



Preliminary Comments

# **Tokensfarm (2022 new scope)**

Feb 22nd, 2022

# Table of Contents

## Summary

### Overview

[Project Summary](#)

[Audit Summary](#)

[Vulnerability Summary](#)

[Audit Scope](#)

### Findings

[TFC-01 : Potential Front-Running Risk](#)

[TFC-02 : Visibility Specifiers Missing](#)

[TFC-03 : Lack of Zero Address Validation](#)

[TFC-04 : Centralization Related Risks](#)

### Appendix

### Disclaimer

### About

# Summary

This report has been prepared for Tokensfarm (2022 new scope) to discover issues and vulnerabilities in the source code of the Tokensfarm (2022 new scope) project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

# Overview

## Project Summary

Project Name	Tokensfarm (2022 new scope)
Platform	Ethereum
Language	Solidity
Codebase	<a href="https://github.com/Tokensfarm/tokensfarm-contracts/commit/ba557af84aff168726d156ac58489a64e0ddba96">https://github.com/Tokensfarm/tokensfarm-contracts/commit/ba557af84aff168726d156ac58489a64e0ddba96</a>
Commit	

## Audit Summary

Delivery Date	Feb 22, 2022
Audit Methodology	Static Analysis, Manual Review

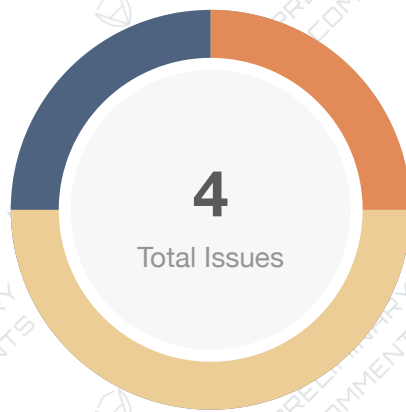
## Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Mitigated	Resolved
<span>●</span> Critical	0	0	0	0	0	0	0
<span>●</span> Major	1	1	0	0	0	0	0
<span>●</span> Medium	0	0	0	0	0	0	0
<span>●</span> Minor	2	2	0	0	0	0	0
<span>●</span> Informational	1	1	0	0	0	0	0
<span>●</span> Discussion	0	0	0	0	0	0	0

## Audit Scope

ID	File	SHA256 Checksum
IVF	IterativeVestingFarm.sol	1f125cb47283daefb5708670e9fff1e3a91e8030f3d9e1708d4b4822bad06aa
LVF	LinearVestingFarm.sol	ba823d354b73b6ff2ee880485267faa9423186f01946829d163177f8ded8820b
TFF	TokensFarmFactory.sol	1c252e04215f0b57a36c77e6fb2fa2d7f5961a5737b32e106d7dc3d4059814a1

# Findings



Critical	0 (0.00%)
Major	1 (25.00%)
Medium	0 (0.00%)
Minor	2 (50.00%)
Informational	1 (25.00%)
Discussion	0 (0.00%)

ID	Title	Category	Severity	Status
TFC-01	Potential Front-Running Risk	Volatile Code	Minor	⌚ Pending
TFC-02	Visibility Specifiers Missing	Language Specific	Informational	⌚ Pending
TFC-03	Lack of Zero Address Validation	Volatile Code	Minor	⌚ Pending
TFC-04	Centralization Related Risks	Centralization / Privilege	Major	⌚ Pending

## TFC-01 | Potential Front-Running Risk

Category	Severity	Location	Status
Volatile Code	Minor	IterativeVestingFarm.sol: 100 LinearVestingFarm.sol: 85 TokensFarmFactory.sol: 63	Pending

### Description

Malicious hackers may observe the pending transaction which will execute the `initialize` function, and launch a similar transaction but with the hacker's address of `owner` and gain the ownership of the contract.

### Recommendation

We advise the client to design functionality to only allow a specific user to execute the `initialize` function.

## TFC-02 | Visibility Specifiers Missing

Category	Severity	Location	Status
Language Specific	● Informational	IterativeVestingFarm.sol: 62 LinearVestingFarm.sol: 53	ⓘ Pending

### Description

The linked variable declaration does not have a visibility specifier explicitly set.

### Recommendation

Inconsistencies in the default visibility the Solidity compilers impose can cause issues in the functionality of the codebase. We advise that visibility specifier for the linked variable is explicitly set.

## TFC-03 | Lack Of Zero Address Validation

Category	Severity	Location	Status
Volatile Code	Minor	IterativeVestingFarm.sol: 100 LinearVestingFarm.sol: 85	⚠ Pending

### Description

The variable `_farmImplementation` should be verified as non-zero values to prevent being mistakenly assigned as `address(0)`.

### Recommendation

We advise the client to add the check for the passed-in values to prevent unexpected errors.

## TFC-04 | Centralization Related Risks

Category	Severity	Location	Status
Centralization / Privilege	Major	IterativeVestingFarm.sol: 173, 212, 248, 275, 399, 434 LinearVestingFarm.sol: 128, 163, 199, 226, 241, 362, 397 TokensFarmFactory.sol: 260, 320, 369, 415, 439, 463, 485, 507, 530, 554, 964, 988, 1010, 1036, 1062, 1085, 579, 608, 636, 664, 693, 722, 749, 770, 795, 831, 853, 877, 899, 920, 941	! Pending

### Description

To bridge the gap in trust between the administrators need to express a sincere attitude regarding the considerations of the administrator team's anonymity.

The owner of IterativeVestingFarm has the responsibility to notify users about the following capabilities:

- add users' rewards through `addUsersRewards()`
- remove user from farm through `removeUser()`
- pause the farm through `pauseFarm()`
- remove leftover rewards to the collector through `removeLeftOverRewards()`
- withdraw assets on the farm to the collector through `emergencyAssetsWithdrawal()`
- fund the farm and active through `fundAndOrActivate()`

The owner of LinearVestingFarm has the responsibility to notify users about the following capabilities:

- add users' rewards through `addUsersRewards()`
- remove user from farm through `removeUser()`
- pause the farm through `pauseFarm()`
- set the `endTime` through `setEndTime()`
- remove leftover rewards to the collector through `removeLeftOverRewards()`
- withdraw assets on the farm to the collector through `emergencyAssetsWithdrawal()`
- fund the farm and active through `fundAndOrActivate()`

Any compromise to the owner account may allow a hacker to take advantage of this authority.

The maintainer of TokensFarmFactory has the responsibility to notify users about the following capabilities:

- deploy and fund tokens farm through `deployAndFundTokensFarm()`
- deploy and fund linear vesting farm through `deployLinearVestingFarm()`

- deploy and fund iterative vesting farm through `deployIterativeVestingFarm()`
- fund again the tokens farm if necessary through `fundTheSpecificFarm()`
- fund again the linear vesting farm if necessary through `fundAndOrActivateSpecificLinearFarm()`
- fund again the iterative vesting farm if necessary through `fundAndOrActivateSpecificIterativeFarm()`
- pause the linear vesting farm through `pauseLinearSpecificFarm()`
- pause the iterative vesting farm through `pauseIterativeSpecificFarm()`
- add more users on linear vesting farm through `addMoreUsersOnSpecificLinearFarm()`
- add more users on iterative vesting farm through `addMoreUsersOnSpecificIterativeFarm()`
- set `minTimeToStake` in tokens farm through `setMinTimeToStakeOnSpecificFarm()`
- set `isEarlyWithdrawAllowed` in tokens farm through `setIsEarlyWithdrawAllowedOnSpecificFarm()`
- set `stakeFeePercent` in tokens farm through `setStakeFeePercentOnSpecificFarm()`
- set `rewardFeePercent` in tokens farm through `setRewardFeePercentOnSpecificFarm()`
- set `flatFeeAmount` in tokens farm through `setFlatFeeAmountOnSpecificFarm()`
- set `isFlatFeeAllowed` in tokens farm through `setIsFlatFeeAllowedOnSpecificFarm()`

Any compromise to the `maintainer` account may allow a hacker to take advantage of this authority.

The `tokensFarmCongress` of `TokensFarmFactory` has the responsibility to notify users about the following capabilities:

- remove users from the linear vesting farm through `removeUserOnSpecificLinearFarm()`
- remove users from the iterative vesting farm through `removeUserOnSpecificIterativeFarm()`
- withdraw the remaining funds left on the linear vesting farm through `withdrawLeftOverTokensOnSpecificLinearVestingFarm()`
- withdraw the remaining funds left on the iterative vesting farm through `withdrawLeftOverTokensOnSpecificIterativeVestingFarm()`
- withdraw assets on the linear vesting farm to the `feeCollector` through `emergencyAssetsWithdrawalOnSpecificLinearVestingFarm()`
- withdraw assets on the iterative vesting farm to the `feeCollector` through `emergencyAssetsWithdrawalOnSpecificIterativeVestingFarm()`
- withdraw fee collected in ERC value through `withdrawCollectedFeesERCOnSpecificFarm()`
- withdraw fee collected in ETH value through `withdrawCollectedFeesETHOnSpecificFarm()`
- withdraw stuck tokens on the farm through `withdrawTokensIfStuckOnSpecificFarm()`
- set `farmImplementation` through `setTokensFarmImplementation()`
- set `linearVestingFarmImplementation` through `setLinearVestingFarmImplementation()`
- set `iterativeVestingFarmImplementation` through `setIterativeVestingFarmImplementation()`

- set `feeCollector` through `setFeeCollector()`
- set `feeCollector` in tokens farm through `setCurrentFeeCollectorOnSpecificFarm()`
- set `endTime` in linear vesting farm through `setEndTimeOnSpecificLinearVestingFarm()`

Any compromise to the `tokensFarmCongress` account may allow a hacker to take advantage of this authority.

## Recommendation

The risk describes the current project design and potentially makes iterations to improve in the security operation and level of decentralization, which in most cases cannot be resolved entirely at the present stage. We advise the client to carefully manage the privileged account's private key to avoid any potential risks of being hacked. In general, we strongly recommend centralized privileges or roles in the protocol be improved via a decentralized mechanism or smart-contract-based accounts with enhanced security practices, e.g., multi-signature wallets.

Indicatively, here are some feasible suggestions that would also mitigate the potential risk at a different level in terms of short-term, long-term and permanent:

### Short Term:

Timelock and Multi sign ( $\frac{2}{3}$ ,  $\frac{3}{5}$ ) combination *mitigate* by delaying the sensitive operation and avoiding a single point of key management failure.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;  
AND
- Assignment of privileged roles to multi-signature wallets to prevent a single point of failure due to the private key compromised;  
AND
- A medium/blog link for sharing the timelock contract and multi-signers addresses information with the public audience.

### Long Term:

Timelock and DAO, the combination, *mitigate* by applying decentralization and transparency.

- Time-lock with reasonable latency, e.g., 48 hours, for awareness on privileged operations;  
AND
- Introduction of a DAO/governance/voting module to increase transparency and user involvement.  
AND

- A medium/blog link for sharing the timelock contract, multi-signers addresses, and DAO information with the public audience.

## Permanent:

Renouncing the ownership or removing the function can be considered *fully resolved*.

- Renounce the ownership and never claim back the privileged roles.
- OR
- Remove the risky functionality.

# Appendix

## Finding Categories

### Centralization / Privilege

Centralization / Privilege findings refer to either feature logic or implementation of components that act against the nature of decentralization, such as explicit ownership or specialized access roles in combination with a mechanism to relocate funds.

### Volatile Code

Volatile Code findings refer to segments of code that behave unexpectedly on certain edge cases that may result in a vulnerability.

### Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

## Checksum Calculation Method

The "Checksum" field in the "Audit Scope" section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux "sha256sum" command against the target file.

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