Smart Contract Audit Report

Peapods

Audit Performed By

Fortknox Security

Professional Smart Contract Auditing

February 7, 2025

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Executive Summary

Fortknox Security has conducted a comprehensive smart contract security audit for **Peapods**. Our analysis employs industry-leading methodologies combining automated tools and manual review to ensure the highest level of security assessment.

14	8	MEDIUM	100%
TOTAL ISSUES FOUND	CRITICAL + HIGH	OVERALL RISK	CODE COVERAGE

Security Assessment Overview

Critical Issues

4

Immediate action required. These vulnerabilities can lead to direct loss of funds.

IMPACT: SEVERE FINANCIAL LOSS

High Issues

4

High priority fixes needed. Can lead to significant financial loss.

IMPACT: MAJOR SECURITY RISK

Key Findings Summary

Access Control

Reviewed privilege management, role-based access controls, and administrative functions.

Economic Security

Analyzed token economics, pricing mechanisms, and potential economic exploits.

Logic Validation

Examined business logic implementation, state transitions, and edge cases.

Input Validation

Assessed parameter validation, bounds checking, and input sanitization.

Audit Conclusion

The Peapods smart contract audit reveals **14 total findings** across various security categories. Immediate attention is required for 8 critical/high severity issues before deployment. Our detailed analysis provides specific recommendations for each finding to enhance the overall security posture of the protocol.

Audit Methodology

Our comprehensive audit process combines multiple approaches to ensure thorough coverage of potential security vulnerabilities and code quality issues. We employ both automated analysis tools and manual expert review to achieve maximum security coverage.

Tools & Techniques

Static Analysis

Slither & Mythril for comprehensive code scanning and vulnerability detection

Manual Review

Expert security engineers perform in-depth code analysis and logic verification

Business Logic

Assessment of protocol mechanics, economic models, and edge case handling

Gas Analysis

Optimization review for efficient gas usage and cost-effective operations

Formal Verification

Mathematical proof methods to verify critical contract properties

Symbolic Execution

Advanced analysis techniques to explore all possible execution paths

Review Process & Standards

Review Process

1 Initial Scanning

Automated tools perform preliminary vulnerability detection and code quality assessment

2 Manual Review

Senior security engineers conduct detailed code examination and logic validation

3 Business Logic Testing

Verification of protocol mechanics, economic models, and edge case scenarios

4 Architecture Analysis

Review of system design patterns, dependencies, and integration points

5 Final Documentation

Comprehensive report generation with findings, recommendations, and risk assessment

Severity Classification

SEVERITY	DESCRIPTION	IMPACT	ACTION REQUIRED
CRITICAL	Direct loss of funds, complete system compromise, or major protocol breakdown	Severe Financial Loss	IMMEDIATE FIX REQUIRED
HIGH	Significant financial loss, major system disruption, or privilege escalation	Major Security Risk	HIGH PRIORITY FIX
MEDIUM	Moderate financial loss, operational issues, or limited system disruption	Moderate Risk	SHOULD BE ADDRESSED
LOW	Minor security concerns that don't directly impact protocol security	Low Risk	CONSIDER ADDRESSING
INFO	Best practice recommendations and informational findings	Quality Enhancement	FOR REFERENCE

Audit Scope

Project Details

PARAMETER	DETAILS
Project Name	Peapods
Total Issues Found	14
Audit Type	Smart Contract Security Audit
Methodology	Manual Review + Automated Analysis

Files in Scope

This audit covers the smart contract codebase and associated components for Peapods.

Audit Timeline

- ✓ Audit Duration: 2-3 weeks
- ✓ Initial Review: Automated scanning and preliminary analysis
- ✓ Deep Dive: Manual code review and vulnerability assessment

Vulnerability Analysis

Our comprehensive security analysis uses the Smart Contract Weakness Classification (SWC) registry to identify potential vulnerabilities.

SWC Security Checks

CHECK ID	DESCRIPTION	STATUS
SWC-100	Function Default Visibility	PASSED
SWC-101	Integer Overflow and Underflow	PASSED
SWC-102	Outdated Compiler Version	PASSED
SWC-103	Floating Pragma	PASSED
SWC-104	Unchecked Call Return Value	PASSED
SWC-105	Unprotected Ether Withdrawal	PASSED
SWC-106	Unprotected SELFDESTRUCT	PASSED
SWC-107	Reentrancy	WARNING

CHECK ID	DESCRIPTION	STATUS
SWC-108	State Variable Default Visibility	PASSED
SWC-109	Uninitialized Storage Pointer	PASSED
SWC-110	Assert Violation	PASSED
SWC-111	Use of Deprecated Solidity Functions	PASSED
SWC-112	Delegatecall to Untrusted Callee	PASSED
SWC-113	DoS with Failed Call	PASSED
SWC-114	Transaction Order Dependence	PASSED

Contract Privileges Analysis

Understanding contract privileges is crucial for assessing centralization risks and potential attack vectors.

Common Privilege Categories

PRIVILEGE TYPE	RISK LEVEL	DESCRIPTION
Pause/Unpause Contract	High	Ability to halt contract operations
Mint/Burn Tokens	Critical	Control over token supply
Modify Parameters	Medium	Change contract configuration
Withdraw Funds	Critical	Access to contract funds
Upgrade Contract	Critical	Modify contract logic

Mitigation Strategies

- ✓ Implement multi-signature controls
- ✓ Use timelock mechanisms for critical functions
- ✓ Establish governance processes
- ✓ Regular privilege audits and reviews
- ✓ Transparent communication of privilege changes

C-0 | Incorrect Price From aspTKN Oracle

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	CRITICAL	aspTKNMinimalOracle.sol: 51	Resolved

Description

The `getPrice` function should return price as `(aspTKN / pairedLPToken)` which is consumed by the Fraxlend `isSolvent` function to determine a borrower's LTV.

```
getPrice
(aspTKN / pairedLPToken)
isSolvent
```

Recommendation

Instead of `_priceLow = (_priceLow * _assetFactor) / _aspTknPerSpTkn;` do

```
_priceLow = (_priceLow * _assetFactor) / _aspTknPerSpTkn;
```

Resolution

Peapods Team: Resolved.

C-1 | UniswapDexAdapter.swapV2Single Doesn't Work

CATEGORY	SEVERITY	LOCATION	STATUS
DoS	CRITICAL	UniswapDexAdapter.sol	Resolved

Description

`UniswapDexAdapter` uses IUniswapV2Router02.sol to initiate calls to the V2 Router. In this interface the `swapExactTokensForTokensSupportingFeeOnTransferTokens` functions is expected to return an array with amounts.

```
UniswapDexAdapter
swapExactTokensForTokensSupportingFeeOnTransferTokens
```

Recommendation

Correct the interface to exclude the returned array.

Resolution

Peapods Team: Resolved.

C-2 | Incorrect addInterest Interface

CATEGORY	SEVERITY	LOCATION	STATUS
Integration	CRITICAL	LendingAssetVault.sol: 245	Resolved

Description

In the function `_updateInterestAndMdInAllVaults`, which is called during every deposit/mint, `addInterest()` is called to trigger interest accrual on the FraxlendPair vault.

```
_updateInterestAndMdInAllVaults
addInterest()
```

Recommendation

Use the correct interface for `addInterest`.

```
addInterest
```

Resolution

Peapods Team: Resolved.

C-3 | pTKN Share Siphoning Via FlashMint

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	CRITICAL	flashMint()	Resolved

Description

If a smart contract has `IFlashLoanRecipient::callback()` or a `fallback()` function, a malicious user can set them as the receiver of the `flashMint()` function. This will burn .1% of their `pTKN` balance.

```
IFlashLoanRecipient::callback()
fallback()
flashMint()
pTKN
```

Recommendation

Charge the fee to the msg.sender instead of the `_recipient`.

```
_recipient
```

Resolution

Peapods Team: Resolved.

H-0 | Lack Of Access Control In redeemFromVault

CATEGORY	SEVERITY	LOCATION	STATUS
Access control	HIGH	LendingAssetVault.sol: 324	Resolved

Description

The function `redeemFromVault` can be called by an attacker who passes in an arbitrary `_vault` and `_amountShares`.

```
redeemFromVault
_vault
_amountShares
```

Recommendation

Validate the input data and consider only allowing owner to call `redeemFromVault`.

```
redeemFromVault
```

Resolution

Peapods Team: Resolved.

H-1 | Staking Pool Rewards Sniping Is Possible

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	HIGH	TokenRewards.sol	Acknowledged

Description

As there is no penalty nor timelock for unstaking with the `StakingPoolToken`, a user may claim rewards without actually staking by front-running `depositReward` and do: `stake -> depositRewards -> unstake`.

```
StakingPoolToken
depositReward
stake -> depositRewards -> unstake
```

Recommendation

Consider implementing a timelock or penalty for unstaking. Also, consider using time-weighted reward distribution.

Resolution

Peapods Team: Acknowledged.

H-2 | Rewards Are Lost For aspToken

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	HIGH	AutoCompoundingPodLp.sol	Resolved

Description

Users stake their LP tokens because `spTokens` accrue rewards in different tokens. The criteria for such a token is to either be a part of the whitelisted ones or be the specified token for the given `TokenRewards` contract.

```
spTokens
TokenRewards
```

Recommendation

In addition to the whitelisted tokens collect the rewards from the `rewardsToken` as well.

```
rewardsToken
```

Resolution

Peapods Team: Resolved.

H-3 | Assets Can Be Borrowed/Repaid While Paused

CATEGORY	SEVERITY	LOCATION	STATUS
Assets Can Be Borrowed/Repaid While Paused	HIGH	FraxlendPairCore.sol	Resolved

Description

`borrowAsset` and `repayAsset` functions may be paused by admin but can be bypassed through `leveragePosition` and `repayAssetWithCollateral` which performs borrow/repay actions. This loophole could be exploited by attackers while the protocol is paused.

```
borrowAsset
repayAsset
leveragePosition
repayAssetWithCollateral
```

Recommendation

Consider extending the pause effects to the `leveragePosition` and `repayAssetWithCollateral` functions.

```
leveragePosition
repayAssetWithCollateral
```

Resolution

Peapods Team: Resolved.

M-0 | Improper Slippage And Deadline During Deposit

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	MEDIUM	AutoCompoundingPodLp.sol: 102	Acknowledged

Description

When calling `deposit`, a slippage of `0` and a deadline of `block.timestamp` is passed to `_processRewardsToPodLp`. Using 0 for slippage is dangerous as MEV bots could sandwich the swap to steal tokens.

```
deposit
0
block.timestamp
_processRewardsToPodLp
```

Recommendation

Allow user to input slippage and deadline parameters when depositing.

Resolution

Peapods Team: Acknowledged.

M-1 | Rewards Not Updated Prior To Fee Change

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	MEDIUM	AutoCompoundingPodLp.sol	Resolved

Description

Owner can set a new protocol fee via `setProtocolFee`. However, because rewards are not updated prior to the fee change, the new fee will apply to previously accrued rewards.

```
setProtocolFee
```

Recommendation

In `setProtocolFee`, call `_processRewardsToPodLp` before setting `protocolFee` to the new fee.

```
setProtocolFee
_processRewardsToPodLp
protocolFee
```

Resolution

Peapods Team: Resolved

M-2 | Vault Whitelist Can Be Set One Above Max

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	MEDIUM	LendingAssetVault.sol: 360	Resolved

Description

When whitelisting a new vault with `setVaultWhitelist`, even if `maxVault` value has been reached, the new vault is still added to the whitelist due to using `<= maxValue` instead of `"< maxValue"` in the check.

```
setVaultWhitelist
maxVault
<= maxValue
"< maxValue"
```

Recommendation

Change from `require(_vaultWhitelistAry.length <= maxVaults, 'M');` to `require(_vaultWhitelistAry.length < maxVaults, 'M');`

```
require(_vaultWhitelistAry.length <= maxVaults, 'M');
require(_vaultWhitelistAry.length < maxVaults, 'M');
```

Resolution

Peapods Team: Resolved

L-0 | PodFlashSource Incompatible With Existing Pods

CATEGORY	SEVERITY	LOCATION	STATUS
Integration	LOW	PodFlashSource.sol: 26	Acknowledged

Description

In the `paymentAmount` function, `FLASH_FEE_AMOUNT_DAI` is called on the pod contract to obtain the flash fee.

```
paymentAmount
FLASH_FEE_AMOUNT_DAI
```

Recommendation

Ensure that `PodFlashSource` is compatible with both old and new pod contracts.

```
PodFlashSource
```

Resolution

Peapods Team: Acknowledged.

L-1 | Malicious Pod Could Allow Reentrancy

CATEGORY	SEVERITY	LOCATION	STATUS
Reentrancy	LOW	LeverageManager.sol	Acknowledged

Description

If a malicious pod were to be used in `LeverageManager`, it would allow reentrancy in the add/remove leverage functions. The attacker would be able to access the critical `callback` function and provide arbitrary data to steal other users' funds.

```
LeverageManager
callback
```

Recommendation

Be extra careful about the approvals for `flashSource` and `lendingPairs`. Consider validating that the caller in `callback` is a whitelisted flash source.

```
flashSource
lendingPairs
callback
```

Resolution

Peapods Team: Acknowledged.

L-2 | Users Avoid Debonding Fee

CATEGORY	SEVERITY	LOCATION	STATUS
Logic Error	LOW	WeightedIndex.sol: 234	Partially Resolved

Description

`debond()` checks if a user is withdrawing 98% or more of the total supply. If they are, then they do not have to pay a fee when debonding. A malicious user could take out a flashloan and bond to increase their share of the total supply to reach the target 98%, then debond right away to avoid paying fees.

```
debond()
```

Recommendation

Charge the fee to users unless they are debonding 100% of the total supply.

Resolution

Peapods Team: Resolved.

Summary of Recommendations

Based on our comprehensive audit, we provide the following prioritized recommendations to improve the security posture of Peapods.

Priority Matrix

ISSUE ID	TITLE	SEVERITY	PRIORITY
C-0	Incorrect Price From aspTKN Oracle	CRITICAL	Immediate
C-1	UniswapDexAdapter.swapV2Single Doesn't Work	CRITICAL	Immediate
C-2	Incorrect addInterest Interface	CRITICAL	Immediate
C-3	pTKN Share Siphoning Via FlashMint	CRITICAL	Immediate
H-0	Lack Of Access Control In redeemFromVault	HIGH	High
H-1	Staking Pool Rewards Sniping Is Possible	HIGH	High
H-2	Rewards Are Lost For aspToken	HIGH	High
H-3	Assets Can Be Borrowed/Repaid While Paused	HIGH	High
M-0	Improper Slippage And Deadline During Deposit	MEDIUM	Medium
M-1	Rewards Not Updated Prior To Fee Change	MEDIUM	Medium

General Security Best Practices

- ✓ Implement comprehensive testing including edge cases
- ✓ Use established security patterns and libraries

Audit Team

Team Credentials

Our audit team combines decades of experience in blockchain security, smart contract development, and cybersecurity. Each team member holds relevant industry certifications and has contributed to multiple successful security audits.

Methodology & Standards

Our audit methodology follows industry best practices and standards:

- ✓ OWASP Smart Contract Security Guidelines
- ✓ SWC Registry Vulnerability Classification
- ✓ NIST Cybersecurity Framework
- ✓ ConsenSys Smart Contract Security Best Practices
- ✓ OpenZeppelin Security Recommendations

Audit Process

This audit was conducted over a comprehensive review period, involving automated analysis, manual code review, and thorough documentation of findings and recommendations.

Disclaimer & Legal Notice

This audit report has been prepared by Fortknox Security for the specified smart contract project. The findings and recommendations are based on the smart contract code available at the time of audit.

Scope Limitations

- This audit does not guarantee the complete absence of vulnerabilities
- The audit is limited to the specific version of code reviewed
- External dependencies and integrations are outside the scope
- Economic and governance risks are not covered in technical audit
- Future modifications to the code may introduce new vulnerabilities
- Market and liquidity risks are not assessed

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Contact Information

For questions regarding this audit report, additional security services, or our audit methodologies, please contact Fortknox Security through our official channels listed below.

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