



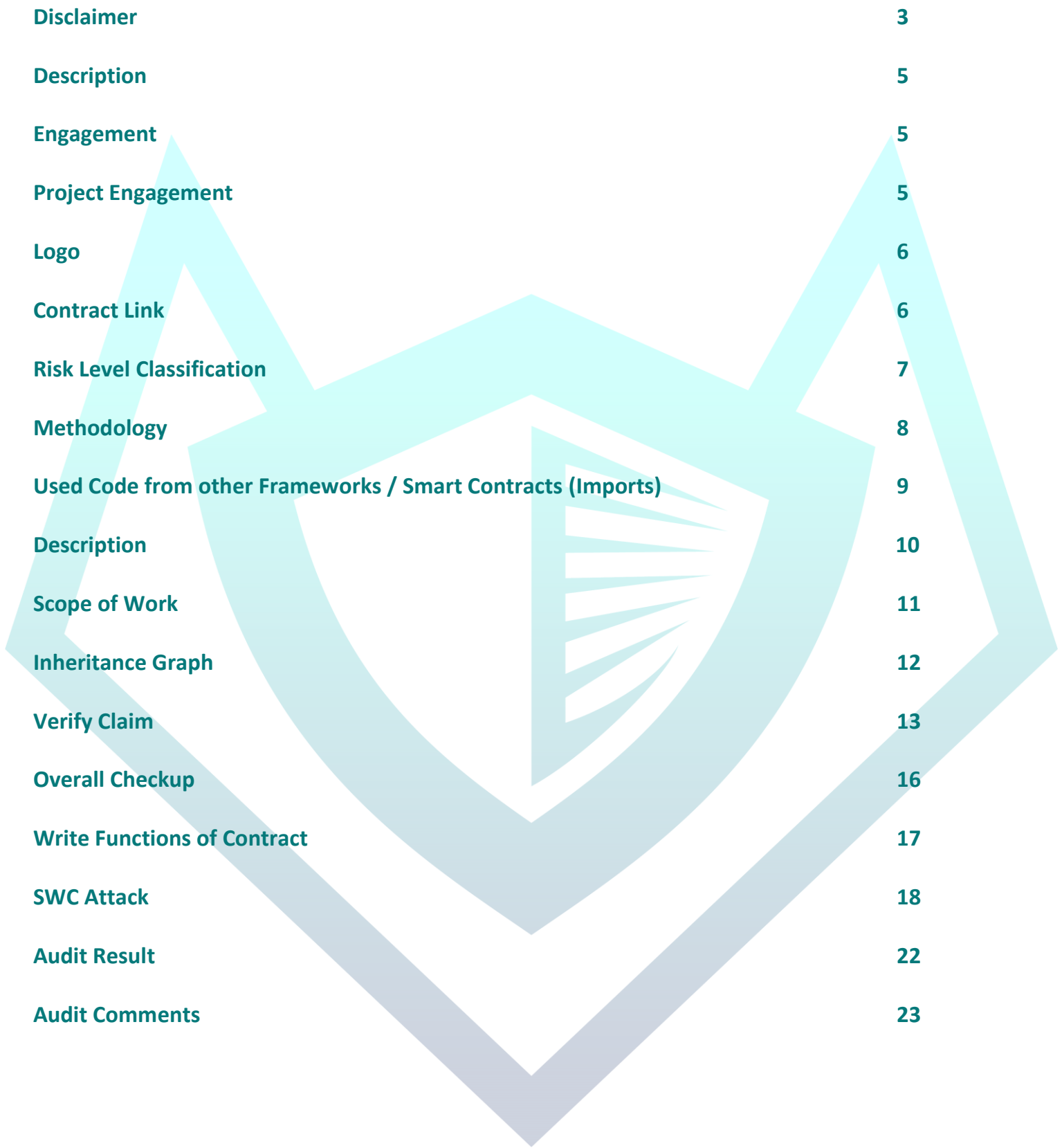
CONTRACT WOLF

Blockchain Security - Smart Contract Audits

Security Assessment

January 17, 2022





Disclaimer

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ContractWolf provides transparent report to all its "clients" and to its "clients participants" and will not claim any guarantee of bug-free code within it's **SMART CONTRACT**.

ContractWolf presence is to analyze, audit and assess the client's smart contract's code.

Each company or projects should be liable to its security flaws and functionalities.

Network

AVAX Network

Website

<https://heroesofnft.com/>

Twitter

<https://twitter.com/heroesofnft>

Telegram

<https://t.me/heroesofNFTofficial>

Other channels

<https://blog.heroesofnft.com/>

<https://discord.com/invite/ngvATGZ6QE>

Description

Heroes of NFT is an online card game where you can attend tournaments and defeat your opponents to rise to victory. Its unique story structure allows you to enter a Metaverse in the year 2073 to experience the stories of your heroes and get to know more about the world they live in before you begin to fight.

ContractWolf Engagement

17th of January 2022, **Heroes of NFT** engaged and agrees to audit their smart contract's code by ContractWolf. The goal of this engagement was to identify if there is a possibility of security flaws in the implementation of the contract or system.

ContractWolf will be focusing on contract issues and functionalities along with the projects claims from smart contract to their website, whitepaper and repository which has been provided by **Heroes of NFT**.

Logo



Contract Link

<https://snowtrace.io/address/0xbd7bd0b4650d324e3ea6f734faa3fc37d80b7d82>

Risk level classification

Risk Level represents the classification or the probability that a certain function or threat that can exploit vulnerability and have an impact within the system or contract.

Risk Level is computed based on CVSS Version 3.0

Level	Value	Vulnerability
Critical	9 - 10	An exposure that can affect the contract functions in several events that can risk and disrupt the contract
High	7 - 8.9	An exposure that can affect the outcome when using the contract that can serve as an opening in manipulating the contract in an unwanted manner
Medium	4 - 6.9	An opening that could affect the outcome in executing the contract in a specific situation
Low	0.1 - 3.9	An opening but doesn't have an impact on the functionality of the contract
Informational	0	An opening that consists of information's but will not risk or affect the contract

Auditing Approach

Every line of code along with its functionalities will undergo manual review to check its security issues, quality, and contract scope of inheritance. The manual review will be done by our team that will document any issues that there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:

- Review of the specifications, sources, and instructions provided to ContractWolf to make sure we understand the size, scope, and functionality of the smart contract.
- Manual review of code, our team will have a process of reading the code line-by-line with the intention of identifying potential vulnerabilities and security flaws.

2. Testing and automated analysis that includes:

- Testing the smart contract functions with common test cases and scenarios, to ensure that it returns the expected results.

3. Best practices review, the team will review the contract with the aim to improve efficiency, effectiveness, clarifications, maintainability, security, and control within the smart contract.

4. Recommendations to help the project take steps to secure the smart contract.

Description

Optimization enabled: Yes

Version : ^0.8.3

Decimal : --(ERC721)

Symbol : HRO

Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	1	4	2	4

Exposed Functions

Version	Public	Private
1.0	35	12

Version	External	Internal
1.0	18	41

Capabilities

Version	Solidity Versions Observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	^0.8.3		Yes	Yes (2asm blocks)	No

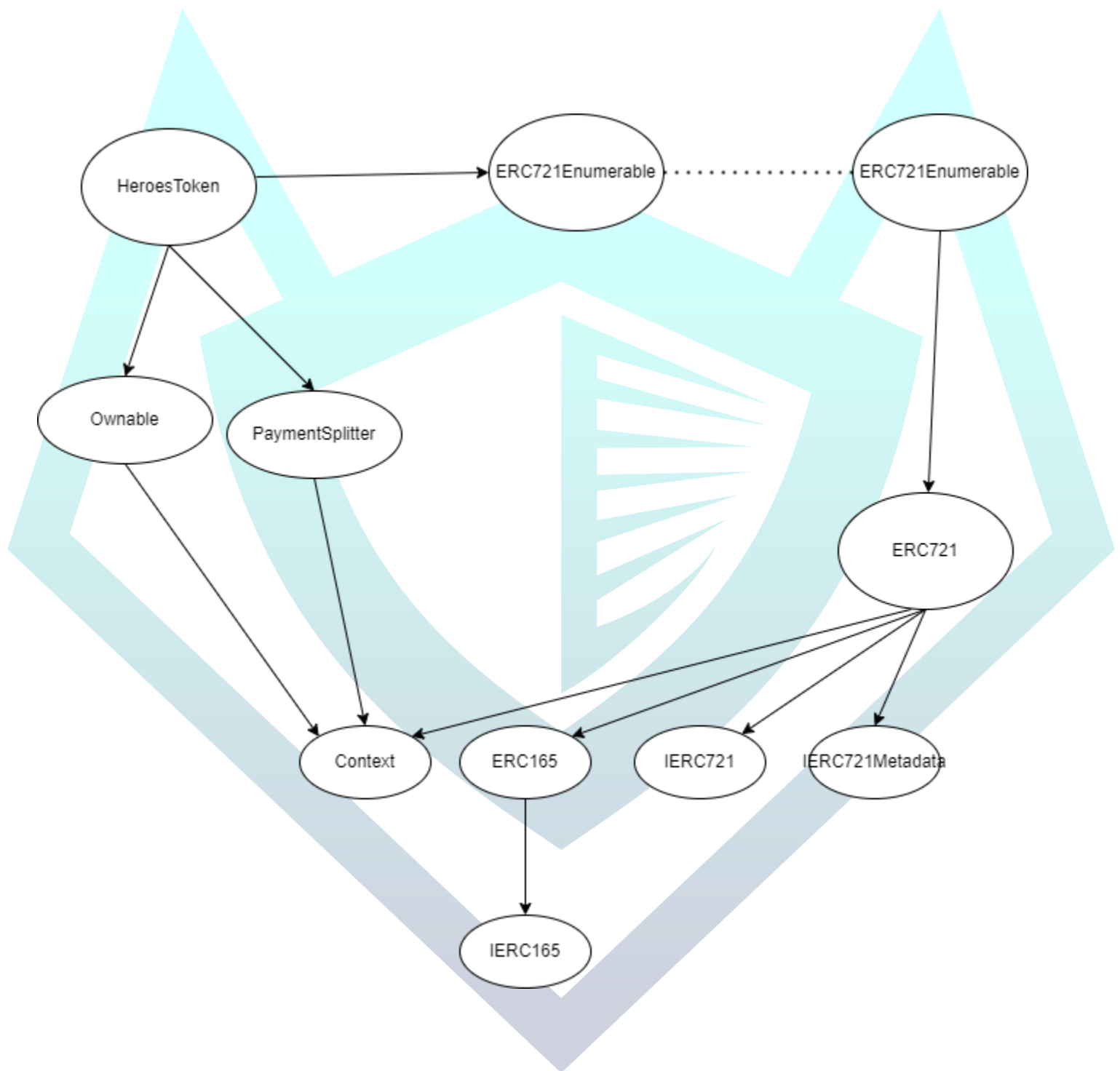
Scope of Work

Heroes Of NFT's 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.

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



Verify Claims

Correct implementation of Token Standard

Tested	Verified
✓	✗

Function	Description	Exist	Tested	Verified
TotalSupply	Information about the total coin or token supply	✓	✓	✗
BalanceOf	Details on the account balance from a specified address	✓	✓	✓
Transfer	An action that transfers a specified amount of coin or token to a specified address	✓	✓	✓
TransferFrom	An action that transfers a specified amount of coin or token from a specified address	✓	✓	✓
Approve	Provides permission to withdraw specified number of coin or token from a specified address	✓	✓	✓

Optional implementation

Function	Description	Exist	Tested	Verified
renounceOwnership	Owner renounce ownership for more trust	✓	✓	✗

Deployer cannot mint any new tokens

Statement	Exist	Tested	Verified	File
Deployer can mint	✓	✓	✓	Main
Deployer can generate NFT	✓	✓	✓	Main

Max / Total supply: --

Deployer cannot burn or lock user funds

Statement	Exist	Tested	Verified
Deployer cannot pause	✓	✓	✓

Deployer cannot pause contract

Statement	Exist	Tested	Verified
Deployer cannot pause	✓	✓	✓

Overall Checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	X
Unverified / Not checked	🚩
Not Available	—

Write Functions of Contract

1. addBundle

2. approve

3. changePriceBundle

4. incrementCurrentGeneration

5. mintLegendary

6. purchaseBundle

7. release

8. renounceOwnership

9. safeTransferFrom

10. safeTransferFrom

11. setApprovalForAll

12. setBaseURI

13. setGenerationSaleStart

14. setNumberOfCharacters

15. setRaritySupplyIncreaseAmount

16. setSeed

17. transferFrom

18. transferOwnership



SWC Attacks

ID	Title	Relationships	Status
<u>SWC-136</u>	Unencrypted Private Data On-Chain	<u>CWE-767: Access to Critical Private Variable via Public Method</u>	PASSED
<u>SWC-135</u>	Code With No Effects	<u>CWE-1164: Irrelevant Code</u>	PASSED
<u>SWC-134</u>	Message call with hardcoded gas amount	<u>CWE-655: Improper Initialization</u>	PASSED
<u>SWC-133</u>	Hash Collisions with Multiple Variable Length Arguments	<u>CWE-294: Authentication Bypass by Capture-replay</u>	PASSED
<u>SWC-132</u>	Unexpected Ether balance	<u>CWE-667: Improper Locking</u>	PASSED
<u>SWC-131</u>	Presence of unused variables	<u>CWE-1164: Irrelevant Code</u>	PASSED
<u>SWC-130</u>	Right-To Left Override control character (U+202E)	<u>CWE-451: User Interface (UI) Misrepresentation of Critical Information</u>	PASSED
<u>SWC-129</u>	Typographical Error	<u>CWE-480: Use of Incorrect Operator</u>	PASSED
<u>SWC-128</u>	DoS With Block Gas Limit	<u>CWE-400: Uncontrolled Resource Consumption</u>	PASSED
<u>SWC-127</u>	Arbitrary Jump with Function Type Variable	<u>CWE-695: Use of Low-Level Functionality</u>	PASSED

<u>SWC-125</u>	Incorrect Inheritance Order	<u>CWE-696: Incorrect Behavior Order</u>	PASSED
<u>SWC-124</u>	Write to Arbitrary Storage Location	<u>CWE-123: Write-what-where Condition</u>	PASSED
<u>SWC-123</u>	Requirement Violation	<u>CWE-573: Improper Following of Specification by Caller</u>	PASSED
<u>SWC-122</u>	Lack of Proper Signature Verification	<u>CWE-345: Insufficient Verification of Data Authenticity</u>	PASSED
<u>SWC-121</u>	Missing Protection against Signature Replay Attacks	<u>CWE-347: Improper Verification of Cryptographic Signature</u>	PASSED
<u>SWC-120</u>	Weak Sources of Randomness from Chain Attributes	<u>CWE-330: Use of Insufficiently Random Values</u>	PASSED
<u>SWC-119</u>	Shadowing State Variables	<u>CWE-710: Improper Adherence to Coding Standards</u>	PASSED
<u>SWC-118</u>	Incorrect Constructor Name	<u>CWE-665: Improper Initialization</u>	PASSED
<u>SWC-117</u>	Signature Malleability	<u>CWE-347: Improper Verification of Cryptographic Signature</u>	PASSED
<u>SWC-116</u>	Timestamp Dependence	<u>CWE-829: Inclusion of</u>	PASSED

		Functionality from Untrusted Control Sphere	
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	Delegate call 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	PASSED

<u>SWC-107</u>	Reentrancy	<u>CWE-841: Improper Enforcement of Behavioral Workflow</u>	PASSED
<u>SWC-106</u>	Unprotected SELFDESTRUCT Instruction	<u>CWE-284: Improper Access Control</u>	PASSED
<u>SWC-105</u>	Unprotected Ether Withdrawal	<u>CWE-284: Improper Access Control</u>	PASSED
<u>SWC-104</u>	Unchecked Call Return Value	<u>CWE-252: Unchecked Return Value</u>	PASSED
<u>SWC-103</u>	Floating Pragma	<u>CWE-664: Improper Control of a Resource Through its Lifetime</u>	PASSED
<u>SWC-102</u>	Outdated Compiler Version	<u>CWE-937: Using Components with Known Vulnerabilities</u>	PASSED
<u>SWC-101</u>	Integer Overflow and Underflow	<u>CWE-682: Incorrect Calculation</u>	PASSED
<u>SWC-100</u>	Function Default Visibility	<u>CWE-710: Improper Adherence to Coding Standards</u>	PASSED

AUDIT PASSED

Critical Issues

No critical issues found

High Issues

No high issues found

Medium Issues

No medium issues found

Low Issues

No medium issues found

Informational Issues

No informational issues found

Function Issues

No informational issues found

Audit Comments

Deployer can **mint NFT**

Deployer can **Increase the supply limit of NFT**

Deployer cannot pause the contract

For more information please check contract HeroesToken

<https://snowtrace.io/address/0xbd7bd0b4650d324e3ea6f734faa3fc37d80b7d82#code>