Software Quality Assurance Plan

for

Soterra: An Individual Land Titling for Farmers using Blockchain Technology

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Foreword

This document is a controlled and versioned document. The format of this document is based on IEEE 730-2002, the IEEE Standard for Software Quality Assurance Plans, and conforms to that standard where possible. Changes to this document shall be submitted to the Soterra Software Quality Assurance Manager (SQAM) and shall be approved by the Project Manager, along with all the supplementary and supportive materials justifying the proposed change/s.

Revision History

Name	Date	Reason For Changes	Version

Table of Contents

1. Introduction

1.1 Purpose

This document specifies the Software Quality Assurance Plan (SQAP) and defines the processes, methodologies, standards, and procedures that will be utilized to perform the Software Quality Assurance function for Sottera: An Individual Land Titling for Farmers using Blockchain Technology. The format of this document is based on IEEE 730-2002 and conforms to that standard where possible.

The Soterra SQAP provides the framework that is necessary to ensure a standardized and consistent approach to software quality assurance throughout the project life cycle. The SQAP also defines the approach that will be used by the Software Quality Assurance Manager (SQAM) and Software Development Engineer in Test (SDET) to monitor and assess software development processes to provide insight regarding the maturity and quality of the software. Soterra will be evaluated to ensure that it meets the requirements and comply with the ISO/IEC 9126 Software engineering — Product quality standards.

1.2 Scope

The SQAP provides the framework for carrying out the Soterra software quality assurance procedures and is based on project quality assurance activities as documented in the project plan of Soterra.

The objectives of this SQAP are the following:

- Provide a quality management approach

- Identify SQA responsibilities of the project team

- Form a consistent technical review that will be applied throughout the SQA phase

- Define the review process and how it will be conducted

- List the product and process assessment that the SQA team will perform

- Provide measurement and reporting mechanisms

2. Reference Documents

- IEEE 730-2002, IEEE Standard for Software Quality Assurance Plans

- ISO/IEC 9126, ISO Standard for Software engineering — Product quality

- Soterra Software Requirements Specification Document (SRSD)

3. Management

This section describes the management organizational structure, its roles and responsibilities, and the software quality tasks to be performed.

3.1 Task

This section describes the task (product and process assessments) to be performed during the development, deployment, and maintenance phase of the software. These tasks are selected based on the project plan and planned deliverables and identified reviews.

3.1.1 Product Assessments

The following are the typical product assessments that may be conducted by the SQA team:

- Peer Reviews

- Document and Code Reviews

- Test Cases/Test Reports

3.1.2 Process Assessments

The following are the typical process assessments that may be conducted by the SQA team:

- Project Planning

- Project Monitoring

- System Analysis

- System/Subsystem Reviews

- Peer Reviews

- Code Reviews

- Test Management

- Software Problem Reporting and Correction

- Risk Management

3.2 SQA Roles and Responsibilities

The following table defines the SQA roles and responsibilities of the members of the project and their function at stage exit.

Stage exits provide a formal checkpoint for every developmental stage. This ensures that a deliverable, or at least a draft deliverable, is produced every time a developmental stage is successfully completed.

Note: Due to relatively small team size, the SQA roles and responsibilities may have overlapping functions.

Role	Name	SQA Responsibility	Stage Exit Function
Software Quality Assurance Manager (SQAM)	Lector, Adrian Job	Manage and provide general guidance and direction to the Software Quality Assurance (SQA) procedures and activities. Secure and manage SQA resources. Assist SDETs in the resolution of any issues and/or risks identified as result of SQA activities.	Approve
Software Development Engineer in Test (SDET)	Famitanico, Erhika Mae	Develop and maintain the project software quality assurance plan. Interface on *ISO/IEC 9126* in conducting SQA activities. Conduct process and product assessments, as described in the SQAP, and identify noncompliance and risks from all SQA activities. Communicate results from assessments with the Project Team.	Conduct
Software Development Engineer in Test (SDET)	Saule, Elizabeth	Develop and maintain the project software quality assurance plan. Interface on *ISO/IEC 9126* in conducting SQA activities. Conduct process and product assessments, as described in the SQAP, and identify noncompliance and risks from all SQA activities. Communicate results from assessments	Conduct

		with the Project Team.	
Project Manager	Robrigado, Mark Vincent	Monitors overall implementation and execution of SQA activities. Receives reports on all SQA activities and evaluates all necessary steps to be taken. Resolves all conflicts regarding the project.	Approve
Assistant Project Manager	Jacolbia, Patrick	Ensures the implementation of SQA activities are carried out and deliverables are met ahead of time. Establish a project schedule and provide regular and timely communication with the Project Team. Coordinates resolution of issues along with the Project Manager.	Conduct

Software Quality Assurance Structure

Project Manager & Assistant Project Manager

Software Quality Assurance Manager (SQAM)

Software Development Engineer in Test (SDET)
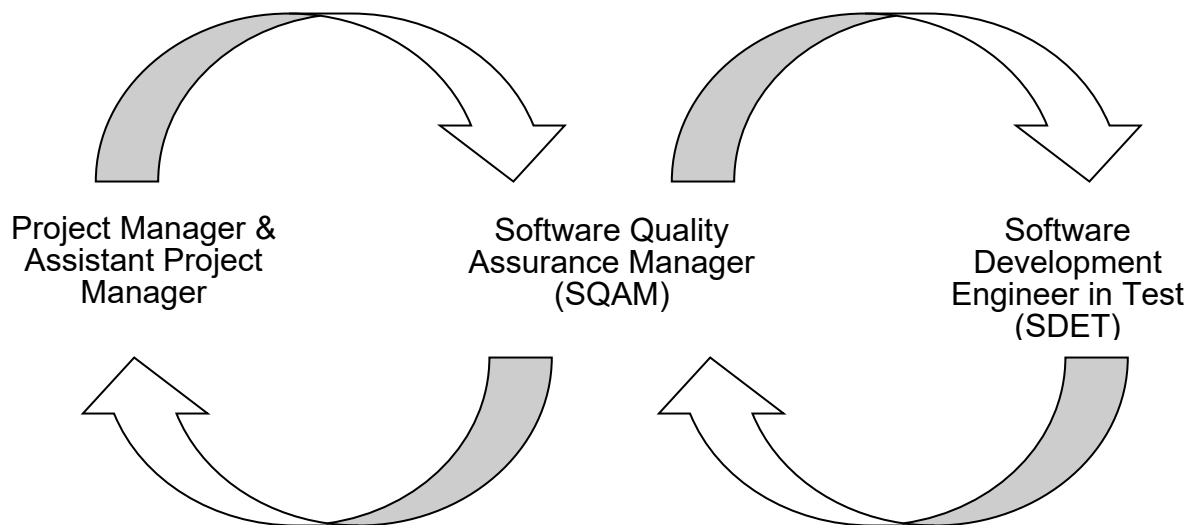
4. Documentation

4.1 Purpose

This section specifies the identified minimum documentation requirements for development, verification, validation, and maintenance of the software in which falls within the scope of this SQAP. Each document below shall be carefully reviewed and assessed by the QA team.

4.2 Minimum Documentation Requirement

- Software Requirements Specification Document (SRSD)

  This document specifies the requirement gathering and analysis in preparation for the software development. Documents all non-functional and functional requirements and the goal or objective of the implementation.

- Software Quality Assurance Plan (SQAP)

  This document specifies the Software Quality Assurance Plan and defines the processes, methodologies, standards, and procedures that will be utilized to perform the Software Quality Assurance function for the software.

- Test Cases/Test Reports

  This document specifies various test scenarios the aims to measure the functionality of the software across different set of actions or conditions to verify and validate expected results.

- Peer Review (Document and Code Review)

  This process is executed several times throughout the project life cycle for the purpose of detecting and correcting defects in the software. Peer review results should be documented and a report should be prepared with the list of issues that needs to be addressed. The project team should carefully assess and consider all suggestions and recommendations of the peer review team.

5. Standards, Practices, Conventions, and Metrics

5.1 Purpose

This section defines the standards, practices, conventions, and metrics that will be utilized to ensure the software quality.

5.2 Software Quality Standard

The project adheres to the ISO/IEC 9126 Software engineering — Product quality standards. The Software Quality Assurance Manager (SQAM) and Software Development Engineer in Test (SDET) shall perform QA activities based on the four parts of the standard – quality model, external metrics, internal metrics, and quality in use metrics. The quality model should be evaluated according to the characteristics of Software System Attributes, stated also in the Software Requirements Specification Document (SRSD). The set of characteristics are as follows: Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability.

5.3 Standard Metrics

The following standard metrics are the minimum planned metrics that will be collected, documented, reported, analyzed, and maintained throughout the duration of the software quality assurance:

- Number of SQ Assessments

- Number of SQ Assessments findings and noncompliance

- Number of Risk identified as result of SQ Assessment

- Number of Peer Review (Planned vs. Actual)

- Number of Open vs. Closed Action Items from peer reviews

6. Software Reviews

6.1 Purpose

This section identifies the types of system and/or subsystem reviews and peer reviews that will be performed by the QA team specifically the Software Quality Assurance Manager (SQAM) and Software Development Engineer in Test (SDET).

6.2 Minimum Software Reviews

For each type of software review, the Software QA team will assess the software review product to ensure that it is being developed according to the specified purpose. This will also ensure the completeness, accuracy, and integrity of the review product. The software QA team is also responsible for ensuring that appropriate personnel are in attendance at the time of the review specially in conducting peer reviews, correct information is presented and documented, stage exit functions and deliverables are met, and appropriate documents are kept up to date.

The following types of software reviews may be carried out by the QA team:

- Software Specification Review (SSR)

- Critical Design Review (CDR)

- Peer Reviews (PR), specifically Design Reviews, Code Walkthroughs/Code Review

6.3 Software Review Process

Deliverables or review products will be assessed by the QA team for the purpose of making careful judgements in accordance with the quality and the integrity of the deliverable or review product. This process will include document verification and validation activities to be performed at the last stage of the software review process as stated below in the diagram. Any identified issue will be logged and complied into a list. The list will then be reviewed with the Project Manager and Assistant Project Manager to discuss possible ways to mitigate or eliminate all identified issues. All issues must be addressed with a corresponding action plan from the Project Manager and Assistant Project Manager.

Issues and risks may be categorized into the following:

Risk Level	Description
Low	Identified issue can be addressed or mitigated and has low impact in the project.
Medium	Identified issue can have a major impact in the project if not addressed or mitigated.
High	Identified issues pose a serious problem and can affect the project.

Software Review Process

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┌──────────────────────┐              ┌──────────────────────┐
│                      │              │                      │
│  Schedule the review │ ───────────▶ │     Agreement on     │
│                      │              │     review date      │
└──────────────────────┘              └──────────────────────┘
           │
           ▼
┌──────────────────────┐              ┌──────────────────────┐
│                      │              │     Created /        │
│  Assess deliverables │ ───────────▶ │   updated draft      │
│                      │              │    deliverables      │
└──────────────────────┘              └──────────────────────┘
           │
           ▼
┌──────────────────────┐              ┌──────────────────────┐
│                      │              │     Formulated       │
│  Conduct the review  │ ───────────▶ │   assessment on      │
│                      │              │    deliverables      │
└──────────────────────┘              └──────────────────────┘
           │
           ▼
┌──────────────────────┐              ┌──────────────────────┐
│                      │              │ Assessment of risks  │
│  Prepare the review  │ ───────────▶ │ and issues with      │
│       findings       │              │ corresponding list of│
│                      │              │ suggestions and      │
└──────────────────────┘              │ recommendation       │
           │                          └──────────────────────┘
           ▼
┌──────────────────────┐
│ Findings submitted to│
│  Project Manager and │
│Assistant Project Manager│
└──────────────────────┘
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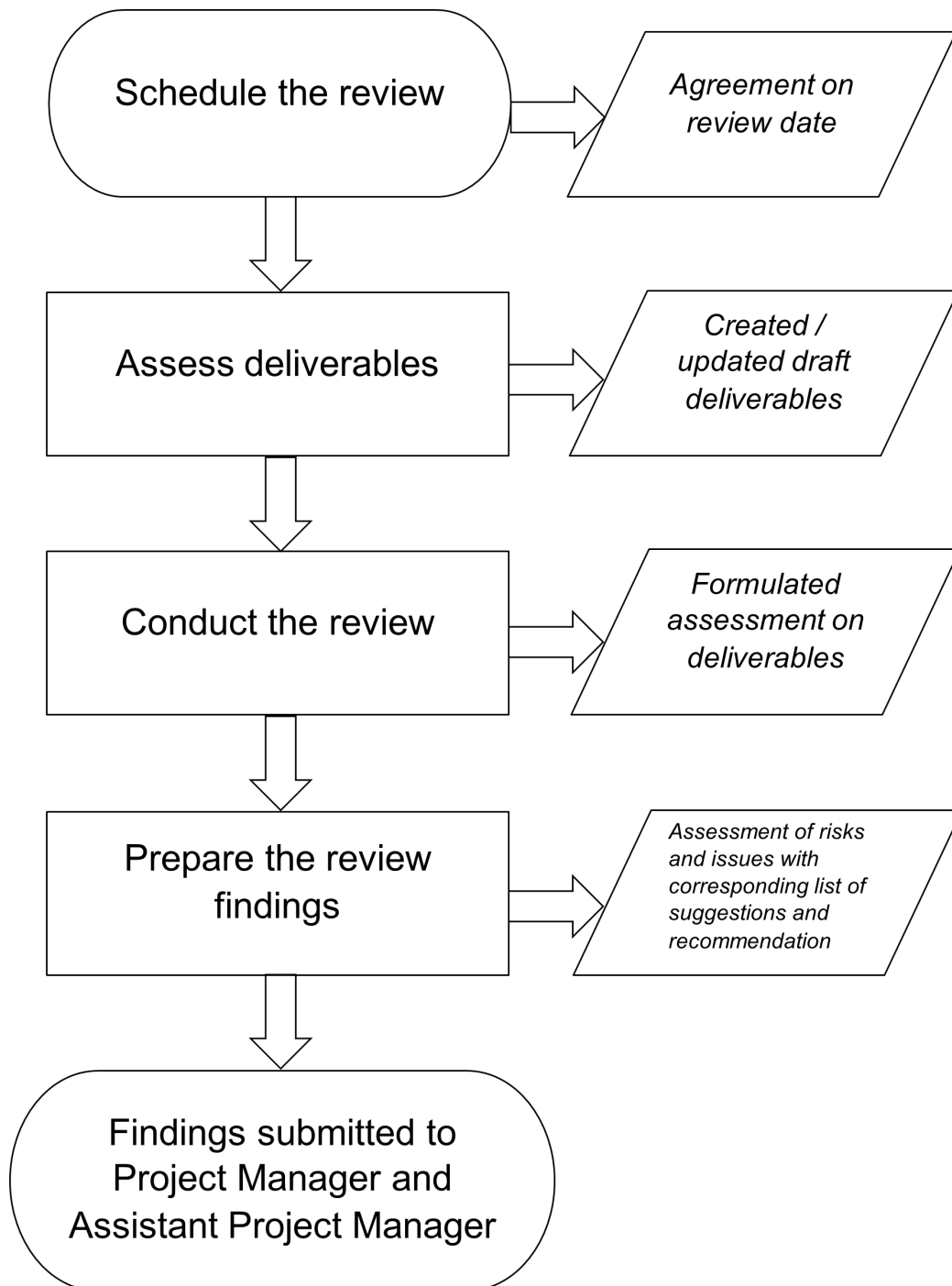
7. Test

Software QA team will ensure that the test management processes are being implemented and all test cases are properly executed to ensure that the software is properly verified and validated. This includes all types of testing across software system and subsystem components.

The software QA team will conduct a post-test execution on test cases, test reports, test results, and will update necessary documents if needed.

7.1 Test Witnessing

The software QA team along with the peer review team will carefully monitor and execute testing procedures to assure that the testing activities adhere to the project schedule to avoid delays. The software QA team will assure that test cases are conducted using standardize testing procedures and methodologies and with proper testing tools whenever possible. Furthermore, the software QA team will assure that all testing anomalies or issues are identified, documented, reported, addressed, and tracked until resolution whenever possible. Finally, the software QA team will assure that all assumptions and constraints over the duration of the testing are accurately documented to preserve the integrity of the software verification and validation status.

7.2 Test Cases

The following table is an example of a test case that the software QA team and the peer review group will be using to evaluate the software. The full list of test cases for the software is available via SharePoint.

Test Case ID	Test Case Description	Test Steps	Test Data	Expected Result	Actual Result	Remarks
TC01	Edit property details	1. Press the edit button 2. Edit property details 3. Click confirm button	Location: Tarlac => Isabela	The property details should be updated in the database	As expected	Passed

Test Case ID is a unique identifier to a test case.
Test Case Description is a brief description of the test to be performed.
Test Steps provides all necessary steps in the execution of the test case.
Test Data is/are the input data.
Expected Result is the result of the process as described in the Software Requirements Specification Document (SRSD).
Actual Result is the result after the test is performed.
Remarks is the output of the test case denoted by Passed or Failed.

8. Problem Reporting and Corrective Action

The software QA team will be responsible in generating and tracking testing findings, noncompliance, and general observations in a centralized document using Microsoft SharePoint, a web-based collaborative platform. This will ensure the availability of assessment findings and hasten the reporting escalation process.

9. Tools, Techniques and Methodologies

The software QA team and the peer review team will require access the following:

9.1 Software Quality Tools

- Microsoft Office tools (i.e., Word, Excel, and PowerPoint)
- Access to Microsoft SharePoint

9.2 Project Tools

- Soterra Project Files
- Soterra [GitHub Repository](#)
- Ganache Truffle Suite

9.3 Testing Techniques and Methodologies

Due to the complexity of the software the software QA team will perform manual quality assurance testing but will try to use automated software testing tools whenever possible. Dynamic Testing technique will be used to test the dynamic behavior of the software. This will also provide the software QA team opportunity to test the application with dynamic inputs – allowed inputs (Positive Testing) and not allowed inputs (Negative Testing). Glass-Box Testing method will also be used alongside dynamic testing to test the logic and control flow of the software as well as the overall code coverage.

10. Media Control

All deliverables will be documented in one of the following Microsoft Office software applications: Microsoft Word, Microsoft Excel, or Microsoft PowerPoint. All deliverables will be available in soft copy, unless stated otherwise. In addition, deliverables will also be on Microsoft SharePoint for availability.

11. Record Collection, Maintenance, and Retention

The software QA team will be responsible for maintaining records, documents regarding all assessments and reviews performed on the project. Maintaining these records will provide an objective insight throughout the project life cycle. These records include all the processes, review products, test cases, assessment results, reports, checklist, software QA schedule, metrics, etc.

12. Training

The software QA team shall have fundamental knowledge in the following areas/disciplines through prior experience and training in processes, methodologies, standards, and procedures:

- Software Quality Assurance

- Software Reviews

- Project Management

- Risk Management

The following courses taken up by the project team and software QA team will provide required training for the development of the project:

- COMP 20093 Information Management

- COMP 20113 Technical Documentation and Presentation Skills in ICT

- COMP 20133 Applications Development and Emerging Technologies

- COSC-E2 Project Management

- COMP 20153 Software Engineering 1

- COMP 20183 Software Engineering 2

13. SQA Plan Change Procedure and History

The software QA team will be responsible for the overall maintenance and management of this document. It is expected that this document will be updated several times over the duration of the software life cycle to reflect the changes in SQA processes, methodologies, standards, and procedures. Proposed changes shall be submitted to the Soterra Software Quality Assurance Manager (SQAM) and shall be approved by the Project Manager, along with all the supplementary and supportive materials justifying the proposed change/s.

Appendix A – Acronyms

Acronym	Definition
IEEE	Institute of Electrical and Electronic Engineers
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
QA	Quality Assurance
SDET	Software Development Engineer in Test
SQAM	Software Quality Assurance Manager
SQAP	Software Quality Assurance Plan
SRSD	Software Requirement Specification Document