Smart Contract Security Audit V1

Nexus Ecosystem NFT 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: 0xfBFff8Ecc19e56ac314ef766850c5643F434a326

• Code:

https://github.com/NexusDAODeFi/nexus-contracts/tree/main/contracts

NFT Information

• Name: NEXUS

• Max Supply: 100,000

• NFT Type: NFT ERC721

• Total transactions:

Contracts address deployed to test net (AVAX)

Nexus Ecosystem NFT Smart contract on AVAX test net to test write functions by the auditor.

https://testnet.snowtrace.io/address/0xfbfff8ecc19e56ac314ef766850c5643f434a326

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 notes in all solidity files of the contract

The files:

NexusERC721.sol

File and Function Level Report

File in Scope:

Contract Name	SHA 256 hash	Contract Address
NexusERC/21.soi	48c5c670a341838938e7233 1e188464a11c50e882ff71c8 9c5a0558a12402f70	0xfBFff8Ecc19e56ac314ef766850c5643F434a3 26

• Contract: NexusERC721

• Inherit: ERC721, ERC721Enumerable, ERC721Burnable, Ownable, Pausable

• Observation: All passed including security check

• Test Report: passed

• Score: passed

• Conclusion: passed

Function	Test Result	Type / Return Type	Score
name	√	Read / public	Passed
symbol	✓	Read / public	Passed
treasury	√	Read / public	Passed
supportsInterface	√	Read / public	Passed
treasuryFee	√	Read / public	Passed
balanceOf	√	Read / public	Passed
Owner	√	Read / public	Passed
vault	√	Read / public	Passed
tokenTier	√	Read / public	Passed
getApprovedForAll	√	Read / public	Passed
ownerOf	√	Read / public	Passed
getApproved	✓	Read / public	Passed

tokenName	√	Read / public	Passed
tokenURI	✓	Read / public	Passed
tokenByIndex	✓	Read / public	Passed
tokenOfOwnerByIndex	✓	Read / public	Passed
tiers	✓	Read / public	Passed
rewardsPoolFee	✓	Read / public	Passed
paused	✓	Read / public	Passed
isAuthorized	✓	Read / public	Passed
MAX_SUPPLY	√	Read / public	Passed
NXS	√	Read / public	Passed
baseURI	√	Read / public	Passed
getTokenEmissionRate	√	Read / public	Passed
totalSupply	√	Read / public	Passed
getTierPrice	√	Read / public	Passed
developer	√	Read / public	Passed
getDetailedBalance	√	Read / public	Passed
developerFee	✓	Read / public	Passed
approve	✓	Write / public	Passed
safeTransferFrom	✓	Write / public	Passed
safeTransferFrom	√	Write / public	Passed
upgradeTier	✓	Write / public	Passed
mint	✓	Write / public	Passed
mintWithToken	√	Write / public	Passed
pause	√	Write / public	Passed
transferOwnership	✓	Write / public	Passed
setApprovalForAll	✓	Write / public	Passed
transferFrom	√	Write / public	Passed

addNewTier	√	Write / public	Passed
setBaseURI	✓	Write / public	Passed
renounceOwnership	✓	Write / public	Passed
removeTier	✓	Write / public	Passed
unpause	✓	Write / public	Passed
burn	√	Write / public	Passed
setDevAddress	✓	Write / public	Passed
setFees	√	Write / public	Passed
setNXSAddress	✓	Write / public	Passed
setTierEmissionRate	✓	Write / public	Passed
setTierPrice	✓	Write / public	Passed
setTokenName	√	Write / public	Passed
setTreasuryAddress	√	Write / public	Passed
setVaultAddress	√	Write / public	Passed
updateAuthorization	√	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		
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.		
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:

#Pragam 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.

#Owner privileges (In the period when the owner isn't renounced)

Description

Owner can change rewards Pool Fee, treasury Fee, developer Fee or make it = zero. Owner can pause and un pause.

```
rewardsPoolFee = _rewardsPoolFee;
    treasuryFee = _treasuryFee;
    developerFee = _developerFee;

    emit FeesUpdated(rewardsPoolFee, treasuryFee, developerFee);
}
function pause() external onlyOwner {
    __pause();
}

function unpause() external onlyOwner {
    __unpause();
}
```

Remediation

Make these functions internal in next version or the team should announce the investors before change the fees and give them time if they want to use the old fees.

P.S: This issue is common to the majority of NFT pausable.

Status: Acknowledged.

Very Low:

No Very Low severity vulnerabilities were found.

Notes:

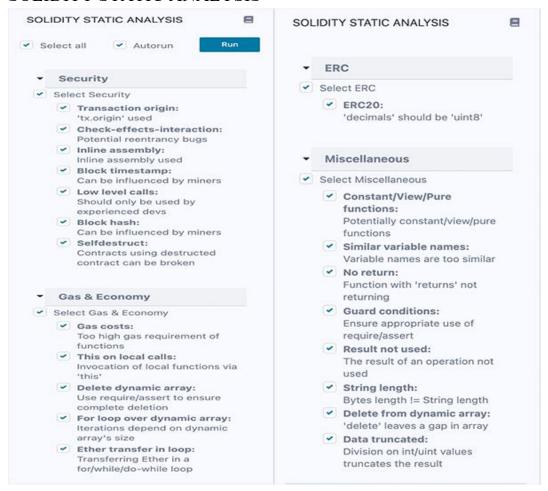
No Notes were found.

Automatic Testing

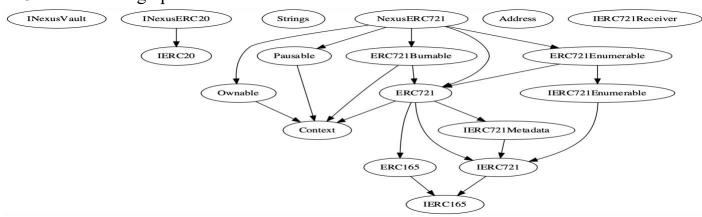
1- Check for security



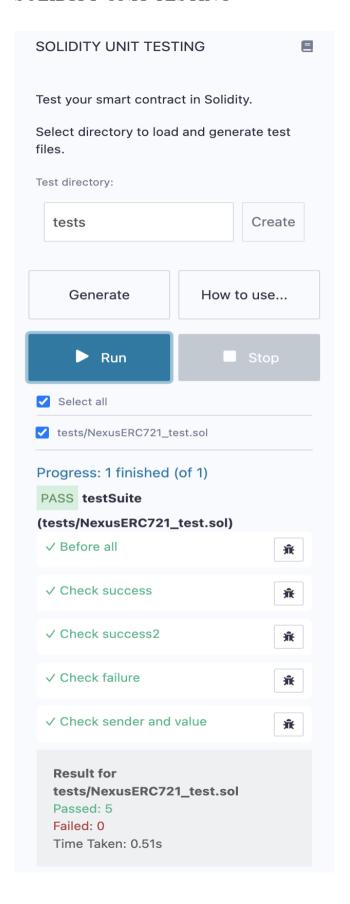
2- SOLIDITY STATIC ANALYSIS



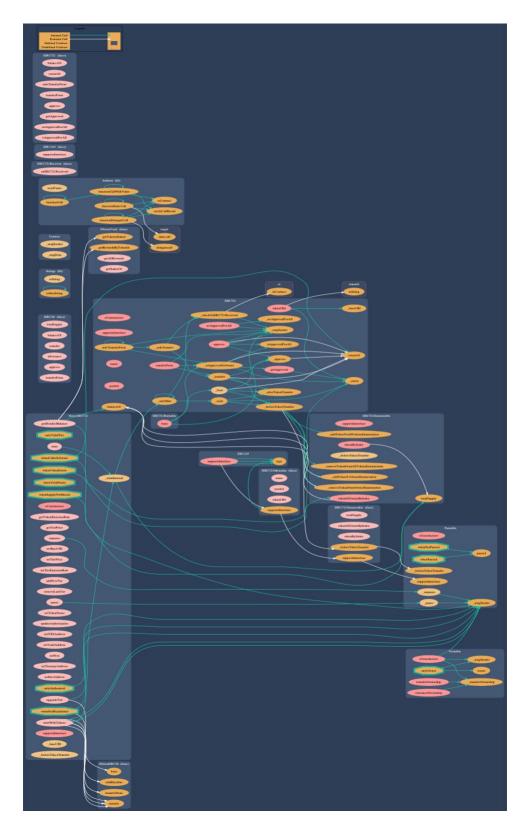
3- Inheritance graph



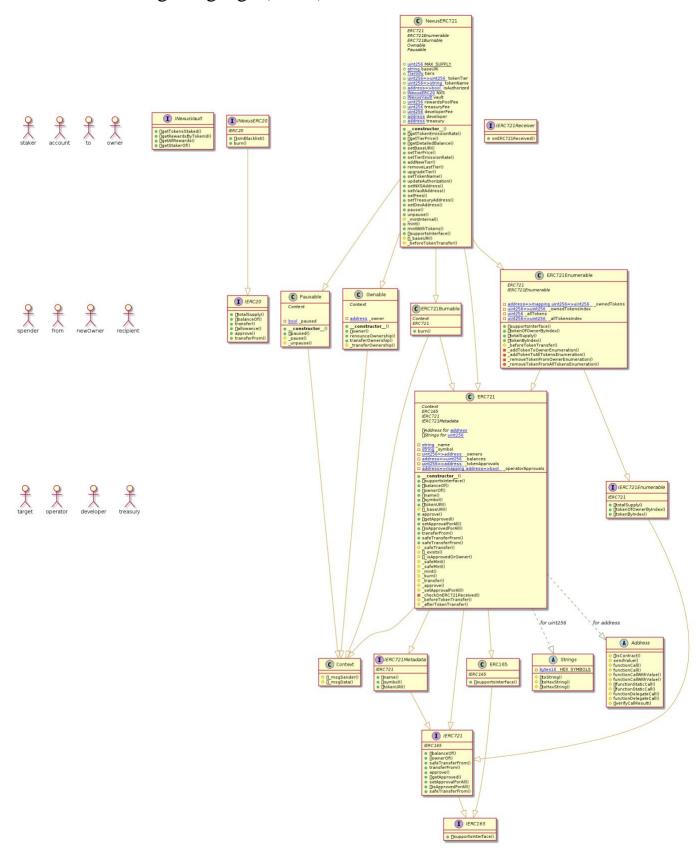
4- SOLIDITY UNIT TESTING



5- Call graph



Unified Modeling Language (UML)



Functions signature

```
Sighash | Function Signature
_____
16279055 => isContract(address)
98838838 => removeLastTier()
52eb7796 => getTokensStaked(address)
515ec105 => getRewardsByTokenId(uint256)
362a3fad => getAllRewards(address)
8c6f90ba => getStakerOf(uint256)
18160ddd => totalSupply()
70a08231 => balanceOf(address)
a9059cbb => transfer(address, uint256)
dd62ed3e => allowance(address, address)
095ea7b3 => approve(address, uint256)
23b872dd => transferFrom(address,address,uint256)
9caf9b00 => isInBlacklist(address)
9dc29fac => burn(address, uint256)
6900a3ae => toString(uint256)
8fba8d5c => toHexString(uint256)
63e1cbea => toHexString(uint256,uint256)
119df25f => _msgSender()
8b49d47e => _msgData()
8da5cb5b => owner()
715018a6 => renounceOwnership()
f2fde38b => transferOwnership(address)
d29d44ee => transferOwnership(address)
5c975abb => paused()
320b2ad9 => _pause()
fc8234cb => _unpause()
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)
150b7a02 => onERC721Received(address,address,uint256,bytes)
01ffc9a7 => supportsInterface(bytes4)
6352211e => ownerOf(uint256)
42842e0e => safeTransferFrom(address,address,uint256)
081812fc => getApproved(uint256)
a22cb465 => setApprovalForAll(address,bool)
e985e9c5 => isApprovedForAll(address,address)
b88d4fde => safeTransferFrom(address,address,uint256,bytes)
2f745c59 => tokenOfOwnerByIndex(address,uint256)
4f6ccce7 => tokenByIndex(uint256)
06fdde03 => name()
95d89b41 => symbol()
c87b56dd => tokenURI(uint256)
743976a0 => baseURI()
24b6b8c0 => _safeTransfer(address,address,uint256,bytes)
```

```
f8e76cc0 => _exists(uint256)
4cdc9549 => _isApprovedOrOwner(address,uint256)
b3e1c718 => _safeMint(address,uint256)
42966c68 => burn(uint256)
 69025b5f => _addTokenToOwnerEnumeration(address,uint256)
e03d890b => _addTokenToAllTokensEnumeration(uint256)
68df0d53 => _removeTokenFromOwnerEnumeration(address,uint256)
4cbb4a0a => _removeTokenFromAllTokensEnumeration(uint256)
5658892b => qetTokenEmissionRate(uint256)
252a8875 => getTierPrice(uint256)
2dc11759 => getDetailedBalance(address)
 55f804b3 => setBaseURI(string)
 5e6bb7bf => setTierPrice(uint256, uint256)
Odb568fa => setTierEmissionRate(uint256, uint256)
b063c84e => addNewTier(uint256,uint256)
 60d77722 => upgradeTier(uint256,uint256)
cdb0e89e => setTokenName(uint256,string)
ba2c4afc => updateAuthorization(address,bool)
f2f48546 => setNXSAddress(address)
85535cc5 => setVaultAddress(address)
 cec10c11 => setFees(uint256, uint256, uint256)
 6605bfda => setTreasuryAddress(address)
d0d41fe1 => setDevAddress(address)
8456cb59 => pause()
3f4ba83a => unpause()
7e0e9ed1 => _mintInternal(address,uint256,string)
d3fc9864 => mint(address,uint256,string)
```

7b0b5cda => mintWithTokens(uint256,string)

Automatic general report

```
Files Description Table
| File Name | SHA-1 Hash |
|-----|
| /Users/macbook/Desktop/smart contracts/NexusERC721.sol |
5bb9b0b72cad6d44168e63751a226f80f6d23909
Contracts Description Table
| Contract |
                Type Bases
| **Function Name** | **Visibility** | **Mutability** |
**Modifiers** |
| **INexusVault** | Interface | || | | |
| L | getTokensStaked | External [ | _ |NO[ |
| L | getRewardsByTokenId | External | | | NO | |
| L | getAllRewards | External | | NO| |
| L | getStakerOf | External | | | NO | |
| **IERC20** | Interface | |||
| L | totalSupply | External | | | NO | |
| L | balanceOf | External | | NO | |
| L | transfer | External | | NO | |
| L | allowance | External | | | NO | |
| L | transferFrom | External | | | NO| |
| **INexusERC20** | Interface | IERC20 |||
| L | isInBlacklist | External | | NO | |
| L | burn | External | | NO | |
| **Strings** | Library | |||
| L | toString | Internal A | | |
L | toHexString | Internal A | | |
| L | toHexString | Internal A | | |
| **Context** | Implementation | |||
| L | msgSender | Internal 🖺 | | |
L | msgData | Internal A | | |
| **Ownable** | Implementation | Context | | | | |
| L | <Constructor> | Public | | | NO | |
| L | owner | Public | | NO | |
| L | renounceOwnership | Public | | OnlyOwner |
| L | _transferOwnership | Internal 🖺 | 🔘 | |
| **Pausable** | Implementation | Context | | |
```

```
| L | paused | Public | | NO | |
| L | functionCall | Internal A |
| L | functionCall | Internal A |
| L | functionCallWithValue | Internal 🖺 |
| L | functionCallWithValue | Internal A |
| L | functionStaticCall | Internal | |
                                   | L | functionStaticCall | Internal A |
| L | functionDelegateCall | Internal 🖺
| L | functionDelegateCall | Internal A |
| **IERC721Receiver** | Interface | |||
| L | onERC721Received | External | | ●
| **IERC165** | Interface | ||| | | | | | | | | |
| L | supportsInterface | External | | NO | |
| **ERC165** | Implementation | IERC165 |||
| L | supportsInterface | Public | | NO | |
| **IERC721** | Interface | IERC165 |||
| L | balanceOf | External | | NO | |
| L | ownerOf | External | | NO | |
| L | safeTransferFrom | External | | NO | |
| L | approve | External | | MO| |
| 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| |
| **IERC721Metadata** | Interface | IERC721 |||
| L | name | External | | NO | |
| L | symbol | External | | | NO|
| L | tokenURI | External | | NO | |
| **ERC721** | Implementation | Context, ERC165, IERC721, IERC721Metadata |||
| L | <Constructor> | Public | | | NO |
| L | supportsInterface | Public | | NO | |
| L | balanceOf | Public | | NO | |
| L | ownerOf | Public | | NO | |
| L | name | Public | | NO | |
| L | symbol | Public | | NO | |
| L | tokenURI | Public | | NO | |
```

```
L | baseURI | Internal 🖺 | | |
 L | approve | Public | | ( NO | |
L | setApprovalForAll | Public | | | NO | |
| L | isApprovedForAll | Public | | NO | |
| L | transferFrom | Public | | O
| L | safeTransferFrom | Public | | NO | NO | L | safeTransferFrom | Public | NO | NO |
| L | safeTransfer | Internal 🖺 |
                        | L | _exists | Internal 🖺 |
                     L | isApprovedOrOwner | Internal 🖺 |
L | mint | Internal 🖰 | 🔘 | |
| L | approve | Internal 🖺 | 🔘 | | |
| L | setApprovalForAll | Internal A |
| L | afterTokenTransfer | Internal A | O | |
| **ERC721Burnable** | Implementation | Context, ERC721 |||
| L | burn | Public | | NO | |
| **ERC721Enumerable** | Implementation | ERC721, IERC721Enumerable | | |
| L | supportsInterface | Public | | | NO
| L | tokenOfOwnerByIndex | Public | | NO | |
| L | totalSupply | Public | | NO | |
| L | tokenByIndex | Public | | NO |
| L | _beforeTokenTransfer | Internal 🖺 | 🔘 | |
| L | addTokenToOwnerEnumeration | Private 🕤 | 🔘
L | _removeTokenFromOwnerEnumeration | Private 🖺 | (
| L | _removeTokenFromAllTokensEnumeration | Private 🖺 | 🔘 | |
| **NexusERC721** | Implementation | ERC721, ERC721Enumerable, ERC721Burnable,
Ownable, Pausable |||
| Constructor> | Public | ERC721 | | | |
| L | getTokenEmissionRate | External | | | whenTokenExists |
 | L | getDetailedBalance | External | | NO | |
| setTierPrice | External | | | | onlyOwner onlyValidTier |
| L | setTierEmissionRate | External | | OnlyOwner onlyValidTier |
| L | addNewTier | External | | OnlyOwner |
 | L | upgradeTier | External | | OnlyValidTier whenTokenExists
whenCallerIsOwner |
whenValidName |
| L | setFees | External | | ● | onlyOwner |
```

```
| L | setDevAddress | External | | OnlyOwner | | | | | |
| L | pause | External | | OnlyOwner | | L | unpause | External | OnlyOwner |
| L | mintInternal | Internal A | O | |
| L | mint | External | | OnlyValidTier whenValidName whenSupplyNotMaxed
onlyAuthorized |
whenSupplyNotMaxed whenValidName onlyValidTier |
| L | supportsInterface | Public | | NO | |
| L | _baseURI | Internal 🖺 | | |
| L | beforeTokenTransfer | Internal A | WhenNotPaused |
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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