

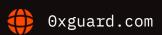
Smart contracts security assessment

Final report

Tariff: Standard

Arbius V4

August 2024





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□ Introduction

The report has been prepared for **Arbius V4**.

This is an incremental audit of the Arbius contracts, including NFT staking and voting governance.

The V2_EngineV4 is an upgradable contract to store models, tasks, and solutions. It also administers rewards, fees, and solution's contestations.

The GovernorV1 is a governance contract inheriting OpenZeppelin's <u>Governor, GovernorSettings, GovernorCompatibilityBravo, and GovernorTimelockControl</u>, can't be upgraded.

The VeGovernorVotes and VeGovernorVotesQuorumFraction contracts are forked from OpenZeppelin's <u>GovernorVotes</u> and <u>GovernorVotesQuorumFraction</u> contracts without modifications.

The VotingEscrow contracts is an ERC721 non-fungible token forked from Velodrome Finance VotingEscrow.

The VeStaking contract is staking contract for VotingEscrow NFTs with external rewards from V2_EngineV4 contract.

The code is available at the GitHub <u>repository</u> and was audited after the commit <u>712c7621cd478ede2369c135fb4bc3d435ae684a</u>.

Name	Arbius V4
Audit date	2024-07-25 - 2024-08-04
Language	Solidity
Platform	Arbitrum Network

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Contracts checked

Name Address

VotingEscrow

VeGovernorVotes

Procedure

We perform our audit according to the following procedure:

Automated analysis

- Scanning the project's smart contracts with several publicly available automated Solidity analysis tools
- Manual verification (reject or confirm) all the issues found by the tools

Manual audit

- Manually analyze smart contracts for security vulnerabilities
- Smart contracts' logic check

Known vulnerabilities checked

Title	Check result
Unencrypted Private Data On-Chain	passed
Code With No Effects	passed
Message call with hardcoded gas amount	passed
Typographical Error	passed
DoS With Block Gas Limit	passed
Presence of unused variables	passed

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Incorrect Inheritance Order	passed
Requirement Violation	passed
Weak Sources of Randomness from Chain Attributes	passed
Shadowing State Variables	passed
Incorrect Constructor Name	passed
Block values as a proxy for time	passed
Authorization through tx.origin	passed
DoS with Failed Call	passed
Delegatecall to Untrusted Callee	passed
Use of Deprecated Solidity Functions	passed
Assert Violation	passed
State Variable Default Visibility	passed
Reentrancy	passed
Unprotected SELFDESTRUCT Instruction	passed
Unprotected Ether Withdrawal	passed
Unchecked Call Return Value	passed
Floating Pragma	passed
Outdated Compiler Version	passed
Integer Overflow and Underflow	passed
Function Default Visibility	passed

Classification of issue severity

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High severity High severity issues can cause a significant or full loss of funds, change

of contract ownership, major interference with contract logic. Such issues

require immediate attention.

Medium severity Medium severity issues do not pose an immediate risk, but can be

detrimental to the client's reputation if exploited. Medium severity issues may lead to a contract failure and can be fixed by modifying the contract

state or redeployment. Such issues require attention.

Low severity Low severity issues do not cause significant destruction to the contract's

functionality. Such issues are recommended to be taken into

consideration.

Issues

High severity issues

No issues were found

Medium severity issues

No issues were found

Low severity issues

1. Useless deposit types (VotingEscrow)

Status: Open

VotingEscrow NFT contract locks ERC20 tokens in governance ERC721 NFTs. Deposit can be done in different forms:

```
enum DepositType {
    DEPOSIT_FOR_TYPE,
    CREATE_LOCK_TYPE,
    INCREASE_LOCK_AMOUNT,
    INCREASE_UNLOCK_TIME
}
```

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DEPOSIT_FOR_TYPE and INCREASE_LOCK_AMOUNT modes share the same code but increase_amount function can be called only by NFT owner authorized address.

2. Math underflow (VotingEscrow)

Status: Open

<u>_deposit_for</u> function and all related external functions may experience underflow failures due to incorrect unsigned type of balanceDiff variable.

```
// get current balance before checkpoint
uint256 balanceOfNFTBefore = balanceOfNFT( tokenId, block.timestamp);
// Possibilities:
// Both old locked.end could be current or expired (>/< block.timestamp)
// value == 0 (extend lock) or value > 0 (add to lock or extend lock)
// _locked.end > block.timestamp (always)
_checkpoint(_tokenId, old_locked, _locked);
// get current balance after checkpoint and calculate diff
uint256 balanceOfNFTAfter = _balanceOfNFT(_tokenId, block.timestamp);
uint256 balanceDiff = balanceOfNFTAfter - balanceOfNFTBefore;
```

Recommendation: Use int256 type fort balanceDiff.

3. Outdated imports (VeGovernorVotes)

Status: Open

The repository uses v4.9 release of OpenZeppelin's contracts. The Governor contract has been moderately updated and patched in the v5 release.

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○ Conclusion

Arbius V4 VotingEscrow, VeGovernorVotes contracts were audited. 3 low severity issues were found.

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