Arweave (AR)
White paper

In accordance with Title II of Regulation (EU) 2023/1114 (MiCA)

N	Field	Content
0	Table of content	

		Energy consumption sources and methodologies 32 Key energy sources and methodologies 32 Key GHG sources and methodologies 33
01	Date of notification	2025-06-12
02	Statement in accordance with Article 6(3) of Regulation (EU) 2023/1114	This crypto-asset white paper has not been approved by any competent authority in any Member State of the European Union. The operator of the trading platform of the crypto-asset is solely responsible for the content of this crypto-asset white paper.
03	Compliance statement in accordance with Article 6(6) of Regulation (EU) 2023/1114	This crypto-asset white paper complies with Title II of Regulation (EU) 2023/1114 and, to the best of the knowledge of the management body, the information presented in the crypto-asset white paper is fair, clear and not misleading and the crypto-asset white paper makes no omission likely to affect its import.
04	Statement in accordance with Article 6(5), points (a), (b), (c) of Regulation (EU) 2023/1114	The crypto-asset referred to in this white paper may lose its value in part or in full, may not always be transferable and may not be liquid.
05	Statement in accordance with Article 6(5), point (d) of Regulation (EU) 2023/1114	false

06	Statement in accordance with Article 6(5), points (e) and (f) of Regulation (EU) 2023/1114	The crypto-asset referred to in this white paper is not covered by the investor compensation schemes under Directive 97/9/EC of the European Parliament and of the Council. The crypto-asset referred to in this white paper is not covered by the deposit guarantee schemes under Directive 2014/49/EU of the European Parliament and of the Council.
Summary		
07	Warning in accordance with Article 6(7), second subparagraph of Regulation (EU) 2023/1114	**Warning** This summary should be read as an introduction to the crypto-asset white paper. The prospective holder should base any decision to purchase this crypto-asset on the content of the crypto-asset white paper as a whole and not on the summary alone. The admission to trading of this crypto-asset does not constitute an offer or solicitation to purchase financial instruments and any such offer or solicitation can be made only by means of a prospectus or other offer documents pursuant to the applicable national law. This crypto-asset white paper does not constitute a prospectus as referred to in Regulation (EU) 2017/1129 of the European Parliament and of the Council (36) or any other offer document pursuant to Union or national law.
08	Characteristics of the crypto-asset	AR is the native, fungible token of the Arweave “blockweave”, a Layer-1 (L1) designed for permanent, censorship-resistant data storage. **Core Utilities** (1) Payment: pay once for intended permanent storage. (2) Incentive: miners earn AR via block rewards and a continuous endowment stream for persisting data. (3) Medium of exchange: AR transfers settle value within the ecosystem. AR tokens are freely transferable, in whole or in part, to third parties, and all associated usage rights and obligations follow the token upon transfer.
09	Information about the quality and quantity of goods or services to which the utility tokens give access and restrictions on the transferability	N/A

10	Key information about the offer to the public or admission to trading	Kraken seeks admission to trading of the AR token so as to be compliant with MiCA and in keeping with its mission to make available for trading to its clients a wide range of assets.
Part I – Information on risks		
I.1	Offer-Related Risks	**General Risk Factors Associated with Crypto-Asset Offerings** The admission to trading of crypto-assets, including AR, is subject to general risks inherent to the broader cryptocurrency market. **Market Volatility** The value of AR may experience substantial fluctuations driven by investor sentiment, macroeconomic developments, and market conditions. **Regulatory Risks** Changes in legislation, applicable laws, compliance requirements or the implementation of new regulatory frameworks could affect the availability, trading, or use of such assets. **Security Risks** The risk of exploitation, hacking or security vulnerabilities of the underlying protocol and/or contracts of the token leading to a loss. **Reputational Risks** The potential for damage to an organization's credibility or public trust, which can negatively impact stakeholder confidence and overall business viability**.**
I.2	Issuer-Related Risks	**Key-Person Dependency** Development has historically centred on the founders; departure or incapacitation could slow protocol evolution and community support. **Legal Uncertainty for Issuer** Minimum Spanning Technologies Ltd. may face litigation or enforcement if authorities deem aspects of AR issuance non-compliant, potentially diverting resources. **Funding Continuity** The issuer relies on treasury AR and grant programmes; adverse market conditions could erode reserves and limit future R&D or ecosystem incentives. **Corporate Governance**

		Limited public disclosure of board composition or internal controls increases information risk for token holders.
I.3	Crypto-Assets-related Risks	**Market Volatility** The crypto-asset market is subject to significant price volatility, which may affect the value of AR. Prices can fluctuate rapidly and unpredictably due to various factors, including market sentiment, economic indicators, technological developments, regulatory news, and macroeconomic trends. This high level of volatility may lead to sudden gains or losses and can impact the liquidity and tradability of the crypto-asset. **Liquidity** Liquidity refers to the ability to buy or sell a crypto-asset without causing significant price impact. AR may experience periods of low liquidity, meaning that it could be difficult to enter or exit positions at desired prices or volumes. Reduced liquidity may result from limited market participation, exchange restrictions, or broader market conditions. This can lead to increased price volatility, slippage, and difficulty in executing transactions. **Cybersecurity & Technology Risks** Risks arising from vulnerabilities in the blockchain technology used by the project or platforms. Example risks include smart contract exploits, compromise of platforms, forking scenarios, compromise of cryptographic algorithms. **Adoption Risks** The risk associated with the project not achieving its goals leading to lower than expected adoption and use within the ecosystem, the impact leading to a reduced utility and value proposition. **Custody & Ownership Risk** The risk related to the inadequate safekeeping and control of crypto-assets e.g. loss of private keys, custodian insolvency leading to a loss. **Limited Disclosure of Token Distribution** The issuer has not published a breakdown of the 55 million genesis AR allocation or subsequent treasury movements. Because holders cannot verify which entities control large, early-stage wallets, or whether additional vesting cliffs remain, purchasers face uncertainty about when significant amounts of AR could enter the market, potentially exerting downward price pressure.
I.4	Project Implementation-Related Risks	**Scalability & Data Retrieval** As stored data approaches larger scales, retrieval latency and redundancy management may challenge existing gateway infrastructure. **Endowment Sustainability**

		The economic model assumes storage hardware costs will continue to decline; if costs plateau, miner incentives could weaken. **External Dependencies** Access often relies on third-party HTTP gateways and browser extensions; long-term availability is outside direct protocol control.
I.5	Technology-Related Risks	**Smart contract risks** AR uses smart contracts to facilitate automated transactions and processes. While these contracts enhance efficiency and decentralization, they also introduce specific technical risks. Vulnerabilities such as coding errors, design flaws, or security loopholes within the smart contract code may be exploited by malicious actors. Such exploits could result in the loss of assets, unauthorized access to sensitive information, or unintended and irreversible execution of transactions. **Blockchain Network Risks** AR operates on a public blockchain infrastructure, which is maintained by a decentralized network of participants. The functionality and reliability of the crypto-asset are dependent on the performance and security of the underlying blockchain. Risks may include network congestion, high transaction fees, delayed processing times, or, in extreme cases, outages and disruptions. Additionally, vulnerabilities or failures in the consensus mechanism, attacks on the network (e.g., 51% attacks), or protocol-level bugs could impact the operation and availability of AR. **Risk of Cryptographic Vulnerabilities** Technological advancements, such as quantum computing, could pose potential risks to cryptocurrencies. **Privacy** Transactions involving AR are recorded on a public blockchain, where transaction data is transparent and permanently accessible. While public addresses do not directly reveal personal identities, transaction histories can be analyzed and, in some cases, linked to individuals through data aggregation or external information sources. This transparency may pose privacy concerns for users seeking confidentiality in their financial activity. Participants should be aware that transaction data on public blockchains is not inherently private and could be subject to scrutiny by third parties, including regulators, analytics firms, or malicious actors. **Recall-Block Availability** Should rare historical blocks become under-replicated, honest miners may incur higher costs to access them, affecting block times and security assumptions.

		Network Spam / Bloat Malicious actors could flood the network with low-value data, increasing storage burden and bandwidth requirements for honest nodes. **Endowment-model risk** The protocol assumes that (a) long-term storage costs will decline faster than the real value of the on-chain endowment and (b) the AR price will remain sufficient to reward miners. If storage costs plateau or rise, or if AR faces sustained price depression, the drip payments to miners may become inadequate, reducing the incentive to persist older data and threatening practical permanence.
I.6	Mitigation measures	**Open-Source Codebase** Arweave is an open source project. Anyone may audit or fork the code. Open sourcing boosts transparency and community-driven security. **Bug-Bounty Program** The issuer operates a continuous bug-bounty scheme: external researchers can probe the smart contracts, back-end, and UI, then submit vulnerability reports. The team then rewards following a severity scale. This incentivises rapid detection and resolution of critical issues. **Economic Redundancy Incentives** PoA makes miners show a random recall block—holding rarer data raises block-win odds. ≈ 85 % of each storage fee drips to miners only while they can serve the data, and Wildfire boosts revenue for fast, complete responders.
Part A - Information about the offeror or the person seeking admission to trading		
A.1	Name	N/A
A.2	Legal form	N/A
A.3	Registered address	N/A
A.4	Head office	N/A

A.5	Registration Date	N/A
A.6	Legal entity identifier	N/A
A.7	Another identifier required pursuant to applicable national law	N/A
A.8	Contact telephone number	N/A
A.9	E-mail address	N/A
A.10	Response Time (Days)	N/A
A.11	Parent Company	N/A
A.12	Members of the Management body	N/A
A.13	Business Activity	N/A
A.14	Parent Company Business Activity	N/A
A.15	Newly Established	N/A

A.16	Financial condition for the past three years	N/A
A.17	Financial condition since registration	N/A
Part B - Information about the issuer, if different from the offeror or person seeking admission to trading		
B.1	Issuer different from offeror or person seeking admission to trading	true
B.2	Name	Minimum Spanning Technologies Ltd.
B.3	Legal form	Private limited Company
B.4	Registered address	International House, 36-38 Cornhill, London, United Kingdom, EC3V 3NG
B.5	Head office	N/A
B.6	Registration Date	2017-07-28
B.7	Legal entity identifier	529900NMO8FFFM6MJR37
B.8	Another identifier required pursuant to applicable national law	984500FAL7DZ2C09B965

<table>
<tr><td>B.9</td><td>Parent Company</td><td>N/A</td></tr>
<tr><td>B.10</td><td>Members of the Management body</td><td>
<table>
<tr><th>Full Name</th><th>Business Address</th><th>Function</th></tr>
<tr><td>Samuel Williams</td><td>United Kingdom, International House, 36-38 Cornhill, London EC3V 3NG UK</td><td>Managing Director</td></tr>
</table>
</td></tr>
<tr><td>B.11</td><td>Business Activity</td><td>62012 - Business and domestic software development</td></tr>
<tr><td>B.12</td><td>Parent Company Business Activity</td><td>Not available</td></tr>
<tr><td colspan="3">Part C- Information about the operator of the trading platform in cases where it draws up the crypto-asset white paper and information about other persons drawing the crypto-asset white paper pursuant to Article 6(1), second subparagraph, of Regulation (EU) 2023/1114</td></tr>
<tr><td>C.1</td><td>Name</td><td>Payward Global Solutions LTD</td></tr>
<tr><td>C.2</td><td>Legal form</td><td>N/A</td></tr>
<tr><td>C.3</td><td>Registered address</td><td>N/A</td></tr>
<tr><td>C.4</td><td>Head office</td><td>N/A</td></tr>
<tr><td>C.5</td><td>Registration Date</td><td>11-07-2023</td></tr>
</table>

<table>
<tr><td>C.6</td><td>Legal entity identifier of the operator of the trading platform</td><td>9845003D98SCC2851458</td></tr>
<tr><td>C.7</td><td>Another identifier required pursuant to applicable national law</td><td>N/A</td></tr>
<tr><td>C.8</td><td>Parent Company</td><td>N/A</td></tr>
<tr><td>C.9</td><td>Reason for Crypto-Asset White Paper Preparation</td><td>Kraken seeks admission to trading of the AR token so as to be compliant with MiCA and in keeping with its mission to make available for trading to its clients a wide range of assets.</td></tr>
<tr><td>C.10</td><td>Members of the Management body</td><td><table>
<tr><th>Full Name</th><th>Business Address</th><th>Function</th></tr>
<tr><td>Shannon Kurtas</td><td>70 Sir John Rogerson's Quay, Dublin 2, Ireland</td><td>Board Member</td></tr>
<tr><td>Andrew Mulvenny</td><td>70 Sir John Rogerson's Quay, Dublin 2, Ireland</td><td>Board Member</td></tr>
<tr><td>Shane O'Brien</td><td>70 Sir John Rogerson's Quay, Dublin 2, Ireland</td><td>Board Member</td></tr>
<tr><td>Laura Walsh</td><td>70 Sir John Rogerson's Quay, Dublin 2, Ireland</td><td>Board Member</td></tr>
<tr><td>Michael Walsh</td><td>70 Sir John Rogerson's Quay, Dublin 2, Ireland</td><td>Board Member</td></tr>
</table></td></tr>
<tr><td>C.11</td><td>Operator Business Activity</td><td>PGSL is the operator of a Trading Platform for Crypto Assets, in accordance with Article 3(1)(18) of Regulation (EU) 2023/1114 (MiCA).</td></tr>
<tr><td>C.12</td><td>Parent Company Business Activity</td><td>Payward, Inc., a Delaware, USA corporation, is the parent company of a worldwide group of subsidiaries (the following paragraphs use the term "Payward" or “Payward Group” to refer to the group) collectively doing business as “Kraken.” Payward’s primary business is the operation of an online virtual</td></tr>
</table>

		asset platform that enables clients to buy and sell virtual assets on a spot basis, including the transfer of crypto-assets to and from external wallets. Payward, through its various affiliates, offers a number of other services and products, including: * A trading platform for futures contracts on virtual assets (“Kraken Derivatives”); * A platform for buying and selling NFTs; * An over-the-counter (“OTC”) desk; * Extensions of margin to support spot trading of virtual assets; * A benchmark administrator; and * Staking services.
C.13	Other persons drawing up the crypto-asset white paper according to Article 6(1), second subparagraph, of Regulation (EU) 2023/1114	N/A
C.14	Reason for drawing the white paper by persons referred to in Article 6(1), second subparagraph, of Regulation (EU) 2023/1114	N/A
Part D- Information about the crypto-asset project		
D.1	Crypto-asset project name	Arweave
D.2	Crypto-assets name	N/A

D.3	Abbreviation	N/A
D.4	Crypto-asset project description	Arweave is a decentralised Layer-1 (L1) blockweave whose native, fungible token AR powers a collectively-owned, censorship-resistant “permaweb” for permanent, tamper-proof data storage. Every upload pays a fee in AR (quoted in Winstons / byte) that flows into an on-chain endowment; miners earn a logarithmically-declining block reward and a continuous share of this endowment, an economic model that lets users pay once, store forever*. Proof-of-Access (PoA) links each new block to a randomly-selected recall block, so miners that store extensive historical data maximise their reward odds. Around this core, developer tooling, SmartWeave contracts, GraphQL gateways and Profit-Sharing Tokens, support dApps ranging from NFT permanence to scientific-data archives. *”Pay once, store forever” describes the intended economic design of the Arweave network; it is not a legal or technical guarantee of perpetual data availability. Data persistence depends on (i) continued miner participation, (ii) the adequacy of the on-chain endowment, (iii) future hardware and energy costs, and (iv) the uninterrupted operation of the Arweave protocol and its gateways. Should any of these assumptions fail, for example, if storage costs rise unexpectedly, the AR token price falls materially, or a network-wide technical fault occurs, stored data may become inaccessible or retrieval may require additional fees. Prospective users should maintain independent backups of critical data and should not rely solely on the Arweave network for legally-mandated or mission-critical storage.
D.5	Details of all natural or legal persons involved in the implementation of the crypto-asset project	**Core protocol developer** Minimum Spanning Technologies Ltd. is the entity behind Arweave. Its address is International House, 36-38 Cornhill, London, United Kingdom, EC3V 3NG **Core Team** Sam Williams: Co-founder & CEO Abhav Kedia: Chief of Staff William Jones: Co-founder & Researcher **Key ecosystem engineering teams** Community Labs LLC Bundlr Labs Inc. Warp Contracts GmbH **Gateway & infrastructure operators** Ar.io Foundation provides public HTTP gateways and permaweb routing

		everFinance Ltd. maintains instant-payment layer on Arweave **Ecosystem funding bodies** Open Web Foundry DAO: on-chain community multisig that allocates grant capital to early-stage permaweb projects
D.6	Utility Token Classification	false
D.7	Key Features of Goods/Services for Utility Token Projects	N/A
D.8	Plans for the token	**2018** Mainnet launch (genesis block & public uploads). **2020** “Arweave 2.0” upgrade introducing bundled transactions for higher throughput. **2020** SOLAR bridge announcement linking Solana programmes to Arweave storage. **2021** SPoRA upgrade deploying Succinct Proofs of Random Access to reduce proof size. **2024** AO compute-layer public beta enabling scalable, message-based execution atop Arweave. Refer to the project team website for any further information regarding future milestones.
D.9	Resource Allocation	The project team has not provided an official resource-allocation report.
D.10	Planned Use of Collected Funds or Crypto-Assets	Not available

Part E - Information about the offer to the public of crypto-assets or their admission to trading		
E.1	Public Offering or Admission to trading	ATTR
E.2	Reasons for Public Offer or Admission to trading	Making secondary trading available to the consumers on the Kraken Trading platform in compliance with the MiCA regulatory framework
E.3	Fundraising Target	N/A
E.4	Minimum Subscription Goals	N/A
E.5	Maximum Subscription Goal	N/A
E.6	Oversubscription Acceptance	N/A
E.7	Oversubscription Allocation	N/A
E.8	Issue Price	N/A
E.9	Official currency or other crypto-assets determining the issue price	N/A
E.10	Subscription fee	N/A

E.11	Offer Price Determination Method	N/A
E.12	Total Number of Offered/Traded crypto-assets	66 000 000
E.13	Targeted Holders	ALL
E.14	Holder restrictions	N/A
E.15	Reimbursement Notice	N/A
E.16	Refund Mechanism	N/A
E.17	Refund Timeline	N/A
E.18	Offer Phases	N/A
E.19	Early Purchase Discount	N/A
E.20	time-limited offer	N/A
E.21	Subscription period beginning	N/A
E.22	Subscription period end	N/A

E.23	Safeguarding Arrangements for Offered Funds/crypto-assets	N/A
E.24	Payment Methods for crypto-asset Purchase	N/A
E.25	Value Transfer Methods for Reimbursement	N/A
E.26	Right of Withdrawal	N/A
E.27	Transfer of Purchased crypto-assets	N/A
E.28	Transfer Time Schedule	N/A
E.29	Purchaser's Technical Requirements	N/A
E.30	crypto-asset service provider (CASP) name	N/A
E.31	CASP identifier	N/A
E.32	Placement form	NTAV

E.33	Trading Platforms name	N/A
E.34	Trading Platforms Market Identifier Code (MIC)	N/A
E.35	Trading Platforms Access	N/A
E.36	Involved costs	N/A
E.37	Offer Expenses	N/A
E.38	Conflicts of Interest	All listings decisions made by Payward Global Solution Ltd are made independently by staff of the entity in line with internal policies. PGSL publishes a conflicts of interest disclosure on its website advising of potential conflicts that may arise.
E.39	Applicable law	Any dispute relating to this white paper shall be governed by and construed and enforced in accordance with the laws of Ireland without regard to conflict of law rules or principles (whether of Ireland or any other jurisdiction) that would cause the application of the laws of any other jurisdiction, irrespective of whether AR tokens qualify as right or property under the applicable law.
E.40	Competent court	Any disputes or claims arising out of this white paper will be subject to the exclusive jurisdiction of the Irish courts.
Part F - Information about the crypto-assets		
F.1	Crypto-Asset Type	AR is classified as a crypto-asset other than an asset referenced token or e-money token under MiCA, (EU) 2023/1114.
F.2	Crypto-Asset Functionality	AR is used as currency for permanent storage payments, block rewards & endowment payout to miners

F.3	Planned Application of Functionalities	All listed functionalities are operational on mainnet. No additional functionalities have been announced.
A description of the characteristics of the crypto-asset, including the data necessary for classification of the crypto-asset white paper in the register referred to in Article 109 of Regulation (EU) 2023/1114, as specified in accordance with paragraph 8 of that Article		
F.4	Type of white paper	OTHR
F.5	The type of submission	NEWT
F.6	Crypto-Asset Characteristics	AR is a fungible native Layer-1 token with a maximum supply of 66M AR.
F.7	Commercial name or trading name	N/A
F.8	Website of the issuer	https://arweave.org/
F.9	Starting date of offer to the public or admission to trading	2018-06-08
F.10	Publication date	2025-07-10
F.11	Any other services provided by the issuer	N/A

F.12	Identifier of operator of the trading platform	PGSL
F.13	Language or languages of the white paper	English
F.14	Digital Token Identifier	CPX6BGPR0
F.15	Functionally Fungible Group Digital Token Identifier	N/A
F.16	Voluntary data flag	Mandatory
F.17	Personal data flag	true
F.18	LEI eligibility	N/A
F.19	Home Member State	Ireland
F.20	Host Member States	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden
Part G - Information on the rights and obligations attached to the crypto-assets		
G.1	Purchaser Rights and Obligations	AR holders have the right to pay AR to store data, transfer AR, and mine to earn rewards. There are no obligations tied to AR.

G.2	Exercise of Rights and obligations	**Using AR to store data** A holder connects a compatible wallet to an Arweave gateway, selects the file or payload, and attaches the required AR fee (quoted in Winstons per byte). Once the signed transaction is broadcast, it is included in a Proof-of-Access block (~2 min average); after ~6 confirmations (~12 min) the data is considered permanently archived. **Transferring AR** The holder signs a transfer transaction specifying the recipient address. The network deducts a minimal fee and the balance updates after block confirmation. **Participating in mining** Any user may download the open-source Arweave node and supply adequate storage (≥ 2 TB recommended). After syncing the chain, the node automatically participates in the block race: if it hashes a valid block and proves possession of the required recall block, it receives the block reward and begins earning endowment payouts for the data it stores.
G.3	Conditions for modifications of rights and obligations	The rights and obligations attached to AR as described in this white paper reflect information available at the time of issuance. This white paper is issued by Kraken and does not constitute a commitment or guarantee by Arweave or any other party regarding future modifications. No promises, warranties, or assurances are made herein regarding future token functionality, and this section is provided solely for informational purposes.
G.4	Future Public Offers	None announced
G.5	Issuer Retained Crypto-Assets	Unknown
G.6	Utility Token Classification	false
G.7	Key Features of Goods/Services of Utility Tokens	N/A
G.8	Utility Tokens Redemption	N/A

G.9	Non-Trading request	This white paper reflects a request to admit the token to trading.
G.10	Crypto-Assets purchase or sale modalities	N/A
G.11	Crypto-Assets Transfer Restrictions	Kraken may, in accordance with applicable laws and internal policies and terms, impose restrictions on buyers and sellers of these tokens.
G.12	Supply Adjustment Protocols	false
G.13	Supply Adjustment Mechanisms	N/A
G.14	Token Value Protection Schemes	false
G.15	Token Value Protection Schemes Description	N/A
G.16	Compensation Schemes	false
G.17	Compensation Schemes Description	N/A
G.18	Applicable law	Any dispute relating to this white paper shall be governed by and construed and enforced in accordance with the laws of Ireland without regard to conflict of law rules or principles (whether of Ireland or any other jurisdiction) that would cause the application of the laws of any other jurisdiction, irrespective of whether AR tokens qualify as right or property under the applicable law.

G.19	Competent court	Any disputes or claims arising out of this white paper will be subject to the exclusive jurisdiction of the Irish courts.
Part H – information on the underlying technology		
H.1	Distributed ledger technology	N/A
H.2	Protocols and technical standards	The AR token is native to Arweave's blockweave, a public Distributed-Ledger protocol that chains blocks and secures transactions with digital signatures. The network's Proof-of-Access consensus links every new block to a randomly-selected recall block, ensuring long-term data integrity.
H.3	Technology Used	AR is issued, transferred, and stored natively on the blockweave.
H.4	Consensus Mechanism	Arweave uses Proof-of-Access (PoA) atop RandomX Proof-of-Work: miners must both solve a PoW hash and prove possession of a randomly-selected recall block from the chain's history. This dual requirement rewards nodes that store extensive data, keeps block times around ~2 minutes, and grants probabilistic finality to AR transfers and data uploads once they are included in a PoA block.
H.5	Incentive Mechanisms and Applicable Fees	**How miners earn AR** Block reward: The protocol will mint the remaining 11M AR over time. Each new block releases a small portion; the amount decays logarithmically, so inflation trends toward zero. Storage reward: When a user uploads data, ≈ 15 % of the fee goes straight to the miner that includes the transaction. The other ≈ 85 % is locked in an on-chain endowment and streamed to miners only while they can serve that data, rewarding long-term redundancy. **What users pay** Upload fee: A one-time AR payment, quoted in Winstons / byte. The formula adjusts periodically to track real-world storage costs, letting users "pay once, store forever." Transfer fee: Simple AR transfers incur a negligible anti-spam fee. No variable "gas" is charged because smart-contract logic runs off-chain (SmartWeave). **Extra performance incentive** Wildfire reputation: Nodes that deliver blocks and data quickly receive new

		transactions sooner, indirectly boosting their chances of winning the next block, another push toward well-provisioned, highly-redundant miners.
H.6	Use of Distributed Ledger Technology	false
H.7	DLT Functionality Description	N/A
H.8	Audit	true
H.9	Audit outcome	**Trail of Bits** (May 2019) 2 Low 1 Informational **Kudelski Security** (July 2019) 0 Critical 0 High 14 observations “not realistic security concerns.” Concluded RandomX is “unlikely to fail its security goals.” **Quarkslab** (July 2019) No critical bugs 3 Medium issues; all remedies accepted by maintainers. **X41 D-Sec** (July 2019) 4 Medium-severity flaws 11 informational notes; confirmed fixes merged before main-net activation. Overall status – Across all four reviews no Critical or High vulnerability remained outstanding; all Medium findings were patched or mitigated prior to Arweave main-net use of RandomX. **NCC Group** (2020-2021) SPoRA consensus upgrade audit. Targeted review of the Succinct Proofs of Random Access implementation that replaced legacy PoA proofs.

		ArweaveEco tweeted “We are happy to report that the security audit by NCC Group of the new algorithm found no significant problems or actionable findings.” The full report is private.
Part J - Information on the suitability indicators in relation to adverse impact on the climate and other environment-related adverse impacts		
S.1	Name	Payward Global Solutions Limited
S.2	Relevant legal entity identifier	9845003D98SCC2851458
S.3	Name of the crypto-asset	Arweave
S.4	Consensus Mechanism	Arweave is present on the following networks: Arweave, Ethereum. Arweave employs a unique Proof of Access (PoA) consensus mechanism, which integrates a requirement for miners to provide cryptographic proof of access to historical data, known as a "recall block." This ensures that miners contribute to both data storage and network security by storing and verifying historical data. Core Components: 1. Proof of Access (PoA): - Recall Block Verification: During mining, miners must retrieve and validate a randomly selected "recall block" from Arweave’s data history, proving they retain access to stored data. This process secures the network while emphasizing long-term data availability. - Enhanced Proof of Work (PoW): PoA builds upon traditional PoW by requiring miners to demonstrate access to previously stored data, adding a storage-focused layer to network security and incentivizing distributed data retention. 2. Data-Centric Mining Incentives: Distributed Storage: The PoA design encourages miners to store a broad history of blocks, as possessing more recall blocks enhances their probability of successfully mining new blocks and earning rewards. The crypto-asset's Proof-of-Stake (PoS) consensus mechanism, introduced with The Merge in 2022, replaces mining with validator staking. Validators must stake at least 32 ETH every block a validator is randomly chosen to propose the next block. Once proposed the other validators verify the blocks integrity. The network operates on a slot and epoch system, where a new block is proposed every 12 seconds, and finalization occurs after two epochs (~12.8 minutes) using Casper-FFG. The Beacon Chain coordinates validators, while

		the fork-choice rule (LMD-GHOST) ensures the chain follows the heaviest accumulated validator votes. Validators earn rewards for proposing and verifying blocks, but face slashing for malicious behavior or inactivity. PoS aims to improve energy efficiency, security, and scalability, with future upgrades like Proto-Danksharding enhancing transaction efficiency.
S.5	Incentive Mechanisms and Applicable Fees	Arweave is present on the following networks: Arweave, Ethereum. Arweave's economic model incentivizes miners to contribute to data storage through upfront storage fees and ongoing block rewards, supporting the network's mission of providing permanent and accessible data storage. Incentive Mechanisms: 1. One-Time Storage Fees: Permanent Data Storage: Users pay a one-time, upfront fee in AR tokens, calculated based on data size and projected storage costs. This fee funds indefinite data storage on the network. Endowment Pool: A portion of each storage fee is allocated to an endowment pool, covering future storage costs as technology advances, ensuring sustainable, permanent data storage. 2. Mining Rewards: Block Rewards: Miners earn AR tokens for successfully mining blocks, incentivizing them to store historical data and maintain network integrity. Applicable Fees: Storage fees in AR are set by data size and projected long-term costs, covering the initial and future costs of data permanence.The crypto-asset's PoS system secures transactions through validator incentives and economic penalties. Validators stake at least 32 ETH and earn rewards for proposing blocks, attesting to valid ones, and participating in sync committees. Rewards are paid in newly issued ETH and transaction fees. Under EIP-1559, transaction fees consist of a base fee, which is burned to reduce supply, and an optional priority fee (tip) paid to validators. Validators face slashing if they act maliciously and incur penalties for inactivity. This system aims to increase security by aligning incentives while making the crypto-asset's fee structure more predictable and deflationary during high network activity.
S.6	Beginning of the period to which the disclosure relates	

S.7	End of the period to which the disclosure relates	
S.8	Energy consumption	kWh/a
S.9	Energy consumption sources and methodologies	The energy consumption of this asset is aggregated across multiple components: For the calculation of energy consumptions, the so called "bottom-up" approach is being used. The nodes are considered to be the central factor for the energy consumption of the network. These assumptions are made on the basis of empirical findings through the use of public information sites, open-source crawlers and crawlers developed in-house. The main determinants for estimating the hardware used within the network are the requirements for operating the client software. The energy consumption of the hardware devices was measured in certified test laboratories. When calculating the energy consumption, we used - if available - the Functionally Fungible Group Digital Token Identifier (FFG DTI) to determine all implementations of the asset of question in scope and we update the mappings regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts. To determine the energy consumption of a token, the energy consumption of the network(s) ethereum is calculated first. For the energy consumption of the token, a fraction of the energy consumption of the network is attributed to the token, which is determined based on the activity of the crypto-asset within the network. When calculating the energy consumption, the Functionally Fungible Group Digital Token Identifier (FFG DTI) is used - if available - to determine all implementations of the asset in scope. The mappings are updated regularly, based on data of the Digital Token Identifier Foundation. The information regarding the hardware used and the number of participants in the network is based on assumptions that are verified with best effort using empirical data. In general, participants are assumed to be largely economically rational. As a precautionary principle, we make assumptions on the conservative side when in doubt, i.e. making higher estimates for the adverse impacts.
S.15	Key energy sources and methodologies	To determine the proportion of renewable energy usage, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house.

		If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal energy cost wrt. one more transaction. Ember (2025); Energy Institute - Statistical Review of World Energy (2024) – with major processing by Our World in Data. “Share of electricity generated by renewables – Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/share-electricity-renewables
S.16	Key GHG sources and methodologies	To determine the GHG Emissions, the locations of the nodes are to be determined using public information sites, open-source crawlers and crawlers developed in-house. If no information is available on the geographic distribution of the nodes, reference networks are used which are comparable in terms of their incentivization structure and consensus mechanism. This geo-information is merged with public information from Our World in Data, see citation. The intensity is calculated as the marginal emission wrt. one more transaction. Ember (2025); Energy Institute - Statistical Review of World Energy (2024) – with major processing by Our World in Data. “Carbon intensity of electricity generation – Ember and Energy Institute” [dataset]. Ember, “Yearly Electricity Data Europe”; Ember, “Yearly Electricity Data”; Energy Institute, “Statistical Review of World Energy” [original data]. Retrieved from https://ourworldindata.org/grapher/carbon-intensity-electricity Licenced under CC BY 4.0