# thirdweb A-3

Security Audit

Aug 9th, 2022
Version 1.0.0

Prepared for Matteo

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## Introduction

This document includes the results of the security audit for thirdweb's smart contract implementation, revision A-3 of their Drop1155 and Drop721 smart contracts, audited by the Macro security team from June 30, 2022 to June 30, 2022.

The purpose of this audit is to review the source code of smart thirdweb Solidity contracts, and provide information on the design, architecture, and quality of the source code and an emphasis on validating the correctness and security of the software in its entirety.

Disclaimer: While Macro's review is comprehensive and has surfaced some changes that should be made to the source code, this audit should not solely be relied upon for security, as no single audit is guaranteed to catch all possible bugs.

## Overall Assessment

The following is an aggregation of issues found by the Macro Audit team:

| Severity | Count | Acknowledged | Won't Do | Addressed |
|---|---|---|---|---|
| High | 1 | - | - | 1 |
| Medium | 5 | 1 | 2 | 2 |
| Low | 7 | 2 | 3 | 2 |
| Code Quality | 5 | 2 | - | 3 |
| Informational | 2 | - | - | 2 |

thirdweb was quick to respond to these issues.

## Specification

Our understanding of the specification has based on the following sources:

- Discussions on Slack with the thirdweb team.
- Are audit-hardened documents hosted on Notion.

## Source Code

The following source code was reviewed during the audit:

- Repository: contracts
- Current Hash: 0f8d5b0e5f5f5f7a27f2d7b7e8f9e7e5e5d39d

Specifically, we audited the following contracts within this repository:

| Contract | SHA256 |
|---|---|
| contracts/prebuilts/drop/Drop1155.sol | 5b5d8c3f38b2c9b8d2c3c3f85a2df7f5a2c0c2f7b7b7f8d3f9f7a8d8d8d8d8 |
| contracts/prebuilts/drop/DropERC721.sol | a3f8b7b7d7d7d7a8c7d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8 |
| contracts/lib/CurrencyTransferLib.sol | 4f8f8f7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/lib/FeeData.sol | 5b5d5f5f7d7d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d8d |
| contracts/lib/MerkleProof.sol | 7d8f8f7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/lib/TokenERC1155.sol | 8d8d8d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/lib/TokenERC721.sol | 8d8d8d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/lib/TransparentUpgradeableProxy.sol | 9d9d9d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/lib/TWStrings.sol | 7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/extension/interface/IDelayedReveal.sol | 3f3f3f7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d7d |
| contracts/extension/interface/IDelayedReveal.sol | 7d8d8d

Not clear how ERC20 accidental transfers would be rejected.

Any function to recover such tokens might affect existing functionality and token balances in the packs.

### L-5 Trusted forwarders can be added, not removed

| TOPIC | STATUS | IMPACT | LIKELIHOOD |
|---|---|---|---|
| Protocol Longevity | Acknowledged | High | Low |

Thirdweb ERC2771Context implementation receives an array of `trustedForwarder` values on initialization. However, there is no way to remove a trusted forwarder.

Consider adding a function to remove a trusted forwarder, or to set the full list of forwarders, to handle cases where forwarders get lost, expired, or compromised.

RESPONSE BY THIRDWEB

> Not fixing (for now).
>
> Today, a thirdweb pre-built smart contract deployed by users on the dashboard or via SDKs use the same set of trusted forwarders deployed by thirdweb, or external providers like Biconomy.
>
> The issue pointed out requires a design change across all of thirdweb's smart contracts; it's fix will be coordinated across the thirdweb products.

### L-6 `maxTotalSupply` can be updated to `< totalSupply()`

| TOPIC | STATUS | IMPACT | LIKELIHOOD |
|---|---|---|---|
| Input Ranges | Wont Do | Low | Medium |

In DropERC20.sol, `setMaxTotalSupply()` allows `maxTotalSupply` to be set to any number. If the value is set to `< totalSupply()` all present and future claims will all fail, and a potentially misleading event will be emitted (`MaxTotalSupplyUpdated()`), potentially causing unnecessary confusion for users. Consider updating `setMaxTotalSupply()` to require a value `>= totalSupply()`.

Note that if the intent is to halt minting immediately, setting `maxTotalSupply` to present `totalSupply()` may suffer from race conditions if additional claims are processed ahead of `setMaxTotalSupply()`. In this case, consider calling `setClaimConditions()` with an empty `_phases` array instead. The latter approach will not revert if additional claims precede its execution.

RESPONSE BY THIRDWEB

> The purpose here was to achieve pausing of claims by setting maxTotalSupply as less than totalSupply().
>
> The absence of checks is intended to transfer responsibility to contract admin.

### L-7 Unpublishing may orphan data

| TOPIC | STATUS | IMPACT | LIKELIHOOD |
|---|---|---|---|
| Data Model | Acknowledged | Low | Low |

The `publishContract()` function adds an entry into `compilerMetadataUriToPublishedMetadataUris` which is not accounted for during `unpublishContract()`.

This may leave orphan `compilerMetadataUri` data, causing it to refer to non-existent `publishMetadataUri` data. Moreover, `getPublishedUriFromCompilerUri()` will return `publishMetadataUris` for contracts that are unpublished.

RESPONSE BY THIRDWEB

> Not fixing (for now).
>
> The issue pointed out requires a design change in the ContractPublisher contract that must be coordinated throughout the thirdweb Release product.

### Q-1 Low Test Coverage

| TOPIC | STATUS | QUALITY IMPACT |
|---|---|---|
| Testing | Acknowledged | High |

DropERC20.sol and ContractPublisher.sol have very light testing. Consider adding more to more confidently affirm the behavior of the contracts.

### Q-2 Missing Events

| TOPIC | STATUS | QUALITY IMPACT |
|---|---|---|
| Events | Fixed | Low |

- DropERC20.sol's `setContractUri()` does not emit an event.
- Pack.sol's `setPublisherProfileUri()` does not emit an event.

Consider adding an event for these changes.

### Q-3 Inconsistent datatype for `platformFeeBps`

| TOPIC | STATUS | QUALITY IMPACT |
|---|---|---|
| Data Model | Acknowledged | Low |

The datatype applied to this value varies throughout the contract between `uint256`, `uint128`, `uint64` and `uint16`. Consider normalizing to the datatype applied to its storage variable definition of `uint128`.

RESPONSE BY THIRDWEB

> Not fixing (yet).
>
> This fix will be coordinated across the relevant thirdweb smart contracts.

### Q-4 Unused import

| TOPIC | STATUS | QUALITY IMPACT |
|---|---|---|
| Extra Code | Fixed | Low |

In DropERC20.sol, the import of `ERC20PausableUpgradeable.sol` is not used.

### Q-5 Inaccurate `getClaimTimestamp()` return value

| TOPIC | STATUS | QUALITY IMPACT |
|---|---|---|
| Data Consistency | Fixed | Medium |

In DropERC20.sol's `getClaimTimestamp()`, when `lastClaimTimestamp` is zero, `nextValidClaimTimestamp` should arguably be `0` to indicate that no delay is required, since no prior purchase has occurred.

If this were to be implemented, a minor gas-savings opportunity can be implemented along with it, as the `nextValidClaimTimestamp` could be skipped, and line 376 could be simplified to:

```
require(block.timestamp >= nextValidClaimTimestamp, "cannot claim yet.");
```

### I-1 `setClaimConditions()` will accept phases that cannot become active

| TOPIC | IMPACT |
|---|---|
| Data Consistency | Informational |

`setClaimConditions()` will update `claimCondition` without comparing individual `_phases[i].startTimestamp` values with respect to `block.timestamp`. As a result, it is possible to supply a set of claim conditions which will never execute.

For example, consider calling `setClaimCondition` with 4 entries in `_phases`, with `startTimestamp` values of: `50`, `75`, `100`, `125`. If executed when `block.timestamp = 100`, the first two phases will never occur.

This may impact an owner's intended phases, or mask accidental errors in phase formulation.

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The scope of this report and review is limited to a review of only the code presented by the Emergent team and only the source code Macro notes as being within the scope of Macro's review within this report. This report does not include an audit of the deployment scripts used to deploy the Solidity contracts in the repository corresponding to this audit. Specifically, for the avoidance of doubt, this report does not constitute investment advice, is not intended to be relied upon as investment advice, is not an endorsement of this project or team, and it is not a guarantee as to the absolute security of the project. In this report you may through hypertext or other computer links, gain access to websites operated by persons other than Macro. Such hyperlinks are provided for your reference and convenience only, and are the exclusive responsibility of such websites' owners. You agree that Macro is not responsible for the content or operation of such websites, and that Macro shall have no liability to your or any other person or entity for the use of third party websites. Macro assumes no responsibility for the use of third party software and shall have no liability whatsoever to any person or entity for the accuracy or completeness of any outcome generated by such software.