



Security Assessment Report



Aave v3.6

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Prepared for:
Aave DAO

Code developed by:



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Project Summary

Project Scope

Project Name	Repository (link)	Latest Commit Hash	Platform
Aave v3.6	Github Repo	v3.6.0	EVM

Project Overview

This document describes the verification of **Aave v3.6** code using manual code review. The work was undertaken from **October 27** to **November 3**.

The following contracts are considered in scope for this review:

- src/contracts/protocol/libraries/logic/GenericLogic.sol
- src/contracts/protocol/libraries/logic/LiquidationLogic.sol
- src/contracts/protocol/libraries/logic/SupplyLogic.sol
- src/contracts/protocol/libraries/logic/ValidationLogic.sol
- src/contracts/protocol/libraries/types/DataTypes.sol
- src/contracts/protocol/pool/Pool.sol
- src/contracts/protocol/pool/PoolConfigurator.sol
- src/contracts/protocol/tokenization/AToken.sol
- src/contracts/protocol/tokenization/VariableDebtToken.sol
- src/contracts/protocol/tokenization/base/DebtTokenBase.sol
- src/contracts/protocol/tokenization/base/IncentivizedERC20.sol

The team performed a manual audit of all the solidity contracts. Issues discovered during the review are listed in the following pages.

Protocol Overview

Aave v3.6.0 introduces major improvements to eMode configuration, allowing `lt`, `ltv`, and `borrowingEnabled` to be independently defined per eMode with the new `ltvZeroBitmap`, enabling granular risk control.



Automatic collateral enablement was removed from aToken transfers, liquidations, and isolated collaterals to save gas and simplify logic.

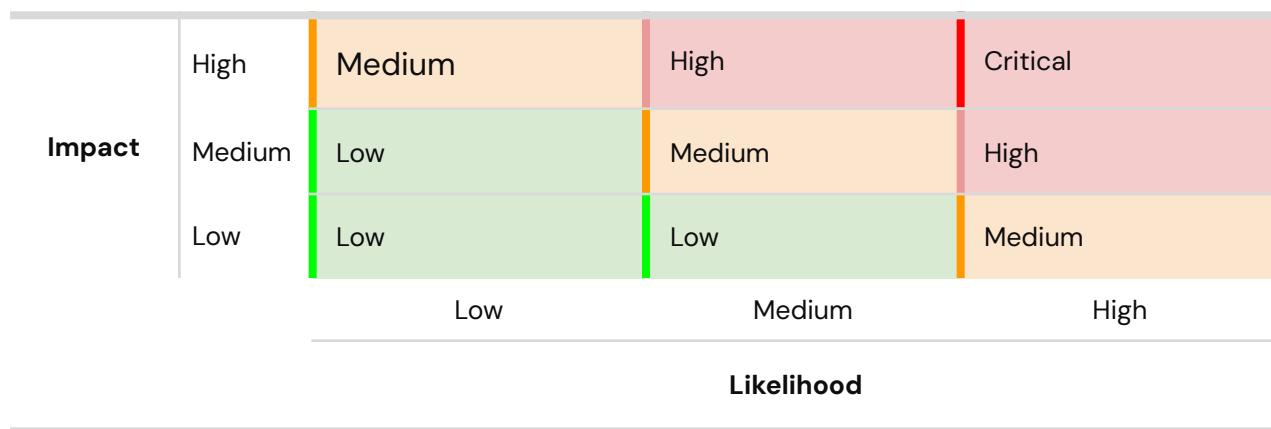
The release adds `renounceAllowance` and `renounceDelegation` functions for revoking approvals, aligns event emissions with OpenZeppelin's ERC20 standard for gas efficiency, and soft-deprecates eMode category labels.

Findings Summary

The table below summarizes the findings of the review, including type and severity details.

Severity	Discovered	Confirmed	Fixed
Critical	-	-	-
High	-	-	-
Medium	-	-	-
Low	1	1	-
Informational	4	4	2
Total	5	5	2

Severity Matrix



Detailed Findings

ID	Title	Severity	Status
L-01	Attacker Can Disable Victim's Auto-Collateral by Sending Minimal aToken	Low	Acknowledged
I-01	Excessive loop range over eMode IDs increases gas usage	Informational	Acknowledged
I-02	Inefficient categoryId != 0 check inside loop	Informational	Acknowledged
I-03	Validate HF / LTVO comment is vague	Informational	Fixed
I-04	Misleading error messages when categoryId == 0 in validateSetUserEMode()	Informational	Fixed

Low Severity Issues

L-01. Attacker Can Disable Victim's Auto-Collateral by Sending Minimal aToken

Severity: Low	Impact: Low	Likelihood: Low
File : SupplyLogic.sol	Status: Acknowledged	

Details:

When a user supplies an asset for the first time, the protocol auto-enables it as collateral if the recipient had zero aToken balance prior to the mint (`isFirstSupply == true`). Since v3.6 the protocol no longer auto-enables collateral on aToken transfers. Because the supply auto-enable still uses the “prior aToken balance == 0” heuristic, an attacker can front-run a victim’s `supply()` by transferring a tiny amount of the aToken (e.g., 1 wei) to the victim. That makes `IAToken.mint()` return `isFirstSupply == false` and prevents the protocol from auto-enabling collateral for the victim.

Impact

An attacker cannot directly steal funds, but can easily prevent a victim’s newly supplied tokens from being treated as collateral.

This breaks common front-end flows where users supply and then immediately borrow (often in a follow-up transaction). Those subsequent borrow attempts can fail, forcing users to submit an extra transaction to enable collateral and pay additional gas.

The same fragility undermines integrations: smart contracts, position managers, and batched strategies that assumed first-supply auto-enable can fail or revert, causing operational issues or missed opportunities.

The attack is cheap and scalable, a tiny aToken transfer is sufficient, so an attacker could target multiple addresses or high-value UX paths at low cost, if motivated.

In most cases the outcome is an inconvenience, but in time-sensitive or integration-heavy scenarios (for example, certain arbitrage or liquidation workflows) the inability to enable collateral could lead to meaningful disruptions rather than just annoyance.



Recommendation:

The protocol should make collateral enablement explicit and atomic. Add an `enableAsCollateral` boolean to `supply()` so the caller can request collateral be enabled within the same transaction that mints aTokens, removing the raceable “zero balance” heuristic. For safety, require `msg.sender == onBehalfOf` when `enableAsCollateral == true`, so only self-supplies can trigger atomic auto-enable and third parties cannot grief by pre-funding.

To support relayers, extend `supplyWithPermit(...)` to accept the same `enableAsCollateral` flag plus a user-signed enable-permit (an EIP-712 authorization containing the relevant parameters, a nonce, and a deadline); with a valid enable-permit the pool may allow `enableAsCollateral == true` even when `msg.sender != onBehalfOf`, enabling relayers to perform atomic supply+enable on behalf of users.

This removes the race condition inherent in the prior balance-based heuristic while preserving both direct-user and relayer-driven workflows.

Customer's response: Acknowledged, but won't fix, since addressing this would break existing functionality that allows users to deposit on behalf of others and supports auto-enabling collateral for the initial supply.

Informational Issues

I-01. Excessive loop range over eMode IDs increases gas usage

Details:

In `PoolConfigurator.setReserveFreeze`, the code loops up to 255 eMode IDs:

```
JavaScript
for (uint256 j = 1; j <= type(uint8).max; j++) {
    collateralEnabledBitmap =
    _pool.getEModeCategoryCollateralBitmap(uint8(j));
    if (EModeConfiguration.isReserveEnabledOnBitmap(collateralEnabledBitmap,
reserveData.id)) {
        ltvzeroBitmap = _pool.getEModeCategoryLtvzeroBitmap(uint8(j));
        _setEmodeLtvZero(ltvzeroBitmap, asset, reserveData.id, uint8(j), true);
    }
}
```

Real deployments use far fewer eModes (usually <10), so iterating to 255 adds unnecessary gas overhead.

Recommendation:

Limit the loop range, either iterate up to the highest configured `categoryId` or use a fixed conservative cap (e.g., `MAX_EMODES = 32`) that is on the lower side.

Customer's response: Acknowledged. There are already around 28 eModes on mainnet. Setting an arbitrary limit seems very dangerous. Iterating to "highest configured" is not possible as the protocol does not maintain a counter and allows gaps.

I-02. Inefficient categoryId != 0 check inside loop

Details:

In `validateSetUserEMode()`, `categoryId != 0` is evaluated on every iteration unnecessarily:

JavaScript

```
// ensure that in the target eMode (even if it's eMode 0), the assets can still be
// borrowed and be used as collateral

unchecked {
    while (unsafe_cachedUserConfig != 0) {
        .

        .

        if (isBorrowed) {
            require(
                categoryId != 0
EModeConfiguration.isReserveEnabledOnBitmap(eModeCategory.borrowableBitmap, i)
                : reservesData[reservesList[i]].configuration.getBorrowingEnabled(),
                Errors.InvalidDebtInEmode(reservesList[i])
            );
        }
        .
        .
    }
    ++
}
```

This adds redundant branching overhead per iteration and slightly impacts gas.

Recommendation:

Evaluate once before the loop and reuse:

JavaScript

```
bool inEMode = categoryId != 0;
```

```
...  
if (isBorrowed) {  
    require(  
        inEMode  
    i) ? EModeConfiguration.isReserveEnabledOnBitmap(eModeCategory.borrowableBitmap,  
        : reservesData[reservesList[i]].configuration.getBorrowingEnabled(),  
        Errors.InvalidDebtInEmode(reservesList[i])  
    );  
}
```

This saves minor gas and keeps the logic equally readable.

Customer's response: Acknowledged. In practice, gas costs may actually increase for users with ≤ 3 positions due to certain optimizer internals.

I-03. Validate HF / LTV0 comment is vague

In the `validateHFAndLtvzero()` function of the `ValidationLogic` library, there is a comment that, while technically correct, is a bit vague.

Details:

JavaScript

```
// User must either:  
// 1. not have any ltv-zero collateral or  
// 2. interact with asset that have 0 ltv on their position
```

Recommendation:

Make the comment more explicit and readable, for example:

JavaScript

```
// User must withdraw any LTV0 collateral before withdrawing any other collateral.
```

Customer's response: Fixed in commit [b2801b7](#).

Fix Review: Fix looks good.

I-04. Misleading error messages when `categoryId == 0` in `validateSetUserEMode()`

Details:

The function reverts with eMode-specific error types even when `categoryId == 0` (default mode):

JavaScript

```
if (isBorrowed) {
    require(
        categoryId != 0
    ?
        EModeConfiguration.isReserveEnabledOnBitmap(eModeCategory.borrowableBitmap,
            i)
            : reservesData[reservesList[i]].configuration.getBorrowingEnabled(),
        Errors.InvalidDebtInEmode(reservesList[i])
    );
}

if (isEnabledAsCollateral) {
    require(
        getUserReserveLtv(reservesData[reservesList[i]], eModeCategory,
            categoryId) != 0,
        Errors.InvalidCollateralInEmode(reservesList[i])
    );
}
```

When `categoryId == 0`, these revert still use `InvalidDebtInEmode` and `InvalidCollateralInEmode`, which is misleading since the user is not in eMode.

Impact:

Informational / UX; confusing revert reasons when interacting in default mode.

Recommendation:

Use context-appropriate error types based on whether the user is in eMode or not.

Because custom errors cannot be conditionally selected inline, handle each case explicitly:

JavaScript

```
if (isBorrowed) {
```

```
bool borrowAllowed = categoryId != 0
?
EModeConfiguration.isReserveEnabledOnBitmap(eModeCategory.borrowableBitmap, i)
: reservesData[reservesList[i]].configuration.getBorrowingEnabled();

if (categoryId != 0) {
    require(borrowAllowed, Errors.InvalidDebtInEmode(reservesList[i]));
} else {
    require(borrowAllowed, Errors.InvalidDebt(reservesList[i]));
}
}

if (isEnabledAsCollateral) {
    uint256 ltv = getUserReserveLtv(reservesData[reservesList[i]],
eModeCategory, categoryId);

    if (categoryId != 0) {
        require(ltv != 0, Errors.InvalidCollateralInEmode(reservesList[i]));
    } else {
        require(ltv != 0, Errors.InvalidCollateral(reservesList[i]));
    }
}
```

Customer's response: Fixed in commit [ce5d9ef](#).

Fix Review: Fix looks good.

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