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*Bring trust into your projects*

**Blockchain Security | Smart Contract Audits | KYC**

MADE IN GERMANY

# Audit

**Security Assessment**  
**29. January, 2022**

**For**



**Beli Finance**

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Version	Date	Description
1.0	29. January 2022	<ul style="list-style-type: none"><li>• Layout project</li><li>• Automated- /Manual-Security Testing</li><li>• Summary</li></ul>

## **Network**

Binance Smart Chain (BEP20)

## **Website**

<https://beli.finance/>



## Description

Beli Finance is a decentralized reserve policy-controlled currency protocol, Multi-Chain Yield Optimizer Aggregator platform that convert yield farm into \$BELI token and still earn small compound interest on their crypto holdings automatically. Each \$BELI token is backed by a basket of assets (e.g., USDT, BNB, BUSD Tokens etc etc) in the treasury, giving it an intrinsic value that it cannot fall below. Beli Finance also introduces economic and game-theoretic dynamics into the market through staking and compounding.

## Project Engagement

During the 27th of January 2022, **Beli Finance 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



# Beli Finance

## Contract Link

**v1.0**

- Github
  - <https://github.com/belifinance/beli-finance>
  - Commit: fe03b705871f742e0eabe3cad79ba9e75c781ff6

# 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)
<b>Critical</b>	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.
<b>High</b>	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 as possible.
<b>Medium</b>	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.
<b>Low</b>	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.
<b>Informational</b>	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.

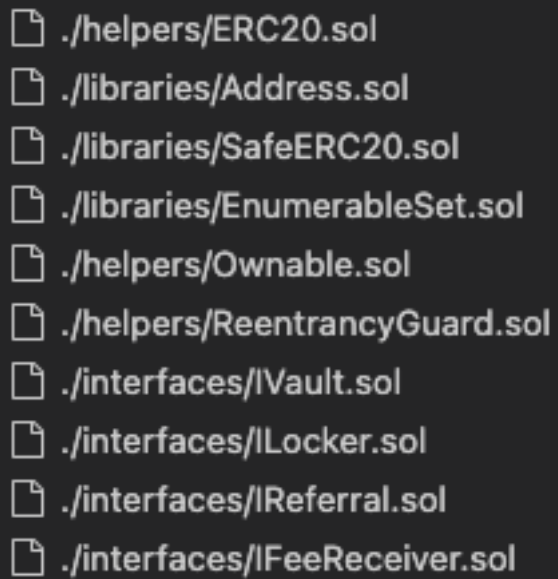
## **Methodology**

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:



- ./helpers/ERC20.sol
- ./libraries/Address.sol
- ./libraries/SafeERC20.sol
- ./libraries/EnumerableSet.sol
- ./helpers/Ownable.sol
- ./helpers/ReentrancyGuard.sol
- ./interfaces/IVault.sol
- ./interfaces/ILocker.sol
- ./interfaces/IReferral.sol
- ./interfaces/IFeeReceiver.sol



## Tested Contract Files

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

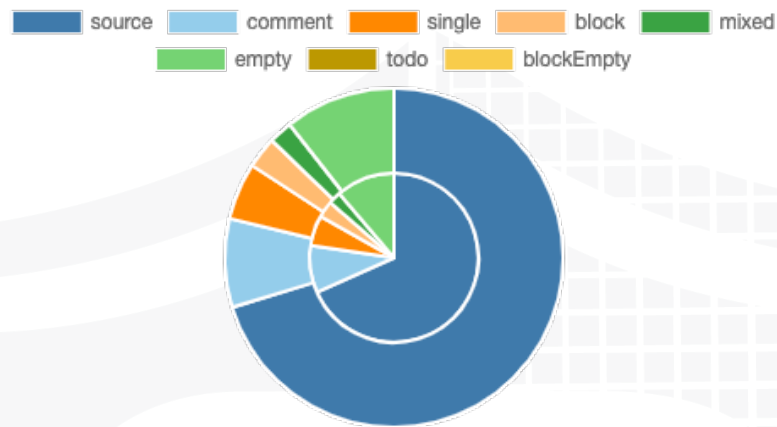
*A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.*

### v1.0

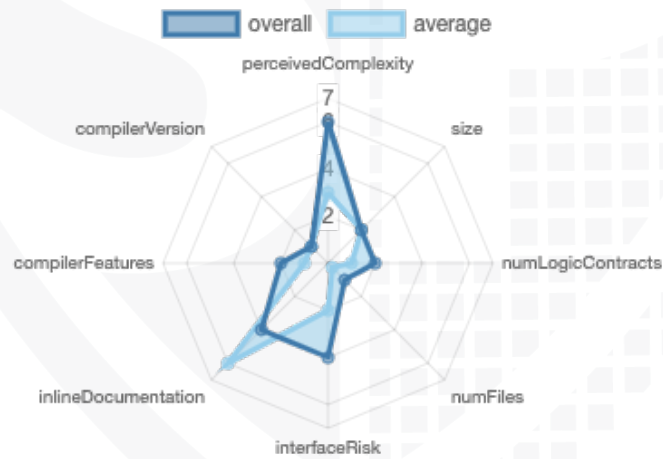
File Name	SHA-1 Hash
contracts/BeliFarm.sol	b3b1e5f2385b37da44df13c33eedc797e1f73d83
contracts/FeeReceiver.sol	c9baec4e23e22cd94d2905d23625647a9ca37864
contracts/Locker.sol	fb470be3b06abc1bb5e135b319e6f5724cdf252d
contracts/Referral.sol	3e83823eaccbe69f9b270c4c87e00cfa74aa258e

# Metrics

## Source Lines v1.0



## Risk Level v1.0



## Capabilities

### Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	4	0	0	1

### 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	45	0

Version	External	Internal	Private	Pure	View
1.0	23	35	2	0	20

### State Variables

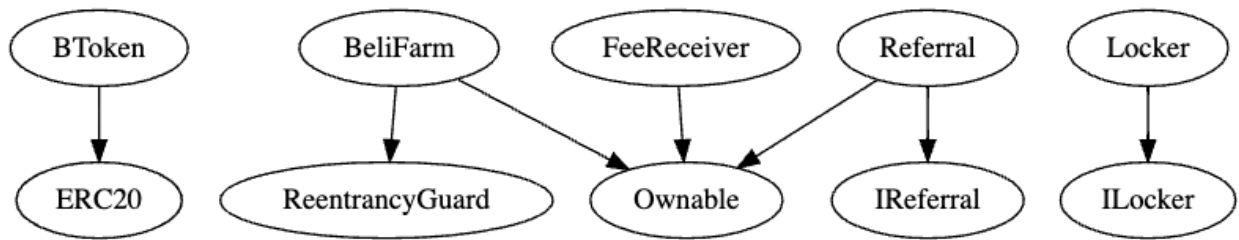
Version	Total	Public
1.0	43	40

### Capabilities

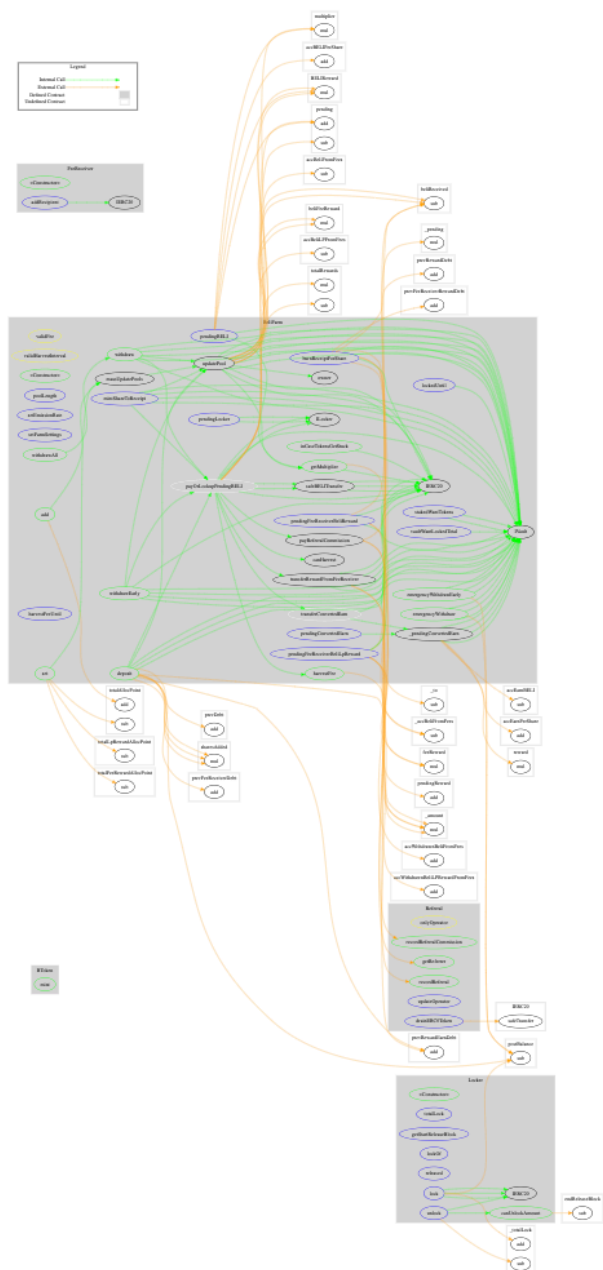
Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	0.6.12				

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
1.0	yes					

## Inheritance Graph v1.0



# CallGraph v1.0



## Scope of Work/Verify Claims

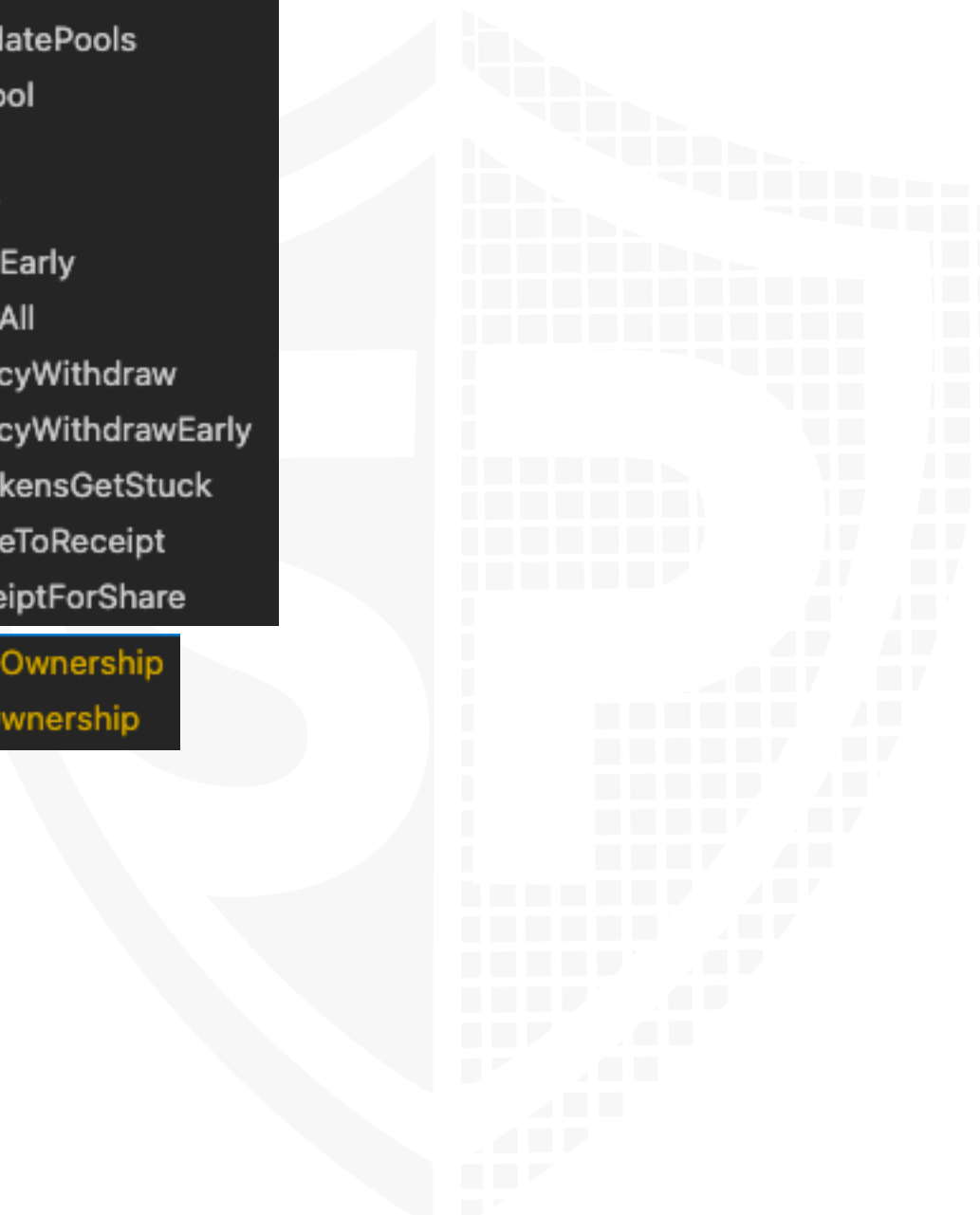
The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Cannot mint any new tokens
2. Cannot burn or lock user funds
3. Cannot pause the contract
4. Overall checkup (Smart Contract Security)



## Write functions of contract v1.0



```
setEmissionRate  
setFarmSettings  
add  
set  
massUpdatePools  
updatePool  
deposit  
withdraw  
withdrawEarly  
withdrawAll  
emergencyWithdraw  
emergencyWithdrawEarly  
inCaseTokensGetStuck  
mintShareToReceipt  
burnReceiptForShare  
  
renounceOwnership  
transferOwnership
```

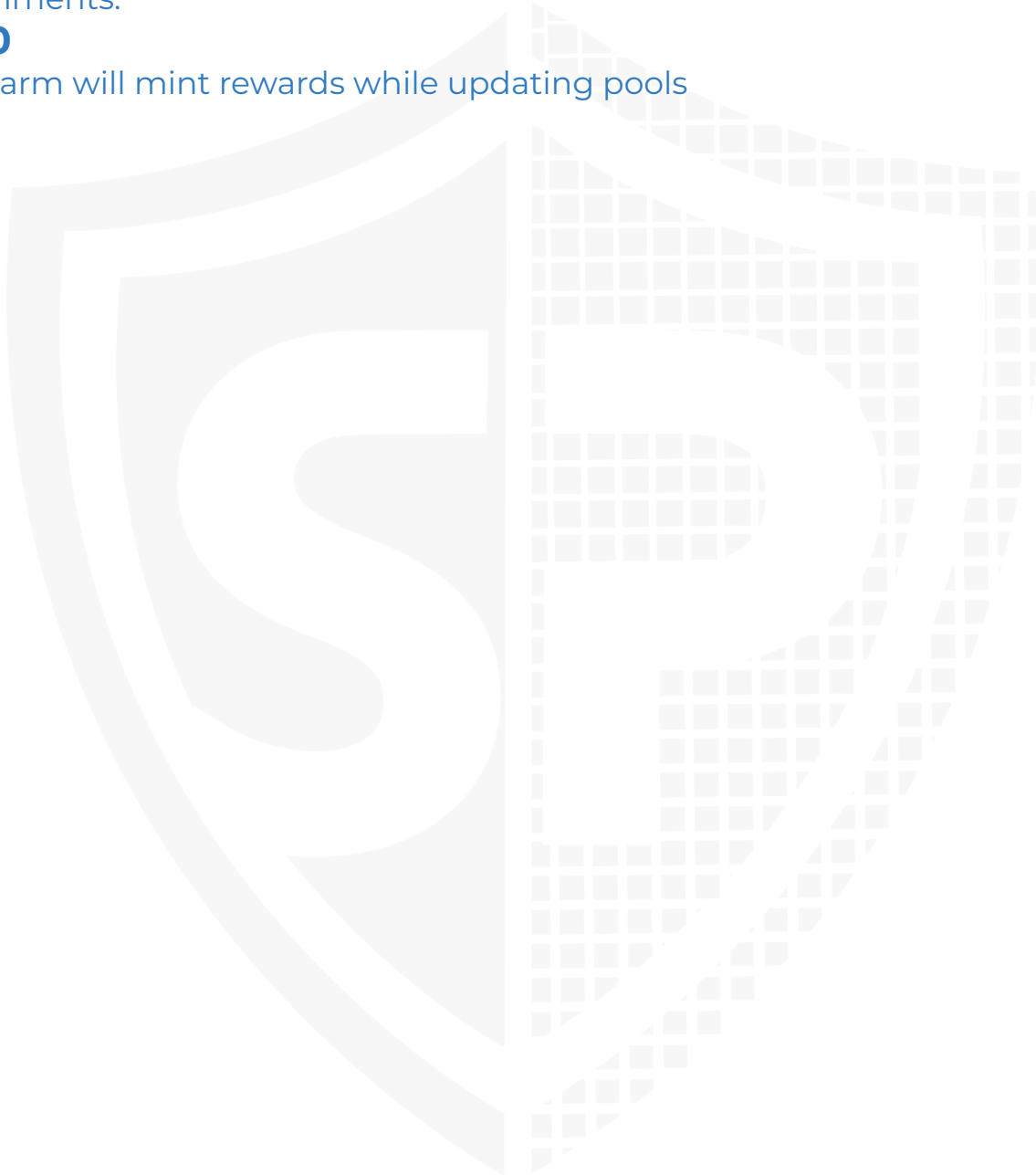
## Deployer cannot mint any new tokens

Name	Exist	Tested	Status
cannot mint	✓	✓	✗

Comments:

**v1.0**

- Farm will mint rewards while updating pools





## Deployer cannot burn or lock user funds

Name	Exist	Tested	Status
cannot lock	✓	✓	✓
cannot burn	✓	✓	✗

Comments:

**v1.0**

- Everybody can burn receipt for shares with `burnReceiptForShare` function in `BeliFarm`

## Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	—	—	—



## Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

### Legend

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

# Modifiers and public functions

v1.0

BeliFarm

- setEmissionRate
  - onlyOwner
- setFarmSettings
  - onlyOwner
- add
  - onlyOwner
  - validFee
  - validHarvestInterval
- set
  - onlyOwner
  - validFee
  - validHarvestInterval
  - massUpdatePools
  - updatePool
- deposit
  - nonReentrant
- withdraw
  - nonReentrant
- withdrawEarly
  - nonReentrant
- withdrawAll
  - nonReentrant
- emergencyWithdraw
  - nonReentrant
- emergencyWithdrawEarly
  - nonReentrant
- inCaseTokensGetStuck
  - onlyOwner
- mintShareToReceipt
  - nonReentrant
- burnReceiptForShare
  - nonReentrant

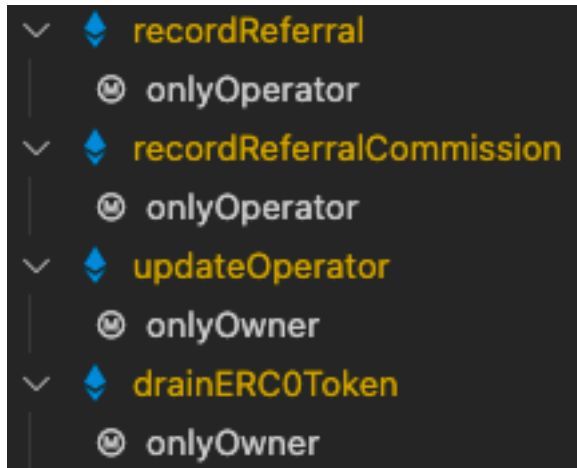
FeeReceiver

- addRecipient
  - onlyOwner

Locker

- lock
- unlock

## Referral










## Comments

- Deployer can set following state variables without any limitations
  - `Poolinfo.harvestFeeInterval`
- Deployer can enable/disable following state variables
  - Either `Poolinfo.isLpReward` or `Poolinfo.isFeeReceiverReward`
  - operators
  - `totalReferralCommissions`
  - referrers

**Please check if an `OnlyOwner` or similar restrictive modifier has been forgotten.**

# Source Units in Scope

## v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/BeliFarm.sol	2	————	993	907	725	104	619	
	contracts/FeeReceiver.sol	1	————	19	19	13	1	12	————
	contracts/Locker.sol	1	————	90	90	69	1	58	————
	contracts/Referral.sol	1	————	64	64	49	7	34	————
	<b>Totals</b>	<b>5</b>	————	<b>1166</b>	<b>1080</b>	<b>856</b>	<b>113</b>	<b>723</b>	

### 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

Issue	File	Type	Line	Description
#1	Referral	The arithmetic operation can overflow.	44	It is possible to cause an arithmetic overflow. Prevent the overflow by constraining inputs using the require() statement or use the OpenZeppelin SafeMath library for integer arithmetic operations

## Medium issues

**No medium issues**

## Low issues

Issue	File	Type	Line	Description
#1	Main	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	BeliFarm	Missing Zero Address Validation (missing-zero-check)	134	Check that the address is not zero
#3	FeeReceiver	Missing Zero Address Validation (missing-zero-check)	12	Check that the address is not zero

#4	Locker	Missing Zero Address Validation (missing-zero-check)	25	Check that the address is not zero
----	--------	--	----	------------------------------------

## Informational issues

Issue	File	Type	Line	Description
#1	BeliFarm	Unused return values	807, 836	Ensure that all the return values of the function calls are used and handle both success and failure cases if needed by the business logic
#2	All	NatSpec documentation missing	-	If you start to comment your code, also comment all other functions, variables etc.
#3	BeliFarm	Misspelling	647	Change:  - Strat to Start line: 647
#4	FeeReceiver	misleading name as the functionality does not match the name	16	Change the function names from addRecipient for example to approveRecipient to make clear what the function is doing  Make sure to change it everywhere else where you using the function (contracts, interfaces etc.)

## Commented Code exist

There are some instances of code being commented out in the following files that should be removed:

File	Line	Comment
BeliFarm	990-991	// user.rewardDebt = user.shares.mul(pool.accBELIPerShare).div(1e12); // user.rewardFeeReceiverDebt = user.shares.mul(pool.accBELIPerShareFromFees).div(1e12);

## Recommendation

Remove the commented code, or address them properly.



## Audit Comments

### 29. January 2022:

- [Read whole report for more information](#)



## SWC Attacks

ID	Title	Relationships	Status
<a href="#">SW C-1 36</a>	Unencrypted Private Data On-Chain	<a href="#">CWE-767: Access to Critical Private Variable via Public Method</a>	PASSED
<a href="#">SW C-1 35</a>	Code With No Effects	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 34</a>	Message call with hardcoded gas amount	<a href="#">CWE-655: Improper Initialization</a>	PASSED
<a href="#">SW C-1 33</a>	Hash Collisions With Multiple Variable Length Arguments	<a href="#">CWE-294: Authentication Bypass by Capture-replay</a>	PASSED
<a href="#">SW C-1 32</a>	Unexpected Ether balance	<a href="#">CWE-667: Improper Locking</a>	PASSED
<a href="#">SW C-1 31</a>	Presence of unused variables	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 30</a>	Right-To-Left-Override control character (U+202E)	<a href="#">CWE-451: User Interface (UI) Misrepresentation of Critical Information</a>	PASSED
<a href="#">SW C-1 29</a>	Typographical Error	<a href="#">CWE-480: Use of Incorrect Operator</a>	PASSED
<a href="#">SW C-1 28</a>	DoS With Block Gas Limit	<a href="#">CWE-400: Uncontrolled Resource Consumption</a>	PASSED

<a href="#">SW C-1 27</a>	Arbitrary Jump with Function Type Variable	<a href="#">CWE-695: Use of Low-Level Functionality</a>	<b>PASSED</b>
<a href="#">SW C-1 25</a>	Incorrect Inheritance Order	<a href="#">CWE-696: Incorrect Behavior Order</a>	<b>PASSED</b>
<a href="#">SW C-1 24</a>	Write to Arbitrary Storage Location	<a href="#">CWE-123: Write-what-where Condition</a>	<b>PASSED</b>
<a href="#">SW C-1 23</a>	Requirement Violation	<a href="#">CWE-573: Improper Following of Specification by Caller</a>	<b>PASSED</b>
<a href="#">SW C-1 22</a>	Lack of Proper Signature Verification	<a href="#">CWE-345: Insufficient Verification of Data Authenticity</a>	<b>PASSED</b>
<a href="#">SW C-1 21</a>	Missing Protection against Signature Replay Attacks	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>
<a href="#">SW C-1 20</a>	Weak Sources of Randomness from Chain Attributes	<a href="#">CWE-330: Use of Insufficiently Random Values</a>	<b>PASSED</b>
<a href="#">SW C-11 9</a>	Shadowing State Variables	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-11 8</a>	Incorrect Constructor Name	<a href="#">CWE-665: Improper Initialization</a>	<b>PASSED</b>
<a href="#">SW C-11 7</a>	Signature Malleability	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>

<a href="#">SW C-11 6</a>	Timestamp Dependence	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 5</a>	Authorization through tx.origin	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 4</a>	Transaction Order Dependence	<a href="#">CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')</a>	<b>PASSED</b>
<a href="#">SW C-11 3</a>	DoS with Failed Call	<a href="#">CWE-703: Improper Check or Handling of Exceptional Conditions</a>	<b>PASSED</b>
<a href="#">SW C-11 2</a>	Delegatecall to Untrusted Callee	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 1</a>	Use of Deprecated Solidity Functions	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 0</a>	Assert Violation	<a href="#">CWE-670: Always-Incorrect Control Flow Implementation</a>	<b>PASSED</b>
<a href="#">SW C-1 09</a>	Uninitialized Storage Pointer	<a href="#">CWE-824: Access of Uninitialized Pointer</a>	<b>PASSED</b>
<a href="#">SW C-1 08</a>	State Variable Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-1 07</a>	Reentrancy	<a href="#">CWE-841: Improper Enforcement of Behavioral Workflow</a>	<b>PASSED</b>
<a href="#">SW C-1 06</a>	Unprotected SELFDESTRUCT Instruction	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>

<a href="#">SW</a> <a href="#">C-1</a> <a href="#">05</a>	Unprotected Ether Withdrawal	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">04</a>	Unchecked Call Return Value	<a href="#">CWE-252: Unchecked Return Value</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">03</a>	Floating Pragma	<a href="#">CWE-664: Improper Control of a Resource Through its Lifetime</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">02</a>	Outdated Compiler Version	<a href="#">CWE-937: Using Components with Known Vulnerabilities</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">01</a>	Integer Overflow and Underflow	<a href="#">CWE-682: Incorrect Calculation</a>	<b>NOT PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">00</a>	Function Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>

The logo features the words "SolidProofed" in a white, handwritten-style script. The text is superimposed on a blue background that includes a faint, stylized shield emblem with a grid pattern. The shield is composed of several overlapping layers, creating a sense of depth and security.

SolidProofed

**Blockchain Security | Smart Contract Audits | KYC**

A small horizontal bar representing the German flag, with black, red, and gold stripes.

MADE IN GERMANY