVER-ISSUANCE OF CREDITS

The occurrence of actual or potential over-issuance of Verified Nature Positive Credits (VNPCs) refers to a situation where the quantity of VNPCs issued for a specific Project exceeds the amount specified in the registered Project Submission Form or the Project Verification Report. Such over-issuance poses a significant risk to the environmental integrity and reputation of the aOCP Program, as well as its stakeholders.

Under normal circumstances, the risk of actual over-issuance of Verified Nature Positive Credits (VNPCs) in the aOCP is very low, and this can be attributed to the following reasons:

a) The determination of baseline and project emissions, as well as the design of monitoring protocols, in aOCP methodologies are meticulously and conservatively developed, in strict adherence to the requirements outlined in the aOCP Standard for Development of Methodologies.

b) Rigorous checks are conducted on project documentation and monitoring reports, which involve assessments carried out by approved aOCP Validators and Verifiers, the aOCP Operations Team, inputs from public stakeholders, appointed members of the Steering Committee, and the Steering Committee itself. Only after comprehensive scrutiny and approval are VNPC issuances granted.

c) If an issuance request and monitoring report submitted to the aOCP indicate greater emission reductions or other benefits than those specified in the registered Project Submission Form and the Project Verification Report, such claims will be duly verified and evaluated by the aOCP Verifier.

d) The aOCP Carbon Registry, NAT5, is set with a robust due diligence system to ensure the accurate administration of VNCP issuances, maintaining the integrity of the process.

e) Provisions are in place within the aOCP Verifier Agreement and the aOCP Monitoring Report template to specifically address and mitigate the risk of over-issuance, establishing safeguards to prevent any potential discrepancies.

However, the following special situations have been identified for which there is a risk of over issuance of VNPCs:

• Situation 1: (Actual over issuance): Erroneous project validation or project impacts verification by an aOCP Verifier, which could be due to: (i) incompetence of Verifier; or (ii) negligence, fraud or willful misconduct by the Verifier.

• Situation 2: (Potential over issuance): Changes in the operating conditions of project that were not foreseen during the project registration process and are not in the control of the Project Proponent.

- Situation 3: (Potential over issuance): Changes in the project design compared to that described in registered Project Submission Form.

If a case of actual or potential over-issuance of Verified Nature Positive Credits (VNPCs) is brought to the attention of the aOCP (ASES Climate Action On-Chain Protocol) by any stakeholder, the aOCP will conduct a thorough investigation. This investigation will involve the appointment of a member of the Steering Committee, and if necessary, external experts, to assess the case. The findings will be presented to the Steering Committee during its next meeting, which can be conducted electronically or in person.

If a complaint or indication of over-issuance or potential over-issuance is deemed legitimate based on the three situations mentioned earlier, the aOCP will take the following actions:

(a) Situation 1: In cases where over-issuance is attributed to the incompetence of the Verifier, the aOCP will promptly suspend the Verifier and require verifiable corrective actions before reinstatement. If over-issuance is a result of negligence, fraud, or intentional misconduct by the Verifier, the Verifier will be immediately terminated. All approved aOCP Verifiers are bound by an aOCP Verifier Agreement that outlines their obligations, including provisions for addressing improper issuance of VNPCs. Additionally, the Project Proponents bear responsibility for any improper issuance resulting from their actions, including negligence, fraud, or intentional misconduct.

(b) Situation 2: If changes in operating conditions are justified and do not lead to issuance requests exceeding 10% of the amount specified in the registered Project Submission Form (PSF), the issuance is approved, provided all other requirements are met. However, if the issuance request exceeds 10% of the registered project documentation, the calculations will be revised and recalculated in order to figure out if the result is correct.

(c) Situation 3: Issuance requests indicating a greater amount of emission reductions or other benefits than stated in the registered PSF due to changes in project design will be rejected by the aOCP. The Project Proponent will be requested to initiate the formal process of amending their PSF. The aOCP will develop a procedural document for this purpose if such a situation arises.

In the case of actual over-issuance (situation 1), the aOCP Verifier is required to utilize its professional liability insurance, as specified in the aOCP Verifier Agreement, to cover the loss. To address concerns regarding environmental integrity resulting from actual over-issuance, the aOCP Program will make necessary adjustments in the issuance of VNPCs during the subsequent monitoring period of the same Project Activity. These adjustments will be documented in the aOCP Monitoring Report, accessible on the NAT5 website.

The aOCP Program has implemented the following safeguards to prevent over-issuance:

(a) Double Issuance by the aOCP Program: The aOCP strictly prohibits double issuance. Prior to issuing Verified Nature Positive Credits (VNPCs), the Steering Committee verifies that no previous issuance has been made for the same Project Activity and its associated benefits. VNPCs are only deposited once into the Project Proponent's account or an aggregator account in the NAT5 Carbon Ledger.

(b) Double Issuance by other GHG programs: There is a risk of an aOCP Project Activity being registered with another GHG program. To mitigate this, the aOCP Operations Team cross-checks the GPS coordinates provided in the Project Submission Form (PSF) to ensure they do not match those of projects registered by other programs. If a potential overlap is identified, the aOCP Operations Team conducts enough investigation to ensure that the Project activity is not registered and applying for carbon credits in other GHG programs.

(c) Double Use and Double Sell: All transactions (issuance, buy/sell, cancellation, and retirement of credits) are automatically registered in the blockchain. The history of transactions in the blockchain is transparently traceable and immutable. This ensures that double use and double selling of VNPCs are completely avoided.

CONFLICT OF INTEREST

To ensure the integrity of the aOCP Program and its governance, the following policies are implemented to prevent financial, commercial, or fiduciary conflicts of interest among aOCP Program staff and Steering Committee members:

(a) Declaration of Conflict of Interest by Steering Committee Members: Before each meeting and about every project or methodology they are involved in, members of the aOCP's Steering Committee are required to disclose any potential conflicts of interest they may have. This practice ensures transparency and accountability in their decision-making process.

(b) Conflict of Interest Declaration by Approved Project Validators (external) and Verifiers (internal): aOCP Project Validators and Verifiers are obligated to assess and openly declare any conflicts of interest they may have with the Project Activities they evaluate. If any conflict of interest is identified, the aOCP Validator or Verifier, whether an organization or an individual, will not be assigned to work on that Project.

(c) Confidentiality Agreements and Long-Term Contracts: All employees and management staff associated with the aOCP Program are required to sign a confidentiality agreement and enter into a long-term contract with the organization. These agreements and contracts establish strict guidelines to prevent engagement in corrupt practices or breaches of integrity, ensuring the highest level of professionalism and ethical conduct throughout their tenure with the organization

PROFESSIONAL LIABILITY INSURANCE

aOCP Program decisions regarding the registration of Project Activities and issuance of VNPCs are made based on verified evidence provided by aOCP-approved Verifiers, assessments conducted by the aOCP Operations Team and the professional judgment of the Steering Committee. Verification Reports play a crucial role in informing the decisions of the Steering Committee. To ensure the integrity of the process, the aOCP holds organization-category Verifiers accountable for the accuracy of the evidence they provide regarding GHG emission reductions and other benefits resulting from aOCP Project Activities. The aOCP Validators and Verifiers Agreement includes a clause addressing this liability, and aOCP Validators/Verifiers are required to make appropriate provisions to cover this liability.

PUBLIC INFORMATION AND TRANSPARENCY POLICIES.

The aOCP Program upholds and enforces transparency policies, incorporating specific provisions to ensure this commitment. The following information is made readily accessible to the public through the aOCP website and/or the NAT5 Carbon Ledger webpage:

(a) The comprehensive aOCP documentation framework, encompassing framework documents, procedural documents, requirement documents, information documents, forms, and templates.

(b) Baseline and Monitoring Methodologies that have received approval from the aOCP Program.

(c) Project-specific details, including project names, associated documents, calculations, and all pertinent non-confidential materials submitted for project evaluation.

(d) All determinations and decisions made by the aOCP Program regarding projects, as well as reports from the aOCP Steering Committee.

(e) Project Verification Reports that have been submitted by aOCP-approved Verifiers.

(f) Elaborate information concerning all registered Project Activities, encompassing their projected emission reductions, impacts on biodiversity, soil and water, and alignment with targeted Sustainable Development Goals (SDGs).

(g) Monitoring reports provided by Project Proponents for each monitoring period of every registered Project Activity.

(h) Comprehensive records documenting all Verified Nature Positive Credits (VNPCs) issued to Project Activities for each monitoring period, alongside information regarding the SDG labels awarded to Project Activities.

(i) Details of projects for which registration requests have been rejected by the aOCP Program.

(j) Thorough records documenting all VNPC transfers, retirements, and cancellations.

XI. REFERENCES

ISO 14064-2 :2019, Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring, and reporting of greenhouse gas emission reductions or removal enhancements.

ISO 14064-3: 2019, Greenhouse gases — Part 3: Specification with guidance for the verification and validation of greenhouse gas statements.

ISO 14065: 2020, Greenhouse gases — Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition.

XII. DOCUMENT VERSION HISTORY

DOCUMENT HISTORY		
Version	**Date**	**Comments**
V2.1	15/03/2024	Third version released for review by the aOCP Steering Committee under the aOCP Version 2.0.
V2.0	05/07/2023	Second version released for review by the aOCP Steering Committee under the aOCP Version 1.0
V1.0	06/01/2023	● Initial version released for review by the aOCP Steering Committee under the aOCP Version 1.