HashEx
Blockchain Security

MasterApeAdmin

smart contracts preliminary audit report

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Contents

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This is a limited report on our findings based on our analysis, in accordance with good industry practice at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the disclaimer below – please make sure to read it in full.

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2. Overview

HashEx was commissioned by the ApeSwap Finance team to perform an audit of their smart contracts. The audit was conducted between October 31 and November 02, 2021.

The code located in the GitHub repository @apeswapfinance/apeswap-banana-farm was audited after the commit 3ea6a0c. The MasterApeAdmin contract is proxy owner for the ApeSwap MasterApe. Documentation was provided with the in-code comments and NatSpec descriptions. The repository contains tests for the reviewed contract.

The purpose of this audit was to achieve the following:

- Identify potential security issues with smart contracts.
- Formally check the logic behind given smart contracts.

Information in this report should be used to understand the risk exposure of smart contracts, and as a guide to improving the security posture of smart contracts by remediating the issues that were identified.

2.1 Summary

Project name	MasterApeAdmin
URL	https://apeswap.finance
Platform	Binance Smart Chain
Language	Solidity

2.2 Contracts

Name	Address
MasterApeAdmin	https://github.com/ApeSwapFinance/apeswap-banana-farm/blob/3ea6a0cd97cde57e40e6d1afe81008bfa5d867a6/contracts/MasterApeAdmin.sol

3. Found issues

High	2 (33%)
Low	2 (33%)
Informational	2 (34%)

MasterApeAdmin

ID	Title	Severity	Status
01	Pending owner is not cleared with direct ownership transfers	High	Open
02	Unlimited emission rate	High	Open
03	Multiple reads in for() loops	Low	Open
04	Gas optimization of fixedPercentFarmPids[]	Low	Open
05	Unused variable FixedPercentFarmInfo.pid	Informational	Open
06	Immutable variable masterApe	Informational	Open

4. Contracts

4.1 MasterApeAdmin

4.1.1 Overview

Admin MasterApe proxy contract used to add features to MasterApe admin functions.

4.1.2 Issues

01. Pending owner is not cleared with direct ownership transfers

- High
- ⓘ Open

Setting the pending owner L83 and then transferring ownership with the transferOwnership() or renounceOwnership() functions would cause a possibly unexpected result for the new owner: pendingMasterApeOwner address would be able to claim the ownership back.

Recommendation

Override the standard Ownable functions to clear the pending owner with the direct transfers.

02. Unlimited emission rate

- High
- Open

updateMasterApeMultiplier() function L98 should require the _newMultiplier value to have an upper limit. Setting the unlimited emission rate in the MasterApe would cause an instant BANANA price crash in case of losing control over the MasterApeAdmin's owner account.

Recommendation

Implement the require() check for the updated multiplier value.

03. Multiple reads in for() loops

- Low
- Open

Multiple reads of the same variables over for() loops could be avoided using the local variables, see L284, 332, 342, 344.

04. Gas optimization of fixedPercentFarmPids[]

- Low
- Open

EnumerableSet could be used instead of fixedPercentFarmPids[] + getFixedPercentFarmFromPid[]. Another option is refactoring this pair into fixedPercentFarmPidToIndex[] mapping + getFixedPercentFarm[] array. Both solutions save gas, removing the for() loop L283.

05. Unused variable FixedPercentFarmInfo.pid

- Informational ⓘ Open

No need to store pid parameter in the pid=>FixedPercentFarmInfo mapping L43.

06. Immutable variable masterApe

- Informational ⓘ Open

masterApe address could be declared immutable in order to save gas. The admin proxy contract doesn't imply future upgrades in its current form.

5. Conclusion

2 high severity issues were found. The contracts are highly dependent on the owner’s account. Users using the project have to trust the owner and that the owner's account is properly secured.

This audit includes recommendations on the code improving and preventing potential attacks.

Appendix A. Issues' severity classification

Critical. Issues that may cause an unlimited loss of funds or entirely break the contract workflow. Malicious code (including malicious modification of libraries) is also treated as a critical severity issue. These issues must be fixed before deployments or fixed in already running projects as soon as possible.

High. Issues that may lead to a limited loss of funds, break interaction with users, or other contracts under specific conditions. Also, issues in a smart contract, that allow a privileged account the ability to steal or block other users' funds.

Medium. Issues that do not lead to a loss of funds directly, but break the contract logic. May lead to failures in contracts operation.

Low. Issues that are of a non-optimal code character, for instance, gas optimization tips, unused variables, errors in messages.

Informational. Issues that do not impact the contract operation. Usually, informational severity issues are related to code best practices, e.g. style guide.

Appendix B. List of examined issue types

- Business logic overview
- Functionality checks
- Following best practices
- Access control and authorization
- Reentrancy attacks
- Front-run attacks
- DoS with (unexpected) revert
- DoS with block gas limit
- Transaction-ordering dependence
- ERC/BEP and other standards violation
- Unchecked math
- Implicit visibility levels
- Excessive gas usage
- Timestamp dependence
- Forcibly sending ether to a contract
- Weak sources of randomness
- Shadowing state variables
- Usage of deprecated code

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