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MADE IN GERMANY

Audit

Security Assessment
10. January, 2022

For

nort
BY: ALLNEXT

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Version	Date	Description
1.0	10. January 2022	• Layout project • Automated- /Manual-Security Testing • Summary

Network
Binance Smart Chain (BEP20)

Website
https://nortswap.finance/

Telegram
https://t.me/joinchat/6FpT_cW2fc5hODEx

Twitter
https://twitter.com/Nort83973702

Instagram
https://instagram.com/nort.app

Github
https://github.com/allnext/

Description

Nortswap is the leading decentralized exchange on Binance Smart Chain, with the highest trading volumes in the market

Project Engagement

During the 8th of January 2022, **NortSwap Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

Logo

Contract Link

v1.0

- Github
  - https://github.com/allnext/nortswap-contracts
  - Commit: c608bfad9b526d80504a54e9125b8d9628d0a233

Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
Critical	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
High	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon aspossible.
Medium	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
Low	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
Informational	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
    i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
    ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
    iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.

2. Testing and automated analysis that includes the following:
    i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
    ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.

3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.

4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:
LpTokenLocker

```
EternalStorage
ReentrancyGuard
SafeMath
Context
Ownable
TransferHelper
IERCBurn
IUniFactory
IMigrator
TokenLocker
```

NortTokenPool

```
./presets/SafeMath.sol
./presets/IBEP20.sol
./SafeBEP20.sol
./presets/Ownable.sol
```

NortTokenVault

```
./presets/SafeMath.sol
./presets/IBEP20.sol
./SafeBEP20.sol
./presets/Ownable.sol
```

Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

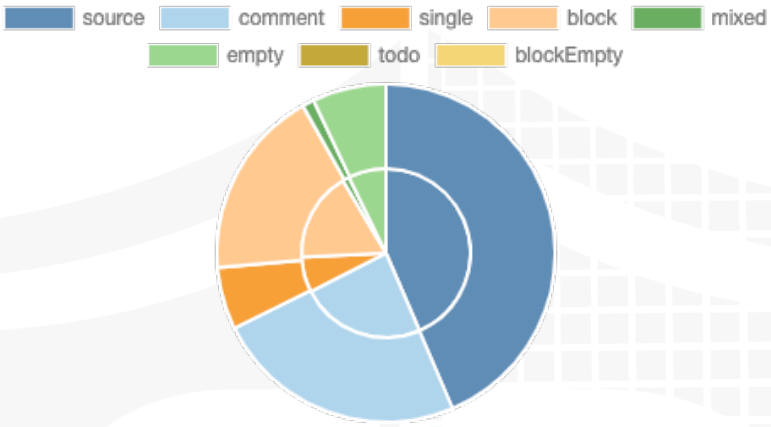
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

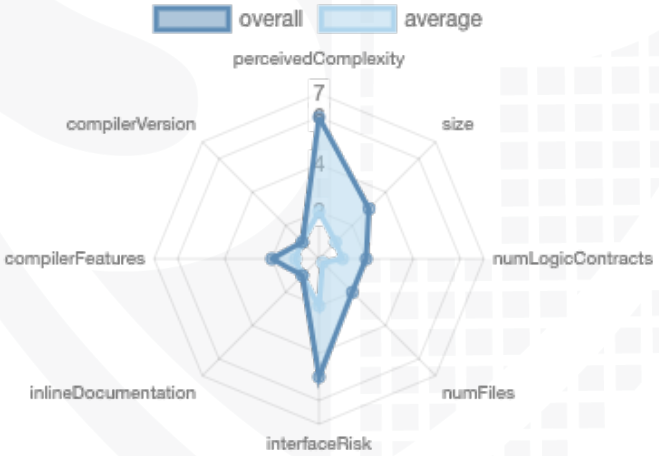
File Name	SHA-1 Hash
contracts/presets/IBEP20.sol	829584a510a78e8fa24bbf19385ad33aa0c2290c
contracts/presets/Context.sol	70f8e53ab0ac56119de6d69be68014c53d90b3c5
contracts/presets/Address.sol	058144476d3eba35e5d3033820a1626382290069
contracts/presets/SafeMath.sol	13fa35570fcd3209e8065231260df3a4fdbb06a5
contracts/presets/Ownable.sol	3d9e0e4074fb8ddcee48b81a3838df8a248fc4e6
contracts/SafeBEP20.sol	ebe1724587a1afabd845ed68a6d86ee324105b6a
contracts/NortTokenVault.sol	3e0e85aea3d1e532e088a56159e4c13c0eeb375b
contracts/NortTokenPool.sol	1698e927f69a31c3f792fd07e6b06d179342e08c
contracts/LpTokenLocker.sol	ba9ec58fe23794add5a538ff67aa8db075fa6dd0

Metrics

Source Lines
v1.0



Risk Level
v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	5	4	5

Exposed Functions

This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.

Version	Public	Payable
1.0	67	1

Version	External	Internal	Private	Pure	View
1.0	36	114	2	27	35

State Variables

Version	Total	Public
1.0	41	25

Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	`^0.8.0`		`yes`	`yes` (2 asm blocks)	

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	ECRecover	New/ Create/ Create2

1.0	`yes`		`yes`	`yes`		

Scope of Work

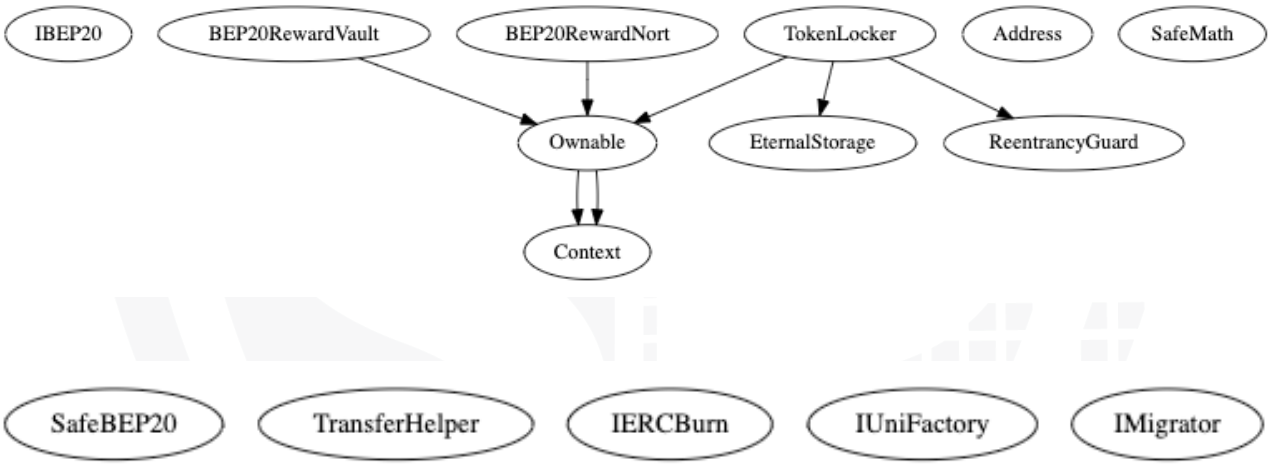
The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Correct implementation of Token standard
2. Deployer cannot mint any new tokens
3. Deployer cannot burn or lock user funds
4. Deployer cannot pause the contract
5. Overall checkup (Smart Contract Security)

Inheritance Graph

v1.0



Verify Claims

Correct implementation of Token standard

Tested	Verified
✓	✓

Write functions of contract

TOKENLOCKER

- lockLPToken
- relock
- renounceOwnership
- setDev
- setFees
- setMigrator
- transferOwnership
- withdraw

BEP20REWARDVAULT

- deposit
- depositRewards
- emergencyRewardWithdraw
- massUpdatePools
- renounceOwnership
- setBonusEndBlock
- setIndicatorBonus
- setRewardPerBlock
- skimStakeTokenFees
- transferOwnership
- updateMultiplier
- updatePool
- withdraw

BEP20REWARDNORT

- deposit
- depositRewards
- emergencyRewardWithdraw
- emergencyWithdraw
- massUpdatePools
- renounceOwnership
- setBonusEndBlock
- setRewardPerBlock
- skimStakeTokenFees
- transferOwnership
- updateMultiplier
- updatePool
- withdraw

Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

Attribute	Symbol
Verfified / Checked	✓
Partly Verified	🚩
Unverified / Not checked	✗
Not available	–

Modifiers

LpTokenLocker

```
setDev
onlyOwner
setMigrator
onlyOwner
setFees
onlyOwner
lockLPToken
nonReentrant
relock
nonReentrant
withdraw
nonReentrant
```

Comments

v1.0

- Deployer can set following state variables without any limitations
  - gFees.ethFee
- Deployer can enable/disable following state variables
- Migrator is set but never used

NortTokenPool

```
updateMultiplier
onlyOwner
```

```
setRewardPerBlock
onlyOwner
setBonusEndBlock
onlyOwner
skimStakeTokenFees
onlyOwner
```

```
emergencyRewardWithdraw
onlyOwner
```

Comments

v1.0

- Deployer can set following state variables without any limitations
  - BONUS_MULTIPLIER
    - Wrong naming convention, use uppercased variable names only for constants
  - rewardPerBlock
  - bonusEndBlock
    - New bonus end block must be higher than old bonus block
- Deployer can enable/disable following state variables
- Migrator is set but never used

NortTokenVault

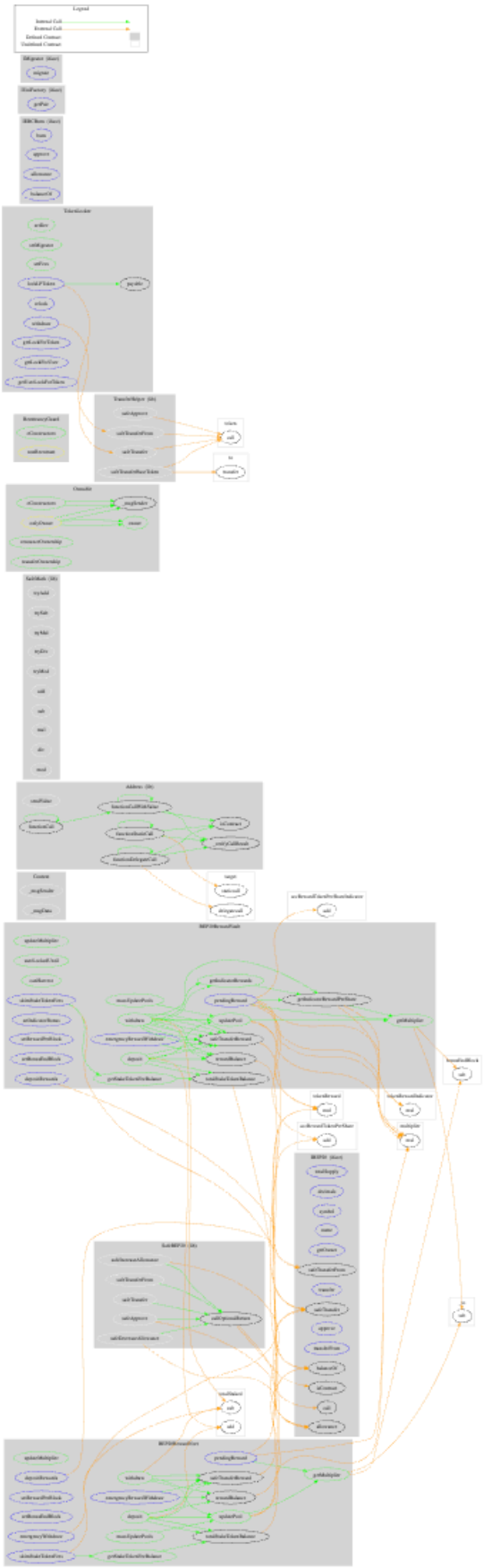
```
updateMultiplier
onlyOwner
setIndicatorBonus
onlyOwner
setRewardPerBlock
onlyOwner
setBonusEndBlock
onlyOwner
skimStakeTokenFees
onlyOwner
emergencyRewardWithdraw
onlyOwner
```

Comments

v1.0

- Deployer can set following state variables without any limitations
  - BONUS_MULTIPLIER
    - Wrong naming convention, use uppercased variable names only for constants
  - rewardIndicatorPerBlock
  - rewardPerBlock
  - bonusEndBlock
    - New bonus end block must be higher than old bonus block

CallGraph



Source Units in Scope
v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
🔍	contracts/presets/IBEP20.sol	————	1	106	26	21	66	21	————
🎨	contracts/presets/Context.sol	1	————	24	24	10	12	1	————
📚	contracts/presets/Address.sol	1	————	252	184	93	113	47	💻👥
📚	contracts/presets/SafeMath.sol	1	————	218	218	69	134	10	🔆Σ
🎨	contracts/presets/Ownable.sol	1	————	75	75	33	33	24	————
📚	contracts/SafeBEP20.sol	1	————	131	110	68	30	29	————
📝	contracts/NortTokenVault.sol	1	————	516	501	391	80	222	————
📝	contracts/NortTokenPool.sol	1	————	333	329	242	56	155	————
📝📚🔍🎨	contracts/LpTokenLocker.sol	7	3	718	617	308	254	166	💰💠🧮🔆
📝📚🔍🎨	**Totals**	**14**	**4**	**2373**	**2084**	**1235**	**778**	**675**	💻💰💠👥🧮🔆Σ

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

Audit Results

AUDIT PASSED

Critical issues

No critical issues

High issues

No high issues

Medium issues

No medium issues

Low issues

Issue	File	Type	Line	Description
#1	All	Contract doesn't import npm packages from source (like OpenZeppelin etc.)	-	We recommend to import all packages from npm directly without flatten the contract. Functions could be modified or can be susceptible to vulnerabilities
#2	LpToken Locker	A floating pragma is set	1	The current pragma Solidity directive is „"^0.8.0"".
#3	NortTok enPool	A floating pragma is set	3	The current pragma Solidity directive is „"^0.8.0"".
#4	NortTok enVault	A floating pragma is set	3	The current pragma Solidity directive is „"^0.8.0"".
#5	LpToken Locker	Missing Zero Address Validation (missing-zero-check)	549, 555	Check that the address is not zero
#6	LpToken Locker	State variable visibility is not set	535, 536, 538	It is best practice to set the visibility of state variables explicitly

Informational issues

Issue	File	Type	Line	Description
#1	Address	Functions that are not used	230, 87, 100, 119, 139, 200, 218, 163, 182, 26, 55	Remove unused functions
#2	LpToken Locker	Functions that are not used	338, 311, 420, 466	Remove unused functions
#3	SafeBEP20	Functions that are not used	107, 45, 82, 64, 22, 33,	Remove unused functions
#4	SafeMath	Functions that are not used	134, 190, 150, 120, 168, 21, 63, 75, 46, 34,	Remove unused functions
#5	LpToken Locker	Unused state variables	6, 7, 9, 5, 4	Remove unused state variables

Audit Comments

10. January 2022:

- Read whole report for more information

SWC Attacks

ID	Title	Relationships	Status
SWC-136	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SWC-135	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SWC-134	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SWC-133	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SWC-132	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SWC-131	Presence of unused variables	CWE-1164: Irrelevant Code	NOT PASSED
SWC-130	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SWC-129	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SWC-128	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SWC-127	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SWC-125	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SWC-124	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SWC-123	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SWC-122	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SWC-121	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SWC-120	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SWC-119	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SWC-118	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SWC-117	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SWC-116	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-115	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SWC-114	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SWC-113	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SWC-112	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SWC-111	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SWC-110	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SWC-109	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SWC-108	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	NOT PASSED
SWC-107	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SWC-106	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SWC-105	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SWC-104	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SWC-103	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	NOT PASSED
SWC-102	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SWC-101	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SWC-100	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

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