



Tender.fi

Smart Contract Audit Report

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AUDITED DETAILS

Audited Project

| Project name | Token ticker | Blockchain |
|--------------|--------------|------------|
| Tender.fi | TND | Arbitrum |

Addresses

| | |
|---------------------------|--|
| Contract address | 0xc47d9753f3b32aa9548a7c3f30b6aec3b2d2798c |
| Contract deployer address | 0x5BffD59217c3c1De7D422Ce4f0D87Ce97DF8395c |

Project Website

<https://www.tender.fi/>

Codebase

<https://arbiscan.io/address/0xc47d9753f3b32aa9548a7c3f30b6aec3b2d2798c#code>

SUMMARY

Tender.fi is a decentralized open-source protocol for borrowing and lending that is leading the way in innovation. It aims to provide support for autocompounding and collateralization for popular DeFi assets, starting with GMX and GLP. This is a unique and important aspect of the protocol, as it allows for the collateralization of long-tail assets. Tender.fi's approach to borrowing and lending is what sets it apart from other DeFi protocols.

Contract Summary

Documentation Quality

Tender.fi provides a very poor documentation with standard of solidity base code.

- The technical description is provided unclear and disorganized.

Code Quality

The Overall quality of the basecode is poor.

- Solidity basecode and rules are unclear and disorganized by Tender.fi.

Test Coverage

Test coverage of the project is 100% (Through Codebase)

Audit Findings Summary

- SWC-103 | Pragma statements can be allowed to float when a contract is intended on lines 49.
- SWC-107 | It is recommended to use a reentrancy lock, reentrancy weaknesses detected on lines 776, 777, 753, 753, 754, 754, 756, 759 and 165.
- SWC-110 SWC-123 | It is recommended to use of revert(), assert(), and require() in Solidity, and the new REVERT opcode in the EVM on lines 165.
- SWC-113 SWC-128 | It is recommended to implement the contract logic to handle failed calls and block gas limit on lines 778.

CONCLUSION

We have audited the Tender.fi project released in January 2023 to find issues and identify potential security vulnerabilities in the Tender.fi project. This process is used to find the technical problems and security loopholes that may be found in smart contracts.

The security audit report gave unsatisfactory results with the discovery of medium-risk issues and several other low-risk issues.

Writing a contract that does not follow the Solidity style guide can pose a significant risk. The medium-risk and low problems we found in the smart contract are multiple calls are executed in the same transaction, a floating pragma is set, read of persistent state following the external call, a call to a user-supplied address is executed, and requirement violation. This call is executed following another call within the same transaction. It is possible that the call never gets executed if a prior call fails permanently. This might be caused intentionally by a malicious callee. If possible, refactor the code such that each transaction only executes one external call or make sure that all callees can be trusted (i.e. they're part of your own codebase). A requirement was violated in a nested call and the call was reverted as a result. Make sure valid inputs are provided to the nested call (for instance, via passed arguments).

AUDIT RESULT

| Article | Category | Description | Result |
|-----------------------------------|--------------------|---|-------------|
| Default Visibility | SWC-100 SWC-108 | Functions and state variables visibility should be set explicitly. Visibility levels should be specified consciously. | PASS |
| Integer Overflow and Underflow | SWC-101 | If unchecked math is used, all math operations should be safe from overflows and underflows. | PASS |
| Outdated Compiler Version | SWC-102 | It is recommended to use a recent version of the Solidity compiler. | PASS |
| Floating Pragma | SWC-103 | Contracts should be deployed with the same compiler version and flags that they have been tested thoroughly. | ISSUE FOUND |
| Unchecked Call Return Value | SWC-104 | The return value of a message call should be checked. | PASS |
| Unprotected Ether Withdrawal | SWC-105 | Due to missing or insufficient access controls, malicious parties can withdraw from the contract. | PASS |
| SELFDESTRUCT Instruction | SWC-106 | The contract should not be self-destructible while it has funds belonging to users. | PASS |
| Reentrancy | SWC-107 | Check effect interaction pattern should be followed if the code performs recursive call. | ISSUE FOUND |
| Uninitialized Storage Pointer | SWC-109 | Uninitialized local storage variables can point to unexpected storage locations in the contract. | PASS |
| Assert Violation | SWC-110 SWC-123 | Properly functioning code should never reach a failing assert statement. | ISSUE FOUND |
| Deprecated Solidity Functions | SWC-111 | Deprecated built-in functions should never be used. | PASS |
| Delegate call to Untrusted Callee | SWC-112 | Delegatecalls should only be allowed to trusted addresses. | PASS |

| | | | |
|-------------------------------------|-------------------------------|---|--------------------|
| DoS (Denial of Service) | SWC-113 SWC-128 | Execution of the code should never be blocked by a specific contract state unless required. | ISSUE FOUND |
| Race Conditions | SWC-114 | Race Conditions and Transactions Order Dependency should not be possible. | PASS |
| Authorization through tx.origin | SWC-115 | tx.origin should not be used for authorization. | PASS |
| Block values as a proxy for time | SWC-116 | Block numbers should not be used for time calculations. | PASS |
| Signature Unique ID | SWC-117 SWC-121 SWC-122 | Signed messages should always have a unique id. A transaction hash should not be used as a unique id. | PASS |
| Incorrect Constructor Name | SWC-118 | Constructors are special functions that are called only once during the contract creation. | PASS |
| Shadowing State Variable | SWC-119 | State variables should not be shadowed. | PASS |
| Weak Sources of Randomness | SWC-120 | Random values should never be generated from Chain Attributes or be predictable. | PASS |
| Write to Arbitrary Storage Location | SWC-124 | The contract is responsible for ensuring that only authorized user or contract accounts may write to sensitive storage locations. | PASS |
| Incorrect Inheritance Order | SWC-125 | When inheriting multiple contracts, especially if they have identical functions, a developer should carefully specify inheritance in the correct order. The rule of thumb is to inherit contracts from more /general/ to more /specific/. | PASS |
| Insufficient Gas Griefing | SWC-126 | Insufficient gas griefing attacks can be performed on contracts which accept data and use it in a sub-call on another contract. | PASS |
| Arbitrary Jump Function | SWC-127 | As Solidity doesnt support pointer arithmetics, it is impossible to change such variable to an arbitrary value. | PASS |

| | | | |
|----------------------------|--------------------|--|------|
| Typographical Error | SWC-129 | A typographical error can occur for example when the intent of a defined operation is to sum a number to a variable. | PASS |
| Override control character | SWC-130 | Malicious actors can use the Right-To-Left-Override unicode character to force RTL text rendering and confuse users as to the real intent of a contract. | PASS |
| Unused variables | SWC-131 SWC-135 | Unused variables are allowed in Solidity and they do not pose a direct security issue. | PASS |
| Unexpected Ether balance | SWC-132 | Contracts can behave erroneously when they strictly assume a specific Ether balance. | PASS |
| Hash Collisions Variable | SWC-133 | Using <code>abi.encodePacked()</code> with multiple variable length arguments can, in certain situations, lead to a hash collision. | PASS |
| Hardcoded gas amount | SWC-134 | The <code>transfer()</code> and <code>send()</code> functions forward a fixed amount of 2300 gas. | PASS |
| Unencrypted Private Data | SWC-136 | It is a common misconception that private type variables cannot be read. | PASS |

SMART CONTRACT ANALYSIS

| | |
|------------------|---|
| Started | Thursday Jan 05 2023 05:37:45 GMT+0000 (Coordinated Universal Time) |
| Finished | Friday Jan 06 2023 02:58:48 GMT+0000 (Coordinated Universal Time) |
| Mode | Standard |
| Main Source File | TND.sol |

Detected Issues

| ID | Title | Severity | Status |
|---------|--|----------|--------------|
| SWC-113 | MULTIPLE CALLS ARE EXECUTED IN THE SAME TRANSACTION. | medium | acknowledged |
| SWC-103 | A FLOATING PRAGMA IS SET. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | WRITE TO PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | WRITE TO PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL. | low | acknowledged |
| SWC-107 | A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED. | low | acknowledged |
| SWC-123 | REQUIREMENT VIOLATION. | low | acknowledged |

SWC-113 | MULTIPLE CALLS ARE EXECUTED IN THE SAME TRANSACTION.

LINE 778

medium SEVERITY

This call is executed following another call within the same transaction. It is possible that the call never gets executed if a prior call fails permanently. This might be caused intentionally by a malicious callee. If possible, refactor the code such that each transaction only executes one external call or make sure that all callees can be trusted (i.e. they're part of your own codebase).

Source File

- TND.sol

Locations

```
777 address yieldTracker = yieldTrackers[i];
778 IYieldTracker(yieldTracker).updateRewards(_account);
779 }
780 }
781 }
782
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 49

low SEVERITY

The current pragma Solidity directive is ""^0.6.2"". It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

Source File

- TND.sol

Locations

```
48
49  pragma solidity ^0.6.2;
50
51  /**
52   * @dev Collection of functions related to the address type
53
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 776

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
775 function _updateRewards(address _account) private {
776   for (uint256 i = 0; i < yieldTrackers.length; i++) {
777     address yieldTracker = yieldTrackers[i];
778     IYieldTracker(yieldTracker).updateRewards(_account);
779   }
780 }
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 777

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
776     for (uint256 i = 0; i < yieldTrackers.length; i++) {
777         address yieldTracker = yieldTrackers[i];
778         IYieldTracker(yieldTracker).updateRewards(_account);
779     }
780 }
781
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 753

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
752
753  balances[_sender] = balances[_sender].sub(_amount, "BaseToken: transfer amount
exceeds balance");
754  balances[_recipient] = balances[_recipient].add(_amount);
755
756  if (nonStakingAccounts[_sender]) {
757
```

SWC-107 | WRITE TO PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 753

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
752
753  balances[_sender] = balances[_sender].sub(_amount, "BaseToken: transfer amount
exceeds balance");
754  balances[_recipient] = balances[_recipient].add(_amount);
755
756  if (nonStakingAccounts[_sender]) {
757
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 754

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
753  balances[_sender] = balances[_sender].sub(_amount, "BaseToken: transfer amount
exceeds balance");
754  balances[_recipient] = balances[_recipient].add(_amount);
755
756  if (nonStakingAccounts[_sender]) {
757    nonStakingSupply = nonStakingSupply.sub(_amount);
758
```


SWC-107 | WRITE TO PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 754

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
753 balances[_sender] = balances[_sender].sub(_amount, "BaseToken: transfer amount
exceeds balance");
754 balances[_recipient] = balances[_recipient].add(_amount);
755
756 if (nonStakingAccounts[_sender]) {
757     nonStakingSupply = nonStakingSupply.sub(_amount);
758 }
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 756

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
755
756   if (nonStakingAccounts[_sender]) {
757     nonStakingSupply = nonStakingSupply.sub(_amount);
758   }
759   if (nonStakingAccounts[_recipient]) {
760
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 759

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- TND.sol

Locations

```
758 }  
759 if (nonStakingAccounts[_recipient]) {  
760     nonStakingSupply = nonStakingSupply.add(_amount);  
761 }  
762  
763
```

SWC-107 | A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED.

LINE 165

low SEVERITY

An external message call to an address specified by the caller is executed. Note that the callee account might contain arbitrary code and could re-enter any function within this contract. Reentering the contract in an intermediate state may lead to unexpected behaviour. Make sure that no state modifications are executed after this call and/or reentrancy guards are in place.

Source File

- TND.sol

Locations

```
164 // solhint-disable-next-line avoid-low-level-calls
165 (bool success, bytes memory returndata) = target.call{ value: value }(data);
166 return _verifyCallResult(success, returndata, errorMessage);
167 }
168
169
```

SWC-123 | REQUIREMENT VIOLATION.

LINE 165

low SEVERITY

A requirement was violated in a nested call and the call was reverted as a result. Make sure valid inputs are provided to the nested call (for instance, via passed arguments).

Source File

- TND.sol

Locations

```
164 // solhint-disable-next-line avoid-low-level-calls
165 (bool success, bytes memory returndata) = target.call{ value: value }(data);
166 return _verifyCallResult(success, returndata, errorMessage);
167 }
168
169
```

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