AUDITS

MH SWIFTSCAN REVIEW

NEOFI

AUGUST 15TH 2022

AUDITS

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MH Audits represents an extensive auditing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology.

Blockchain technology and cryptographic assets present a high level of ongoing risk. MH Audits' position is that each company and individual are responsible for their own due diligence and continuous security.

The security audit is not meant to replace functional testing done before a software release. As one audit-based assessment cannot be considered comprehensive, we always recommend proceeding with several independent manual audits and a public bug bounty program to ensure the security of the smart contracts.

INTRODUCTION

MH Audits is a leading blockchain security company that serves to verify the security and correctness of smart contracts and blockchain-based protocols. Through the utilization of our world-class technical expertise, alongside our proprietary, innovative tech, we're able to support the success of our clients with best-in-class security, all whilst realizing our overarching vision; provable trust for all throughout all facets of blockchain.

Secure your project with MH Audits

We offer field-proven audits with in-depth reporting and a range of suggestions to improve and avoid contract vulnerabilities.

Industry-leading comprehensive and transparent smart contract auditing on all public and private blockchains.

Vunerability checking

A crucial manual inspection carried out to eliminate any code flaws and security loopholes. This is vital to avoid vulnerabilities and exposures incurring costly errors at a later stage.

Contract verification

A thorough and comprehensive review in order to verify the safety of a smart contract and ensure it is ready for launch and built to protect the end-user.

Risk assessment

Analyse the architecture of the blockchain system to evaluate, assess and eliminate probable security breaches. This includes a full assessment of risk and a list of expert suggestions.

In-depth reporting

A truly custom exhaustive report that is transparent and depicts details of any identified threats and vulnerabilities and classifies those by severity.

Fast turnaround

We know that your time is valuable and therefore provide you with the fastest turnaround times in the industry to ensure that both your project and community are at ease.

Best-of-class blockchain engineers

Our engineers combine both experience and knowledge stemming from a large pool of developers at our disposal. We work with some of the brightest minds that have audited countless smart contracts over the last 4 years.

PROJECT SUMMARY

PROJECT INTRODUCTION

NeoFi enables its users to build a diversified long-term portfolio of digital assets in a single click!

NeoFi is designed to give you instant access to pre-built portfolios modeled after some of the most popular crypto indexes, hedge funds, and trends

As well as many other great features, users can also compound their crypto assets by earning high yield from your unused crypto assets!

Project Name *NeoFi*

Contract Name *NEOFI Token*

Contract Address *0xa1578bdcd26773e16631Ac626803Bf388449c53c*

Contract Chain *Mainnet*

Contract Type *Smart Contract*

Platform *EVM*

Language *Solidity*

Codebase *https://bscscan.com/address/0xa1578bdcd26773e16631Ac626803Bf388449c53c#code*

INFO & SOCIALS

Network *BNB Chain (BEP20)*

Total Token Supply *350.000.000*

Website *https://neofi.app/*

Twitter *https://twitter.com/NeofiOfficial*

Telegram Chat *https://t.me/NeofiOfficial*

Telegram Ann *https://t.me/NeofiAnn*

Medium *https://neofiofficial.medium.com/*

BSCScan *https://bscscan.com/token/0xa1578bdcd26773e16631Ac626803Bf388449c53c*

AUDIT SCORES

Issues	11
Critical	0
Major	1
Medium	3
Minor	4
Informational	3
Discussion	0

All issues are described in further detail
on the following pages.

* Note that if no manual in-depth expert review has been performed a score multiplier of .9 will apply to the final result.

AUDIT SCOPE

FILE	LOCATION
Neofi.sol	*BSC Deployment: /address/0xa1578bdcd26773e16631Ac626803Bf388449c53c#code*

REVIEW METHODOLOGY

TECHNIQUES

This report has been prepared for NeoFi to discover issues and vulnerabilities in the source code of the NeoFi project as well as any contract dependencies that were not part of an officially recognized library. An examination has been performed, utilizing Static Analysis and MH SwiftScan 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 producedby industry leaders.

The security assessment resulted in findings that ranged from major 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 in the comments below.

TIMESTAMP

Version	v1.0
Date	2022/08/15
Description	Layout project
	Automated / Static security testing
	Summary

KEY FINDINGS

TITLE	SEVERITY	STATUS
Signature Malleability	Major	*Pending*
Unprotected Ether Withdrawal	Medium	*Pending*
BEP20 Approve Font-Running Attack	Medium	*Pending*
Array Length Manipulation	Medium	*Pending*
Custom Errors To Save Gas	Minor	*Pending*
Cheaper Inequalities In Require()	Minor	*Pending*
Use Of Floating Pragma	Minor	*Pending*
Cheaper Inequalities In If()	Minor	*Pending*
In-Line Assembly Detected	Informational	*Pending*
Private Modifier Does Not Hide Data	Informational	*Pending*
Require Instead of revert	Informational	*Pending*

Description:

The function ecrecover *allows you to convert a valid signature into a different valid signature without requiring knowledge of the private key. It is usually not a problem unless you use signatures to identify items or require them to be uniquely recognizable.*

Therefore, depending on the function of the code, this may lead to discrepancies and faulty logic.

Location: *contracts/Neofi.sol L287*

Issue: *Signature Malleability*

Level: *Major*

Recommendation: *It is recommended to use OpenZeppelin's ECDSA library* (https://docs.openzeppelin.com/contracts/2.x/api/cryptography#ECDSA) *that has a wrapper around* ecrecover *that mitigates this issue. The data signer can be recovered using* ECDSA.recover*, and its address can be compared to verify the signature.*

Alleviation:

Description:

Ether and tokens are the basis of smart contracts on which the contract runs and executes transactions. Therefore, it is absolutely necessary to have input and access control validations on the functions executing funds withdrawal within the contract. The following unprotected public and external functions were found which were accepting addresses controlled by external users.

Location: *contracts/Neofi.sol L1237-L1240*

Issue: *Unprotected Ether Withdrawal*

Level: *Medium*

Recommendation: *It is recommended to go through the functions and make sure that the ether withdrawal implements an access control, input validation, and/or that the funds of the user is depreciated after they withdraws the amount.*

Alleviation:

Description:

The approve() *method overrides current allowance regardless of whether the spender already used it or not, so there is no way to increase or decrease allowance by a certain value atomically unless the token owner is a smart contract, not an account.*

This can be abused by a token receiver when they try to withdraw certain tokens from the sender's account.

Meanwhile, if the sender decides to change the amount and sends another approve *transaction, the receiver can notice this transaction before it's mined and can extract tokens from both the transactions, therefore, ending up with tokens from both the transactions. This is a front-running attack affecting the* BEP20 Approve *function.*

Location: *contracts/Neofi.sol L677; L875-L879*

Issue: *BEP20 Approve Font-Running Attack*

Level: *Medium*

Recommendation: *Only use the approve function of the BEP-20 standard to change the allowed amount to 0 or from 0 (wait till transaction is mined and approved).*

*Token owner just needs to make sure that the first transaction actually changed allowance from N to 0, i.e., that the spender didn't manage to transfer some of N allowed tokens before the first transaction was mined. Such checking is possible using advanced blockchain explorers such as [bscscan.io] (*https://bscscan.io/*)*

Another way to mitigate the threat is to approve token transfers only to smart contracts with verified source code that does not contain logic for performing attacks like described above, and to accounts owned by the people you may trust.

Alleviation:

Description:

A smart contract's data (e.g., storing the owner of the contract) is persistently stored at some storage location (i.e., a key or address) on the EVM level. The contract is responsible for ensuring that only authorized user or contract accounts may write to sensitive storage locations. If an attacker is able to write to arbitrary storage locations of a contract, the authorization checks may easily be circumvented. This can allow an attacker to corrupt the storage; for instance, by overwriting a field that stores the address of the contract owner.

The length of the dynamic array is changed directly. In this case, the appearance of gigantic arrays is possible and it can lead to a storage overlap attack (collisions with other data in storage).

Location: *contracts/Neofi.sol L31: L39; L44*

Issue: *Array Length Manipulation*

Level: *Medium*

Recommendation: *Only use the* approve *function of the BEP-20 standard to change allowed amount to 0 or from 0 (wait till transaction is mined and approved).*

Alleviation:

Description:

The contract was found to be using revert() *statements. Since Solidity* v0.8.4*, custom errors have been introduced which are a better alternative to the revert. This allows the developers to pass custom errors with dynamic data while reverting the transaction and also making the whole implementation a bit cheaper than using reverts.*

Location: *contracts/Neofi.sol L145; L147; L149; L151*

Issue: *Custom Errors To Save Gas*

Level: *Minor*

Recommendation: *It is recommended to replace all the instances of* revert() *statements with* error() *to save gas.*

Alleviation:

Description:

The contract was found to be doing comparisons using inequalities inside the require statement. When inside the require statements, non-strict inequalities (>=, <=) are usually costlier than the strict equalities (>, <).

Location: *contracts/Neofi.sol L943; L976; L1025; L1076; L1174*

Issue: *Cheaper Inequalities In* Require()

Level: *Minor*

Recommendation: *It is recommended to go through the code logic, and, if possible, modify the non-strict inequalities with the strict ones to save ~3 gas as long as the logic of the code is not affected.*

Alleviation:

Description:

Solidity source files indicate the versions of the compiler they can be compiled with using a pragma directive at the top of the solidity file. This can either be a floating pragma or a specific compiler version.

The contract was found to be using a floating pragma which is not considered safe as it can be compiled with all the versions described.

Location: *contracts/Neofi.sol L07*

Issue: *Use Of Floating Pragma*

Level: *Minor*

Recommendation: *It is recommended to follow the latter example, as future compiler versions may handle certain language constructions in a way the developer did not foresee. The developers should always use the exact Solidity compiler version when designing their contracts as it may break the changes in the future.*

pragma solidity ^0.4.17; not recommended -> compiles with 0.4.17 and above

pragma solidity 0.8.4; recommended -> compiles with 0.8.4 only

Alleviation:

Description:

The contract was found to be doing comparisons using inequalities inside the if statement. When inside the if statements, non-strict inequalities (>=, <=) are usually cheaper than the strict equalities (>, <).

Location: *contracts/Neofi.sol L279*

Issue: *Cheaper Inequalities In* If()

Level: *Minor*

Recommendation: *It is recommended to go through the code logic, and, if possible, modify the strict inequalities with the non-strict ones to save ~3 gas as long as the logic of the code is not affected.*

Alleviation:

Description:

Inline assembly is a way to access the Ethereum Virtual Machine at a low level. This bypasses several important safety features and checks of Solidity. This should only be used for tasks that need it and if there is confidence in using it.

Multiple vulnerabilities have been detected previously when the assembly is not properly used within the Solidity code; therefore, caution should be exercised while using them.

Location: *contracts/Neofi.sol L141-L153; L175-L204; L233-L241; L264-L293*

Issue: *In-Line Assembly Detected*

Level: *Informational*

Recommendation: *Avoid using inline assembly instructions if possible because it might introduce certain issues in the code if not dealt with properly because it bypasses several safety features that are already implemented in Solidity.*

Alleviation:

Description:

Everything that is inside a contract is visible to all observers external to the blockchain. Making something private *only prevents other contracts from reading or modifying the information, but it will still be visible to the whole world and observers of the blockchain.*

Miners have access to all contracts' code and data. Developers must account for the lack of privacy in Ethereum.

Location: *contracts/Neofi.sol L59; L381-L387; L567; L775-L782; L1149; L1152-L1153*

Issue: *Private Modifier Does Not Hide Data*

Level: *Informational*

Recommendation: *Keep in mind that the* private *modifier does not make a variable invisible and should not keep sensitive contents within the modifier.*

It is a best practice to use private *when you really want to protect your state variables and functions because you hide them behind logic executed through internal or public functions.*

Alleviation:

Description:

The require *Solidity function guarantees the validity of the condition(s) passed as a parameter that cannot be detected before execution. It checks inputs, contract state variables, and return values from calls to external contracts.*

Using require *instead of* revert *improves the overall readability of the contract code.*

The construction if (condition) {revert();} *is equivalent to r*equire(!condition);

Location: *contracts/Neofi.sol L144-L152*

Issue: Require *Instead of* revert

Level: *Informational*

Recommendation: *Depending on the contract's validation checks, it is recommended to use the* require *function to handle input validations.*

Alleviation:

SOURCE CODE

https://bscscan.com/address/0xa1578bdcd26773e16631Ac626803Bf388449c53c#code

FINDING CATEGORIES

The assessment process will utilize a mixture of static analysis, swift scan and other security techniques.

This report has been prepared for NeoFi project using MH SwiftScan to examine and discover vulnerabilities and safe coding practices in NeoFi's smart contract including the libraries used by the contract that are not officially recognized.

The scan runs a comprehensive static analysis on the solidity code and finds vulnerabilities ranging from minor gas optimizations to major vulnerabilities leading to the loss of funds. The coverage scope pays attention to all the informational and critical vulnerabilities with over (110+) modules. The scanning and auditing process covers the following areas:

Various common and uncommon attack vectors will be investigated to ensure that the smart contracts are secure from malicious actors. The scanner modules find and flag issues related to gas optimizations that help in reducing the overall gas cost It scans and evaluates the codebase against industry best practices and standards to ensure compliance It makes sure that the officially recognized libraries used in the code are secure and up to date.

AUDIT SCORES

MH Audits AuditScores is not a live dynamic score. It is a fixed value determined at the time of the report issuance date.

*Note that if no manual in-depth expert review has been performed a score multiplier of .9 will apply to the final result.

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