



Part of Tibereum Group

# AUDITING REPORT

# Version Notes

Version	No. Pages	Date	Revised By	Notes
1.0	Total: 84	2022-02-16	Zapmore, Donut	Audit Final

## Audit Notes

Audit Date	2021-11-30 - 2022-02-15
Auditor/Auditors	Donut, MrTeaThyme, ByFixter
Auditor/Auditors Contact Information	contact@obeliskauditing.com
Notes	Specified code and contracts are audited for security flaws. UI/UX (website), logic, team, and tokenomics are not audited.
Audit Report Number	OB65969010

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# Obelisk Auditing

Defi is a relatively new concept but has seen exponential growth to a point where there is a multitude of new projects created every day. In a fast-paced world like this, there will also be an enormous amount of scams. The scams have become so elaborate that it's hard for the common investor to trust a project, even though it could be legit. We saw a need for creating high-quality audits at a fast phase to keep up with the constantly expanding market. With the Obelisk stamp of approval, a legitimate project can easily grow its user base exponentially in a world where trust means everything. Obelisk Auditing consists of a group of security experts that specialize in security and structural operations, with previous work experience from among other things, PricewaterhouseCoopers. All our audits will always be conducted by at least two independent auditors for maximum security and professionalism.

As a comprehensive security firm, Obelisk provides all kinds of audits and project assistance.

## Audit Information

The auditors always conducted a manual visual inspection of the code to find security flaws that automatic tests would not find. Comprehensive tests are also conducted in a specific test environment that utilizes exact copies of the published contract.

While conducting the audit, the Obelisk security team uses best practices to ensure that the reviewed contracts are thoroughly examined against all angles of attack. This is done by evaluating the codebase and whether it gives rise to significant risks. During the audit, Obelisk assesses the risks and assigns a risk level to each section together with an explanatory comment. Take note that the comments from the project team are their opinion and not the opinion of Obelisk.

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# Project Information

Name	Summit
Description	Summit Defi is bringing new and unique features to the #DeFi space, starting off with what we are calling "Yield Multiplying" launching first on \$FTM
Website	<a href="https://ftm.summitdefi.com/">https://ftm.summitdefi.com/</a>
Contact	<a href="https://twitter.com/SummitDefi">https://twitter.com/SummitDefi</a>
Contact information	@architect_dev on TG
Token Name(s)	N/A
Token Short	N/A
Contract(s)	See Appendix A
Code Language	Solidity
Chain	Fantom

# Audit of Summit v2

**After working through, Closing and Mitigating issues found, the current implementation of the contracts is as stated.**

Obelisk was commissioned by Summit on the 29th of November 2021 to conduct a comprehensive audit of Summits' contracts. The following audit was conducted between the 30th of November 2021 and the 15th of February 2022. Two of Obelisk's security experts went through the related contracts manually using industry standards to find if vulnerabilities could be exploited either by the project team or users.

The code is mostly written from scratch and it's then natural to have a multitude of findings when a new pair of eyes go through the code. The auditors gave suggestions on solving the findings they found and the project team was eager to listen and solve the majority of the issues.

Overall, all **High-Risk** issues are closed.

Most **Medium-Risk** findings are either Closed, Mitigated. Issue #5 and #8 are Partially Mitigated which means they work in the current setup, however, care should be taken when the setup is changed. Issue #45 refers to that the treasury addresses, as well as the lp generator address, are externally owned accounts, currently without multisig, which needs to be considered.

All **Low-Risk** issues besides issue #19 are Closed. Low-Risk issue #19 adds no risk to losing funds as the update can be done independently in case it's needed.

The informational findings are good to know while interacting with the project but don't directly damage the project in its current state, hence it's up to the project team if they deem that it's worth solving these issues.

**The team has not reviewed the UI/UX, logic, team, or tokenomics of the** Summit project. This document is a summary of the findings that the auditors found.

Please read the full document for a complete understanding of the audit.

## Summary Table

Finding	ID	Severity	Status
Deity Balances Update Out Of Order	#0001	High Risk	Closed
Emergency Withdraw Has Too Many Dependencies	#0002	High Risk	Closed
No Way To Call Emergency Withdraw On Underlying Contracts	#0003	High Risk	Closed
Setting Signature Specific Delay Uses The General Delay	#0004	High Risk	Closed
Off Chain Randomness Cannot Be Guaranteed	#0005	Medium Risk	Partially Mitigated
Randomness Seed Round Can Be Longer Than SubCartographer Round	#0006	Medium Risk	Closed
VRFModule And ElevationHelper Can Be Disconnected	#0007	Medium Risk	Mitigated
Passthroughs Do Not Account For Fees When Enacting Or Retiring	#0008	Medium Risk	Partially Mitigated
Elevation Rewards Duplicated For First Interacted Round	#0009	Medium Risk	Closed
Everest Used For Emissions Is Different From Balance	#0010	Medium Risk	Mitigated
Expedition Emissions Can Be Extended Indefinitely	#0011	Medium Risk	Closed
Multiple Expeditions Cannot Rollover ElevationHelper	#0012	Medium Risk	Mitigated
Initial Round Still Can Generate Rewards	#0013	Medium Risk	Closed
No Limit For Protocol Values	#0014	Medium Risk	Closed
Minimum Timelock Duration Insufficient	#0015	Low Risk	Mitigated



Alloc Multiplier Is 8 Bit Integer	#0016	Low Risk	Closed
Random Numbers Are Re-Used Between Elevations	#0017	Low Risk	Closed
Protocol Values Should Be Public	#0018	Low Risk	Closed
Unbounded Loop	#0019	Low Risk	Open
Changing Everest Lock Times Uses Incorrect Multiplier	#0020	Low Risk	Closed
Changing Everest Lock Time Limits Does Not Affect Existing Lock Times	#0021	Low Risk	Closed
Lock Duration Can Only Be Raised By Increasing Increments	#0022	Low Risk	Closed
Updating User Everest Requires Locking Or Withdraw Interaction	#0023	Low Risk	Closed
Expeditions Can Be Enabled Or Disabled During A Round	#0024	Low Risk	Closed
Bonus Timestamp Not Set On Deposit	#0025	Low Risk	Closed
Initial Referral BP Is Out Of Bounds	#0026	Low Risk	Closed
Referral Cycles Not Prevented	#0027	Informational	Closed
Identical Contracts	#0028	Informational	Closed
Tokens Are Transferred To Burn Address Indirectly (Gas Optimization)	#0029	Informational	Open
Totem Supplies Always Returns 10 Values	#0030	Informational	Closed
Redundant Check For Active Pool (Gas Optimization)	#0031	Informational	Closed
Redundant Check When Setting Summit Per Second (Gas Optimization)	#0032	Informational	Closed
Hypothetical Rewards	#0033	Informational	Closed

Calculation Does Not Match Rollover			
Error Message Doesn't Reflect Check	#0034	Informational	Closed
Resetting Deposit Timestamp For Tax Can Be Avoided	#0035	Informational	Closed
Contract Values Can Be Constant Or Immutable (Gas Optimization)	#0036	Informational	Closed
Unused Library	#0037	Informational	Closed
No Events Emitted For Changes To Protocol Values	#0038	Informational	Closed
Unused Variables	#0039	Informational	Closed
Unused Functions And Modifiers	#0040	Informational	Closed
Missing Zero Checks	#0041	Low Risk	Closed
Setter Does Not Change Intended Variable	#0042	Low Risk	Closed
Linear Scaling Incorrect When Lower Bound Value Exceeds Upper Bound Value	#0043	Low Risk	Closed
Supplies Updated Incorrectly When Changing Both Deity and Safety Factor	#0044	Medium Risk	Closed
Treasuries And LP Generation Are Externally Owned Accounts	#0045	Medium Risk	Open
Missing Signature Specific Delay	#0046	Low Risk	Mitigated
Changes To Deployed Contract	#0047	Informational	Closed

# Findings

## Manual Analysis

### Deity Balances Update Out Of Order

FINDING ID	#0001
SEVERITY	High Risk
STATUS	Closed
LOCATION	Rev4 - ExpeditionV2.sol -> 715-742

```
1  function selectDeity(uint8 _newDeity)
2      public
3      nonReentrant validDeity(_newDeity)
4  expeditionInteractionsAvailable
5  {
6      // ...
7      // Update user deity in state
8      user.deity = _newDeity;
9      user.deitySelected = true;
10     user.deitySelectionRound =
11     elevationHelper.roundNumber(EXPEDITION);
12     // Update user's interaction in this expedition
13     _updateUserRoundInteraction(user);
14
15     // Transfer deitied everest from previous deity to new deity
16     if (user.entered) {
17         expeditionInfo.supplies.deity[user.deity] -=
18         user.deitiedSupply;
19         expeditionInfo.supplies.deity[_newDeity] +=
20         user.deitiedSupply;
21     }
22     // ...
23 }
```

#### DESCRIPTION

The users' deity is set before the expedition info is modified leading to no change in deity supplies. The function merely subtracts user balance from the new deity then adds it back.

This can ultimately lead to users being unable to withdraw from the EverestToken because *updateUserEverest()* may

	revert.
RECOMMENDATION	Update the user deity after balance transfer occurs.
RESOLUTION	The deity supplies are now updated in the correct order.

## Emergency Withdraw Has Too Many Dependencies

FINDING ID	#0002
SEVERITY	High Risk
STATUS	Closed
LOCATION	Rev-2 - CartographerOasis.sol -> 406-418

```
1  function emergencyWithdraw(address _token, address _userAdd)
2      external override
3      nonReentrant onlyCartographer poolExists(_token)
4      validUserAdd(_userAdd)
5      returns (uint256)
6  {
7      return _unifiedWithdraw(
8          poolInfo[_token],
9          userInfo[_token][_userAdd],
10         userInfo[_token][_userAdd].staked,
11         _userAdd,
12         false
13     );
14 }
```

LOCATION	Rev-2 - CartographerElevation.sol -> 1038-1051
----------	--

```
1  function emergencyWithdraw(address _token, address _userAdd)
2      external override
3      nonReentrant onlyCartographer poolExists(_token)
4      validUserAdd(_userAdd)
5      returns (uint256)
6  {
7      return _unifiedWithdraw(
8          poolInfo[_token],
9          userInfo[_token][_userAdd],
10         userInfo[_token][_userAdd].staked,
11         _userAdd,
12         false,
13         true
14     );
15 }
```

DESCRIPTION	The <i>emergencyWithdraw()</i> functions are reliant on functionality of multiple other contracts including <i>Cartographer</i> , <i>ElevationHelper</i> , all other sub cartographers, and the pool's associated passthrough.
-------------	--

	<p>The purpose of an emergency withdrawal function should be to allow users to extract deposited funds in case of broken logic elsewhere in the contracts.</p>
RECOMMENDATION	<p>Simplify the emergency withdrawal process to have the minimum effects and interactions between only the <i>Cartographer</i>, <i>CartographerOasis</i>, and <i>passthrough</i>.</p> <p>Do not update the pool when doing an emergency withdrawal.</p>
RESOLUTION	<p>The <i>emergencyWithdraw()</i> functions no longer update the pool, reducing the dependency of the function.</p> <p>Project team comment: "Removing the updatePool from the EmergencyWithdraw pipeline is as far as we can go in slimming down functionality. Any further removal of functionality may allow the contract's internal states to become out of sync"</p>

## No Way To Call Emergency Withdraw On Underlying Contracts

FINDING ID	#0003
SEVERITY	High Risk
STATUS	Closed
LOCATION	Rev-2 - Cartographer.sol

DESCRIPTION	The top-level cartographer contract does not expose an emergency withdrawal functionality to end-users and third-party protocols. This can lead to loss of user funds in the event of a protocol malfunction or if the underlying protocol malfunctions.
RECOMMENDATION	Implement an emergency withdrawal function.
RESOLUTION	An emergency withdrawal function call was added to the Cartographer.

## Setting Signature Specific Delay Uses The General Delay

FINDING ID	#0004
SEVERITY	High Risk
STATUS	Closed
LOCATION	Rev-4 - Timelock.sol -> 59-67

```
1     function setFunctionSpecificDelay(string memory signature_, uint
specificDelay_) public {
2         require(msg.sender == address(this), "Timelock::setDelay:
Call must come from Timelock.");
3         require(specificDelay_ >= delay, "Timelock::setDelay:
Signature specific delay must exceed base delay.");
4         require(specificDelay_ <= MAXIMUM_DELAY, "Timelock::setDelay:
Signature specific delay must not exceed maximum delay.");
5
6         signatureSpecificDelay[sigToHash(signature_)] =
specificDelay_;
7
8         emit NewSpecificDelay(signature_, specificDelay_);
9     }
```

### DESCRIPTION

Suppose a secure function is set with a delay of 10 days, with the general delay being 1 day. The delay of that secure function can be changed to 1 day, after the general delay. Then the formerly secure function can be called 1 day after that.

For example, to call a dangerous function, the following steps can be taken:

- queue  
*setFunctionSpecificDelay("dangerousFunction()", 1 day)*
- wait 1 day
- execute  
*setFunctionSpecificDelay("dangerousFunction()", 1 day)*
- queue *dangerousFunction()*
- wait 1 day
- execute *dangerousFunction()*

In general, a specific delay of more than double the general delay will not be effective.

### RECOMMENDATION

Apply the function-specific delay to queuing changes of function-specific delays.



## RESOLUTION

Using *queueTransaction* was changed to use the existing delay when calling *setFunctionSpecificDelay()*.

## Off-Chain Randomness Cannot Be Guaranteed

FINDING ID	#0005
SEVERITY	Medium Risk
STATUS	Partially Mitigated
LOCATION	Rev-2 - SummitVRFModule.sol -> 160-173

```
1  function receiveSealedSeed(bytes32 _sealedSeed)
2      public
3      onlyTrustedSeeder
4  {
5      require(nextSeedRoundAvailable(), "Already sealed seeded");
6
7      // Increment seed round and set next seed round end timestamp
8      seedRound += 1;
9      seedRoundEndTimestamp += (baseRoundDuration *
seedRoundDurationMult);
10
11     // Store new sealed seed for next round of round rollovers
12     sealedSeed[seedRound] = _sealedSeed;
13     futureBlockNumber[seedRound] = block.number + 1;
14 }
```

DESCRIPTION	<p>Randomness generated off-chain cannot be guaranteed as truly random. A malicious actor in control of the protocol may manipulate the operation of the trusted seeder.</p> <p>Additionally, if the seed is not generated in the 120s timeframe, the seed will effectively be null.</p>
RECOMMENDATION	<p>Use a cryptographically verifiable randomness oracle.</p> <p>Note: The noted implementation is not a verifiable randomness oracle, despite being called SummitVRFModule.</p>
RESOLUTION	<p>The contract can be replaced with a chainlink randomness oracle when it is made available.</p> <p>The contract was also renamed to SummitTrustedSeederRNGModule.</p>

## Randomness Seed Round Can Be Longer Than SubCartographer Round

FINDING ID	#0006
SEVERITY	Medium Risk
STATUS	Closed
LOCATION	Rev-2 - ElevationHelper.sol -> 56

```
1     function setElevationRoundDurationMult(uint8 _elevation, uint8
    _mult)
2     public
3         onlyOwner elevationOrExpedition(_elevation)
4     {
5         require(_mult > 0, "Duration mult must be non zero");
6         pendingDurationMult[_elevation] = _mult;
7     }
```

LOCATION	Rev-2 - ElevationHelper.sol -> 324
----------	------------------------------------

```
1         uint256 rand =
    ISummitVRFModule(summitVRFModuleAdd).getRandomNumber( roundNumber[_ele
    vation]);
```

LOCATION	Rev-2 - SummitVRFModule.sol -> 56
----------	-----------------------------------

```
1     uint256 seedRoundDurationMult = 2;
```

## LOCATION

Rev-2 - SummitVRFModule.sol -&gt; 151-154

```
1    function getRandomNumber(uint256 roundNumber) public view  
    override returns (uint256) {  
2        return uint256(keccak256(abi.encode(roundNumber,  
        unsealedSeed[seedRound], futureBlockHash[seedRound])));  
3    }
```

## DESCRIPTION

The ElevationHelper uses the SummitVRFModule to get a random number for each round of a given elevation. However, if the elevation round is incremented faster than the randomness round, the values of *unsealedSeed* and *futureBlockHash* will be reused until a new seed is provided.

This can be done by setting *durationMult* to 1.

## RECOMMENDATION

Ensure that the randomness rounds cannot be longer than the elevation rounds.

Add a check to ensure that rounds can only be rolled over if a new random number is ready.

## RESOLUTION

Random number round duration is now 1 hour and as such cannot be longer than elevation rounds.

## VRFModule And ElevationHelper Can Be Disconnected

FINDING ID	#0007
SEVERITY	Medium Risk
STATUS	Mitigated
LOCATION	Rev-2 - ElevationHelper.sol -> 266-271

```
1  function setSummitVRFModuleAdd (address _summitVRFModuleAdd)
2      public onlyOwner
3  {
4      require(_summitVRFModuleAdd != address(0), "SummitVRFModule
missing");
5      summitVRFModuleAdd = _summitVRFModuleAdd;
6  }
```

LOCATION	Rev-2 - SummitVRFModule.sol -> 99-104
----------	---------------------------------------

```
1  function setElevationHelper (address _elevationHelper)
2      public onlyOwner
3  {
4      require(_elevationHelper != address(0), "ElevationHelper
missing");
5      elevationHelper = _elevationHelper;
6  }
```

DESCRIPTION	<p>The ElevationHelper and SummitVRFModule contracts can be disconnected from each other, breaking the protocol's functionality.</p> <p>Changing the SummitVRFModule can be used to cause the round timings of the two contracts to go out of sync. In particular, <i>SummitVRFModule.elevationHelper</i> can call <i>setSeedRoundEndTimestamp()</i>.</p>
RECOMMENDATION	Ensure the noted setter functions are called only once.
RESOLUTION	<p>This behavior is intended as the randomness module will be upgraded when chainlink is available. A timelock was added to delay any inappropriate changes to the contract settings.</p> <p>When implementing the chainlink randomness, ensure</p>

that functionality exists to sync the upgraded randomness module to the *ElevationHelper*.

Project team comment: "The only upgrade that will be made to the VRFModule will be to replace it with an on-chain chainlink VRF, which will not need the seed round timestamp for its functionality."

## Passthroughs Do Not Account For Fees When Enacting Or Retiring

FINDING ID	#0008
SEVERITY	Medium Risk
STATUS	Partially Mitigated
LOCATION	Rev-2 - BeefyVaultV2Passthrough.sol -> 158-162

```
1      uint256 tokenBalance =
    passthroughToken.balanceOf(address(this));
2
3      // Return collective user's amount back to cartographer
4      uint256 usersWithdrawn = tokenBalance > balance ? balance :
    tokenBalance;
5      passthroughToken.safeTransfer(cartographer, usersWithdrawn);
```

LOCATION	Rev-2 - BeefyVaultV6NativePassthrough.sol -> 154-164 Rev-2 - BeefyVaultV6Passthrough.sol -> 154-164
----------	--

```
1      // Withdraw all from the vault
2      uint256 sharesBalance =
    IERC20(vault).balanceOf(address(this));
3      if (sharesBalance > 0) {
4          IBeefyVault(vault).withdrawAll();
5      }
6
7      uint256 tokenBalance =
    passthroughToken.balanceOf(address(this));
8
9      // Return collective user's amount back to cartographer
10     uint256 usersWithdrawn = tokenBalance > balance ? balance :
    tokenBalance;
11     passthroughToken.safeTransfer(cartographer, usersWithdrawn);
```

LOCATION	Rev-2 - MasterChefPassthrough.sol -> 103-105
----------	--

```
1      uint256 cartographerBalance =
    passthroughToken.balanceOf(cartographer);
2      passthroughToken.safeTransferFrom(cartographer,
    address(this), cartographerBalance);
3      IMasterChef(masterChef).deposit(masterChefPid,
    cartographerBalance);
```

## LOCATION

Rev-2 - MasterChefPassthrough.sol -&gt; 154-164

```
1      uint256 stakedAmount = balance();
2
3      // Withdraw all from the masterChef
4      IMasterChef(masterChef).withdraw(masterChefPid,
    stakedAmount);
5
6      // Return collective user's amount back to cartographer
7      passthroughToken.safeTransfer(cartographer, stakedAmount);
```

## DESCRIPTION

The passthrough contracts deposit and withdraw tokens to underlying farming contracts or other vaults. During normal deposit and withdrawal, they take potential fees into account.

However, no fees are accounted for when retiring.

## RECOMMENDATION

Ensure that user deposits are correctly accounted for when retiring pass-through contracts.

## RESOLUTION

Project team comment: "Retire is withdrawing the full amount in the vault. If the fees are covered by the earnings of the vault (withdrawn amount > running balance uint) then the running balance is sent to the cartographer, else the withdrawn amount is sent."

Obelisk Comment: As long as the withdrawal fee has been covered by the current rewards, this will work. The project team should ensure that changing strategies is done sparingly.

Note: The delay for retiring strategies will be verified in the on-chain analysis.



## Elevation Rewards Duplicated For First Interacted Round

FINDING ID	#0009
SEVERITY	Medium Risk
STATUS	Closed
LOCATION	Rev-2 - CartographerElevation.sol -> 764-772

```
1      claimable += userFirstInteractedRoundWinnings(user,  
poolRoundInfo[pool.token][user.prevInteractedRound], totem);  
2  
3      // Escape early if user interacted during previous round  
4      if (user.prevInteractedRound == currRound - 1) return  
claimable;  
5  
6      // Add multiple rounds of precomputed mult delta for all  
rounds between first interacted and most recent round  
7      claimable += user.staked *  
(pool.totemRunningPrecomputedMult[totem] - user.winningsDebt) / 1e12;  
8  
9      return claimable;
```

### DESCRIPTION

The user's *winningsDebt* is set to the value of *pool.totemRunningPrecomputedMult[totem]* at the beginning of the round in which they stake. As a result, they will receive rewards from that round as if they staked for the entire round.

Note: this can only be done once every other round due to the escape early clause.

### RECOMMENDATION

Ensure that users' *winningsDebt* is tracked accurately.

### RESOLUTION

The calculation of the winnings debt was changed to explicitly include any "rewards" accrued by the first interaction round. This will negate their existence for future claims and resolve the issue.

## Everest Used For Emissions Is Different From Balance

FINDING ID	#0010
SEVERITY	Medium Risk
STATUS	Mitigated
LOCATION	@OpenZeppelin/ERC20.sol -> 36

```
1      mapping(address => uint256) private _balances;
```

LOCATION	EverestToken.sol -> 39-48
----------	---------------------------

```
1      struct UserEverestInfo {
2          address userAdd;
3
4          uint256 everestOwned;
5          uint256 everestLockMultiplier;
6          uint256 lockDuration;
7          uint256 lockRelease;
8          uint256 summitLocked;
9      }
10     mapping(address => UserEverestInfo) public userEverestInfo;
```

LOCATION	EverestToken.sol -> 389-410
----------	-----------------------------

```
1      function withdrawLockedSummit(uint256 _everestAmount)
2          public
3          nonReentrant notPanic userEverestInfoExists userOwnsEverest
4          userLockDurationSatisfied validEverestAmountToBurn(_everestAmount)
5      {
6          // ...
7          summit.safeTransfer(msg.sender, summitToWithdraw);
8          _burnEverest(msg.sender, _everestAmount);
9          // ...
10     }
```

DESCRIPTION	The EverestToken acts as a normal token, but uses a separate variable from <i>ERC20._balances</i> to determine users' emissions.
-------------	--

	Users require the exact amount of EverestToken as an ERC20 to withdraw their locked summit. If users attempt to trade their Everest, they may be unable to retrieve their stake.
RECOMMENDATION	Incorporate the <i>transfer</i> and <i>transferFrom</i> functionalities of the ERC20 token into the contract's behaviour. Alternatively, remove the ERC20 inheritance.
RESOLUTION	Project team comment: "We have added whitelisted transfer addresses for the EVEREST token, only transfers with a whitelisted address as either the source or destination will be permitted. This prevents users from accidentally losing their EVEREST token. The requirement to keep EVEREST tokens to unlock their SUMMIT will be made as clear to all users through the frontend."

## Expedition Emissions Can Be Extended Indefinitely

FINDING ID	#0011
SEVERITY	Medium Risk
STATUS	Closed
LOCATION	Rev2 - ExpeditionV2.sol -> 358-368

```
1    function _recalculateExpeditionTokenEmissions(ExpeditionToken
    storage expedToken)
2        internal
3        returns (bool)
4    {
5        uint256 fund = expedToken.token.balanceOf(address(this)) -
        expedToken.markedForDist;
6
7        expedToken.emissionsRemaining = fund;
8        expedToken.roundEmission = fund == 0 ? 0 : fund /
        expeditionRunwayRounds;
9
10       return fund > 0;
11    }
```

LOCATION	ExpeditionV2.sol -> 381-389
----------	-----------------------------

```
1    function addExpeditionFunds(address _token, uint256 _amount)
2        public nonReentrant
3    {
4        require (_token == address(expeditionInfo.summit.token) ||
        _token == address(expeditionInfo.usdc.token), "Invalid token to add
        to expedition");
5        IERC20(_token).safeTransferFrom(msg.sender, address(this),
        _amount);
6        _recalculateExpeditionEmissions();
7
8        emit ExpeditionFundsAdded(_token, _amount);
9    }
```

### DESCRIPTION

The function *addExpeditionFunds()* can be called each round by any account.

Each time, the round emissions will be re-calculated using *expeditionRunwayRounds*, effectively extending the rounds while reducing the emission rate. If this is called each

	round, it will result in an exponentially decaying emission rate.
RECOMMENDATION	Separate the functionality of funding the emissions and extending the emissions.
RESOLUTION	The recommended changes have been implemented.

## Multiple Expeditions Cannot Rollover ElevationHelper

FINDING ID	#0012
SEVERITY	Medium Risk
STATUS	Mitigated
LOCATION	Rev-4 - ElevationHelper.sol -> 316-323

```
1  function validateRolloverAvailable(uint8 _elevation)
2      external view
3  {
4      // Elevation must be unlocked for round to rollover
5      require(block.timestamp >= unlockTimestamp[_elevation],
6      "Elevation locked");
7      // Rollover only becomes available after the round has ended,
8      // if timestamp is before roundEnd, the round has already been rolled
9      // over and its end timestamp pushed into the future
10     require(block.timestamp >= roundEndTimestamp[_elevation],
11     "Round already rolled over");
12 }
```

LOCATION	Rev-4 - ExpeditionV2.sol -> 496-515
----------	-------------------------------------

```
1  function rollover()
2      public
3  {
4      // Ensure that the expedition is ready to be rolled over,
5      // ensures only a single user can perform the rollover
6      elevationHelper.validateRolloverAvailable(EXPEDITION);
7      // ...
8  }
```

## LOCATION

Rev-4 - EverestToken.sol -&gt; 424-431

```
1    function addEverestExtension(address _extension)
2        public
3        onlyOwner
4    {
5        require(_extension != address(0), "Missing extension");
6        require(everestExtensions.length() < 3, "Max extension cap
7reached");
8        everestExtensions.add(_extension);
9    }
```

## DESCRIPTION

Each expedition contract will attempt to rollover the expedition round of the *ElevationHelper* separately. However, the *ElevationHelper* only allows a single rollover per round per elevation.

Note that the EverestToken allows for up to 3 expedition-type contracts.

## RECOMMENDATION

Check whether rolling over the elevation helper is necessary before rolling over the expedition contract.

## RESOLUTION

Project team comment: "Only a single Expedition that interacts with the ElevationHelper will ever be active concurrently. Other Everest Extensions will be entirely independent of the rollover mechanic, including a DAO, standard farming, etc."

## Initial Round Still Can Generate Rewards

FINDING ID	#0013
SEVERITY	Medium Risk
STATUS	Closed
LOCATION	Rev-4 - ElevationHelper.sol -> 328-346

```
1  function selectWinningTotem(uint8 _elevation)
2      external
3      onlyCartographerOrExpedition
4  elevationOrExpedition(_elevation)
5  {
6      // No winning totem should be selected for round 0, which
7      // takes place when the elevation is locked
8      if (roundNumber[_elevation] == 0) { return; }
9  }
```

LOCATION	Rev-4 - CartographerElevation.sol -> 657-686
----------	--

```
1  function rollover()
2      external override
3      onlyCartographer
4  {
5      uint256 currRound = elevationHelper.roundNumber(elevation);
6      uint8 winningTotem = elevationHelper.winningTotem(elevation,
7      currRound - 1);
8      // ...
9  }
```



## LOCATION

Rev-4 - ExpeditionV2.sol -&gt; 520-546

```
1  function _rolloverExpedition(uint256 _currRound)
2      internal
3  {
4      if (!expeditionInfo.live) return;
5
6      uint8 winningDeity = elevationHelper.winningTotem(EXPEDITION,
7      _currRound - 1);
8      // ...
9  }
```

## DESCRIPTION

The elevation helper does not select a winning totem in the very first round (index 0). However, the elevation and expedition contracts can generate winnings if a pool is active during this round.

## RECOMMENDATION

Disable any earnings in round 0 or generate a winning totem/deity.

## RESOLUTION

Elevation and expedition pools were set to never generate rewards on the first round they rollover.

## No Limit For Protocol Values

FINDING ID	#0014
SEVERITY	Medium Risk
STATUS	Closed
LOCATION	Rev-4 - Cartographer.sol -> 1179-1185

```
1  function setTaxDecayDuration(uint256 _taxDecayDuration)
2      public
3      onlyOwner
4  {
5      taxDecayDuration = _taxDecayDuration;
6      emit SetTaxDecayDuration(_taxDecayDuration);
7  }
```

DESCRIPTION	The following values can be set arbitrarily high, potentially breaking the functionality of the contracts: - <i>taxDecayDuration</i>
RECOMMENDATION	Add an upper limit to the values.
RESOLUTION	The recommended changes have been implemented.

## Minimum Timelock Duration Insufficient

FINDING ID	#0015
SEVERITY	Low Risk
STATUS	Mitigated
LOCATION	Rev-2 - Timelock.sol -> 23

```
1      uint public constant MINIMUM_DELAY = 6 hours;
```

DESCRIPTION	The minimum delay in the timelock contracts constants is below the minimum recommendation.
RECOMMENDATION	Obelisk recommends a minimum delay of 72 hours.
RESOLUTION	<p>Project team comment: "V1 has shown the Summit team that a 24-hour timelock is not fast enough to respond or fine-tune in the way we like. However some functionality must be put on a longer timelock, and our new more robust function-specific timelock will allow us to handle both well."</p> <p>Signature-specific timelock delays were added to high-risk functions. Refer to finding #46.</p>

## Alloc Multiplier Is 8 Bit Integer

FINDING ID	#0016
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-2 - ElevationHelper.sol -> 285

```
1 function setElevationAllocMultiplier(uint8 _elevation, uint8
   _allocMultiplier)
2     public
3     onlyOwner allElevations(_elevation)
4     {
5         require(_allocMultiplier <= 300, "Multiplier cannot exceed
   3X");
6         pendingAllocMultiplier[_elevation] = _allocMultiplier;
7         if (_elevation == OASIS) {
8             allocMultiplier[_elevation] = _allocMultiplier;
9         }
10    }
```

DESCRIPTION	<p>The type of <i>_allocMultiplier</i> is <i>uint8</i> which has a maximum value of 255. Therefore comparing it with 300 will always return true.</p> <p>The alloc multiplier is used as a relative multiplier. Therefore even with a limit of 300, tokens could be weighted at 1, with another at 300 to make their relative weights 1:300.</p>
RECOMMENDATION	Use a larger uint datatype for the alloc multiplier.
RESOLUTION	The recommended changes have been implemented.

## Random Numbers Are Re-Used Between Elevations

FINDING ID	#0017
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-2 - ElevationHelper.sol -> 324

```
1      uint256 rand =  
    ISummitVRFModule(summitVRFModuleAdd).getRandomNumber(roundNumber[_elevation]);
```

LOCATION	Rev-2 - SummitVRFModule.sol -> 152-154
----------	--

```
1      function getRandomNumber(uint256 roundNumber) public view  
    override returns (uint256) {  
2          return uint256(keccak256(abi.encode(roundNumber,  
    unsealedSeed[seedRound], futureBlockHash[seedRound])));  
3      }
```

DESCRIPTION	The same random seed will be used across multiple elevations which end their rounds concurrently. If the elevations have the same round number as well, the selection of winning totems from each elevation will not be independent.
RECOMMENDATION	Do not re-use random numbers.
RESOLUTION	The elevation number is hashed with the random number to produce a unique random number per elevation.

## Protocol Values Should Be Public

FINDING ID	#0018
SEVERITY	Low Risk
STATUS	Closed
LOCATION	<ul style="list-style-type: none"><li>• Rev-2 - CartographerOasis.sol -&gt; 55: <i>Cartographer cartographer;</i></li><li>• Rev-2 - CartographerOasis.sol -&gt; 65: <i>mapping(address =&gt; EnumerableSet.AddressSet) userInteractingPools;</i></li><li>• Rev-2 - CartographerOasis.sol -&gt; 76: <i>EnumerableSet.AddressSet private poolTokens;</i></li><li>• Rev-2 - CartographerOasis.sol -&gt; 77: <i>EnumerableSet.AddressSet private activePools;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 101: <i>Cartographer cartographer;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 102: <i>ElevationHelper elevationHelper;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 127: <i>mapping(address =&gt; EnumerableSet.AddressSet) userInteractingPools;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 154: <i>EnumerableSet.AddressSet private poolTokens;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 155: <i>EnumerableSet.AddressSet private activePools;</i></li><li>• Rev-4 - Cartographer.sol -&gt; 120: <i>address[] tokensWithAllocation;</i></li><li>• Rev-4 - EverestToken.sol -&gt; 52: <i>EnumerableSet.AddressSet everestExtensions;</i></li><li>• Rev-4 - ExpeditionV2.sol -&gt; 104: <i>ElevationHelper elevationHelper;</i></li><li>• Rev-7 @OpenZeppelin/AccessControl.sol -&gt; 102: <i>mapping(bytes32 =&gt; RoleData) private _roles;</i></li></ul>
DESCRIPTION	Variables critical to the operation of the protocol should be public or have an associated view function.
RECOMMENDATION	Add getter functions or change the values to be public.
RESOLUTION	The recommended changes have been implemented.

## Unbounded Loop

FINDING ID	#0019
SEVERITY	Low Risk
STATUS	Open
LOCATION	<ul style="list-style-type: none"><li>• Rev-2 - CartographerOasis.sol -&gt; 229-231: <i>for (uint16 index = 0; index &lt; poolTokens.length(); index++) {</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 444-446: <i>for (uint16 index = 0; index &lt; poolTokens.length(); index++) {</i></li></ul>
DESCRIPTION	Iterating over an unbounded array can cause transactions to revert due to the gas limit.
RECOMMENDATION	Provide a limit to the size of the array. Alternatively, pass a lower and upper index as parameters and iterate over a range.
RESOLUTION	<p>The pools can be updated independently in case the mass updating of pools hits the gas limit.</p> <p>Project team comment: "If this ever runs into the gas limit, each pool can be updated independently. It is not necessary for the functionality of SUMMIT, only a convenience."</p>

## Changing Everest Lock Times Uses Incorrect Multiplier

FINDING ID	#0020
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev4 - EverestToken.sol -> 136

```
1      minLockTime = _lockTimeDays * 24 * 365;
```

LOCATION	Rev4 - EverestToken.sol -> 141
----------	--------------------------------

```
1      maxLockTime = _lockTimeDays * 24 * 365;
```

DESCRIPTION	<p>Changing the lock time limits is implied to be in days (eg. a multiplier of <math>3600 \times 24</math>) but instead uses a multiplier of <math>24 \times 365</math>. This will cause the lock limits to be much smaller than anticipated.</p> <p>Note that <i>setLockTimeRequiredForTaxlessSummitWithdraw</i> and <i>setLockTimeRequiredForLockedSummitDeposit</i> use incorrect limits as well by assuming that their inputs are in days.</p>
RECOMMENDATION	Use the correct multipliers.
RESOLUTION	The recommended changes have been implemented.



## Changing Everest Lock Time Limits Does Not Affect Existing Lock Times

FINDING ID	#0021
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-2 - EverestToken.sol -> 134-143

```
1     function setMinLockTime(uint256 _lockTimeDays) public onlyOwner {
2         require(_lockTimeDays <= maxLockTime && _lockTimeDays >= 1 &&
3             _lockTimeDays <= 30, "Invalid minimum lock time (1-30 days)");
4         minLockTime = _lockTimeDays * 24 * 365;
5         emit SetMinLockTime(_lockTimeDays);
6     }
7     function setMaxLockTime(uint256 _lockTimeDays) public onlyOwner {
8         require(_lockTimeDays >= minLockTime && _lockTimeDays >= 7 &&
9             _lockTimeDays <= 730, "Invalid maximum lock time (7-730 days)");
10        maxLockTime = _lockTimeDays * 24 * 365;
11        emit SetMaxLockTime(_lockTimeDays);
12    }
```

LOCATION	Rev-2 - EverestToken.sol -> 154-163
----------	-------------------------------------

```
1     function setLockTimeRequiredForTaxlessSummitWithdraw(uint256
2         _lockTimeDays) public onlyOwner {
3         require(_lockTimeDays >= minLockTime && _lockTimeDays <=
4             maxLockTime && _lockTimeDays >= 1 && _lockTimeDays <= 30, "Invalid
5             taxless summit lock time (1-30 days)");
6         lockTimeRequiredForTaxlessSummitWithdraw = _lockTimeDays;
7         emit
8             SetLockTimeRequiredForTaxlessSummitWithdraw(_lockTimeDays);
9     }
10    function setLockTimeRequiredForLockedSummitDeposit(uint256
11        _lockTimeDays) public onlyOwner {
12        require(_lockTimeDays >= minLockTime && _lockTimeDays <=
13            maxLockTime && _lockTimeDays >= 1 && _lockTimeDays <= 90, "Invalid
14            locked summit lock time (1-90 days)");
15        lockTimeRequiredForClaimableSummitLock = _lockTimeDays;
16        emit
17            SetLockTimeRequiredForLockedSummitDeposit(_lockTimeDays);
18    }
```

DESCRIPTION	The lock times are intended to be between the minimum and maximum lock times. However, changing the minimum and maximum lock times can result in the lock
-------------	---

	times being outside the expected bounds.
RECOMMENDATION	Update the lock times whenever changing the minimum or maximum lock times.
RESOLUTION	<p>The lock time mechanism was changed to use an inflection point and a general lock time range.</p> <p>These are now strictly ordered from minLockTime to inflectionLockTime to maxLockTime.</p>

## Lock Duration Can Only Be Raised By Increasing Increments

FINDING ID	#0022
SEVERITY	Low Risk
STATUS	Closed
LOCATION	EverestToken.sol -> 280

```
1         require(_lockDuration >= everestInfo.lockDuration, "Lock  
duration must strictly increase");
```

DESCRIPTION	<p>The duration of the lock can only increase even when extending the lock, thereby resetting its start time. This can prevent small incremental increases to the lock release time.</p> <p>If the value of <i>lockTimeRequiredForClaimableSummitLock</i> is reduced, it may cause a temporary loss of functionality in <i>SummitLocking.harvestWinnings()</i> and <i>ExpeditionV2._harvestExpedition()</i>.</p>
RECOMMENDATION	Allow the lock duration to increase in smaller increments.
RESOLUTION	<p>Project team has stated this is intentional.</p> <p>Project team comment: "The increaseLockDuration should only allow the user to increase. Users being able to reduce their lock duration would allow users to get the full benefit of the locking and then reduce to a short time to unlock their summit early. To reduce their lock duration they'll have to wait until their lock matures, then withdraw and lock with a new initial amount. Alternatively, a 2nd account can be used, but this is working as intended"</p>

## Updating User Everest Requires Locking Or Withdraw Interaction

FINDING ID	#0023
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-2 - ExpeditionV2.sol -> 670-695

```
1     function updateUserEverest(uint256 _everestAmount, address
    _userAdd)
2         external override
3         onlyEverestToken
4     {
5         // ...
6     }
```

LOCATION	Rev-2 - EverestToken.sol -> 451-458
----------	-------------------------------------

```
1     function _updateEverestExtensionsUserEverestOwned(UserEverestInfo
    storage user)
2         internal
3     {
4         // Iterate through and update each extension with the user's
        everest amount
5         for (uint8 extensionIndex = 0; extensionIndex <
        everestExtensions.length(); extensionIndex++) {
6             BaseEverestExtension(everestExtensions.at(extensionIndex)).updateUse
            rEverest(user.everestOwned, user.userAdd);
7         }
8     }
```

DESCRIPTION	<p>Updating a user's everest in the <i>ExpeditionV2</i> contract requires a user interaction from the <i>EverestToken</i> which may neither be possible nor desirable for a user.</p> <p>As <i>ExpeditionV2</i> contracts are connected and disconnected from the <i>EverestToken</i>, it may cause users' information in the <i>ExpeditionV2</i> contracts to be out of sync.</p>
RECOMMENDATION	<p>Ensure that the values between the contracts are properly synchronized.</p> <p>One method could be to add a public function to allow</p>

	users to manually update their everest amounts from the <i>ExpeditionV2</i> contract. Another could be to use the ERC20 functionality to stake in the Expedition.
RESOLUTION	Functionality was added to allow for users to manually update their EverestAmount value.

## Expeditions Can Be Enabled Or Disabled During A Round

FINDING ID	#0024
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-2 - ExpeditionV2.sol -> 670-695

```
1  /// @dev Turn off an expedition
2  function disableExpedition()
3      public
4      onlyOwner
5  {
6      require(expeditionInfo.live, "Expedition already disabled");
7      expeditionInfo.live = false;
8
9      emit ExpeditionDisabled();
10 }
11
12 /// @dev Turn on a turned off expedition
13 function enableExpedition()
14     public
15     onlyOwner
16 {
17     require(!expeditionInfo.live, "Expedition already enabled");
18     expeditionInfo.live = true;
19
20     emit ExpeditionEnabled();
21 }
```

DESCRIPTION	Expedition rounds can be enabled and disabled during a round. This differs from the Elevation contract which updates its active state only after a rollover.
RECOMMENDATION	Change the Expedition to use a similar mechanism to update its live state after rollover.
RESOLUTION	Project team was stated that this behavior is intentional.

## Bonus Timestamp Not Set On Deposit

FINDING ID	#0025
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-4 - Cartographer.sol -> 858-860

```
1         if ( tokenLastWithdrawTimestampForBonus[msg.sender][_token] ==  
2         0) {  
3             tokenLastWithdrawTimestampForBonus[msg.sender][_token] ==  
             block.timestamp;  
             }
```

DESCRIPTION	The bonus timestamp is not assigned in <i>Cartographer.deposit()</i> . Note the use of == as opposed to =.
RECOMMENDATION	Use the correct assignment operator.
RESOLUTION	The recommended changes have been implemented.

## Initial Referral BP Is Out Of Bounds

FINDING ID	#0026
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-4 - Cartographer.sol -> 110

```
1    uint256 public referralsSummitBP = 20;
```

LOCATION	Rev-4 - Cartographer.sol -> 287-293
----------	-------------------------------------

```
1    function setSummitDistributionBPs(uint256 _referralsBP, uint256
   _treasuryBP) public onlyOwner {
2        // Require dev emission less than 25% of total emission
3        require(_treasuryBP <= 250 && _referralsBP <= 5, "Invalid
   Distributions");
4
5        referralsSummitBP = _referralsBP;
6        treasurySummitBP = _treasuryBP;
7    }
```

DESCRIPTION	The initial value of <i>referralsSummitBP</i> is set to 0.2% which is greater than the limit in its setter function.
RECOMMENDATION	Ensure the initial value and the setter's bounds match.
RESOLUTION	The referral limit was increased to 0.4%.



## Referral Cycles Not Prevented

FINDING ID	#0027
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - SummitReferrals.sol -> 34-40

```
1     function createReferral(address referrerAddress) public {
2         require(referrerAddress != msg.sender, "Cant refer
yourself");
3         require(referrerOf[msg.sender] == address(0), "Already been
referred");
4         require(referrerOf[referrerAddress] != msg.sender, "No
reciprocal referrals");
5         referrerOf[msg.sender] = referrerAddress;
6         emit ReferralCreated(referrerAddress, msg.sender);
7     }
```

DESCRIPTION	Self-referrals, reciprocal referrals, and 3-way referrals are prevented. However, four or more addresses may refer to each other in a cycle.
RECOMMENDATION	Disallow referrers from also being referees, in essence, once an account has made a referral they can no longer become someone else's referral. This will not prevent referred accounts from going on to become referrers themselves but it does prevent existing referees from forming a cycle.
RESOLUTION	The referral system was removed.

## Identical Contracts

FINDING ID	#0028
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - BeefyVaultV6NativePassthrough.sol Rev-2 - BeefyVaultV6Passthrough.sol

DESCRIPTION	The noted files are identical except for the contract name.
RECOMMENDATION	Remove one of the contracts and deploy separately.
RESOLUTION	<i>BeefyVaultV6NativePassthrough.sol</i> was removed.

## Tokens Are Transferred To Burn Address Indirectly (Gas Optimization)

FINDING ID	#0029
SEVERITY	Informational
STATUS	Open
LOCATION	Rev-2 - SummitToken.sol -> 26-27

```
1      oldSummit.safeTransferFrom(msg.sender, address(this),  
    _amount);  
2      oldSummit.safeTransfer(burnAdd, _amount);
```

DESCRIPTION	The burned amount when swapping from Summit v1 tokens is transferred twice.
RECOMMENDATION	Transfer the burned tokens directly to the burn address.  <i>oldSummit.safeTransferFrom(msg.sender, burnAdd, _amount);</i>
RESOLUTION	Project team comment: "The gas increase is negligible and user approves the new Token address instead of the burn address"

## Totem Supplies Always Returns 10 Values

FINDING ID	#0030
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - CartographerElevation.sol -> 288-302

```
1 function totemSupplies(address _token) public view poolExists(_token)
  returns (uint256[10] memory) {
2     ElevationPoolInfo storage pool = poolInfo[_token];
3     return [
4         elevation >= 1 ? pool.totemSupplies[0] : 0,
5         elevation >= 1 ? pool.totemSupplies[1] : 0,
6         elevation >= 2 ? pool.totemSupplies[2] : 0,
7         elevation >= 2 ? pool.totemSupplies[3] : 0,
8         elevation >= 2 ? pool.totemSupplies[4] : 0,
9         elevation >= 3 ? pool.totemSupplies[5] : 0,
10        elevation >= 3 ? pool.totemSupplies[6] : 0,
11        elevation >= 3 ? pool.totemSupplies[7] : 0,
12        elevation >= 3 ? pool.totemSupplies[8] : 0,
13        elevation >= 3 ? pool.totemSupplies[9] : 0
14    ];
15 }
```

LOCATION Rev-2 - CartographerElevation.sol -> 319-354

```
1 function totemRoundRewards(address _token)
2     public view
3     poolExists(_token)
4     returns (uint256[11] memory)
5 {
6     // ...
7     uint256[11] memory finalTotemRewards;
8     // ...
9     return finalTotemRewards;
10 }
```

## LOCATION

Rev-2 - ElevationHelper.sol -&gt; 422-452

```
1    function historicalWinningTotems(uint8 _elevation) public view
    allElevations(_elevation) returns (uint256[20] memory) {
2
3        // Early escape OASIS winners, as they don't exist
4        if (_elevation == OASIS) {
5            return [uint256(0), 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0];
6        }
7
8        uint256 round = roundNumber[_elevation];
9        return [
10            // ...
11        ];
12    }
```

## DESCRIPTION

The noted functions return a fixed element array which may contain unnecessary blank entries.

## RECOMMENDATION

Return a dynamic array with the exact number of elements.

## RESOLUTION

The recommended changes have been implemented.

## Redundant Check For Active Pool (Gas Optimization)

FINDING ID	#0031
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - CartographerElevation.sol -> 364-377

```
1    function _markPoolActive(ElevationPoolInfo storage pool, bool
    _active)
2        internal
3    {
4        if (pool.active == _active) return;
5
6        // ...
7    }
```

LOCATION	Rev-2 - CartographerElevation.sol -> 430
----------	--

```
1        if (!_live && !pool.active) _markPoolActive(pool, true);
```

LOCATION	Rev-2 - CartographerElevation.sol -> 679
----------	--

```
1        if (!pool.live && pool.active) _markPoolActive(pool, false);
```

DESCRIPTION	The <i>active</i> flag is checked within <i>_markPoolActive()</i> and does not need to be checked again before calling it.
RECOMMENDATION	This would also clarify the relationship between <i>pool.active</i> and <i>pool.live</i>
RESOLUTION	The recommended changes have been implemented.

## Redundant Check When Setting Summit Per Second (Gas Optimization)

FINDING ID	#0032
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-4 - Cartographer.sol -> 277-282

```
1 function setTotalSummitPerSecond(uint256 _amount) public onlyOwner {  
2     // Must be less than 1 SUMMIT per second  
3     require(_amount >= 0 && _amount < 1e18, "Invalid emission");  
4  
5     summitPerSecond = _amount;  
6 }
```

DESCRIPTION	The value of <i>_amount</i> can't be less than 0 since it is an unsigned integer.
RECOMMENDATION	Remove the redundant check.
RESOLUTION	The recommended changes have been implemented.

## Hypothetical Rewards Calculation Does Not Match Rollover

FINDING ID	#0033
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - CartographerElevation.sol -> 523-554

```
1  function hypotheticalRewards(address _token, address _userAdd)
2      public view
3      poolExists(_token) validUserAdd(_userAdd)
4      returns (uint256, uint256)
5  {
6      // ...
7  }
```

LOCATION	Rev-2 - CartographerElevation.sol -> 604-625
----------	--

```
1  function rollover()
2      external override
3      onlyCartographer
4  {
5      // ...
6  }
```

DESCRIPTION	<p>The winnings calculated by <i>hypotheticalRewards()</i> takes into account:</p> <ul style="list-style-type: none"><li>- the user's stake</li><li>- the user's totem's stake</li><li>- the total stake in the pool</li></ul> <p>However, the winnings calculated by <i>rollover()</i> use the average winning multiplier across all pools.</p>
RECOMMENDATION	<p>Because this is a UI function, this does not present a security risk. However, the mismatch in calculations may give users the wrong impression.</p>
RESOLUTION	<p>Functionality changed to use correct formulas.</p>



## Error Message Doesn't Reflect Check

FINDING ID	#0034
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev4 - ExpeditionV2.sol -> 337

```
1 function setExpeditionDeityWinningsMult(uint256 _deityMult) public
  onlyOwner {
2     require(_deityMult >= 100 && _deityMult <= 500, "Invalid
  runway rounds (7-90)");
3     //...
4 }
5 function setExpeditionRunwayRounds(uint256 _runwayRounds) public
  onlyOwner {
6     require(_runwayRounds >= 7 && _runwayRounds <= 90, "Invalid
  runway rounds (7-90)");
7     //...
8 }
```

LOCATION	Rev4 - Cartographer.sol -> 1188-1195
----------	--------------------------------------

```
1     function setBaseMinimumWithdrawalTax(uint16
  _baseMinimumWithdrawalTax)
2         public
3         onlyOwner
4     {
5         require(_baseMinimumWithdrawalTax <= 100, "Minimum tax
  outside 0%-10%");
6         baseMinimumWithdrawalTax = _baseMinimumWithdrawalTax;
7         emit SetBaseMinimumWithdrawalTax(_baseMinimumWithdrawalTax);
8     }
```

DESCRIPTION	The error message does not match captured error at the noted locations.
RECOMMENDATION	Update error handling to match.  Note: It might be easier to read for the check (100 <= example && example <= 500)

## RESOLUTION

The recommended changes have been implemented.

## Resetting Deposit Timestamp For Tax Can Be Avoided

FINDING ID	#0035
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-4 - Cartographer.sol -> 863-865

```
1         if (_amount > (_userTokenStakedAmount(_token, msg.sender) *  
    taxResetOnDepositBP / 10000)) {  
2             tokenLastDepositTimestampForTax[msg.sender][_token] =  
    block.timestamp;  
3         }
```

DESCRIPTION	The withdrawal tax is reset whenever a user deposits an amount greater than a given threshold based on their current stake. This can be avoided by depositing in multiple smaller steps.
RECOMMENDATION	Confirm whether this behavior is intentional or changes the threshold mechanism.
RESOLUTION	<p>Project team has stated this is intentional.</p> <p>Project team comment: "This behavior is intentional. We want to prevent users from depositing a tiny amount of token to allow the withdrawal tax to decrease, and only then depositing a large stack of funds. Though this can be skirted easily, it is much harder to do so in the specific circumstances we are trying to avoid."</p>

## Setter Does Not Change Intended Variable

FINDING ID	#0042
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-5 - EverestToken.sol -> 145-149

```
1  function setInflectionLockTime(uint256 _lockTimeDays) public  
    onlyOwner {  
2      require(_lockTimeDays >= minLockTime && _lockTimeDays <=  
        maxLockTime && _lockTimeDays >= 7 && _lockTimeDays <= 365, "Invalid  
        inflection lock time (7-365 days)");  
3      minLockTime = _lockTimeDays * daySeconds;  
4      emit SetInflectionLockTime(_lockTimeDays);  
5  }
```

DESCRIPTION	The inflection lock time is not modified in the function <i>setInflectionLockTime()</i> .
RECOMMENDATION	Ensure that the correct variable is changed in the setter.
RESOLUTION	The recommended changes have been implemented.

## Linear Scaling Incorrect When Lower Bound Value Exceeds Upper Bound Value

FINDING ID	#0043
SEVERITY	Low Risk
STATUS	Closed
LOCATION	Rev-5 - libs/SummitMath.sol -> 7-19

```
1    function scaledValue(uint256 scalar, uint256 minBound, uint256
    maxBound, uint256 minResult, uint256 maxResult)
2        internal pure
3        returns (uint256)
4    {
5        require(minBound <= maxBound, "Invalid scaling range");
6        if (minResult == maxResult) return minResult;
7        if (scalar <= minBound) return minResult;
8        if (scalar >= maxBound) return maxResult;
9        if (maxResult > minResult) {
10            return (((scalar - minBound) * (maxResult - minResult) *
1e12) / (maxBound - minBound) / 1e12) + minResult;
11        }
12        return (((maxBound - scalar) * (minResult - maxResult) *
1e12) / (maxBound - minBound) / 1e12);
13    }
```

DESCRIPTION	Only the linearly scaling amount is included in the case of <i>maxResult</i> being less than <i>minResult</i> .
RECOMMENDATION	Include the non-scaling in the result, in this case, <i>maxResult</i> .
RESOLUTION	The recommended changes have been implemented.

## Supplies Updated Incorrectly When Changing Both Deity and Safety Factor

FINDING ID	#0044
SEVERITY	Medium Risk
STATUS	Open
LOCATION	Rev-9 - ExpeditionV2.sol -> 833-842

```
1      if (user.entered) {
2          // Transfer deitied everest from previous deity to new
        deity
3          expeditionInfo.supplies.deity[prevDeity] -=
        user.deitiedSupply;
4          expeditionInfo.supplies.deity[_newDeity] +=
        user.deitiedSupply;
5
6          // Remove safe and deitied everest from existing supply
        states
7          expeditionInfo.supplies.safe = expeditionInfo.supplies.safe
        - existingSafeSupply + user.safeSupply;
8          expeditionInfo.supplies.deitied =
        expeditionInfo.supplies.deitied - existingDeitiedSupply +
        user.deitiedSupply;
9          expeditionInfo.supplies.deity[user.deity] =
        expeditionInfo.supplies.deity[user.deity] - existingDeitiedSupply +
        user.deitiedSupply;
10     }
```

### DESCRIPTION

The values of *expeditionInfo.supplies.deity[]* are updated incorrectly when changing both deity and safety factors at the same time.

This can result in other users being unable to select their deity, change their safety factor, and potentially even update their Everest amounts.

### RECOMMENDATION

The correct changes should be:

- *deity[prevDeity] -= existingDeitiedSupply;*
- *deity[\_newDeity] += user.deitiedSupply;*

### RESOLUTION

The recommended changes have been implemented.

# Static Analysis

## Contract Values Can Be Constant Or Immutable (Gas Optimization)

FINDING ID	#0036
SEVERITY	Informational
STATUS	Closed
LOCATION	<ul style="list-style-type: none"><li>• Rev-2 - SummitLocking.sol -&gt; 22: <i>uint256 public epochDuration = 3600 * 24 * 7;</i></li><li>• Rev-2 - SummitVRFModule.sol -&gt; 56: <i>uint256 seedRoundDurationMult = 2;</i></li><li>• Rev-4 - Cartographer.sol -&gt; 136: <i>uint256 public taxResetOnDepositBP = 500;</i></li><li>• Rev-5 - EverestToken.sol -&gt; 29: <i>uint256 public daySeconds = 24 * 3600;</i></li></ul>
DESCRIPTION	Variables that do not change during the operation of a contract can be marked <i>constant</i> or <i>immutable</i> to reduce gas costs and improve code readability.
RECOMMENDATION	Mark these variables as <i>constant</i> or <i>immutable</i> as appropriate.
RESOLUTION	All values have either been deprecated or changed to a constant.

## Unused Library

FINDING ID	#0037
SEVERITY	Informational
STATUS	Closed
LOCATION	Rev-2 - libs/UQ112x112.sol

DESCRIPTION	The UQ112x112 library is never used.
RECOMMENDATION	Remove the library.
RESOLUTION	The library was removed.



## No Events Emitted For Changes To Protocol Values

FINDING ID	#0038
SEVERITY	Informational
STATUS	Closed
LOCATION	<ul style="list-style-type: none"> <li>• Rev-2 - ElevationHelper.sol -&gt; 266-271: <i>function setSummitVRFFModuleAdd (address _summitVRFFModuleAdd) public onlyOwner</i></li> <li>• Rev-2 - ElevationHelper.sol -&gt; 271-281: <i>function setElevationRoundDurationMult(uint8 _elevation, uint8 _mult) public onlyOwner elevationOrExpedition(_elevation)</i></li> <li>• Rev-2 - ElevationHelper.sol -&gt; 285-294: <i>function setElevationAllocMultiplier(uint8 _elevation, uint8 _allocMultiplier) public onlyOwner allElevations(_elevation)</i></li> <li>• Rev-2 - SummitVRFFModule.sol -&gt; 99-104: <i>function setElevationHelper (address _elevationHelper) public onlyOwner</i></li> <li>• Rev-2 - SummitVRFFModule.sol -&gt; 109-112: <i>function setTrustedSeederAdd(address _trustedSeeder) public override onlyCartographer</i></li> <li>• Rev-2 - SummitVRFFModule.sol -&gt; 117-119: <i>function setSeedRoundEndTimestamp(uint256 _seedRoundEndTimestamp) public override onlyElevationHelper</i></li> <li>• Rev-4 - Cartographer.sol -&gt; 270-273: <i>function setRolloverRewardInNativeToken(uint256 _reward) public onlyOwner</i></li> <li>• Rev-4 - Cartographer.sol -&gt; 277-282: <i>function setTotalSummitPerSecond(uint256 _amount) public onlyOwner</i></li> <li>• Rev-4 - Cartographer.sol -&gt; 287-293: <i>function setSummitDistributionBPs(uint256 _referralsBP, uint256 _treasuryBP) public onlyOwner</i></li> <li>• Rev-4 - SummitLocking.sol -&gt; 102-107: <i>function setYieldLockEpochCount(uint8 _count)</i></li> <li>• Rev-5 - Cartographer.sol -&gt; 280-283: <i>function setRolloverRewardInNativeToken(uint256 _reward) public onlyOwner</i></li> </ul>
DESCRIPTION	<p>Functions that change important variables should emit events such that users can more easily monitor the change.</p>

RECOMMENDATION	Emit events from these functions.
RESOLUTION	Recommended changes have been implemented.

## Unused Variables

FINDING ID	#0039
SEVERITY	Informational
STATUS	Closed
LOCATION	<ul style="list-style-type: none"><li>• Rev-2 - CartographerOasis.sol -&gt; 77: <i>EnumerableSet.AddressSet private activePools;</i></li><li>• Rev-2 - CartographerElevation.sol -&gt; 104: <i>bool public elevationEnabled;</i></li></ul>

DESCRIPTION	The noted variables are not used.
RECOMMENDATION	Remove the variables or incorporate them into the contract functionality.
RESOLUTION	The variables were removed.

## Unused Functions And Modifiers

FINDING ID	#0040
SEVERITY	Informational
STATUS	Closed
LOCATION	<ul style="list-style-type: none"><li>• Rev-4 BaseEverestExtension.sol -&gt; 16-21: <i>function getUserEverest(address _userAdd) internal view returns (uint256)</i></li><li>• Rev-4 CartographerElevation.sol -&gt; 739-748: <i>function totemPrecomputedMultForRound(ElevationPoolInfo storage pool, uint8 _totem, uint256 _roundIndex) internal view returns (uint256)</i></li><li>• Rev-4 EverestToken.sol -&gt; 114-117: <i>modifier validUserAdd(address _userAdd)</i></li><li>• Rev-4 ExpeditionV2.sol -&gt; 274-277: <i>modifier elevationHelperRoundRolledOver()</i></li></ul>
DESCRIPTION	The noted functions and modifiers are never used.
RECOMMENDATION	Remove the unused functions and modifiers or incorporate them into the contract functionality.
RESOLUTION	The recommended changes have been implemented.

## Missing Zero Checks

FINDING ID	#0041
SEVERITY	Low Risk
STATUS	Closed
LOCATION	<ul style="list-style-type: none"><li>Rev-4 contracts/Cartographer.sol -&gt; 180-186: <i>constructor(address_treasuryAdd, address_expeditionTreasuryAdd)</i></li></ul>

DESCRIPTION	The contract address values can be set to zero address in various constructors, initializers, and setter functions. Zero addresses may cause incorrect contract behavior.
RECOMMENDATION	Add a check to ensure contract values are never set to invalid zero addresses.
RESOLUTION	The recommended changes have been implemented.

# On-Chain Analysis

## Treasuries And LP Generation Are Externally Owned Accounts

FINDING ID	#0045
SEVERITY	Medium Risk
STATUS	Open
LOCATION	Cartographer <a href="https://explorer.bloxroute.com/address/0x71210E72D065C19406913cD706e964A9f21856D4">0x71210E72D065C19406913cD706e964A9f21856D4</a>

DESCRIPTION	<p>The treasury addresses, as well as the lp generator address, are externally owned accounts. A malicious actor in control of these accounts can take funds intended for project purposes.</p> <p>expeditionTreasuryAdd <a href="https://explorer.bloxroute.com/address/0x00676eF184C36EBf73d0F3059D2a6909F02AA893">0x00676eF184C36EBf73d0F3059D2a6909F02AA893</a> lpGeneratorAdd <a href="https://explorer.bloxroute.com/address/0x50963e3c0899584a3EBD3226d976210aF0e42349">0x50963e3c0899584a3EBD3226d976210aF0e42349</a> treasuryAdd <a href="https://explorer.bloxroute.com/address/0x474332025Dd20D5F09FFd766b317F98A872D71e0">0x474332025Dd20D5F09FFd766b317F98A872D71e0</a></p>
RECOMMENDATION	<p>Set these addresses to an appropriate contract. A multi-sig wallet can work as well.</p>
RESOLUTION	<p>Project team comment: "The treasuries are currently managed by the Summit Team, as we have been managing them for the duration of V1. As we refine our strategies for the treasuries we will develop contracts that handle these treasuries trustlessly."</p>

## Missing Signature Specific Delay

FINDING ID	#0046
SEVERITY	Low Risk
STATUS	Mitigated
LOCATION	Timelock <a href="#">0x191528B779Ada279145D42350226bF75c0c73715</a>

DESCRIPTION	<p>The following functions are sensitive and should have a longer time delay</p> <ul style="list-style-type: none"><li>- <i>setExpeditionTreasuryAdd(address)</i></li><li>- <i>setLpGeneratorAdd(address)</i></li><li>- <i>setElevationHelper(address)</i></li></ul> <p>Note: the <i>expeditionTreasuryAdd</i> and <i>lpGeneratorAdd</i> are currently EOAs.</p> <p>The following specific delays were found without the full function signature:</p> <ul style="list-style-type: none"><li>- <i>transferOwnership</i> - 7 days</li><li>- <i>renounceOwnership</i> - 7 days</li><li>- <i>setPendingAdmin</i> - 7 days</li><li>- <i>migrateSummitOwnership</i> - 7 days</li><li>- <i>setTotalSummitPerSecond</i> - 3 days</li><li>- <i>setTokenPassthroughStrategy</i> - 3 days</li><li>- <i>retireTokenPassthroughStrategy</i> - 3 days</li><li>- <i>upgradeSummitRNGModule</i> - 3 days</li><li>- <i>setYieldLockEpochCount</i> - 3 days</li></ul>
RECOMMENDATION	Add a new specific time delay for the functions noted. Obelisk recommends a delay of at least 72 hours.
RESOLUTION	<p>The correct signature-specific delays were added.</p> <p>7 day delays:</p> <ul style="list-style-type: none"><li>• <i>migrateSummitOwnership(address)</i></li><li>• <i>renounceOwnership()</i></li><li>• <i>setPendingAdmin(address)</i></li><li>• <i>transferOwnership(address)</i></li></ul> <p>3 day delays</p> <ul style="list-style-type: none"><li>• <i>retireTokenPassthroughStrategy(address)</i></li><li>• <i>setElevationHelper(address)</i></li><li>• <i>setExpeditionTreasuryAdd(address)</i></li></ul>

- *setLpGeneratorAdd(address)*
- *setTokenPassthroughStrategy(address,address)*
- *setTotalSummitPerSecond(uint256)*
- *setYieldLockEpochCount(uint8)*
- *upgradeSummitRNGModule(address)*



## Changes To Deployed Contract

FINDING ID	#0047
SEVERITY	Informational
STATUS	Closed
LOCATION	ElevationHelper <a href="#">0xDfBb673787DfC1477b0ca7890887136a13296811</a>

DESCRIPTION	<p>The expedition round duration was changed from 6 hours to 24 hours.</p> <p>The delays before the rounds at each elevation begin were also changed.</p>
RECOMMENDATION	No changes are necessary.
RESOLUTION	N/A

# External Addresses

## Externally Owned Accounts

### Admin

ACCOUNT	<a href="#">0x3a7679E3662bC7c2EB2B1E71FA221dA430c6f64B</a>
USAGE	<a href="#">0x191528B779Ada279145D42350226bF75c0c73715</a> <i>Timelock.admin</i> - Variable  <a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a> <i>Cartographer.getRoleMember(PAUSER_ROLE,0)</i>  <a href="#">0xC687806Cfd11B5330d7c3aE6f18B18DC71e1083e</a> <i>EverestToken.getRoleMember(PAUSER_ROLE,0)</i>  <a href="#">0x94233b479B37FBb41E81C63E27b6C2279646C609</a> <i>ExpeditionV2.getRoleMember(PAUSER_ROLE,0)</i>  <a href="#">0x17EB377C16653523DFAa8402de8A8eEe4832c108</a> <i>SummitGlacier.getRoleMember(PAUSER_ROLE,0)</i>  <a href="#">0x0dDB88e14494546D07fCd94c3f0ef6D3296B1cD7</a> <i>SummitTokenV2.getRoleMember(PAUSER_ROLE,0)</i>
IMPACT	<ul style="list-style-type: none"><li>receives elevated permissions as owner, operator, or other</li></ul>

### Expedition Treasury

ACCOUNT	<a href="#">0x00676eF184C36EBf73d0F3059D2a6909F02AA893</a>
USAGE	<a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a> <i>Cartographer.expeditionTreasuryAdd</i> - Variable
IMPACT	<ul style="list-style-type: none"><li>receives transfer of tokens farmed by project</li></ul>

## LP Generator

ACCOUNT	<a href="#">0x50963e3c0899584a3EBD3226d976210aF0e42349</a>
USAGE	<a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a> <i>Cartographer.lpGeneratorAdd</i> - Variable
IMPACT	<ul style="list-style-type: none"><li>• receives transfer of tokens farmed by project</li></ul>

## Treasury

ACCOUNT	<a href="#">0x474332025Dd20D5F09FFd766b317F98A872D71e0</a>
USAGE	<a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a> <i>Cartographer.treasuryAdd</i> - Variable
IMPACT	<ul style="list-style-type: none"><li>• receives transfer of tokens farmed by project</li></ul>

## Trusted Seeder

ACCOUNT	<a href="#">0x7E1e4354de68B644c30b40F983f66aF60042fF69</a>
USAGE	<a href="#">0xFCcf00CCdeb8964c0F996f332F5A0f763d571d27</a> <i>SummitTrustedSeederRNGModule.trustedSeeder</i> - Variable
IMPACT	<ul style="list-style-type: none"><li>• receives elevated permissions as owner, operator, or other</li></ul>

# External Contracts

*These contracts are not part of the audit scope.*

## Deposit Tokens

ADDRESS	<p>SpookyLP WFTM TOMB <a href="#">0x2A651563C9d3Af67aE0388a5c8F89b867038089e</a></p> <p>SpookyLP WFTM TSHARE <a href="#">0x4733bc45eF91cF7CcEcaeeDb794727075fB209F2</a></p> <p>SpookyLP WFTM BOO <a href="#">0xEc7178F4C41f346b2721907F5cF7628E388A7a58</a></p> <p>WeightedPool2Tokens BPT-BEETS-FTM <a href="#">0xcdE5a11a4ACB4eE4c805352Cec57E236bdBC3837</a></p> <p>WeightedPool GRAND-ORCH <a href="#">0xd47D2791d3B46f9452709Fa41855a045304D6f9d</a></p> <p>WeightedPool2Tokens FTM-OPERA <a href="#">0xcdF68a4d525Ba2E90Fe959c74330430A5a6b8226</a></p> <p>SpookyToken BOO <a href="#">0x841FAD6EAe12c286d1Fd18d1d525DffA75C7EFFE</a></p> <p>WeightedPool BPT-L1TOKEN <a href="#">0x9af1F0e9aC9C844A4a4439d446c1437807183075</a></p> <p>SpookyLP WFTM 2SHARE <a href="#">0x6398ACBBAB2561553a9e458Ab67dCFbD58944e52</a></p> <p>SpookyLP WFTM 2OMB <a href="#">0xbdC7DFb7B88183e87f003ca6B5a2F81202343478</a></p>
USAGE	<p><a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a> <i>Cartographer.tokensWithAllocation</i> - Variable</p> <p><a href="#">0x8047C5Bed363FE1bf458eC3E20E93A3c28A07b8d</a> <i>CartographerOasis.getPools</i> - Variable</p> <p><a href="#">0x1805922e7F82fc9DbAd8E2435C146ba605C4a25d</a> Plains <a href="#">0x64F8a1DBC20f132159605Ad8d7111e75EA702358</a> Mesa <a href="#">0x93af6a3882aAF4112Fc404E30277b39452F44cf6</a> Summit <i>CartographerElevation.getPools</i> - Variable</p>
IMPACT	<ul style="list-style-type: none"><li>ERC20 Token</li></ul>

## SummitV1

ADDRESS	<a href="#">0x8F9bCCB6Dd999148Da1808aC290F2274b13D7994</a>
USAGE	<a href="#">0x0dDB88e14494546D07fCd94c3f0ef6D3296B1cD7</a> <i>SummitTokenV2.oldSummit</i> - Initialized
IMPACT	<ul style="list-style-type: none"><li>• ERC20 Token</li></ul>

## Beefy Vaults

ADDRESS	BeefyVaultV6 - SpookyLP WFTM TOMB <a href="#">0x27c77411074ba90cA35e6f92A79dAd577c05A746</a> BeefyVaultV6 - SpookyLP WFTM TSHARE <a href="#">0xae94e96bF81b3a43027918b138B71a771D381150</a> BeefyVaultV6 - SpookyLP WFTM BOO <a href="#">0xEe3a7c885Fd3cc5358FF583F2DAB3b8bC473316f</a> BeefyVaultV6 - WeightedPool2Tokens BPT-BEETS-FTM <a href="#">0xAe0AB718971bb2BAd88AE6Bdc4D0eA63F3CD53Ee</a> BeefyVaultV6 - WeightedPool GRAND-ORCH <a href="#">0x0ab24Bfc2503bB536ad667c00685BBB70fA90433</a> BeefyVaultV6 - WeightedPool2Tokens FTM-OPERA <a href="#">0xB40c339e2b0a8513152F68082D3c87314E03776D</a> BeefyVaultV6 - SpookyToken BOO <a href="#">0x15DD4398721733D8273FD4Ed9ac5eadC6c018866</a> BeefyVaultV6 - WeightedPool BPT-L1TOKEN <a href="#">0x0139C853539bF1EDf221cf9d665F282C2701335a</a> BeefyVaultV6 - SpookyLP WFTM 2SHARE <a href="#">0x03668Bd5dc63B1e15c39619b599091A4f68cAFB3</a> BeefyVaultV6 - SpookyLP WFTM 2OMB <a href="#">0xf3A72885cB383543AEE60f44Ca51C760f0bC3b9b</a>
USAGE	BeefyVaultV6Passthrough - SpookyLP WFTM TOMB <a href="#">0x3B4C96337f62EE0Bc70a30F523b15de15dBAEF9E</a> BeefyVaultV6Passthrough - SpookyLP WFTM TSHARE <a href="#">0xCccfd006145dDDfC7Bb431329D3620a4d601936b</a> BeefyVaultV6Passthrough - SpookyLP WFTM BOO <a href="#">0xf0D80E3E76Acc03E37976673aF6730866afF0305</a> BeefyVaultV6Passthrough - WeightedPool2Tokens BPT-BEETS-FTM <a href="#">0x8D82120DD86a54AfC4b8cf749C46c2a46717Ce90</a> BeefyVaultV6Passthrough - WeightedPool GRAND-ORCH <a href="#">0x4776Bc42C56B8d5c53B5EBC4D306CDfD480c926f</a> BeefyVaultV6Passthrough - WeightedPool2Tokens FTM-OPERA <a href="#">0x79A54A9502aEf31768e2a0702ca8eA8Ea7AEa20C</a> BeefyVaultV6Passthrough - SpookyToken BOO <a href="#">0x5722b6F09848354E2A7539FE509eEe708155658b</a>

	<p>BeefyVaultV6Passthrough - WeightedPool BPT-L1TOKEN  <a href="#">0xde223f1dE2a62345d48a76250E767aCfAa3792B3</a></p> <p>BeefyVaultV6Passthrough - SpookyLP WFTM 2SHARE  <a href="#">0xa9db0459648e1754AB4811815f771a99e2d92392</a></p> <p>BeefyVaultV6Passthrough - SpookyLP WFTM 2OMB  <a href="#">0xF136B1aE80362DEd39d7cf4A6172E3F67260b276</a></p> <p><i>BeefyVaultV6Passthrough.passthroughToken</i> - Initialized</p>
IMPACT	<ul style="list-style-type: none"> <li>• receives transfer of tokens deposited by users</li> <li>• impacts ability to deposit or withdraw tokens</li> </ul>

## Appendix A - Reviewed Documents

Document	Address
interfaces/IPancakeFactory.sol	N/A
interfaces/IPancakeRouter.sol	N/A
interfaces/IPassthrough.sol	N/A
interfaces/ISubCart.sol	N/A
interfaces/ISummitRNGModule.sol	N/A
interfaces/IUniswapV2Pair.sol	N/A
interfaces/PancakeFactory.sol	N/A
libs/ERC20Mintable.sol	N/A
libs/Multicall.sol	N/A
libs/SummitMath.sol	N/A
libs/UQ112x112.sol	N/A
BaseEverestExtension.sol	N/A
BeefyVaultV2Passthrough.sol	N/A
BeefyVaultV6NativePassthrough.sol	N/A
BeefyVaultV6Passthrough.sol	<p>SpookyLP WFTM TOMB  <a href="#">0x3B4C96337f62EE0Bc70a30F523b15de15dBAEF9E</a>            SpookyLP WFTM TSHARE  <a href="#">0xCccfd006145dDDfC7Bb431329D3620a4d601936b</a>            SpookyLP WFTM BOO  <a href="#">0xf0D80E3E76Acc03E37976673aF6730866afF0305</a>            WeightedPool2Tokens BPT-BEETS-FTM  <a href="#">0x8D82120DD86a54AfC4b8cf749C46c2a46717Ce90</a>            WeightedPool GRAND-ORCH  <a href="#">0x4776Bc42C56B8d5c53B5EBC4D306CDFS480c926f</a></p>

	WeightedPool2Tokens FTM-OPERA <a href="#">0x79A54A9502aEf31768e2a0702ca8eA8Ea7AEa20C</a> SpookyToken BOO <a href="#">0x5722b6F09848354E2A7539FE509eEe708155658b</a> WeightedPool BPT-L1TOKEN <a href="#">0xde223f1dE2a62345d48a76250E767aCfAa3792B3</a> SpookyLP WFTM 2SHARE <a href="#">0xa9db0459648e1754AB4811815f771a99e2d92392</a> SpookyLP WFTM 2OMB <a href="#">0xF136B1aE80362DEd39d7cf4A6172E3F67260b276</a>
Cartographer.sol	<a href="#">0x71210E72D065C19406913cD706e964A9f21856D4</a>
CartographerElevation.sol	Plains <a href="#">0x1805922e7F82fc9DbAd8E2435C146ba605C4a25d</a> Mesa <a href="#">0x64F8a1DBC20f132159605Ad8d7111e75EA702358</a> Summit <a href="#">0x93af6a3882aAF4112Fc404E30277b39452F44cf6</a>
CartographerOasis.sol	<a href="#">0x8047C5Bed363FE1bf458eC3E20E93A3c28A07b8d</a>
ElevationHelper.sol	<a href="#">0xDfBb673787DfC1477b0ca7890887136a13296811</a>
EverestToken.sol	<a href="#">0xC687806Cfd11B5330d7c3aE6f18B18DC71e1083e</a>
ExpeditionV2.sol	<a href="#">0x94233b479B37FBb41E81C63E27b6C2279646C609</a>
MasterChefPassthrough.sol	N/A
SummitGlacier.sol	<a href="#">0x17EB377C16653523DFAa8402de8A8eEe4832c108</a>
SummitReferrals.sol	N/A
SummitToken.sol	<a href="#">0x0dDB88e14494546D07fCd94c3f0ef6D3296B1cDZ</a>
SummitTrustedSeederRN GModule.sol	<a href="#">0xFCcf00CCdeb8964c0F996f332F5A0f763d571d27</a>
Timelock.sol	<a href="#">0x191528B779Ada279145D42350226bF75c0c73715</a>

## Revisions

Revision 1	<a href="#">19a1b63e4348d84593534ffdcdbf7f0e764f90d0</a>
Revision 2	<a href="#">71710fd897fd2728785d115dd6913509776eeb18</a>
Revision 3	<a href="#">d05bd64f6dc6f784bd3f0530557dc6fe7db8b983</a>



Revision 4	<a href="#">14f80a616eb9394cab289c06a95802823049dab0</a>
Revision 5	<a href="#">b526774a1e7104f189c5b4259609eb5776901d3c</a>
Revision 6	<a href="#">4af984faa5c0f15252dcad3c77f2564910071c90</a>
Revision 7	<a href="#">301aed1111a4758b665d5d03d293cdda55da43db</a>
Revision 8	<a href="#">9e221b0a455c85fe8c0fea011936f717b5dbc982</a>
Revision 9	<a href="#">963423dc28131412dc830cb8eb04c81bd0f07f1e</a>
Revision 10	<a href="#">c2c32fbd166058a45a44399f67e817cd71883f22</a>

## Imported Contracts

OpenZeppelin	4.3.0
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## Appendix B - Risk Ratings

Risk	Description
High Risk	A fatal vulnerability that can cause the loss of all Tokens / Funds.
Medium Risk	A vulnerability that can cause the loss of some Tokens / Funds.
Low Risk	A vulnerability that can cause the loss of protocol functionality.
Informational	Non-security issues such as functionality, style, and convention.

## Appendix C - Finding Statuses

Closed	Contracts were modified to permanently resolve the finding.
Mitigated	The finding was resolved by other methods such as revoking contract ownership. The issue may require monitoring, for example in the case of a time lock.
Partially Closed	Contracts were updated to fix the issue in some parts of the code.
Partially Mitigated	Fixed by project-specific methods which cannot be verified on-chain. Examples include compounding at a given frequency.
Open	The finding was not addressed.

# Appendix D - Audit Procedure

A typical Obelisk audit uses a combination of the three following methods:

**Manual analysis** consists of a direct inspection of the contracts to identify any security issues. Obelisk auditors use their experience in software development to spot vulnerabilities. Their familiarity with common contracts allows them to identify a wide range of issues in both forked contracts as well as original code.

**Static analysis** is software analysis of the contracts. Such analysis is called “static” as it examines the code outside of a runtime environment. Static analysis is a powerful tool used by auditors to identify subtle issues and to verify the results of manual analysis.

**On-chain analysis** is the audit of the contracts as they are deployed on the blockchain. This procedure verifies that:

- deployed contracts match those which were audited in manual/static analysis;
- contract values are set to reasonable values;
- contracts are connected so that interdependent contracts function correctly;
- and the ability to modify contract values is restricted via a timelock or DAO mechanism. (We recommend a timelock value of at least 72 hours)

Each obelisk audit is performed by at least two independent auditors who perform their analysis separately.

After the analysis is complete, the auditors will make recommendations for each issue based on best practices and industry standards. The project team can then resolve the issues, and the auditors will verify that the issues have been resolved with no new issues introduced.

Our auditing method lays a particular focus on the following important concepts:

- Quality code and the use of best practices, industry standards, and thoroughly tested libraries.
- Testing the contract from different angles to ensure that it works under a multitude of circumstances.
- Referencing the contracts through databases of common security flaws.

## Follow Obelisk Auditing for the Latest Information



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