0.7

Nerve.fi Process Quality Review

Score: 34%

Overview

This is a Process Quality Review of Nerve.fi completed on May 17th 2021. It was performed using the Process Review process (version 0.7) and is documented here. The review was performed by Nic of DeFiSafety. Check out our Telegram.

The final score of the review is 34%, a fail. The breakdown of the scoring is in Scoring Appendix. For our purposes, a pass is 70%.

Summary of the Process

Very simply, the review looks for the following declarations from the developer's site. With these declarations, it is reasonable to trust the smart contracts.

- **Here are my smart contracts on the blockchain**
- **Here is the documentation that explains what my smart contracts do**
- **Here are the tests I ran to verify my smart contract**
- **Here are the audit(s) performed on my code by third party experts**
- **Here are the admin controls and strategies**

Disclaimer

This report is for informational purposes only and does not constitute investment advice of any kind, nor does it constitute an offer to provide investment advisory or other services. Nothing in this report shall be considered a solicitation or offer to buy or sell any security, token, future, option or other financial instrument or to offer or provide any investment advice or service to any person in any jurisdiction. Nothing contained in this report constitutes investment advice or offers any opinion with respect to the suitability of any security, and the views expressed in this report should not be taken as advice to buy, sell or hold any security. The information in this report should not be relied upon for the purpose of investing. In preparing the information contained in this report, we have not taken into account the investment needs, objectives and financial circumstances of any particular investor. This information has no regard to the specific investment objectives, financial situation and particular needs of any specific recipient of this information and investments discussed may not be suitable for all investors.

Any views expressed in this report by us were prepared based upon the information available to us at the time such views were written. The views expressed within this report are limited to DeFiSafety and the author and do not reflect those of any additional or third party and are strictly based upon DeFiSafety, its authors, interpretations and evaluation of relevant data. Changed or additional information could cause such views to change. All information is subject to possible correction. Information may quickly become unreliable for various reasons, including changes in market conditions or economic circumstances.

Chain

This section indicates the blockchain used by this protocol.

> **Chain: Binance Smart Chain**

Guidance:
Ethereum
Binance

Code and Team

This section looks at the code deployed on the Mainnet that gets reviewed and its corresponding software repository. The document explaining these questions is here. This review will answer the questions;

1) Are the executing code addresses readily available? (%)
2) Is the code actively being used? (%)
3) Is there a public software repository? (Y/N)
4) Is there a development history visible? (%)
5) Is the team public (not anonymous)? (Y/N)

1) Are the executing code addresses readily available? (%)

> Answer: 100%

They are available at website https://docs.nerve.fi/contract-addresses as indicated in the Appendix.

Guidance:

100%	Clearly labelled and on website, docs or repo, quick to find
70%	Clearly labelled and on website, docs or repo but takes a bit of looking
40%	Addresses in mainnet.json, in discord or sub graph, etc
20%	Address found but labelling not clear or easy to find
0%	Executing addresses could not be found

How to improve this score

Make the Ethereum addresses of the smart contract utilized by your application available on either your website or your GitHub (in the README for instance). Ensure the addresses is up to date. This is a very important question wrt to the final score.

2) Is the code actively being used? (%)

> ✓ Answer: 100%

Activity is around 7000 transactions a day on contract *MasterMind.sol*, as indicated in the Appendix.

Percentage Score Guidance

100%	More than 10 transactions a day
70%	More than 10 transactions a week
40%	More than 10 transactions a month
10%	Less than 10 transactions a month
0%	No activity

3) Is there a public software repository? (Y/N)

> ✓ Answer: Yes

GitHub: https://github.com/nerve-finance/contracts

Is there a public software repository with the code at a minimum, but normally test and scripts also (Y/N). Even if the repo was created just to hold the files and has just 1 transaction, it gets a Yes. For teams with private repos, this answer is No.

4) Is there a development history visible? (%)

> ⚠ Answer: 10%

with 13 commits and 1 branch, this is not a healthy repository.

This checks if the software repository demonstrates a strong steady history. This is normally demonstrated by commits, branches and releases in a software repository. A healthy history demonstrates a history of more than a month (at a minimum).

Guidance:

100%	Any one of 100+ commits, 10+branches
70%	Any one of 70+ commits, 7+branches
50%	Any one of 50+ commits, 5+branches

30%	Any one of 30+ commits, 3+branches
0%	Less than 2 branches or less than 10 commits

How to improve this score

Continue to test and perform other verification activities after deployment, including routine maintenance updating to new releases of testing and deployment tools. A public development history indicates clearly to the public the level of continued investment and activity by the developers on the application. This gives a level of security and faith in the application.

5) Is the team public (not anonymous)? (Y/N)

⚠ Answer: No

Nerve.fi explicitly stated that their team will remain anonymous at https://docs.nerve.fi/faq

For a yes in this question the real names of some team members must be public on the website or other documentation. If the team is anonymous and then this question is a No.

Documentation

This section looks at the software documentation. The document explaining these questions is here.

Required questions are;

6) Is there a whitepaper? (Y/N)
7) Are the basic software functions documented? (Y/N)
8) Does the software function documentation fully (100%) cover the deployed contracts? (%)
9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)
10) Is it possible to trace from software documentation to the implementation in
code (%)

6) Is there a whitepaper? (Y/N)

✓ Answer: Yes

Location: https://docs.nerve.fi/

How to improve this score

Ensure the white paper is available for download from your website or at least the software repository. Ideally update the whitepaper to meet the capabilities of your present application.

7) Are the basic software functions documented? (Y/N)

⚠ Answer: no

There is no evident software function documentation.

How to improve this score

Write the document based on the deployed code. For guidance, refer to the SecurEth System Description Document.

8) Does the software function documentation fully (100%) cover the deployed contracts? (%)

⚠ Answer: 0%

There is no evident software function documentation.

Guidance:

100%	All contracts and functions documented
80%	Only the major functions documented
79-1%	Estimate of the level of software documentation
0%	No software documentation

How to improve this score

This score can improve by adding content to the requirements document such that it comprehensively covers the requirements. For guidance, refer to the SecurEth System Description Document . Using tools that aid traceability detection will help.

9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)

✓ Answer: 100%

Code examples are in the Appendix. As per the SLOC, there is 153% commenting to code (CtC).

The Comments to Code (CtC) ratio is the primary metric for this score.

Guidance:

100%	CtC > 100 Useful comments consistently on all code
90-70%	CtC > 70 Useful comment on most code
60-20%	CtC > 20 Some useful commenting
0%	CtC < 20 No useful commenting

How to improve this score

This score can improve by adding comments to the deployed code such that it comprehensively covers the code. For guidance, refer to the SecurEth Software Requirements.

10) Is it possible to trace from software documentation to the implementation in code (%)

> ⚠ Answer: 0%

No connection between documentation and code.

Guidance:
100% Clear explicit traceability between code and documentation at a requirement level for all code
60% Clear association between code and documents via non explicit traceability
40% Documentation lists all the functions and describes their functions
0% No connection between documentation and code

How to improve this score

This score can improve by adding traceability from requirements to code such that it is clear where each requirement is coded. For reference, check the SecurEth guidelines on traceability.

Testing

This section looks at the software testing available. It is explained in this document. This section answers the following questions;

11) Full test suite (Covers all the deployed code) (%)
12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)
13) Scripts and instructions to run the tests (Y/N)
14) Report of the results (%)
15) Formal Verification test done (%)
16) Stress Testing environment (%)

11) Is there a Full test suite? (%)

> ⚠ Answer: 0%

No testing suite was found in their documentation.

This score is guided by the Test to Code ratio (TtC). Generally a good test to code ratio is over 100%. However the reviewers best judgement is the final deciding factor.

Guidance:
100% TtC > 120% Both unit and system test visible
80% TtC > 80% Both unit and system test visible
40% TtC < 80% Some tests visible
0% No tests obvious

How to improve this score

This score can improve by adding tests to fully cover the code. Document what is covered by traceability or test results in the software repository.

12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)

> ⚠ Answer: 0%

There is no evident code coverage available.

Guidance:
100% Documented full coverage
99-51% Value of test coverage from documented results
50% No indication of code coverage but clearly there is a reasonably complete set of tests
30% Some tests evident but not complete
0% No test for coverage seen

How to improve this score

This score can improve by adding tests achieving full code coverage. A clear report and scripts in the software repository will guarantee a high score.

13) Scripts and instructions to run the tests (Y/N)

> ⚠ Answer: No

No test or script instructions visible in their documentation.

How to improve this score

Add the scripts to the repository and ensure they work. Ask an outsider to create the environment and run the tests. Improve the scripts and docs based on their feedback.

14) Report of the results (%)

> ⚠

> Answer: 0%

No test report in their documentation.

Guidance:

100%	Detailed test report as described below
70%	GitHub Code coverage report visible
0%	No test report evident

How to improve this score

Add a report with the results. The test scripts should generate the report or elements of it.

15) Formal Verification test done (%)

> ⚠ Answer: 0%

16) Stress Testing environment (%)

> ⚠ Answer: 0%

No testing smart contract addresses visible in ther documentation.

Security

This section looks at the 3rd party software audits done. It is explained in this document. This section answers the following questions;

17) Did 3rd Party audits take place? (%)
18) Is the bounty value acceptably high?

17) Did 3rd Party audits take place? (%)

> ⓘ Answer: 50%

Certik did an audit on them on April 6th 2021. It is a very simple audit that does not even mention finance aspect, the bridge. As such 20% is deducted to 50% final score

Nerve.fi was launched March 1st 2021.

Guidance:
100% Multiple Audits performed before deployment and results public and implemented or not required
90% Single audit performed before deployment and results public and implemented or not required
70% Audit(s) performed after deployment and no changes required. Audit report is public
20% No audit performed
0% Audit Performed after deployment, existence is public, report is not public and no improvements deployed OR smart contract address' not found, question

18) Is the bounty value acceptably high (%)

> ⚠ Answer: 0%

There is no evident bug bounty program.

Guidance:

100% Bounty is 10% TVL or at least $1M AND active program (see below)
90% Bounty is 5% TVL or at least 500k AND active program
80% Bounty is 5% TVL or at least 500k
70% Bounty is 100k or over AND active program
50% Bounty is 100k or over
40% Bounty is 50k or over
20% Bug bounty program bounty is less than 50k
0% No bug bounty program offered

Active program means a third party actively driving hackers to the site. Inactive program would be static mention on the docs.

Access Controls

This section covers the documentation of special access controls for a DeFi protocol. The admin access controls are the contracts that allow updating contracts or coefficients in the protocol. Since these contracts can allow the protocol admins to "change the rules", complete disclosure of capabilities is vital for user's transparency. It is explained in this document. The questions this section asks are as follow;

19) Can a user clearly and quickly find the status of the admin controls?
20) Is the information clear and complete?
2`) Is the information in non-technical terms that pertain to the investments?
22) Is there Pause Control documentation including records of tests?

19) Can a user clearly and quickly find the status of the admin controls (%)

> Answer: 20%

The only admin access control information is in a Twitter Post.

Guidance:
100% Clearly labelled and on website, docs or repo, quick to find
70% Clearly labelled and on website, docs or repo but takes a bit of looking
40% Access control docs in multiple places and not well labelled
20% Access control docs in multiple places and not labelled
0% Admin Control information could not be found

20) Is the information clear and complete (%)

> Answer: 30%

The nerve Multisig and it's owners are indicated in a twitter post.
https://twitter.com/NerveFinance/status/1387813314336600068

Guidance:
All the contracts are immutable -- 100% OR

All contracts are clearly labelled as upgradeable (or not) -- 30% AND
The type of ownership is clearly indicated (OnlyOwner / MultiSig / Defined Roles) -- 30% AND
The capabilities for change in the contracts are described -- 30%

How to improve this score

Create a document that covers the items described above. An example is enclosed.

21) Is the information in non-technical terms that pertain to the investments (%)

> Answer: 90%

Their twitter post is investor-friendly to read.

Guidance:
100% All the contracts are immutable
90% Description relates to investments safety and updates in clear, complete non-software l language
30% Description all in software specific language
0% No admin control information could not be found

How to improve this score

Create a document that covers the items described above in plain language that investors can understand. An example is enclosed.

22) Is there Pause Control documentation including records of tests (%)

> ⚠ Answer: 0%

There is no evident pause control information explained anywhere in their documentation.

Guidance:
100% All the contracts are immutable or no pause control needed and this is explained OR
100% Pause control(s) are clearly documented and there is records of at least one test within 3 months
80% Pause control(s) explained clearly but no evidence of regular tests
40% Pause controls mentioned with no detail on capability or tests
0% Pause control not documented or explained

How to improve this score

Create a document that covers the items described above in plain language that investors can understand. An example is enclosed.

Appendices

Author Details

The author of this review is Rex of DeFi Safety.

Email : rex@defisafety.com Twitter : @defisafety

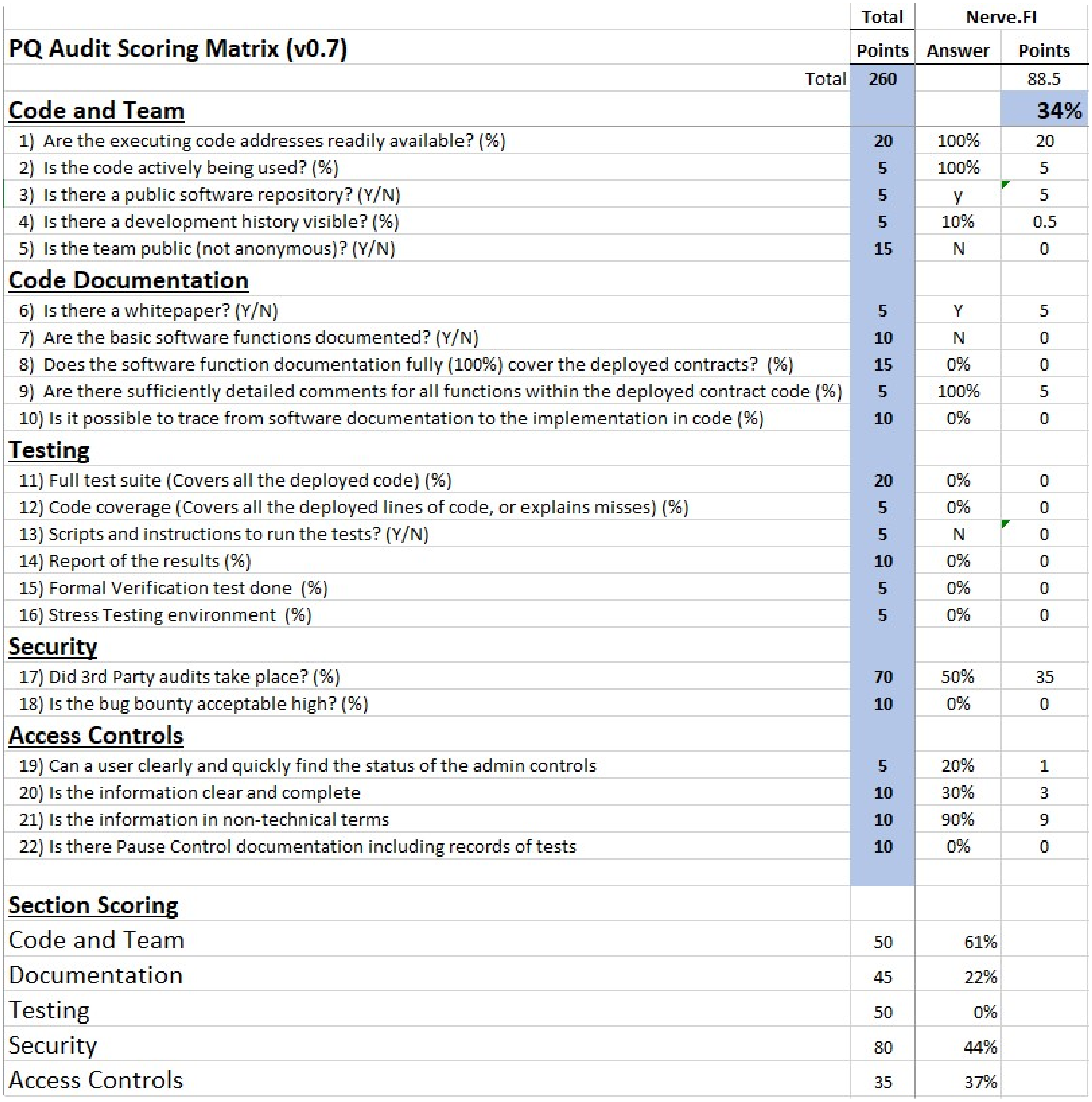
I started with Ethereum just before the DAO and that was a wonderful education. It showed the importance of code quality. The second Parity hack also showed the importance of good process. Here my aviation background offers some value. Aerospace knows how to make reliable code using quality processes.

I was coaxed to go to EthDenver 2018 and there I started SecuEth.org with Bryant and Roman. We created guidelines on good processes for blockchain code development. We got EthFoundation funding to assist in their development.

Process Quality Reviews are an extension of the SecurEth guidelines that will further increase the quality processes in Solidity and Vyper development.

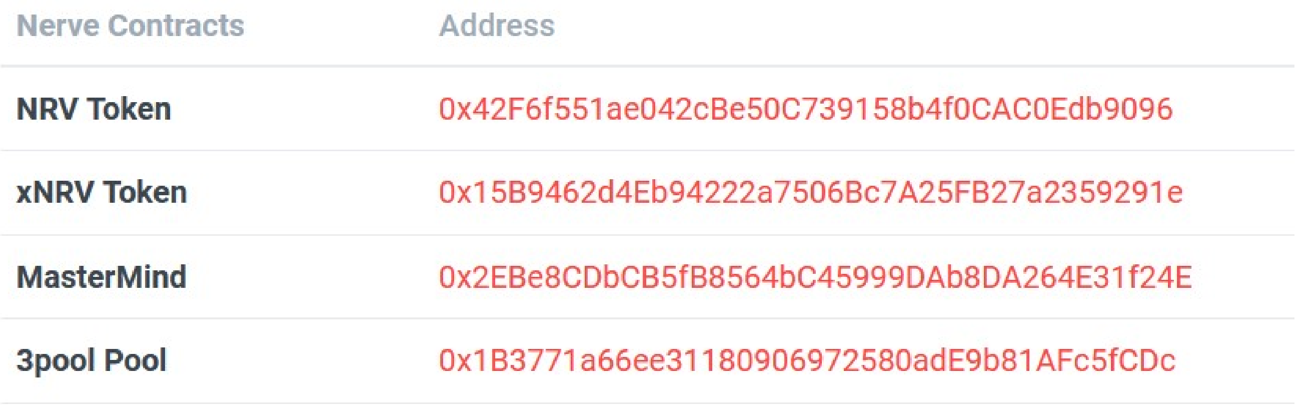
DeFiSafety is my full time gig and we are working on funding vehicles for a permanent staff.

Scoring Appendix

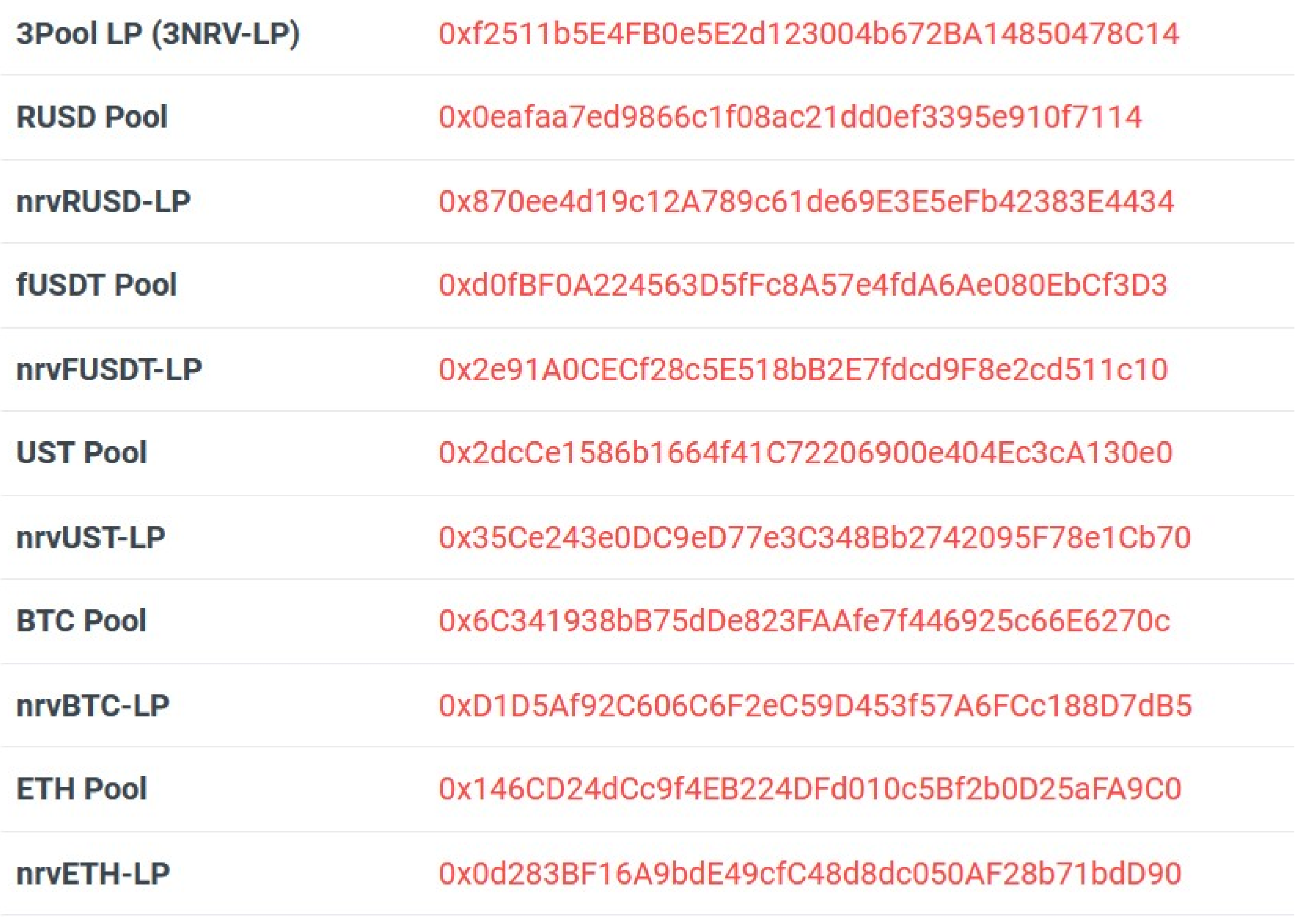


	Total	Nerve.FI	
PQ Audit Scoring Matrix (v0.7)	**Points**	**Answer**	**Points**
Total	260		88.5
Code and Team			**34%**
1) Are the executing code addresses readily available? (%)	**20**	100%	20
2) Is the code actively being used? (%)	**5**	100%	5
3) Is there a public software repository? (Y/N)	**5**	y	5
4) Is there a development history visible? (%)	**5**	10%	0.5
5) Is the team public (not anonymous)? (Y/N)	**15**	N	0
Code Documentation			
6) Is there a whitepaper? (Y/N)	**5**	Y	5
7) Are the basic software functions documented? (Y/N)	**10**	N	0
8) Does the software function documentation fully (100%) cover the deployed contracts? (%)	**15**	0%	0
9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)	**5**	100%	5
10) Is it possible to trace from software documentation to the implementation in code (%)	**10**	0%	0
Testing			
11) Full test suite (Covers all the deployed code) (%)	**20**	0%	0
12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)	**5**	0%	0
13) Scripts and instructions to run the tests? (Y/N)	**5**	N	0
14) Report of the results (%)	**10**	0%	0
15) Formal Verification test done (%)	**5**	0%	0
16) Stress Testing environment (%)	**5**	0%	0
Security			
17) Did 3rd Party audits take place? (%)	**70**	50%	35
18) Is the bug bounty acceptable high? (%)	**10**	0%	0
Access Controls			
19) Can a user clearly and quickly find the status of the admin controls	**5**	20%	1
20) Is the information clear and complete	**10**	30%	3
21) Is the information in non-technical terms	**10**	90%	9
22) Is there Pause Control documentation including records of tests	**10**	0%	0
Section Scoring			
Code and Team	50	61%	
Documentation	45	22%	
Testing	50	0%	
Security	80	44%	
Access Controls	35	37%	

Executing Code Appendix

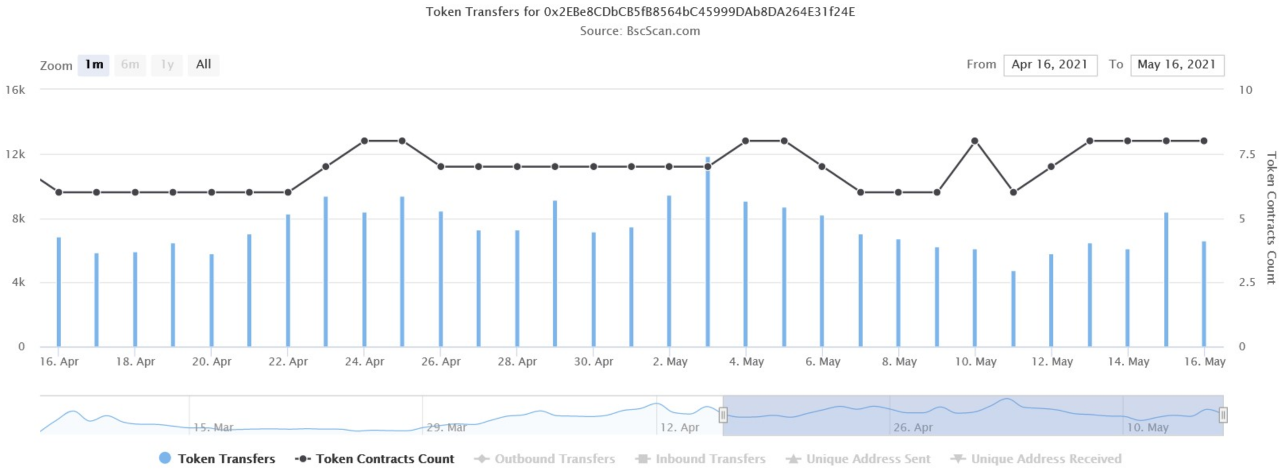


Nerve Contracts	Address
NRV Token	0x42F6f551ae042cBe50C739158b4f0CAC0Edb9096
xNRV Token	0x15B9462d4Eb94222a7506Bc7A25FB27a2359291e
MasterMind	0x2EBe8CDbCB5fB8564bC45999DAb8DA264E31f24E
3pool Pool	0x1B3771a66ee31180906972580adE9b81AFc5fCDc



3Pool LP (3NRV-LP)	0xf2511b5E4FB0e5E2d123004b672BA14850478C14
RUSD Pool	0x0eafaa7ed9866c1f08ac21dd0ef3395e910f7114
nrvRUSD-LP	0x870ee4d19c12A789c61de69E3E5eFb42383E4434
fUSDT Pool	0xd0fBF0A224563D5fFc8A57e4fdA6Ae080EbCf3D3
nrvFUSDT-LP	0x2e91A0CECf28c5E518bB2E7fdcd9F8e2cd511c10
UST Pool	0x2dcCe1586b1664f41C72206900e404Ec3cA130e0
nrvUST-LP	0x35Ce243e0DC9eD77e3C348Bb2742095F78e1Cb70
BTC Pool	0x6C341938bB75dDe823FAAfe7f446925c66E6270c
nrvBTC-LP	0xD1D5Af92C606C6F2eC59D453f57A6FCc188D7dB5
ETH Pool	0x146CD24dCc9f4EB224DFd010c5Bf2b0D25aFA9C0
nrvETH-LP	0x0d283BF16A9bdE49cfC48d8dc050AF28b71bdD90

Code Used Appendix



Token Transfers for 0x2EBe8CDbCB5fB8564bC45999DAb8DA264E31f24E
Source: BscScan.com

Example Code Appendix

```
// SPDX-License-Identifier: MIT

pragma solidity 0.6.12;

import "@openzeppelin/contracts/token/ERC20/ERC20Burnable.sol";
import "@openzeppelin/contracts/access/Ownable.sol";
import "@openzeppelin/contracts/math/SafeMath.sol";
import "./interfaces/ISwap.sol";

/**
 * @title Liquidity Provider Token
 * @notice This token is an ERC20 detailed token with added capability to be minted by the
 * It is used to represent user's shares when providing liquidity to swap contracts.
 */
contract LPToken is ERC20Burnable, Ownable {
    using SafeMath for uint256;

    // Address of the swap contract that owns this LP token. When a user adds liquidity to
    // they receive a proportionate amount of this LPToken.
    ISwap public immutable swap;

    /**
     * @notice Deploys LPToken contract with given name, symbol, and decimals
     * @dev the caller of this constructor will become the owner of this contract
     * @param name_ name of this token
     * @param symbol_ symbol of this token
     * @param decimals_ number of decimals this token will be based on
     */
    constructor(
        string memory name_,
        string memory symbol_,
        uint8 decimals_
    ) public ERC20(name_, symbol_) {
        _setupDecimals(decimals_);
        swap = ISwap(_msgSender());
    }

    /**
     * @notice Mints the given amount of LPToken to the recipient.
     * @dev only owner can call this mint function
     * @param recipient address of account to receive the tokens
     * @param amount amount of tokens to mint
     */
    function mint(
        address recipient,
        uint256 amount
    ) external onlyOwner {
        require(amount != 0, "amount == 0");
        _mint(recipient, amount);
    }

```

SLOC Appendix

Solidity Contracts

Language	Files	Lines	Blanks	Comments	Code	Complex
Solidity	1	8635	1123	4551	2961	270

Comments to Code 4551/2961 = 153%

Javascript Tests

Language	Files	Lines	Blanks	Comments	Code	Complex
JavaScript	0	0	0	0	0	0

Tests to Code 0/0 = 0%