



CredShields

# Smart Contract Audit

Jan 14th, 2026 • CONFIDENTIAL

## Description

This document details the process and result of the Smart Contract audit performed by CredShields Technologies PTE. LTD. on behalf of HeyElsa between Jan 12th, 2026, and Jan 12th, 2026. A retest was performed on Jan 14th, 2026.

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## Prepared for

HeyElsa

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# 1. Executive Summary -----

HeyElsa engaged CredShields to perform a smart contract audit from Jan 12th, 2026, to Jan 12th, 2026. During this timeframe, Four(4) vulnerabilities were identified. A retest was performed on Jan 14th, 2026, and all the bugs have been addressed.

During the audit, Zero (0) vulnerabilities were found with a severity rating of either High or Critical. These vulnerabilities represent the greatest immediate risk to "HeyElsa" and should be prioritized for remediation, and fortunately, none were found.

The table below shows the in-scope assets and a breakdown of findings by severity per asset. Section 2.3 contains more information on how severity is calculated.

| Assets in Scope        | Critical | High     | Medium   | Low      | Info     | Gas      | $\Sigma$ |
|------------------------|----------|----------|----------|----------|----------|----------|----------|
| Airdrop Smart Contract | 0        | 0        | 1        | 1        | 2        | 0        | <b>4</b> |
|                        | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>0</b> | <b>4</b> |

*Table: Vulnerabilities Per Asset in Scope*

The CredShields team conducted the security audit to focus on identifying vulnerabilities in Airdrop Smart Contract's scope during the testing window while abiding by the policies set forth by HeyElsa's team.



## **State of Security**

To maintain a robust security posture, it is essential to continuously review and improve upon current security processes. Utilizing CredShields' continuous audit feature allows both HeyElsa's internal security and development teams to not only identify specific vulnerabilities but also gain a deeper understanding of the current security threat landscape.

To ensure that vulnerabilities are not introduced when new features are added, or code is refactored, we recommend conducting regular security assessments. Additionally, by analyzing the root cause of resolved vulnerabilities, the internal teams at HeyElsa can implement both manual and automated procedures to eliminate entire classes of vulnerabilities in the future. By taking a proactive approach, HeyElsa can future-proof its security posture and protect its assets.

## 2. The Methodology -----

HeyElsa engaged CredShields to perform an Airdrop Smart Contract audit. The following sections cover how the engagement was put together and executed.

### 2.1 Preparation Phase

The CredShields team meticulously reviewed all provided documents and comments in the smart contract code to gain a thorough understanding of the contract's features and functionalities. They meticulously examined all functions and created a mind map to systematically identify potential security vulnerabilities, prioritizing those that were more critical and business-sensitive for the refactored code. To confirm their findings, the team deployed a self-hosted version of the smart contract and performed verifications and validations during the audit phase.

A testing window from Jan 12th, 2026, to Jan 12th, 2026, was agreed upon during the preparation phase.

#### 2.1.1 Scope

During the preparation phase, the following scope for the engagement was agreed upon:

##### IN SCOPE ASSETS

Audit Commit:

<https://github.com/HeyElsa/airdrop-contract/blob/72d6ef1d5917dbea05c8ddff9b1c1b20f94d27c0/contracts/ELSAAirdrop.sol>

Retest Commit:

<https://github.com/HeyElsa/airdrop-contract/blob/060b8232975dc523631599007d1d890b61bd1433/contracts/ELSAAirdrop.sol>

## 2.1.2 Documentation

Documentation was not required as the code was self-sufficient for understanding the project.

## 2.1.3 Audit Goals

CredShields employs a combination of in-house tools and thorough manual review processes to deliver comprehensive smart contract security audits. The majority of the audit involves manual inspection of the contract's source code, guided by OWASP's Smart Contract Security Weakness Enumeration (SCWE) framework and an extended, self-developed checklist built from industry best practices. The team focuses on deeply understanding the contract's core logic, designing targeted test cases, and assessing business logic for potential vulnerabilities across OWASP's identified weakness classes.

CredShields aligns its auditing methodology with the [OWASP Smart Contract Security](#) projects, including the Smart Contract Security Verification Standard (SCSVS), the Smart Contract Weakness Enumeration (SCWE), and the Smart Contract Secure Testing Guide (SCSTG). These frameworks, actively contributed to and co-developed by the CredShields team, aim to bring consistency, clarity, and depth to smart contract security assessments. By adhering to these OWASP standards, we ensure that each audit is performed against a transparent, community-driven, and technically robust baseline. This approach enables us to deliver structured, high-quality audits that address both common and complex smart contract vulnerabilities systematically.

## 2.2 Retesting Phase

HeyElsa is actively partnering with CredShields to validate the remediations implemented towards the discovered vulnerabilities.

## 2.3 Vulnerability classification and severity

CredShields follows OWASP's Risk Rating Methodology to determine the risk associated with discovered vulnerabilities. This approach considers two factors - Likelihood and Impact - which are evaluated with three possible values - **Low**, **Medium**, and **High**, based on factors such as Threat agents, Vulnerability factors, and Technical and Business Impacts. The overall severity of the risk is calculated by combining the likelihood and impact estimates.

| Overall Risk Severity |        |  |  |   |
|-----------------------|--------|--|--|---|
| Impact                | HIGH   | <span style="color: yellow;">●</span> Medium | <span style="color: red;">●</span> High      | <span style="color: darkred;">●</span> Critical |
|                       | MEDIUM | <span style="color: green;">●</span> Low     | <span style="color: yellow;">●</span> Medium | <span style="color: red;">●</span> High         |
|                       | LOW    | <span style="color: grey;">●</span> None     | <span style="color: green;">●</span> Low     | <span style="color: yellow;">●</span> Medium    |
|                       |        | LOW  | MEDIUM                                       | HIGH  |
| Likelihood            |        |  |  |   |

Overall, the categories can be defined as described below -

### 1. Informational

We prioritize technical excellence and pay attention to detail in our coding practices. Our guidelines, standards, and best practices help ensure software stability and reliability. Informational vulnerabilities are opportunities for improvement and do not pose a direct risk to the contract. Code maintainers should use their own judgment on whether to address them.

### 2. Low

Low-risk vulnerabilities are those that either have a small impact or can't be exploited repeatedly or those the client considers insignificant based on their specific business circumstances.

### **3. Medium**

Medium-severity vulnerabilities are those caused by weak or flawed logic in the code and can lead to exfiltration or modification of private user information. These vulnerabilities can harm the client's reputation under certain conditions and should be fixed within a specified timeframe.

### **4. High**

High-severity vulnerabilities pose a significant risk to the Smart Contract and the organization. They can result in the loss of funds for some users, may or may not require specific conditions, and are more complex to exploit. These vulnerabilities can harm the client's reputation and should be fixed immediately.

### **5. Critical**

Critical issues are directly exploitable bugs or security vulnerabilities that do not require specific conditions. They often result in the loss of funds and Ether from Smart Contracts or users and put sensitive user information at risk of compromise or modification. The client's reputation and financial stability will be severely impacted if these issues are not addressed immediately.

### **6. Gas**

To address the risk and volatility of smart contracts and the use of gas as a method of payment, CredShields has introduced a "Gas" severity category. This category deals with optimizing code and refactoring to conserve gas.

## **2.4 CredShields staff**

The following individual at CredShields managed this engagement and produced this report:

- Shashank, Co-founder CredShields [shashank@CredShields.com](mailto:shashank@CredShields.com)

Please feel free to contact this individual with any questions or concerns you have about the engagement or this document.

## 3. Findings Summary -----

This chapter contains the results of the security assessment. Findings are sorted by their severity and grouped by asset and OWASP SCWE classification. Each asset section includes a summary highlighting the key risks and observations. The table in the executive summary presents the total number of identified security vulnerabilities per asset, categorized by risk severity based on the OWASP Smart Contract Security Weakness Enumeration framework.

### 3.1 Findings Overview

#### 3.1.1 Vulnerability Summary

During the security assessment, Four (4) security vulnerabilities were identified in the asset.

| VULNERABILITY TITLE   | SEVERITY      | SCWE   Vulnerability Type   |
|---|---------------|---|
| Owner Can Permanently Block Legitimate Claimants After Merkle Root Update | Medium        | Business Logic<br>( <a href="#">SC03-LogicErrors</a> )                        |
| Floating and Outdated Pragma  | Low           | Floating Pragma<br>( <a href="#">SCWE-060</a> )                               |
| Use Ownable2Step  | Informational | Missing Input Validation<br>( <a href="#">SC04-Lack Of Input Validation</a> ) |
| Missing zero address validations  | Informational | Missing Input Validation<br>( <a href="#">SC04-Lack Of Input Validation</a> ) |

*Table: Findings in Smart Contracts*

## 4. Remediation Status -----

HeyElsa is actively partnering with CredShields from this engagement to validate the discovered vulnerabilities' remediations. A retest was performed on Jan 14th, 2026, and all the issues have been addressed.

Also, the table shows the remediation status of each finding.

| VULNERABILITY TITLE   | SEVERITY      | REMEDIATION STATUS            |
|---|---------------|-------------------------------|
| Owner Can Permanently Block Legitimate Claimants After Merkle Root Update | Medium        | Won't Fix<br>[Jan 14th, 2026] |
| Floating and Outdated Pragma  | Low           | Fixed<br>[Jan 14th, 2026]     |
| Use Ownable2Step  | Informational | Fixed<br>[Jan 14th, 2026]     |
| Missing zero address validations  | Informational | Fixed<br>[Jan 14th, 2026]     |

*Table: Summary of findings and status of remediation*

## 5. Bug Reports -----

Bug ID #M001[Not Applicable]

### Owner Can Permanently Block Legitimate Claimants After Merkle Root Update

#### Vulnerability Type

Business Logic ([SC03-LogicErrors](#))

#### Severity

Medium

#### Description

The airdrop is designed to allow the owner to update the merkle root over time in order to add new recipients or modify allocations for existing ones, while preventing double claims. Users are expected to call `ELSAAirdrop.claim` with a valid merkle proof corresponding to the current merkle root in order to receive their allocated tokens.

However, the contract tracks claims solely via `claimed[account]` and does not bind the claimed state to a specific merkle leaf or allocation. As a result, once an address has successfully claimed under any merkle root, it is permanently marked as claimed. If the owner later updates the merkle root to increase or otherwise change that address's allocation, the user is unable to claim again, even though the new merkle root explicitly authorizes an additional or updated amount.

#### Affected Code

- <https://github.com/HeyElsa/airdrop-contract/blob/72d6ef1d5917dbea05c8ddff9b1c1b20f94d27c0/contracts/ELSAAirdrop.sol#L98>

#### Impacts

Eligible claimants may be permanently prevented from receiving their full entitled allocation when the merkle root is updated to correct or increase amounts. This can result in irreversible loss of tokens for affected addresses, reduced trust in the airdrop mechanism, and operational overhead for manual compensation or redeployment of a new distribution contract.

#### Remediation

Track claims at the merkle leaf or allocation level (e.g., by including the root or amount in the claimed state) so that legitimate claims under updated merkle roots remain possible without enabling double claims.

**Retest**

**Client's comment:** It is by design. We will not change or add tokens

Bug ID #L001[Fixed]

## Floating and Outdated Pragma

### Vulnerability Type

Floating Pragma ([SCWE-060](#))

### Severity

Low

### Description

Locking the pragma helps ensure that the contracts do not accidentally get deployed using an older version of the Solidity compiler affected by vulnerabilities.

The contract allowed floating or unlocked pragma to be used, i.e., ^0.8.24. This allows the contracts to be compiled with all the solidity compiler versions above the limit specified. The following contracts were found to be affected -

### Affected Code

- <https://github.com/HeyElsa/airdrop-contract/blob/72d6ef1d5917dbea05c8ddff9b1c1b20f94d27c0/contracts/ELSAAirdrop.sol#L2>

### Impacts

If the smart contract gets compiled and deployed with an older or too recent version of the solidity compiler, there's a chance that it may get compromised due to the bugs present in the older versions or unidentified exploits in the new versions.

Incompatibility issues may also arise if the contract code does not support features in other compiler versions, therefore, breaking the logic. The likelihood of exploitation is low.

### Remediation

Keep the compiler versions consistent in all the smart contract files. Do not allow floating pragmas anywhere. It is suggested to use the 0.8.32 pragma version

Reference: <https://scs.owasp.org/SCWE/SCSVS-CODE/SCWE-060/>

### Retest

Fixed in [72d6ef1](#).

Bug ID #I001[Fixed]

## Use Ownable2Step

### Vulnerability Type

Missing Best Practices

### Severity

Informational

### Description

The "Ownable2Step" pattern is an improvement over the traditional "Ownable" pattern, designed to enhance the security of ownership transfer functionality in a smart contract. Unlike the original "Ownable" pattern, where ownership can be transferred directly to a specified address, the "Ownable2Step" pattern introduces an additional step in the ownership transfer process. Ownership transfer only completes when the proposed new owner explicitly accepts the ownership, mitigating the risk of accidental or unintended ownership transfers to mistyped addresses.

### Affected Code

- <https://github.com/HeyElsa/airdrop-contract/blob/72d6ef1d5917dbea05c8dff9b1c1b20f94d27c0/contracts/ELSAAirdrop.sol#L67>

### Impacts

Without the "Ownable2Step" pattern, the contract owner might inadvertently transfer ownership to an unintended or mistyped address, potentially leading to a loss of control over the contract. By adopting the "Ownable2Step" pattern, the smart contract becomes more resilient against external attacks aimed at seizing ownership or manipulating the contract's behavior.

### Remediation

It is recommended to use either Ownable2Step or Ownable2StepUpgradeable depending on the smart contract.

### Retest:

Fixed in [72d6ef1](#).

Bug ID #1002 [Fixed]

## Missing zero address validations

### Vulnerability Type

Missing Input Validation ([SC04-Lack Of Input Validation](#))

### Severity

Informational

### Description:

The contracts were found to be setting new addresses without proper validations for zero addresses.

Address type parameters should include a zero-address check otherwise contract functionality may become inaccessible or tokens burned forever.

Depending on the logic of the contract, this could prove fatal and the users or the contracts could lose their funds, or the ownership of the contract could be lost forever.

### Affected Code

- <https://github.com/HeyElsa/airdrop-contract/blob/72d6ef1d5917dbea05c8ddff9b1c1b20f94d27c0/contracts/ELSAAirdrop.sol#L67>

### Impacts

If address type parameters do not include a zero-address check, contract functionality may become unavailable or tokens may be burned permanently.

### Remediation

Add a zero address validation to all the functions where addresses are being set.

### Retest

Fixed in [72d6ef1](#).

## **6. The Disclosure -----**

The Reports provided by CredShields are not an endorsement or condemnation of any specific project or team and do not guarantee the security of any specific project. The contents of this report are not intended to be used to make decisions about buying or selling tokens, products, services, or any other assets and should not be interpreted as such.

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