

Smart Contract Security Audit V1

Nexus Reflection Manager Smart Contract

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Background

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Project Information

- **Platform:** Avalanche C-Chain
- **Contract Address:** 0x870752a136261bD7c46b5B9a48130f36A34bfE3F
- **Code Source:**
<https://github.com/NexusDAODeFi/nexus-contracts/tree/main/contracts>
- **Contract Type:** Reflection Manager Contract for Nexus Ecosystem.

Contracts address deployed to test net (AVAX)

Reflection Manager Smart contract on AVAX test net to test some of write functions by the auditor.

<https://testnet.snowtrace.io/address/0x870752a136261bd7c46b5b9a48130f36a34bfe3f>

Executive Summary

According to our assessment, the customer`s solidity smart contract is **Secured**.

Well Secured	
Secured	✓
Poor Secured	
Insecure	

Automated checks are with remix IDE. All issues were performed by the team, which included the analysis of code functionality, manual audit found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the audit overview section. The general overview is presented in the Project Information section and all issues found are located in the audit overview section.

Team found 0 critical, 0 high, 0 medium, 2 low, 0 very low-level issues and 0 note in all solidity files of the contract

The files:

ReflectionManager.sol

File and Function Level Report

File in Scope:

Contract Name	SHA 256 hash	Contract Address
ReflectionManager.sol	a185af0085c137cf863af1a4b0a9a20b4a03127b5a0626060cd4dd222bea0ae0	0x870752a136261bD7c46b5B9a48130f36A34bfE3F

- Contract: ReflectionManager
- Inherit: Ownable
- Observation: All passed including security check
- Test Report: passed
- Score: passed
- Conclusion: passed

Function	Test Result	Type / Return Type	Score
distributeOnceIn	✓	Read / public	Passed
distributor	✓	Read / public	Passed
isDataPopulated	✓	Read / public	Passed
isShareCalculated	✓	Read / public	Passed
nextDistributionIn	✓	Read / public	Passed
reflections	✓	Read / public	Passed
Owner	✓	Read / public	Passed
NEXUS	✓	Read / public	Passed
shareHolders	✓	Read / public	Passed
shares	✓	Read / public	Passed
vault	✓	Read / public	Passed
totalDistributed	✓	Read / public	Passed

totalShares	✓	Read / public	Passed
renounceOwnership	✓	Write / public	Passed
transferOwnership	✓	Write / public	Passed
distribute	✓	Write / public	Passed
populateData	✓	Write / public	Passed
resetData	✓	Write / public	Passed
setDistributeOnceIn	✓	Write / public	Passed
setDistributorAddress	✓	Write / public	Passed
setNextDistributionIn	✓	Write / public	Passed
withdraw	✓	Write / public	Passed

Issues Checking Status

No.	Issue Description	Checking Status
1	Compiler warnings.	Passed
2	Race conditions and Reentrancy. Cross-function race conditions.	Passed
3	Possible delays in data delivery.	Passed
4	Oracle calls.	Passed
5	Design Logic.	Passed
6	Timestamp dependence.	Passed
7	Integer Overflow and Underflow.	Passed
8	DoS with Revert.	Passed
9	DoS with block gas limit.	Passed with notes
10	Methods execution permissions.	Passed
11	Economy model. If application logic is based on an incorrect economic model, the application would not function correctly and participants would incur financial losses. This type of issue is most often found in bonus rewards systems, Staking and Farming contracts, Vault and Vesting contracts, etc.	Passed
12	The impact of the exchange rate on the logic.	Passed
13	Private user data leaks.	Passed
14	Malicious Event log.	Passed
15	Scoping and Declarations.	Passed
16	Uninitialized storage pointers.	Passed
17	Arithmetic accuracy.	Passed

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to tokens loss etc.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to tokens lose
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
Note	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

Audit Findings

Critical:

No Critical severity vulnerabilities were found.

High:

No High severity vulnerabilities were found.

Medium:

No Medium severity vulnerabilities were found.

Low:

#Pragma version not fixed

Description

It is a good practice to lock the solidity version for a live deployment (use 0.8.9 instead of ^0.8.9). contracts should be deployed with the same compiler version and flags that they have been tested the most with. Locking the pragma helps ensure that contracts do not accidentally get deployed using, for example, the latest compiler which may have higher risks of undiscovered bugs. Contracts may also be deployed by others and the pragma indicates the compiler version intended by the original authors.

Remediation

Remove the ^ sign to lock the pragma version.

Status: **Acknowledged**.

#Use of block.timestamp for comparisons

Description

The value of block.timestamp can be manipulated by the miner. And conditions with strict equality is difficult to achieve - block.timestamp.

Remediation

Avoid use of block.timestamp

Status: **Acknowledged**

Very Low:

No Very Low severity vulnerabilities were found.

Notes:

No Notes were found.

Automatic Testing

1- Check for security

a185af0085c137cf863af1a4b0a9a20b4a03127b5a0626060cd4dd222bea0ae0
File: Reflectio... | Language: solidity | Size: 4062 bytes | Date: 2022-03-10T08:34:51.812Z

Critical High Medium Low Note
0 0 0 0 0



2- SOLIDITY STATIC ANALYSIS

SOLIDITY STATIC ANALYSIS

☒ Select all ☒ Autorun Run

Security

☒ Select Security

- ☒ Transaction origin:
'tx.origin' used
- ☒ Check-effects-interaction:
Potential reentrancy bugs
- ☒ Inline assembly:
Inline assembly used
- ☒ Block timestamp:
Can be influenced by miners
- ☒ Low level calls:
Should only be used by experienced devs
- ☒ Block hash:
Can be influenced by miners
- ☒ Selfdestruct:
Contracts using destructed contract can be broken

Gas & Economy

☒ Select Gas & Economy

- ☒ Gas costs:
Too high gas requirement of functions
- ☒ This on local calls:
Invocation of local functions via 'this'
- ☒ Delete dynamic array:
Use require/assert to ensure complete deletion
- ☒ For loop over dynamic array:
Iterations depend on dynamic array's size
- ☒ Ether transfer in loop:
Transferring Ether in a for/while/do-while loop

SOLIDITY STATIC ANALYSIS

ERC

☒ Select ERC

- ☒ ERC20:
'decimals' should be 'uint8'

Miscellaneous

☒ Select Miscellaneous

- ☒ Constant/View/Pure functions:
Potentially constant/view/pure functions
- ☒ Similar variable names:
Variable names are too similar
- ☒ No return:
Function with 'returns' not returning
- ☒ Guard conditions:
Ensure appropriate use of require/assert
- ☒ Result not used:
The result of an operation not used
- ☒ String length:
Bytes length != String length
- ☒ Delete from dynamic array:
'delete' leaves a gap in array
- ☒ Data truncated:
Division on int/uint values truncates the result

3- Inheritance graph

```
graph TD; INexusVault --> IERC721Enumerable; INexusERC721 --> IERC721Enumerable; Address --> IERC721; IERC721Enumerable --> IERC721; IERC721 --> IERC165; ReflectionManager --> Ownable; Ownable --> Context;
```

4- SOLIDITY UNIT TESTING

SOLIDITY UNIT TESTING

Test your smart contract in Solidity.

Select directory to load and generate test files.

Test directory:

☒ Select all

☒ tests/ReflectionManager_test.sol

Progress: 1 finished (of 1)

PASS testSuite

(tests/ReflectionManager_test.sol)

✓ Before all

✖

✓ Check success

✖

✓ Check success2

✖

✓ Check failure

✖

✓ Check sender and value

✖

Result for

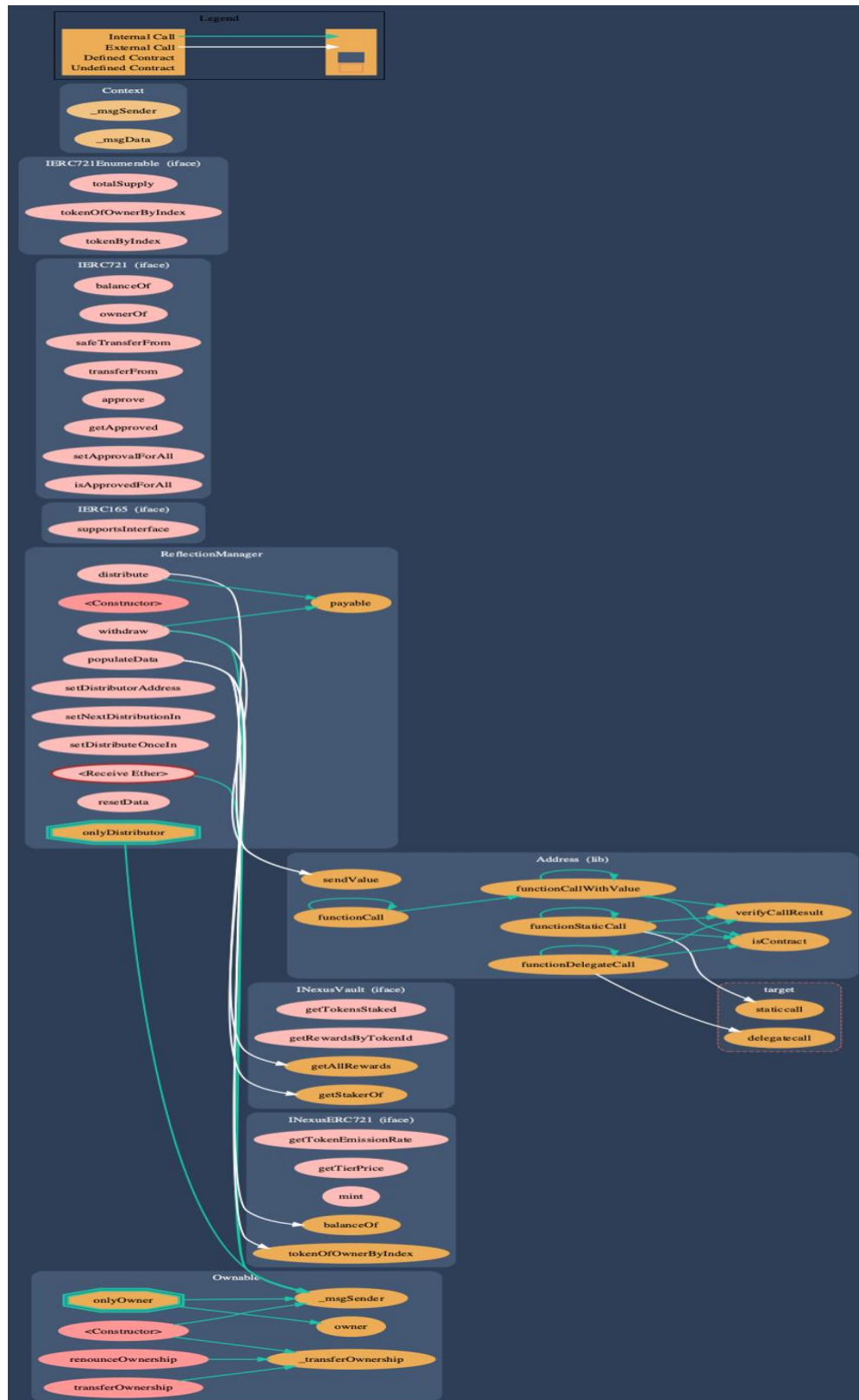
tests/ReflectionManager_test.sol

Passed: 5

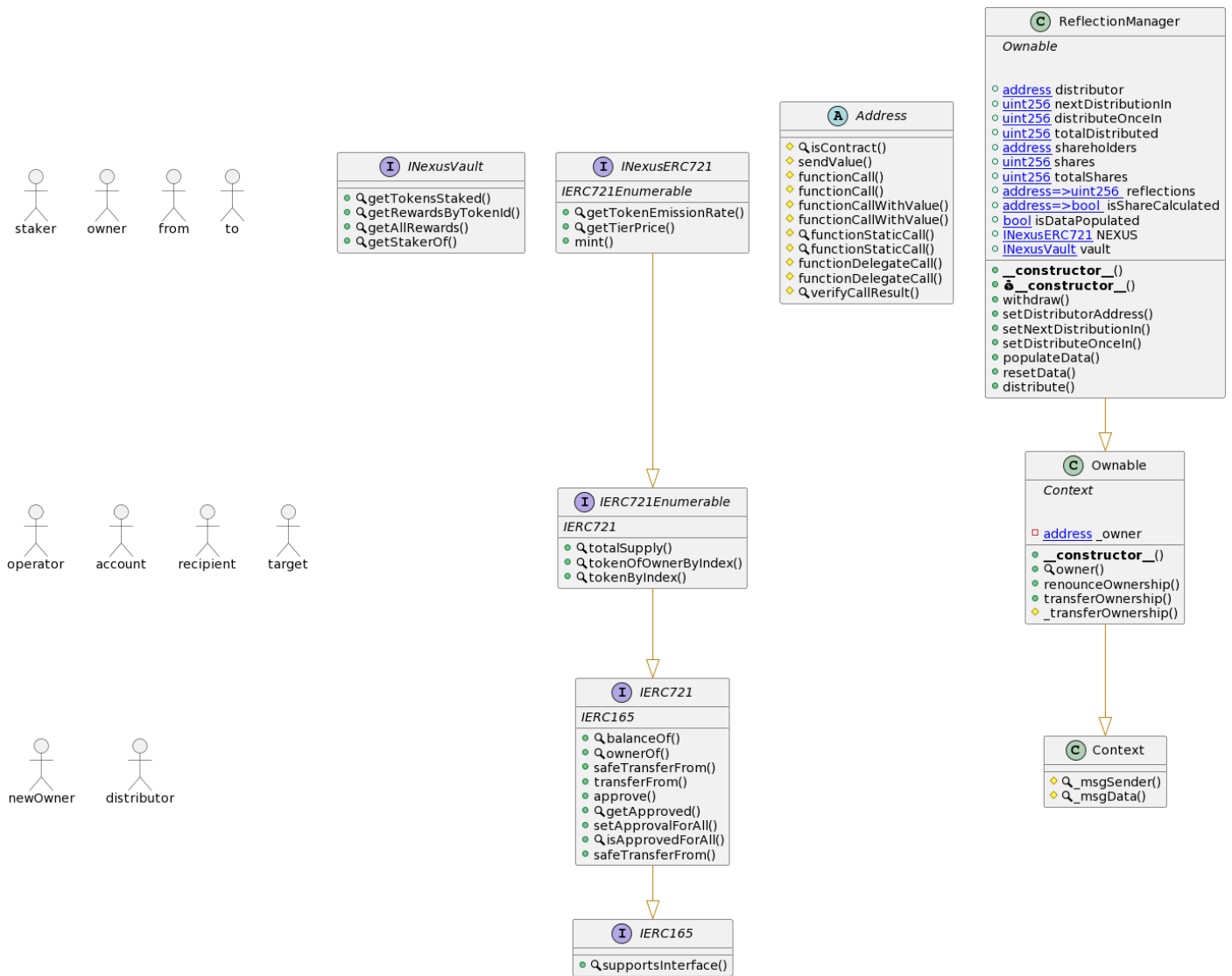
Failed: 0

Time Taken: 0.44s

5- Call graph



Unified Modeling Language (UML)



Functions signature

Sighash		Function Signature
=====		
16279055	=>	isContract (address)
52eb7796	=>	getTokensStaked (address)
515ec105	=>	getRewardsByTokenId (uint256)
362a3fad	=>	getAllRewards (address)
8c6f90ba	=>	getStakerOf (uint256)
01ffc9a7	=>	supportsInterface (bytes4)
70a08231	=>	balanceOf (address)
6352211e	=>	ownerOf (uint256)
42842e0e	=>	safeTransferFrom (address, address, uint256)
23b872dd	=>	transferFrom (address, address, uint256)
095ea7b3	=>	approve (address, uint256)
081812fc	=>	getApproved (uint256)
a22cb465	=>	setApprovalForAll (address, bool)
e985e9c5	=>	isApprovedForAll (address, address)
b88d4fde	=>	safeTransferFrom (address, address, uint256, bytes)
18160ddd	=>	totalSupply ()
2f745c59	=>	tokenOfOwnerByIndex (address, uint256)
4f6ccce7	=>	tokenByIndex (uint256)
5658892b	=>	getTokenEmissionRate (uint256)
252a8875	=>	getTierPrice (uint256)
d3fc9864	=>	mint (address, uint256, string)
24a084df	=>	sendValue (address, uint256)
a0b5ffb0	=>	functionCall (address, bytes)
241b5886	=>	functionCall (address, bytes, string)
2a011594	=>	functionCallWithValue (address, bytes, uint256)
d525ab8a	=>	functionCallWithValue (address, bytes, uint256, string)
c21d36f3	=>	functionStaticCall (address, bytes)
dbc40fb9	=>	functionStaticCall (address, bytes, string)
ee33b7e2	=>	functionDelegateCall (address, bytes)
57387df0	=>	functionDelegateCall (address, bytes, string)
946b5793	=>	verifyCallResult (bool, bytes, string)
119df25f	=>	_msgSender ()
8b49d47e	=>	_msgData ()
8da5cb5b	=>	owner ()
715018a6	=>	renounceOwnership ()
f2fde38b	=>	transferOwnership (address)
d29d44ee	=>	_transferOwnership (address)
3ccfd60b	=>	withdraw ()
87950f49	=>	setDistributorAddress (address)
356f1505	=>	setNextDistributionIn (uint256)
5d2f34ef	=>	setDistributeOnceIn (uint256)
5aa5af96	=>	populateData ()
478c4e0e	=>	resetData ()
e4fc6b6d	=>	distribute ()

Automatic general report

Files Description Table

File Name	SHA-1 Hash
/Users/macbook/Desktop/smart contracts/ReflectionManager.sol	2a3cf2b798b1533da15301fe8129c8c76c3d4288

Contracts Description Table

Contract	Type	Bases			
:-----: :-----: :-----: :-----: :-----: :-----:					
L	**Function Name**	**Visibility**	**Mutability**		
Modifiers					
INexusVault	Interface				
L	getTokensStaked	External	!	NO	!
L	getRewardsByTokenId	External	!	NO	!
L	getAllRewards	External	!	NO	!
L	getStakerOf	External	!	NO	!
IERC165	Interface				
L	supportsInterface	External	!	NO	!
IERC721	Interface	IERC165			
L	balanceOf	External	!	NO	!
L	ownerOf	External	!	NO	!
L	safeTransferFrom	External	!	NO	!
L	transferFrom	External	!	NO	!
L	approve	External	!	NO	!
L	getApproved	External	!	NO	!
L	setApprovalForAll	External	!	NO	!
L	isApprovedForAll	External	!	NO	!
L	safeTransferFrom	External	!	NO	!
IERC721Enumerable	Interface	IERC721			
L	totalSupply	External	!	NO	!
L	tokenOfOwnerByIndex	External	!	NO	!
L	tokenByIndex	External	!	NO	!
INexusERC721	Interface	IERC721Enumerable			
L	getTokenEmissionRate	External	!	NO	!
L	getTierPrice	External	!	NO	!
L	mint	External	!	NO	!
Address	Library				
L	isContract	Internal	!		
L	sendValue	Internal	!		
L	functionCall	Internal	!		
L	functionCall	Internal	!		
L	functionCallWithValue	Internal	!		
L	functionCallWithValue	Internal	!		
L	functionStaticCall	Internal	!		
L	functionStaticCall	Internal	!		

```

| L | functionDelegateCall | Internal | 🔒 | 🔒 | |
| L | functionDelegateCall | Internal | 🔒 | 🔒 | |
| L | verifyCallResult | Internal | 🔒 | | |
| | | |
| **Context** | Implementation | | |
| L | _msgSender | Internal | 🔒 | | |
| L | _msgData | Internal | 🔒 | | |
| | | |
| **Ownable** | Implementation | Context | | |
| L | <Constructor> | Public | ! | 🔒 | NO! |
| L | owner | Public | ! | NO! |
| L | renounceOwnership | Public | ! | 🔒 | onlyOwner |
| L | transferOwnership | Public | ! | 🔒 | onlyOwner |
| L | _transferOwnership | Internal | 🔒 | 🔒 | |
| | | |
| **ReflectionManager** | Implementation | Ownable | | |
| L | <Constructor> | Public | ! | 🔒 | NO! |
| L | <Receive Ether> | External | ! | 💰 | NO! |
| L | withdraw | External | ! | 🔒 | onlyOwner |
| L | setDistributorAddress | External | ! | 🔒 | onlyOwner |
| L | setNextDistributionIn | External | ! | 🔒 | onlyOwner |
| L | setDistributeOnceIn | External | ! | 🔒 | onlyOwner |
| L | populateData | External | ! | 🔒 | onlyDistributor |
| L | resetData | External | ! | 🔒 | onlyDistributor |
| L | distribute | External | ! | 🔒 | onlyDistributor |

```

Legend

Symbol	Meaning
:-----:	-----
🔒	Function can modify state
💰	Function is payable

Conclusion

The contracts are written systematically. Team found no critical issues. So, it is good to go for production.

Since possible test cases can be unlimited and developer level documentation (code flow diagram with function level description) not provided, for such an extensive smart contract protocol, we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan Everything.

Security state of the reviewed contract is “Secured”.

- ✓ No volatile code.
- ✓ Not many high severity issues were found.

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as of 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 the team on the basis of what it says or doesn't say, or how team produced it, and it is important for you to conduct your own independent investigations before making any decisions. team go into more detail on this in the below disclaimer below – please make sure to read it in full.

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