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Dark Earth

Audit

Security Assessment

15. June, 2022

For



E A R T H



SolidProof_io



@solidproof_io

Disclaimer	3
Description	5
Project Engagement	5
Logo	5
Contract Link	5
Methodology	7
Used Code from other Frameworks/Smart Contracts (direct imports)	8
Tested Contract Files	9
Source Lines	10
Risk Level	10
Capabilities	11
Inheritance Graph	12
CallGraph	13
Scope of Work/Verify Claims	14
Modifiers and public functions	20
Source Units in Scope	23
Critical issues	24
High issues	24
Medium issues	24
Low issues	24
Informational issues	25
Audit Comments	25
SWC Attacks	26

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Version	Date	Description
1.0	15. June 2022	<ul style="list-style-type: none">• Layout project• Automated- /Manual-Security Testing• Summary

Network

Polygon Matic

Website

<https://darkearth.gg/en/home/>

Telegram

<https://t.me/darkearthgame>

Twitter

<https://twitter.com/DarkEarthgame>

Instagram

<https://www.instagram.com/darkearthgame/>

Medium

<https://medium.com/@DarkEarth>

Discord

<https://discord.com/invite/gc3f5ZNqyp>

Youtube

<https://www.youtube.com/channel/UC-XUvSYH0MyH1rNm8geNR8Q>

Description

Dark Earth describes a dystopian future of humanity seeking to establish a colony on another planet as the Earth finds itself at the limit of its survival.

Dark Earth is a massive ecosystem of **Blockchain Gaming** that opens its door to all kinds of players, from the most traditional ones who do not use **blockchain technology**, to the most expert in the use of this technology. **No one is left behind!**

Dark Earth Raids Strategy Game will be the first game of this **ecosystem**, and it will be followed by a whole expansion of titles within the Dark Earth metaverse: MOBA, RTS, TBS, MMORPG, Shooter... The universe of Dark Earth is constantly evolving, its fate depends on the players' decisions.

Project Engagement

During the 13th of June 2022, **Dark Earth Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

Logo



Contract Link

v1.0

- Github
 - https://github.com/DarkEarthGAME/DarkEarth_SC
 - Commit: 25c6f395ba5f3c2ad2f8859a960be7851e61ec22

Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
Critical	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
High	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon as possible.
Medium	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
Low	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
Informational	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

Methodology

The auditing process follows a routine series of steps:

1. Code review that includes the following:
 - i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
 - ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
 - iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.
2. Testing and automated analysis that includes the following:
 - i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
 - ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

Dependency / Import Path	Count
@chainlink/contracts/src/v0.8/interfaces/AggregatorV3Interface.sol	1
@openzeppelin/contracts/access/AccessControlEnumerable.sol	2
@openzeppelin/contracts/token/ERC20/IERC20.sol	1
@openzeppelin/contracts/token/ERC721/extensions/ERC721Enumerable.sol	2
@openzeppelin/contracts/utils/Counters.sol	2
@openzeppelin/contracts/utils/cryptography/ECDSA.sol	1

Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

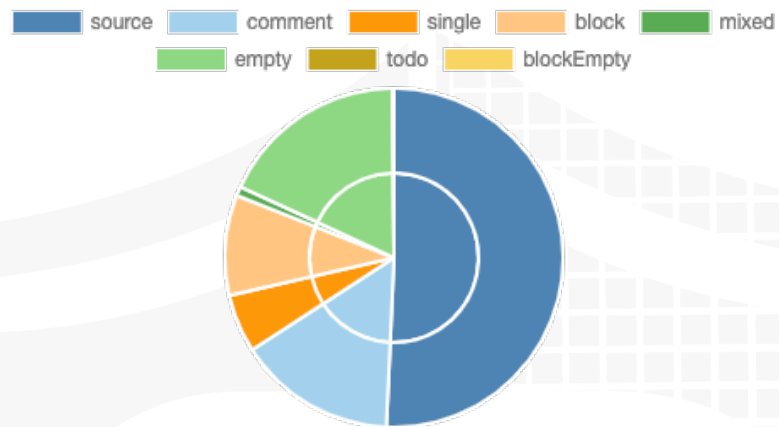
A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.

v1.0

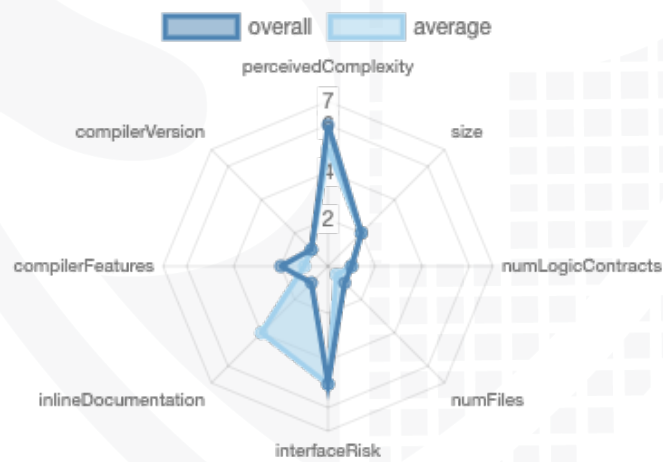
File Name	SHA-1 Hash
contracts/MysteryCapsule.sol	d820553dc0f66f5d725cf3810883eecc280878dc
contracts/DECollection.sol	d9d5a2930c8b805c5c3b0f641a3ffca5c394b9b7

Metrics

Source Lines v1.0



Risk Level v1.0



Capabilities

Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	2	0	0	0

Exposed Functions

This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.

Version	Public	Payable
1.0	121	3

Version	External	Internal	Private	Pure	View
1.0	97	82	0	3	65

State Variables

Version	Total	Public
1.0	55	6

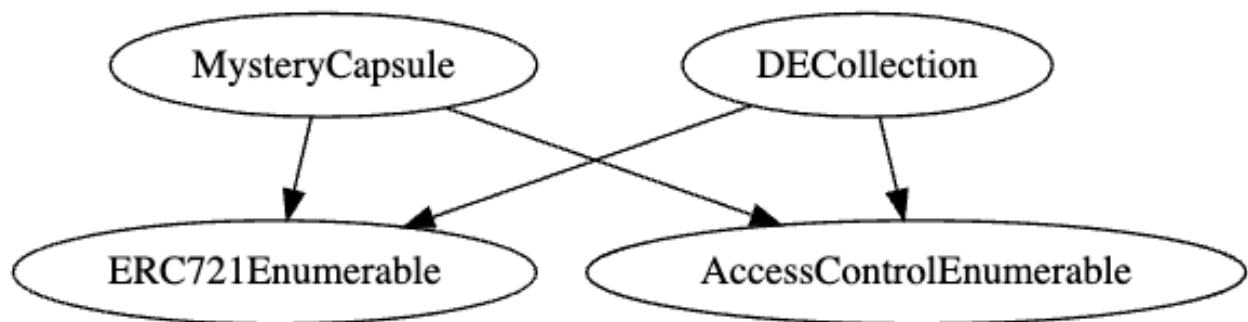
Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	<code>^0.8.13</code>		yes		

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
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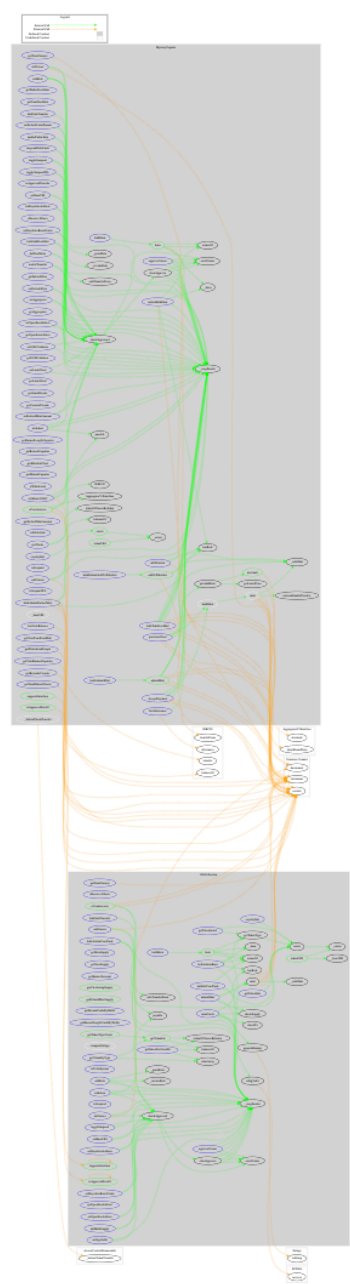
1.0	yes			yes		
-----	-----	--	--	-----	--	--

Inheritance Graph v1.0



CallGraph

v1.0



Scope of Work/Verify Claims

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Deployer cannot mint any new tokens
2. Deployer cannot burn or lock user funds
3. Deployer cannot pause the contract
4. Overall checkup (Smart Contract Security)



Write functions of contract v1.0

▼ MYSTERYCAPSULE	toggleSuspend
AcceptPayment	toggleSuspen...
addOwner	transferFrom
addRole	approve
addToWhitelist	approveOwner
adminBulkBurn	bulkAddFreeM...
adminMint	bulkAdminPar...
bulkAdminMint	bulkBurn
grantRole	bulkDefaultAd...
purchaseChest	bulkSafeTrans...
renounceRole	bulkTakeFree...
revokeRole	burn
safeTransferFr...	clearApprove
safeTransferFr...	delFreeMints
setAggregator	delOwner
setApprovalFo...	delWhitelist
setBaseURI	enablePublicS...
setDefaultLimi...	enableTransfer
setDefaultMint...	withdraw
setDefaultPrice	withdrawUSDC
setLimitChest	
setOpenSeaA...	
setRoyaltiesA...	
setRoyaltiesBa...	
setUSDCAddr...	
suspendPublic...	

▼ DECOLLECTION	setSignAddr
addBulkSupply	toggleSuspend
addOwner	transferFrom
addRole	withdraw
adminMint	
approve	
approveOwner	
bulkAdminBurn	
bulkAdminUse...	
bulkBurn	
bulkSafeTrans...	
bulkSetUsedC...	
burn	
clearApprove	
delOwner	
grantRole	
mintCards	
renounceRole	
revokeRole	
safeTransferFr...	
safeTransferFr...	
setApprovalFo...	
setBaseURI	
setOpenSeaA...	
setRoyaltiesA...	
setRoyaltiesBa...	

Deployer cannot mint any new tokens

Name	Exist	Tested	Status
Deployer cannot mint	✓	✓	✗

Comments:

v1.0

- Owner can mint



Deployer cannot burn or lock user funds

Name	Exist	Tested	Status
Deployer cannot lock	✓	✓	✓
Deployer cannot burn	✓	✓	✗

Comments:

v1.0

- Tokens
 - can be burned by the owner
 - Can be burned by BURNER_ROLE

Deployer cannot pause the contract

Name	Exist	Tested	Status
Deployer cannot pause	—	—	—



Overall checkup (Smart Contract Security)

Tested	Verified
✓	✓

Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	🚩
Unverified / Not checked	✗
Not available	—

Modifiers and public functions

v1.0

withdraw	addRole
bulkSafeTransfer	addToWhitelist
addRole	bulkDefaultAddToWhitelist
addBulkSupply	delWhitelist
burn	bulkAddFreeMint
bulkBurn	bulkTakeFreeMint
bulkAdminBurn	delFreeMints
mintCards	burn
adminMint	bulkBurn
setSignAddr	adminBulkBurn
bulkSetUsedCard	purchaseChest 💰
bulkAdminUsedCard	adminMint
toggleSuspend	bulkAdminMint
setBaseURI	bulkAdminPartnerMint
setRoyaltiesAddress	bulkSafeTransfer
setRoyaltiesBasicPoints	enableTransfer
setOpenSeaAddress	AcceptPayment
approveOwner	withdrawUSDC
clearApprove	withdraw
addOwner	setDefaultPrice
delOwner	setAggregator
	setOpenSeaAddress
	setUSDCAddress
	setLimitChest
	setDefaultMintAmount
	setDefaultLimitPresale
	enablePublicSale
	suspendPublicSale
	toggleSuspend
	toggleSuspendWL
	setBaseURI
	setRoyaltiesAddress
	setRoyaltiesBasicPoints
	approveOwner
	clearApprove
	addOwner
	delOwner

Note: Not implemented functions was imported from external libraries

Comments

- Deployer can set following state variables without any limitations
 - available (whitelist)
 - freeMints
 - totalFreeMints
 - presaleCounter
 - Look at function ID below
- Deployer can enable/disable following state variables
 - _roles













- Look at function ID below
- Deployer can set following addresses
 - Look at function ID below
- Existing Modifiers
- There are several authorities which are authorized to call some functions, that means, if the owner is renounced, another address is still authorized to call functions
 - Be aware of this
- Function Id
 - 1 can
 - Add bulk supply
 - Delete free mints
 - 2 can
 - Set new signAddr
 - Bulk mint
 - 3 can
 - Add role
 - Set price capsule
 - 4 can
 - Set tokenInfo usado
 - Set aggregator
 - 5 can
 - Withdraw
 - Set opensea address
 - 6 can
 - Delete owner
 - Set used address
 - 7 can
 - Toggle suspend
 - Set limit capsules
 - 8 can
 - Set baseUriExtend
 - Set default mint amount
 - 9 can
 - Set royalty address
 - Bulk admin partner mint
 - 10 can
 - Set royalty basic points
 - Set enable public sale
 - 11 can
 - Set opensea address
 - Disable public sale

- 12 can
 - Add new owner
 - Toggle suspended
- 13 can
 - Toggle suspendedWL
- 14 can
 - Set royalty address
- 15 can
 - Set royalty basic points
- 16 can
 - Add new owner
- 17 can
 - Delete owner
- 18 can
 - Withdraw USDC
- 19 can
 - Withdraw
- 20 can
 - Set baseUriExtend
- 21 can
 - Set limit presale
- 22 can
 - Add role
- 23 can
 - Enable transfer

Please check if an OnlyOwner or similar restrictive modifier has been forgotten.

Source Units in Scope

v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/MysteryCapsule.sol	1	————	737	737	465	128	535	  
	contracts/DECollection.sol	1	————	658	658	389	127	442	  
	Totals	2	————	1395	1395	854	255	977	  

Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

Audit Results

AUDIT PASSED

Critical issues

No critical issues

High issues

No high issues

Medium issues

No medium issues

Low issues

Issue	File	Type	Line	Description
#1	All	A floating pragma is set	At the top of source file	The current pragma Solidity directive is „^0.8.13“.
#2	DECollection	Missing Zero Address Validation (missing-zero-check)	587, 554, 329	Check that the address is not zero
#3	Mystery Capsule	Missing Zero Address Validation (missing-zero-check)	449, 458, 617, 467	Check that the address is not zero
#4	Mystery Capsule	State variable visibility is not set	33, 40, 41, 49-64, 73, 92, 97, 107-109	It is best practice to set the visibility of state variables explicitly
#5	DECollection	State variable visibility is not set	33, 44, 84, 85, 89	It is best practice to set the visibility of state variables explicitly

Informational issues

Issue	File	Type	Line	Description
#1	DECollection	Functions that are not used	335	Remove unused functions. Before removing check the function, it could be possible, that you forget to implement it into the contract
#2	Mystery Capsule	Functions that are not used	581	Remove unused functions. Before removing check the function, it could be possible, that you forget to implement it into the contract

Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information <https://docs.soliditylang.org/en/v0.5.10/natspec-format.html>) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

15. June 2022:

- Read whole report and modifiers section for more information

SWC Attacks

ID	Title	Relationships	Status
SW C-1 36	Unencrypted Private Data On-Chain	CWE-767: Access to Critical Private Variable via Public Method	PASSED
SW C-1 35	Code With No Effects	CWE-1164: Irrelevant Code	PASSED
SW C-1 34	Message call with hardcoded gas amount	CWE-655: Improper Initialization	PASSED
SW C-1 33	Hash Collisions With Multiple Variable Length Arguments	CWE-294: Authentication Bypass by Capture-replay	PASSED
SW C-1 32	Unexpected Ether balance	CWE-667: Improper Locking	PASSED
SW C-1 31	Presence of unused variables	CWE-1164: Irrelevant Code	PASSED
SW C-1 30	Right-To-Left-Override control character (U+202E)	CWE-451: User Interface (UI) Misrepresentation of Critical Information	PASSED
SW C-1 29	Typographical Error	CWE-480: Use of Incorrect Operator	PASSED
SW C-1 28	DoS With Block Gas Limit	CWE-400: Uncontrolled Resource Consumption	PASSED

SW C-1 27	Arbitrary Jump with Function Type Variable	CWE-695: Use of Low-Level Functionality	PASSED
SW C-1 25	Incorrect Inheritance Order	CWE-696: Incorrect Behavior Order	PASSED
SW C-1 24	Write to Arbitrary Storage Location	CWE-123: Write-what-where Condition	PASSED
SW C-1 23	Requirement Violation	CWE-573: Improper Following of Specification by Caller	PASSED
SW C-1 22	Lack of Proper Signature Verification	CWE-345: Insufficient Verification of Data Authenticity	PASSED
SW C-1 21	Missing Protection against Signature Replay Attacks	CWE-347: Improper Verification of Cryptographic Signature	PASSED
SW C-1 20	Weak Sources of Randomness from Chain Attributes	CWE-330: Use of Insufficiently Random Values	PASSED
SW C-11 9	Shadowing State Variables	CWE-710: Improper Adherence to Coding Standards	PASSED
SW C-11 8	Incorrect Constructor Name	CWE-665: Improper Initialization	PASSED
SW C-11 7	Signature Malleability	CWE-347: Improper Verification of Cryptographic Signature	PASSED

SW C-11 6	Timestamp Dependence	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-11 5	Authorization through tx.origin	CWE-477: Use of Obsolete Function	PASSED
SW C-11 4	Transaction Order Dependence	CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')	PASSED
SW C-11 3	DoS with Failed Call	CWE-703: Improper Check or Handling of Exceptional Conditions	PASSED
SW C-11 2	Delegatecall to Untrusted Callee	CWE-829: Inclusion of Functionality from Untrusted Control Sphere	PASSED
SW C-11 1	Use of Deprecated Solidity Functions	CWE-477: Use of Obsolete Function	PASSED
SW C-11 0	Assert Violation	CWE-670: Always-Incorrect Control Flow Implementation	PASSED
SW C-1 09	Uninitialized Storage Pointer	CWE-824: Access of Uninitialized Pointer	PASSED
SW C-1 08	State Variable Default Visibility	CWE-710: Improper Adherence to Coding Standards	NOT PASSED
SW C-1 07	Reentrancy	CWE-841: Improper Enforcement of Behavioral Workflow	PASSED
SW C-1 06	Unprotected SELFDESTRUCT Instruction	CWE-284: Improper Access Control	PASSED

SW C-1 05	Unprotected Ether Withdrawal	CWE-284: Improper Access Control	PASSED
SW C-1 04	Unchecked Call Return Value	CWE-252: Unchecked Return Value	PASSED
SW C-1 03	Floating Pragma	CWE-664: Improper Control of a Resource Through its Lifetime	NOT PASSED
SW C-1 02	Outdated Compiler Version	CWE-937: Using Components with Known Vulnerabilities	PASSED
SW C-1 01	Integer Overflow and Underflow	CWE-682: Incorrect Calculation	PASSED
SW C-1 00	Function Default Visibility	CWE-710: Improper Adherence to Coding Standards	PASSED

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