UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL

(UCI)

Create a project management plan to produce an updated geo-spatial database of land parcels data of the coast and cayes in Belize to improve the land information management system.

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FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

MASTER IN PROJECT MANAGEMENT (MPM) DEGREE

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(UCI)

This Final Graduation Project was approved by the University as

partial fulfillment of the requirements to opt for the

Master in Project Management (MPM) Degree

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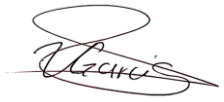

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Urania Elizabeth Garcia

STUDENT

DEDICATION

This final project is dedicated to the most precious little human in my life, my lovely daughter Sophia Garcia. You are my day to day motivation, thank you for staying up late at night making me company, do know that you are the reason I made it all the way here. You are and will always be my number one in everything I do.

ACKNOWLEDGMENTS

First of all, I want to thank God for guidance and love throughout my life, for showing me that anything is possible in life.

To my aunt Alba for always believing in me and pushing me and for never letting me give up. To everyone who supported me and was there with me every step of the way, I cannot thank you enough.

ABSTRACT

The purpose of this document is to present the requirements and importance of updating the Landolfio system to include coastal and mangrove tenure within Belize. A Land Information Management System (LIMS) is a GIS-based digital platform used to manage land-related data, such as ownership, use, value, and location. It is an integrated system that enables the efficient collection, storage, retrieval, analysis, and dissemination of land information, improve land governance by providing accurate, reliable, and up-to-date land-related information. LIMS can promote equitable access to land resources by enabling better planning and ensuring that land is used in a sustainable and fair manner (Mitra, 2023). Trimble was commissioned by the Ministry of Resource, Petroleum and Mining (MNRPM) in 2006, to develop and implement a Land Information System for the Government of Belize's MNRPM. Within this research the aim is to provide the MNRP with a more reliable database that encompasses all land tenure in coastal areas.

Landfolio was used to automate and integrate Belize's public land records and cadastral maps in the Surveys and Mapping, Valuation, and Land Registry Departments, under a single software platform which was subsequently expanded to include the departments of Physical Planning, National Estates, and Inland Revenue, as well as to six district offices located throughout the country. Within the Landfolio system, however, updated since 2022, it does not provide data for mangroves and coastal tenure for the country of Belize creating a noticable gap in the adminstration of coastal tenure.

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ABBREVIATIONS AND ACRONYMS

1. CEO: Chief Executive Officer
2. CLS: Commissioner of Land and Surveys
3. DBMU: Debt Management Unit
4. DSLO: District Lands and Survey Officer
5. GPD: Geology and Petroleum Department
6. HR: Human Resources
7. IT: Information Technology
8. IWRM: Integrated Water Resources Management
9. LSD: Lands and Survey Department
10. LIC: Land Information Centre
11. NIWRA: National Integrated Water Resources Act
12. ND: Never Delay Oilfield
13. NHS: National Hydrological Services
14. MNRPM: Ministry of Natural Resources, Petroleum and Mining
15. REDD+: Reducing Emissions from Deforestation and forest Degradation +
16. RSL: Regional Sanitary Landfill
17. SI: Statutory Instrument
18. SOP: Standard Operating Procedures
19. SLO: Spanish Lookout Oilfield
20. SWaMA: Solid Waste Management Authority
21. TC: Technical Cooperation

EXECUTIVE SUMMARY

The Ministry of Natural Resources, Petroleum and Mining (MNRPM) is responsible for the proper management of ground and surface water quality, land use, petroleum operations, and mining resources and of proper arrangement for the collection and disposal of solid waste in Belize. Landfolio is used to automate and integrate Belize's public land records and cadastral maps in the Surveys and Mapping, Valuation and Land Registry Departments, under a single software platform which was subsequently expanded to include the departments of Physical Planning, National Estates, and Inland Revenue, as well as to six district offices located throughout the country.

A fully functional and integrated national land administration environment was developed, which in 2013, showed significant reduction in the average time to register a property transaction and a substantial increase in revenue from land fees and taxes. Trimble was commissioned, in 2006, to develop and Implement a Land Information System for the Government of Belize's Ministry of Natural Resources and Immigration.

While the MNRPM unit has several accomplishments in improving the services offered, there is improvement requirements for internal process for efficiency. One of those is where the FGP is centered around; which is the updating and digitizing land parcels data of the coast and cayes in Belize to improve the land information management system, Landfolio, that may assist with better tenure and policy management.

This document is centered on digitizing land tenure for coastal and mangrove areas and inputting the data into the Lanfolio System following the PMBOK ten knowledge are. The general project ojective is to develop the integration management plan to outline and summarize project

requirements, create a scope management plan to define all the project work required, to create a schedule management plan that will define the process for creating and effectively manage the anticipated launch., to develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department, to develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery to create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project, to create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes, to develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks, to develop a procurement plan that identifies the external and internal consultants required for the execution of the project, to create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies.

At the end of this document, it becomes abundantly clear that proper project management will require the outsourcing of a Project Manager from a private sector and the establishment of a Quality Assurance team for the Government of Belize to adequately monitor and test changes to the Trimble Landfolio database. This updating of the database an dproviding an additional feature to the Landfoliio tool will benefit greatly the agenda for the Government of Belize to be sustainable and ethical in the disbursement of coastal marine tenure to the public.

1. INTRODUCTION

The MNRPM comprises the LRD, LSD, GPD, Mining Unit, NHS, and the SWaMA. The LSD is further subdivided into sub-units, namely, the National Estate Section, Surveys and Mapping Section, Physical Planning Section, Land Information Centre (LIC), and Valuation Section. Prior to the portfolios and management change in December 2020, under the last Administration the Ministry had not prioritized succession planning, strategic planning, nor evaluating and monitoring. The Departments involved were working independently without established ministry goals and no semblance of informed decision making. The Mission and Vision utilized had not been reviewed for several years, perhaps attributed to the constant change in management. Naturally, with a renewed change in Administration our brilliant people responded rapidly to make sure commercial transactions, transfers, mortgages and collateralised lending were able to continue uninterrupted despite the COVID-19 pandemic

1.1 Background

The Ministry of Natural Resources undertakes the immense responsibility of assessing and managing the country's natural resources. Through efficient management, we aim to achieve sustainable development of Belize's national land, water and mineral resources. The Ministry works diligently to ensure a better quality of life for present and future generations of Belizeans. The Ministry's portfolio centers namely around the Lands and Surveys Department, Land Registry Department, National Hydrological Service Unit, and Mineral Sector Unit. The minsitry utilizes the Landoflio Vistural Application and Cloud service, to store previous and incoming natural resource request that cover land requisitions across Belize. Although the Landolfio system has been recently updated within the last five year, it does not include the maritime and mangrove area

acquisitions of land, leaving a gap in the natural resources allocation and tracing of these type of Coastal Marine related tenures.

1.2 Statement of the problem

There are currently no digitized records forBelize's Coastal Marine Tenure within the Lanfolio system. There is a need to analyze or identify which areas can be identified as mangroves and digitize the coastal tenures on file physically with the MNRPM; this information will then be compiled and digitized to improve the land information management system.

1.3 Purpose

This project, with an urgent need, aims to create a project management plan to develop an updated geo-spatial database of land parcels with tenure data for Belize's coastal and Cayes regions. The primary motivation behind this research stems from the pressing need for digitized data within the Landfolio system for the Belize Coastal Marine Tenure. This gap in the system hampers efficient land management, policy formulation, and sustainable development planning for coastal areas.

1. The project will also identify and map areas covered by mangroves, a vital ecosystem for coastal protection and carbon sequestration. The updated and digitized data will provide a comprehensive and reliable land information management system that facilitates better management of coastal and marine resources, ensuring their sustainable use for current and future generations.
2. This project addresses this critical issue by analyzing, compiling, and digitizing the existing physical tenure data for these coastal and Cayes regions. Doing so will enhance the

accessibility and accuracy of land information, which is essential for informed decision-making and policy development.

3. Digitizing this data will contribute to developing and protecting Belize's coastal marine infrastructure. For instance, the project will support the Blue Carbon Initiatives by providing accurate data on carbon-storing ecosystems like mangroves, which are crucial for carbon accounting and climate change mitigation. It will also aid in meeting the targets set by Belize's Nationally Determined Contributions (NDCs) by ensuring that land use planning aligns with climate resilience goals.

General objective

To develop a comprehensive Project Management Plan to update approximately two thousand parcel to the geo-spatial database, Landfolio, and digitize all existing tenure datafor the coast and cayes of Belize by 2025.

Specific objectives

1. To develop the integration management plan to outline and summarize project requirements.
2. To create a scope management plan to define all the project work required.
3. To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.
4. To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.

5. To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.
6. To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.
7. To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes..
8. To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.
9. To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.
10. To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies.

2. THEORETICAL FRAMEWORK

The Department of Land and Survey is subdivided into five sections, namely, National estate, Survey and Mapping, Physical Planning, Valuation, and the Land Information Center (LIC). These sections collectively have the prime responsibility of overseeing all aspects of land tenure in Belize to ensure compliance with the standards provided in accordance with relevant Belize Acts and Regulations.

In June 1992, the Land Information Centre (LIC) was established to serve as the databank for land information in Belize and to provide policy and decision makers in government and other agencies with standardized-up-to-date information (Iyo, Mendoza, Cardon, & Cansino, 2003). The LIC had/has three sections:

1. The Geographic Information System (GIS), which handles information on land resources, land use/cover and environment as an aid to planning, management and monitoring activities.
2. The Land Information System (LIS), handles land records and cadastral data. This will in effect computerize many of the activities of the Lands and Survey Department. Suffice to mention that, at present, there is no single directory or index of all properties in Belize.
3. The Conservation and Environmental Data System (CEDS) is still in its infancy but when completed will formalize and coordinate environmental data gathering in Belize. The CEDS will form a network of data gathering groups and ensure open data exchange between them.
4. In 1993, the Physical Planning Section was established to facilitate the following: urban and rural planning, land subdivision, licensing (piers, land reclamation and creation, alien landholding) and land use zoning. The role of the Section has also witnessed some changes, one of which is the new responsibility for the production of a comprehensive national land use plan.

Belize today is characterized by a variety of landholdings with ownership (tenure) vested through both private freehold and leasehold titles in both urban and rural areas. In addition, National Estate lands are available for leases or currently in lease application process to a total of 8% of all rural lands available.1 It has been estimated that at any given time, about 1% of available (national) land parcels in Belize are in the process of leasehold and that occupants claiming tenure through approved leases for which no Certificate of Leasehold title has been issued account for about 50% of land titles under adjudication.

It is worth noting that the current land recording systems do not offer easy ways to examine land records. In many instances, individuals have to visit the Archives in Belmopan to determine land ownership dating far back in time. Beside the matter, there is no true compliance to acknowledging piers located on the coast of Belize and the rightful ownership of such tenures. As a result, this project aims to develop a strategy to update the geo-spatial database of land parcels with tenure data of the coast and cayes in Belize.

2.1 Company/Enterprise framework

2.1.1 Mission and vision statements

The overarching Mission is a reflection of below mission statements guiding departments/units with varying scope of work ultimately aiming for economic transformation and enhance quality of economic growth listed thereafter.

Vision

To improve the quality of life for present and future generations through sustainable management of Belize's natural resources.

General Mission

To continue as the economic pillar of Belize through responsible management of our natural resources and providing technical assistance to all stakeholders.

Departmental Mission:

LRD: To have an efficient land registration system for improvement in service quality and secure a customer friendly land registration and information services.

LSD: To ensure a transparent, accountable, and easily accessible land management and processes, and strengthen capacity for effective delivery of land services and optimized revenue generation.

GPD: To promote and regulate oil and gas exploration and production in a safe, environmentally, and socially responsible manner with the assistance of international investors and other stakeholders to maximize the benefits from the country's petroleum resources for the economic and social development of Belize.

Mining Unit: To develop the mineral industry of Belize in accordance with mining legislation, acceptable international standards, and sound environmental practices for the benefit of all Belizeans

NHS: To manage the country's water resources using an IWRM approach to promote development, conservation, and protection of water resources via our core values in alignment with the Government's water policy.To enhance economic development and foster better quality of life for present andfuture generations through regulation and accountable management of our natural resources

SWaMA: Through the application of the concept of Integrated Sustainable Solid Waste Management and working within the framework of the waste management hierarchy, SWaMA along with its partners will continuously strive to improve on and contribute to the protection of human health/safety and the environment, the conservation of natural resources, and the promotion of the occupational health/safety of workers in the waste sector, both formal and informal.

Customer Services: To provide effective and efficient customer service as an integral part of the delivery of services at the MNRPM.

Debt Management: To outline in a clear and methodical manner the operational procedures to be followed for the efficient collection of Land Tax and Land Rent.

Policy Coordination and Planning Unit: To support the strengthening of the Ministry's policies and operational methods, provide inter and intra ministerial support, and serve as an executive arm to the Chief Executive Officer.

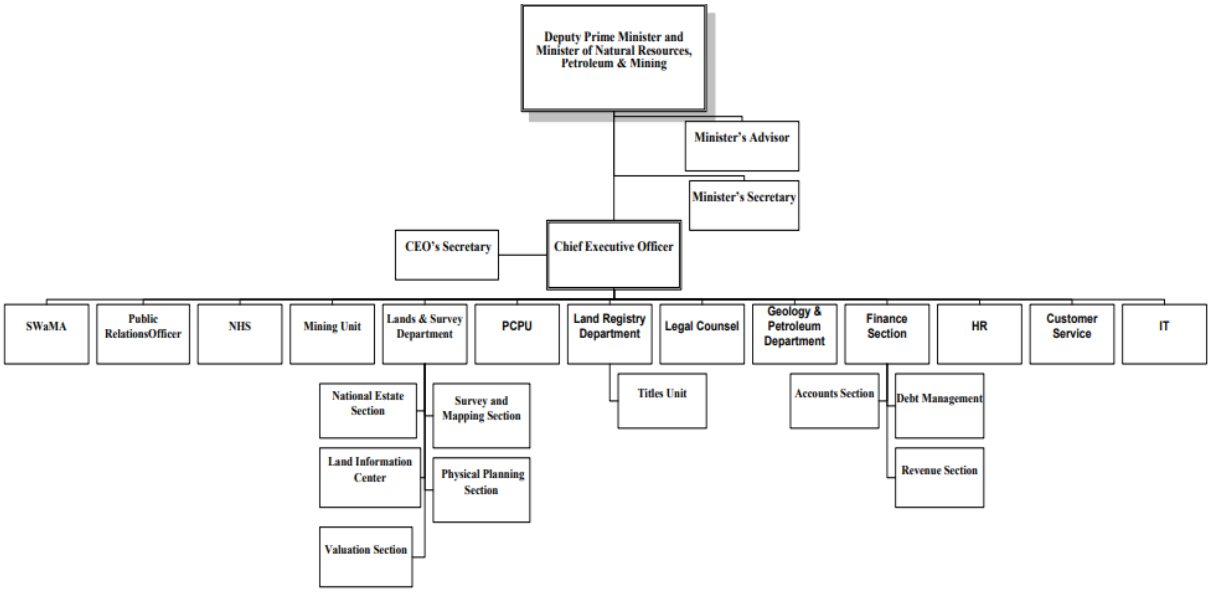
Human Resources: Through strategic partnerships and collaboration, to oversee recruitment by the Ministry of the Public Services, develops and retains a high performing staff and fosters a healthy, safe, and productive work environment for employees to maximize individual and organizational potential; and to provide programs and services that create a work environment of employee empowerment and involvement in the business.

Information Technology: To support or build a quality and comprehensive technology infrastructure, establish, and maintain an effective operational environment, and deliver quality, prompt, cost effective and reliable technology services

2.1.2 Organizational structure

The Department of Land and Survey is subdivided into five sections, namely, National estate, Survey and Mapping, Physical Planning, Valuation, and the Land Information Center (LIC). These sections collectively have the prime responsibility of overseeing all aspects of land tenure in Belize to ensure compliance with the standards provided in accordance with relevant Belize Acts and Regulations.

Figure 1: Organization Structure



Note: Adapted from the (Ministry of Natural Resources, Petroleum & Mining , December 2021)

2.1.3 Products offered

- Meet and greet members of the public.
- Offer directions and information to the public.
- Accept all application type for the National Estate Section (National Land)
- Issue of Approvals (completed documents) to the public.
- Manage customers' complaints and inquiries.

2.1.4 Project Management concepts

"Project management has evolved into a business process" being used by companies all over the world to increase corporate value in many ways. For example, it can be used to efficiently deliver services, enhance customer satisfaction, and as a tool to embrace opportunities to expand services (Picariello, 2014).. Within every sector, specifically construction, the discipline of project management is integral to success. According to PMI, "ninety percent of global senior executives

ranked project management methods as either critical or somewhat important to their ability to deliver successful projects and remain competitive" (Project Management Institute, 2017)

According to PMI, "project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Project Management Institute, 2016, p. 8). The development of the Final Graduation Project (FGP) will consist of the creation of the Project Management Plan for the building of a Convention Center and will be managed as a project. After which, the construction of the Convention Center project will be managed as another project with six (6) phases. Each phase is identified below:

PHASE 1: Initiation Phase

PHASE 2: Design Phase

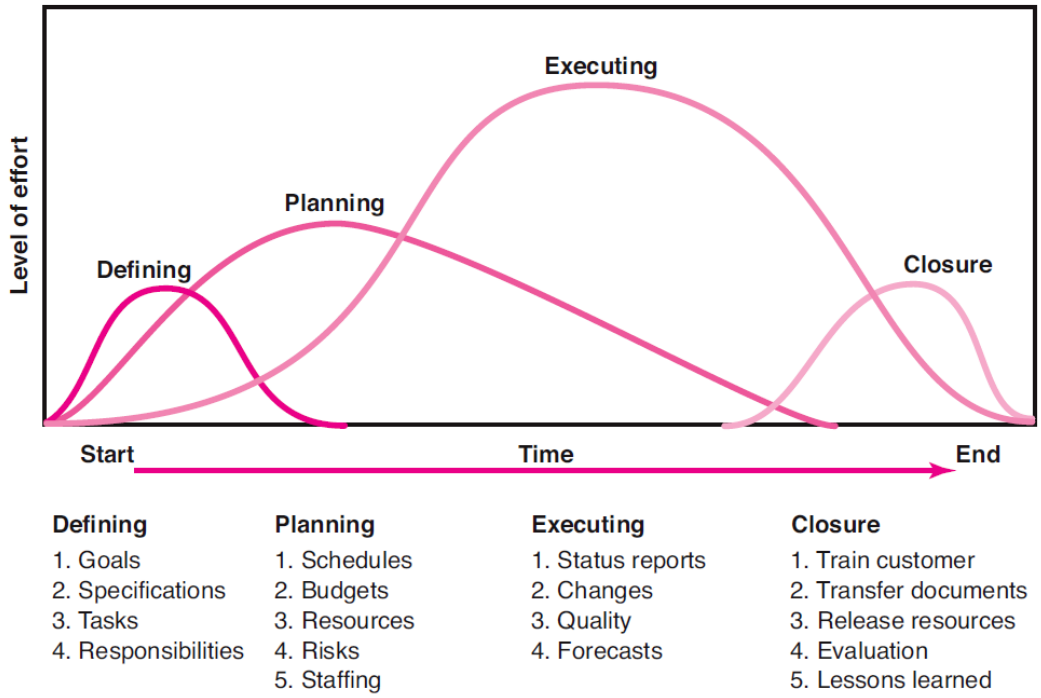
PHASE 3: Pre-Construction Phase

PHASE 4: Construction

PHASE 5: Post Construction Phase

PHASE 6: Project Closure

Figure 2: Project Lifecycle Stages



Note: Project life cycle stages of progression. Extracted from Mastering Project Management Strategy and Processes (p. 12), by R. Wilson, 2015, FT Press.

2.1.5 Project management principles

Project managers should "continually evaluate exposure to risk, both opportunities and threats, to maximize positive impacts and minimize negative impacts to the project and its outcomes" (PMBOK® Guide, 7th Edition, The Standard for Project Management, p. 53). Principles that must be considered within the FGP for the outlined topic include the following:

1. Stewardship: A holistic view of stewardship considers financial, social, technical, and sustainable environmental awareness when implementing a change to the MNRPM Customer Service Unit. This encompasses responsibilities within and external to the organization which includes:

- Integrity

- Care
- Trustworthiness
- Compliance

2. Stakeholders: Engage stakeholders proactively and to the degree needed to contribute to project success and customer satisfaction.

- Stakeholders influence projects, performance, and outcomes.
- Project teams serve other stakeholders by engaging with them.
- Stakeholder engagement proactively advances value delivery

3. Value: Continually evaluate and adjust project alignment to business objectives and intended benefits and value.

- Value is the ultimate indicator of project success.
- Value can be realized throughout the project, at the end of the project, or after the project is complete.
- Value, and the benefits that contribute to value, can be defined in quantitative and/or qualitative terms.

4. Leadership: Demonstrate and adapt leadership behaviours to support individual and team needs.

- Effective leadership promotes project success and contributes to positive project outcomes.
- Any project team member can demonstrate leadership behaviours.
- Leadership is different than authority.
- Effective leaders adapt their style to the situation

2.1.6 Project management domains

The 8 Project Performance domains are:

1. Stakeholders: Effective interaction with stakeholders contributes to the success of the project.
2. Team: This performance domain focuses on all actions and processes related to the project team, including conflict management, team growth and monitoring of team interactions.
3. Development approach and Life cycle: The results of the project determine the most appropriate development approach, such as a predictive, adaptive or hybrid approach. The deliverables and the development approach influence the number and cadence of project deliverables.
4. Planning: Planning organises, processes and coordinates the work during the project. The amount, timing and frequency vary depending on the product, development approach, environment and stakeholders.
5. Project work: Project work is associated with the definition of processes and execution of work to enable the team to create value and achieve the expected results. This includes communication, engagement, resource management, procurement and other activities to run project operations smoothly.
6. Delivery: The release performance domain includes all processes and actions related to project delivery performance. The results produced at the end of the project continue to generate business value for a long time after completion.
7. Performance: includes activities to evaluate project performance and take action to ensure performance.

8. Uncertainty and ambiguity: This domain deals with activities and functions associated with risk and uncertainty. In this domain, the information will need to be accurate to enable the team to act on any changes to actually achieve the performance initially desired.

Together, the performance domains form a cohesive group. They operate as an integrated system with each domain based on the other to ensure successful project creation while meeting the anticipated results.

The performance domains compete in the project regardless of how the value is delivered, whether frequently, periodically or at the end of a project. The ways in which the performance domains relate are different in each project but always present (QRP Professionals, 2023). The project domains are not to be seen in a hierarchical order because they all have the same importance.

2.1.7 Predictive, adaptative and hybrid projects

1. The Predictive strategy

A precise plan is created and adhered to throughout the duration of the project. The timetable, budget, and deliverables are all specified and determined from the beginning of the project. This method is ideal for projects with well-defined needs and stable environments.

2. The Adaptive strategy

often known as Agile, places emphasis on adaptability and flexibility. On the basis of feedback from stakeholders and changes in the development environment, requirements and project plans are continuously revised and reevaluated. This strategy is ideal for projects with quickly changing requirements and a high level of uncertainty.

3. The Hybrid technique

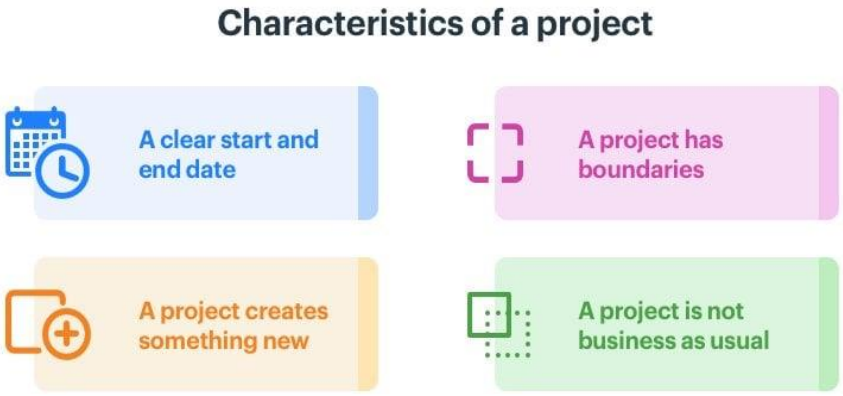
as its name implies, contains features of both the predictive and adaptive approaches. It entails drafting a high-level strategy at the beginning of the project while allowing for flexibility and

modification as the project develops. This strategy is ideal for projects requiring a balance of predictability and flexibility (Iqbal, 2023).

2.2 Project Management

A project is defined as a sequence of tasks that must be completed to attain a certain outcome. According to the Project Management Institute (PMI), the term Project refers to ” to any temporary endeavor with a definite beginning and end”. Depending on its complexity, it can be managed by a single person or hundreds. A project is a set of interdependent tasks that have a common goal. Projects have the characteristics outlined in figure 2.

Figure 3: Characteristics of a Project

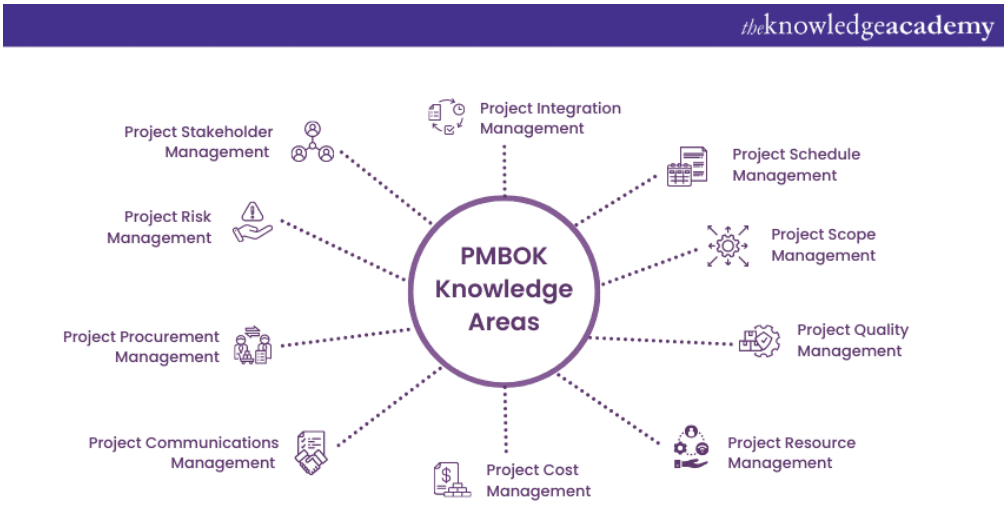


Note: Extracted from (kissflow, 2024)

2.3 Project management knowledge areas and processes

The project management knowledge areas can be simply defined as the key aspects of project management that should be overseen by project managers so they can plan, schedule, track and deliver projects successfully with the help of the project team and project stakeholders.

Figure 4: PMBOK Knowledge Areas

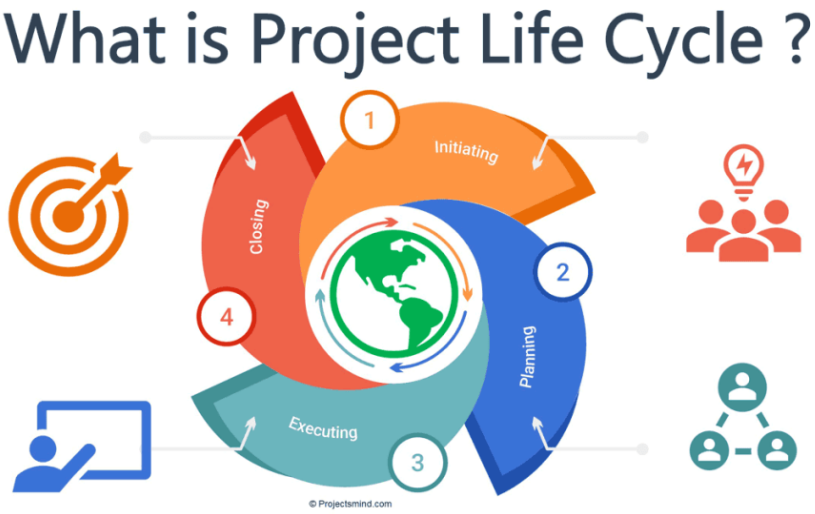


Note: Image was extracted from The Knowledge Academy Website (Taylor, 2022)

Each of these project management knowledge areas needs to be managed throughout the five project life cycle phases, which are project initiation, project planning, project execution, monitoring and controlling, and project closing. These are the chronological phases that every project goes through, also referred to as project management process groups in PMI's PMBOK (Landau, 2023).

2.4 Project life cycle

Figure 5: What is a project lifecycle?



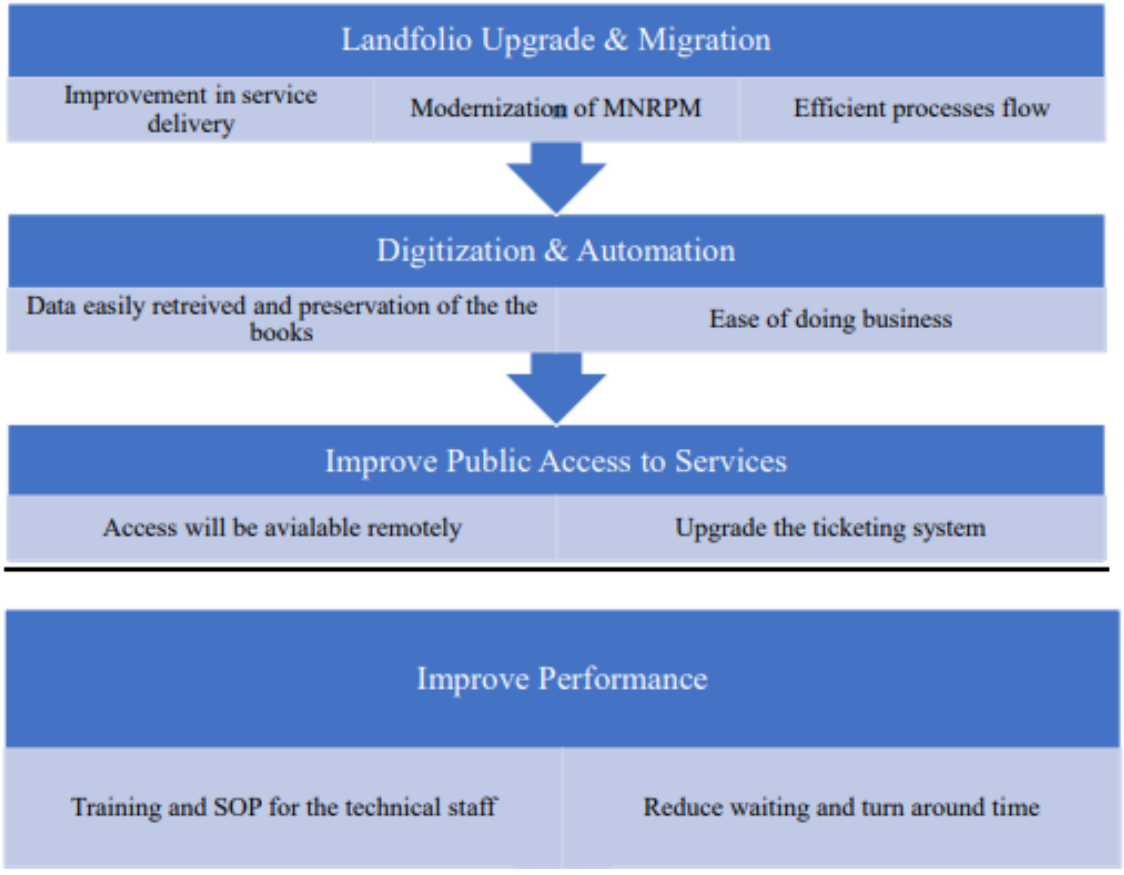
Note: Image was extracted from Project Mind Website (Kumar, 2021)

The project life cycle outlines the different stages a project goes through from start to finish. It encompasses several key phases, each addressing different needs as the project progresses. This framework offers a high-level view of the project's evolution, ensuring you hit important milestones along the way. There are typically five project life cycle phases: initiation, planning, execution, monitoring and controlling, and closure.

2.5 Company strategy, portfolios, programs, and projects

The MNRPM is grounded in its mission to implement the government's initiatives regarding the proper management of ground and surface water quality, land use, petroleum operations, and mining resources for sustainable and enhanced economic growth. As depicted in Figure 6, the strategy for improvements in the first phase of the Landfolio Digitization is to Upgrade & Migrate, Digitize & Automate, Improve Public Access to Service and Improving Performance. The four stages within Phase 1 reflect the modernization of an outdated data system that will subsequently create efficient processes and improve the public access to service & customer service performance.

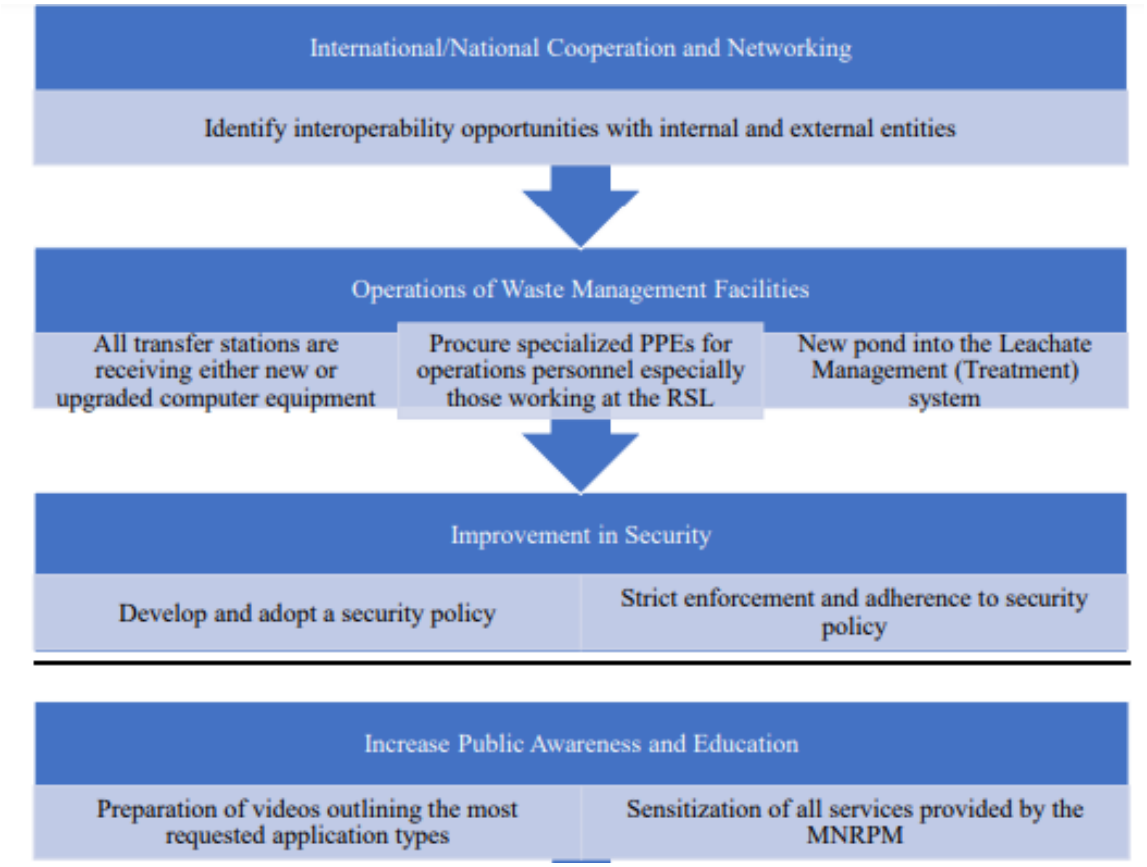
Figure 6: Strategy for improvement of the Landfolio Digitization



Note: This image was extracted from the techinical report of the Ministry of Natural Resources

(Ministry of Natural Resources, Petroleum & Mining , December 2021)

Figure 7: Strategy for the International/ National Cooperation Networking



Note: This image was extracted from the techinical report of the Ministry of Natural Resources

(Ministry of Natural Resources, Petroleum & Mining , December 2021)

Figure 7 above is rooted in the strategy for the MNRMP to identify opportunity scenarious within the MNRMP staff across all the departments. Mainly focusing on auditing and identifying operability opportunities with internal and external entities such as Trimble. The second tier involves the upgrading of equipment thorugh procurement of specicial PPEs in addition to the

improvement of security policies and their enforcement activities. The last stage in Phase 2 focuses on public awareness and education of the outlined changes. The last stage is vital to ensure the public is aware of noew process and polciies, and the general udnerstanding of changes and the reasoning behind it to better serve them.

2.6 Other applicable theory/concepts related to the project topic and context

Environmental Project Management keeps and overview of the project's framework which incorporates the views of project management; however, additional principles will guide this project towards an environmental project management approach. The concept of Environmental Project Management is a relatively new term, and to some, its definition is managing the environment as a project. However, the authors, Sholarin & Awange (2015) describe environmental project management as "a concept that uses project management principles, methods, and processes, to manage and improve an element of the ecosystem in order to achieve a sustainable outcome." The framework of environmental project management gears towards environmental compliance, environmental management, and environmental project planning. The framework aims to achieve the following:

- Protect human health and the environment
- Facilitate more effective and efficient environmental monitoring and remediation of contaminated sites
- Provide a social benefit for people and the community

2.7 Current Situation Of The Problem Or Opportunity In Study

Belize today is characterized by a variety of landholdings with ownership (tenure) vested through both private freehold and leasehold titles in both urban and rural areas. In addition, National Estate

lands are available for leases or currently in lease application process to a total of 8% of all rural lands available. It has been estimated that at any given time, about 1% of available (national) land parcels in Belize are in the process of leasehold and that occupants claiming tenure through approved leases for which no Certificate of Leasehold title has been issued account for about 50% of land titles under adjudication. Where 5% of Belizean land is unaccounted for uninhanbited, there makes leeway for a substantial amount of unaccounted mangrover terrain that are not within the Geo-spatial system. This causes a setback in filing, purchasing and processing development occuring in mangrove areas and maritime piers. By accounting for and tracking database records through the Landfolio system, Belizeans can create coninuity of service and efficiency in the purchasing and leasing of maritime areas.

2.8 Previous research done for the topic in study

Marine tenure involves establishing a set of rights and responsibilities in the coastal and marine environment as to who is allowed to use which resources, in what way, for how long, and under what conditions, as well as who is entitled to transfer rights (if any) to others and how. The allocation and strength of these resource rights and governance rules and the extent of devolution to local stakeholders have a major influence on the economic and ecological viability of these resources (Brooks, 2018).

In recent years, global attention on mangroves has increased considerably.Although there have been many small and large initiatives at the national and local levels to rehabilitate and restore mangrove areas, particularly after the 2004 tsunami in the Indian Ocean, these have largely revolved around developing a strong knowledge base about the biophysical dimensions of

mangrove planting and protection to achieve better success rates. The central issue of how governance and tenure arrangements provide the enabling framework for achieving an integrated approach to mangrove management has largely been left on the margins. Given that mangrove forests play a critical role in multiple ways within coastal landscapes, support for effective governance institutions that establish clear tenure rights to access, use, and manage mangroves can ensure that institutions of mangrove management meet a wide range of goals (Brooks, 2018).

Belize is a small, lower-middle income country with increasing poverty (55% of population are either poor or vulnerable), and is highly vulnerable to external shocks including terms of trade, natural hazards and impacts of climate change. High poverty rates persist despite the devotion of a significant amount of resources to social protection (5.7 percent of GDP). The poorest people and communities in Belize are predominantly rural and their livelihoods depend largely on access to land and natural resources. Coupled with rapid and increasing coastal development, illegal logging, and slash-and-burn agriculture, Belize is currently experiencing uncontrolled and unsustainable rate of deforestation. Also, coastal communities are highly vulnerable as the integrity of marine and coastal ecosystems continues to deteriorate due to impacts of climate change, exacerbated by pollution, overfishing, erosion, and sedimentation. Recognizing that deteriorating or poor socio-economic conditions are drivers of environmental degradation, any successful MNRPM initiative involving local communities must attempt to empower people, especially women, by providing them with the necessary skills, knowhow, and financial resources required to improve their conditions (Belize Enterprise for Sustainable Technology (BEST), 2010).

2.9 Other theory related to the topic in study

Land Tenure

Land tenure is an important part of social, political and economic structures. It is multi-dimensional, bringing into play social, technical, economic, institutional, legal and political aspects that are often ignored but must be taken into account. Land tenure relationships may be well-defined and enforceable in a formal court of law or through customary structures in a community. Alternatively, they may be relatively poorly defined with ambiguities open to exploitation.

Maritime and Coastal Policy

A Marine and Coastal Policy guides decision makers in the planning, management and sustainable use of our coastal and marine environment. It provides direction to decision makers including local councils and land managers on a range of issues such as dealing with the impacts of climate change, population growth and ageing coastal structures.

3. METHODOLOGICAL FRAMEWORK

3.1 Information sources

Information sources is described as the degree to which social influence, advertising, published reviews, and exposure to a technology influence the development of an individual's normative beliefs (Brown & Venkatesh, 2005; Rogers, 2003). Information can emanate from several sources in varying forms. Information can be in the form of magazines, articles, report, books, electronic data, online information, experiences, and observations to name a few. IGI Global (n.d) cite an information source as a person, thing, or place from which information comes, arises, or is obtained. Information sources can be known as primary or secondary.

3.2 Primary sources

The Primary sources gathered for this research purpose include Ministry of Natural Resources library archives that have reported previous project data, previous project status reports and observation reports from previous projects, and questionnaires delivered to staff, and the wider Government of Belize customers. Lastly, interviews were scheduled with the sectors that fall within the MNRPM where the CEO would primarily hold responsibility of all department functions across the ministry. These documents consist of correspondence with stakeholders, budget evaluations, public reports and employee agreements that have previously been executed for thre MNRPM. The project will entail use of data existing within the Ministry of Natural Resources, Petroleum and Mining (Lands and Surveys Department and Land Registry Department) that may be digital or paper-based (old land records). It will also utilize and integrate data and information from the World Wildlife Fund (WWF) 2017 Coastal and Marine Land Tenure project and data existing from the Coastal Zone Management Authority and Institute (CZMAI). It

will entail the use of remote sensing and ground-truthing to create an updated geo-spatial database containing land parcels with land owner information (where possible) and other attribute data (parcel size, land use etc.) of the coastal-marine areas with existing mangrove cover, that is, a 10 km area of interest on the mainland and all cayes. The six-month scope will entail the creation of the above for the coast of Belize District only.

3.3 Secondary sources

The project management plan for updating the geospatial database of land parcel data for the coast and cayes in Belize will leverage a variety of secondary sources. Ministry reports and policies will provide essential regulatory and procedural frameworks, ensuring compliance with national standards. Existing MNRPMs Customer Service and Land Survey Manuals and guidelines will offer structured methodologies and best practices for project execution and management. The PMBOK Sixth and Seventh Edition guides provide structured methodologies and best practices for managing projects. Additionally, online materials, including academic articles and industry reports, will supply valuable insights and case studies on geospatial data management and land information systems. These secondary sources provide a clear understanding of the project's scope, aiding informed decisions and effective implementation.

Chart 1 Information sources (Source: Own elaboration)

Objectives	**Information sources**	
	Primary	**Secondary**
To develop the integration management plan to outline and summarize project requirements	– Research within the MNRPM archives with correspondence, employee contracts,	– Research MNRPM updated staff tenure request policies and manuals.

Objectives	Information sources	
	Primary	**Secondary**
	and customer service manuals – Hold Interviews with the Customer Service department along with Chief Executive Officer.	– Explore MNRPM update landfolio program navigation – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements.
To create a scope management plan to define all the project work required.	– Research Process Groups: A Practice Guide – Review the units updated manuals of authority	– Research public policy customer service procedures – Examine staff policies – Review MNRPM's human resource policies.
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established within MNRPM – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements.
To develop a cost management plan that focuses on the key processes necessary for	– Research Process Groups: A Practice Guide	– Review Current Project Management practices

Objectives	Information sources	
	Primary	**Secondary**
establishing a project budget within the Department.		established within MNRPM – Research implementation strategies within the MNRPM for Lanfdolio technical development. – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements
To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	– Research Process Groups: A Practice Guide	– Research online samples – Review MNRPM human resource policies. – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established within MNRPM. – Read and review implementation strategies for MNRPM

Objectives	Information sources	
	Primary	**Secondary**
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes..	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established within MNRPM – Research department implementation strategies for MNRPM

Objectives	Information sources	
	Primary	**Secondary**
		– PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements
To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies	– Research Process Groups: A Practice Guide	– Review Current Project Management practices established within MNRPM. – Research MNRPM implementation strategies for technical development – Review and understand escalation methods. – PMBOK Guide (Sixth and Seventh Editions): Provides comprehensive guidelines on integrating various project elements

3.4 Research methods

This term refers to how the information will be acquired to further develop of a research and the manner the researcher designs the study. It is defined as “the strategies, processes and techniques utilized in the collection of data or evidence for analysis in order to uncover new information or create better understanding of a topic” (Walliman, 2011).

3.4.1 Qualitative Method

The qualitative research looks to understand “how much” and to consider the magnitude of the variable that it is studied. Qualitative research methods are invaluable in project management for understanding the complexities of project environments and stakeholder perspectives. These methods, such as interviews, focus groups, and participant observation, allow project managers to gather rich, detailed data that can inform decision-making throughout the project lifecycle. For instance, during the planning phase, qualitative methods can help identify stakeholder needs and expectations, ensuring that project objectives align with these insights. During implementation, these methods can be used to monitor project progress and identify any emerging issues or changes in stakeholder attitudes (American University, 2023) Qualitative research methods involve collecting and analyzing non-numerical data, such as text, audio, or video, to uncover insights into people's thoughts, behaviors, and social contexts.

3.4.2 Quantiative method

Quantitative research refers to the systematic empirical investigation of any phenomena via statistical, mathematical, or computational techniques. The objective of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena. Quantitative research is generally made using scientific methods, which can include:

- The generation of models, theories, and hypotheses
- The development of instruments and methods for measurement
- Experimental control and manipulation of variables
- Collection of empirical data
- Modelling and analysis of data

– Evaluation of results

Quantitative research methods in project management involve the systematic collection and analysis of numerical data to understand and improve project performance. These methods rely on metrics and statistical techniques to measure various aspects of a project, such as time, cost, and quality. By using quantitative data, project managers can make informed decisions, identify trends, and predict outcomes, ultimately leading to more effective and efficient project managemen

3.4.3 Mixed Methods

Mixed Method tntegrates both Qualitative and Quantitative Research. It provides a holistic approach combining and analysing the statistical data with deeper contextualised insights. Using Mixed Methods also enables Triangulation, or verification, of the data from two or more sources (Newcastle Library Guide, 2024). Mixed method research in project management combines both quantitative and qualitative research techniques to provide a comprehensive understanding of project-related phenomena. This approach allows researchers to leverage the strengths of both methods, offering a more nuanced and complete picture of project management issues.

3.4.4 Analytical Research Method

Analytical research methods involve systematically gathering, analyzing, and interpreting data to draw meaningful conclusions and make informed decisions. These methods are essential in various fields, including project management, where they help in understanding complex issues and finding manners for improving project outcomes. Some aspects of the method incolve data collection, critical thinking, and case study analysis.

Chart 2 Research methods (Source: Own elaboration)

Objectives	Research methods		
	Quantiative	Qualitative	Analytical
To develop the integration management plan to outline and summarize project requirements	Revision of the geospatial database existing data.	Gather numerical data categorized by numbers of land parcels in maritime, mangrove areas	
To create a scope management plan to define all the project work required.	Sourcing documents and reports from existing archibed files on martime tenure.	Interviews, On Site revision of the application	Compare the outcomes of previous projects managed using Agile versus PMI methodologies to see which approach yields better results
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	Calculate timeline duration for extraction of data.	Document analysis: Examination of correspondence (letters, memos, emails etc)	

Objectives	Research methods		
	Quantiative	Qualitative	Analytical
To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.	Quantitative to collect and calculate software acquisition		
To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	Observations on custoemr service officers efficiency when using the Landfolio system	Review with a Quality Assurance Department and create a focus group to highlight required	in-depth analysis of the Trimble Implementation Project of 2021
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	Calculate resource cost in (hours) for duration of project.	Interview existing staff and their training	Evaluating documents, reports, and other project-related materials to identify patterns and trends. Observation of the most efficient officers according to their field for

Objectives	Research methods		
	Quantiative	Qualitative	Analytical
			scouting resources.
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes..	Determine patterns of communication for stakeholder for efficiency in escalating delays/risks/issues	Interview CEO for scalatin points of contact.	
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	Revise patterns in land tenure requestes for coastal areas in Belize	Physical report revision	
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	Survery to customer service on how often a person would request coastal tenure	Reviewing online articles	
To create a stakeholder engagement plan that ensures the proper identification and categorization of	Observations on stakeholders that carry decision	Reading related project requirements	Evaluating documents, reports, and

Objectives	Research methods		
	Quantiative	Qualitative	Analytical
stakeholders across all departments with appropriate engagement strategies	making power when assigning and approving land tenure		other project-related materials to identify patterns and trends. Specifically, patterns for best communication strategy with stakeholders in different ministry divisions.

3.5 Tools

Many different methodologies can be used for data collection and analysis. Most are based around a core set of basic tools. These include interviews, focus group discussions, observation, photography, video, surveys, questionnaires, and case studies. Data may also be generated through direct measurement, reviewing secondary data, and informal project/programme management processes. Merriam-Webster defines a tool as “something (such as an instrument or apparatus) used in operating or necessary in the practice of a vocation or profession.” To conduct this research several tools must be administered.

Interviews

Interviews are probably the most common tool used in planning, monitoring, and evaluation. They can be carried out with one person at a time (individual interviews) or groups of people. They can be administered formally or informally. They can be carried out face-to-face or through remote media such as telephone and Teams.

Questionnaires

Surveys and questionnaires: These are designed to collect and record information from many people, groups, or organizations in a consistent way. A questionnaire is a form containing questions. It may be a printed form or one designed to be filled out online. Questionnaires may be administered in many different ways. A survey, by contrast, is normally a large, formal exercise.

Observation

In the simplest terms, observation involves 'seeing' things – such as objects, processes, relationships, events – and formally recording the information. There are different types of observation. Structured or direct observation is a process in which observations are recorded against an agreed checklist. Expert observation is usually carried out by someone with specific expertise in an area of work and involves the expert observing and recording information on a subject.

Chart 3 Tools for Data Collection and Analysis (Source: Own elaboration)

Objectives	Tools
To develop the integration management plan	Project Management Charter, Integration Management Template
To create a scope management plan to define all the project work required.	Project Management Plans, Microsoft Word, Microsoft Excel, Microsoft Project.
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	Microsoft Word, Microsoft Excel, Microsoft Project.
To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.	Minute Meetings Template, Microsoft Word, Microsoft Excel, Microsoft Project.
To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	Microsoft Word, Microsoft Excel, Microsoft Project, Human Resource Cost Management, Quality Assurance Criteria
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	Human Resource Cost Management, Microsoft Word, Microsoft Excel, Microsoft Project
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes..	Email, Meeting Register Format, Communication Matrix

Objectives	Tools
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	Email, Meeting Minute Template, Risk Matrix,
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	Microsoft excel, Microsoft Project, MNRPM procurement Template
To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies	Meeting Register Format, Power Interest Matrix, Stakeholder Analysis Chart, Stakeholder engagement assessment matrix.

3.6 Assumptions and constraints

PMI defines an assumption as "a factor in the planning process considered to be true, real, or uncertain, without proof or demonstration" (Project Management Institute, 2017). It also defines a constraint as "a limiting factor that affects the execution of a project, program, portfolio, or process". The assumptions and constraints considered on the Final Graduation Project for each specific objective outline in Chart 4 below which encompass the main restrictions stated below:

I. Limited to sector (location) data availability
II. Access & monitoring of these reports.
III. Expertise in using MS Project
IV. Restricted access to branch databases
V. Access & time to interview required staff

Chart 1 Assumptions and constraints (Source: Own elaboration)

Objectives	Assumptions	Constraints
To develop the integration management plan to outline and summarize project requirementsxisting mangrove cover that is,	– It is assumed that the ministry will grant permission to execute the proposal of the FGP. – It is assumed that all relevant information can be readily sourced. – It is assumed that interviews with key staff members can be conducted timely and without disruption of the workday. – It is assumed that the executives will grant the use of relative data for this research.	Insufficient time to gather data on the project and landfolio use requirements.
To create a scope management plan to define all the project work required.	– It is assumed that all relevant information can be readily sourced. – It is assumed that the CEOs will grant the use of relative data for this research.	The project plan may not have sufficient details on the mangrove and maritime area.
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	– It is assumed the ministry will grant permission to execute the proposal of a methodology. – It is assumed that all relevant information can be readily accessed.	The time allotted to complete the adaptation of digitalizing the maritime tenure must be compatible with current projects under execution

Objectives	Assumptions	Constraints
To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.	– It is assumed that a budget is already under existence for the use of the Landfolio application.	The team may have a delay in providing adequate training and budgeting for the use of the Lanfolio application.
To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	– It is assumed that all relevant information can be readily sourced. – It is assumed that interviews with key staff members can be conducted timely and without disruption of the workday.	The ministry maynot management required for project execution which may lead to inadequate project deliverables.
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	– It is assumed that all relevant information can be readily accessed	Not all resources identified will be readily available to the project.
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives	– It is assumed that all relevant information can be readily accessed	- Availability of CEO for internview sessions

Objectives	Assumptions	Constraints
Department to conduct research purposes..		
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	– It is assumed that MNRPM will grant permission to execute the proposal of a methodology. – It is assumed that all relevant information can be readily sourced. – It is assumed that interviews with key staff members can be conducted timely and without disruption of the workday.	Unidentified risk may emerge as the project is developed. They may need to be updated as the project goes along. A major classified risk is the disapproval of CSR practices due to cost implications.
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	– It is assumed that all relevant information can be readily sourced.	Different level sof approval for the procurement processes
To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies	– It is assumed MNRPM will grant permission to execute the proposal of a methodology. – It is assumed that all relevant information can be readily accessed.	A key stakeholder is not integrated from the beginning of the project for feedback leading to changes requested during execution and disrupting scheduled activities.

3.7 Deliverables

A deliverable is defined as “any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project” (Project Management Institute, 2017). The term "deliverables" is a project management term that's traditionally used to describe the quantifiable goods or services that must be provided upon the completion of a project. Deliverables can be tangible or intangible. For example, in a project focusing on upgrading a firm's technology, a deliverable may refer to the acquisition of a dozen new computers (Bloomthal, 2022).

Chart 5 Deliverables (Source: Own elaboration)

Objectives	Deliverables
To develop the integration management plan to outline and summarize project requirementsxisting mangrove cover that is,	Integration Management Plan
To create a scope management plan to define all the project work required.	Scope Management Plan
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	Gantt Chart, Schedule, WBS
To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.	Budget, Cost Management Plan
To develop a quality management plan that defines the project’s quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	Quality Management Plan

Objectives	Deliverables
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	Resource Management Plan, Cost Estimate Report
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes..	Communications Management Plan
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	Risk Management Plan
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	Procurement Plan
To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies	Stakeholder Engagement Plan

4. RESULTS

This section aims to provide the ten subsidiary plans that are included in the project management plan which serve as a guide for the implementation of this project. The information consists of details such as implementation framework, staffing criteria, stakeholder criteria, and other pertinent project information.

4.1 Project Integration Management

Chart 6: PROJECT INTEGRATION MANAGEMENT PLAN

Project Integration Management Plan	
PROBLEM OR ISSUE	The current land recording systems do not offer easy ways to examine land records. In many instances, individuals have to visit the Archives in Belmopan to determine land ownership dating far back in time. Beside the matter, there is no true compliance to acknowledging piers located on the coast of Belize and the rightful ownership of such tenures.
PURPOSE OF PROJECT	This project aims to develop a strategy to update the geo-spatial database of land parcels with tenure data of the coast and cayes in Belize.
BUSINESS CASE	Belize today is characterized by a variety of landholdings with ownership (tenure) vested through both private freehold and leasehold titles in both urban and rural areas. In addition, National Estate lands are available for leases or currently in lease application process to a total of 8% of all rural lands available.1 It has been estimated that at any given time, about 1% of available (national) land parcels in Belize are in the process of leasehold and that occupants claiming tenure through approved leases for which no Certificate of Leasehold title has been issued account for about 50% of land titles under adjudication. II. There is a need to analyze or identify which areas can be identified as mangroves; the information will then be compiled and digitized to improve the land information management system.
EXPECTED DELIVERABLES	Updated geo-spatial database (Landfolio) of land parcels with tenure data of the coast and cayes in Belize assist with better management, policies and plans for Coastal Marine Tenure
PROJECT SCOPE	
GENERAL OBJECTIVES	To produce an updated geo-spatial database of land parcels with tenure data of the coast (up to 10 km) and cayes in Belize.
SPECIFIC OBJECTIVES	1. To integrate data and physical information/archives from the World Wildlife Fund (WWF) 2017 Coastal and Marine Land Tenure project

	and data existing from the Coastal Zone Management Authority and Institute (CZMAI). 2. To complete remote sensing and ground-truthing which will be used to create an updated geospatial database containing the land of the coastal-marine areas with existing mangrove cover, that is a 10 km area of interest on the mainland and all cayes. 3. To confirm physical approximation and verify all tenure data gathered is accurate. 4. Update the digital compilation of all surveys in the target area (Belize District) within the Landfolio system.
WITHIN SCOPE	Updating existing landfolio registry of tenure in the coast and cayes of Belize city.
OUTSIDE OF SCOPE	Coastal Tenure outside of Belize City jurisdiction, other locations will be updated in a sepearte project.

TENTATIVE SCHEDULE

KEY MILESTONE	**START**	**FINISH**
Form Project Team / Preliminary Review / Scope	12/09/2024	30/09/202024
Finalize Project Plan / Charter / Kick Off	12/09/2024	30/09/2024
Define Phase	2/10/2024	12/10/2024
Measurement Phase	12/10/2024	21/10/20X24
Analysis Phase	22/12/2024	30/12/2024
Improvement Phase	10/1/2025	30/01/2025
Control Phase	15/02/2025	20/02/2025
Project Summary Report and Close Out	15/02/2025	24/02/2025

RESOURCES

SUPPORT RESOURCES	National estate, Survey and Mapping, Physical Planning, Valuation, and the Land Information Center (LIC).

COSTS

COST TYPE	VENDOR / LABOR NAMES	RATE	QTY	AMOUNT
Labor	Electro Charge Logistics, Inc.	$78.00	200	$15,600.00
Labor	Level 1 EVS	$46.00	100	$4,600.00
Labor	Level 2 EVS	$58.00	50	$2,900.00
Labor	Trimble	$85,000.00	1	$85,000.00
Labor	IT	$79,879.00	3	$239,637.00
		TOTAL COSTS		$416,423.00

BENEFITS AND CUSTOMERS

PROCESS OWNER	Urania Garcia - Project Manager
KEY STAKEHOLDERS	Amber DeGrassio
FINAL CUSTOMER	Land Owners in Belize, Government of Belize
EXPECTED BENEFITS	The updating of the landfolio system will reflect a specfic number of land tenure in coastal areas that are not accounted for in the database, largely catering for coastal development for private and public use.

TYPE OF BENEFIT	BASIS OF ESTIMATE	ESTIMATED BENEFIT AMOUNT
Specific Cost Savings	Estimator’s projections	$25,000.00
Enhanced Revenues	Finance's projections	$92,500.00
Higher Productivity (Soft)	Project management's estimations	$17,500.00
Improved Compliance	Operations' estimations	$12,000.00
Better Decision Making	Project management's estimations	$18,500.00
Less Maintenance	Project management's estimations	$26,000.00
Other Costs Avoided	Finance's projections	$46,250.00
	TOTAL BENEFIT	$237,750.00

RISKS, CONSTRAINTS, AND ASSUMPTIONS	
RISKS	Though Trimble is hired under a service level agreement, the software updates required may not fall within their contract requirements, leading to an additional cost.
CONSTRAINTS	We have to "backfill" some key project management and field engineer positions to ensure we have people "on the ground" to manage coastal land acquisition at the branch level.
ASSUMPTIONS	1. Access and permits for updating the landfolio system. 2. Availability of resoruces for guidance 3. Technical feasibility

	4. Data accuracy and integrity 5. Stakeholder Participation

PREPARED BY:		
Urania Garcia	Project Manager	08/28/2024
Approval Signatures		
Project Sponsor	Project Manager	Date

4.1.1 Integration Management Change Control

The purpose of the Project Change Request Form Template is to document how project changes are to be requested, assessed, approved, monitored and controlled. This form will assist in standardizing the procedures for efficient handling of all project Change Requests (CR). Actions will be required to make changes to the project's approved and baselined documents, schedule, scope, and costs with responsible predetermined members. Adhering to the CCP prevents unauthorized changes, minimizes disruptions to the project environment, and ensures proper analysis and input.

The Change Control Process for approval within the MNRPM is depicted in figure 8 below, followed by the change request form template.

Figure 8: Change Control Approval Process

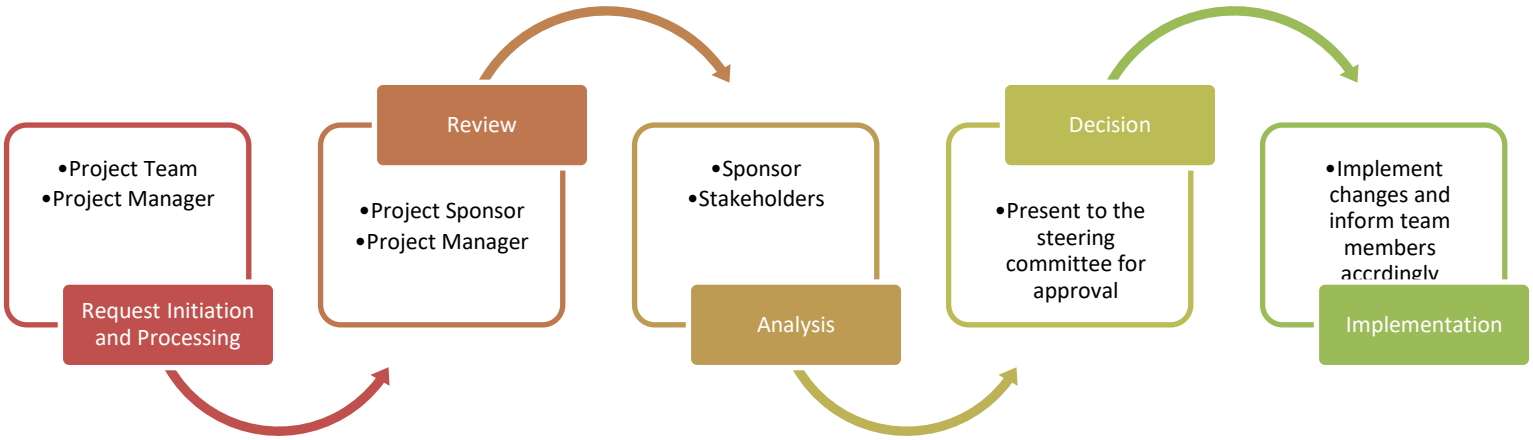


Chart 7 Change Request Form Template

Change Request Form			
Project:	Updated Geo-Spatial Database Of Land Parcels Data Of The Coast And Cayes In Belize To Improve The Land Information Management System	**Change ID:**	*V1.0*
Change Request			
Change Title:		**Identification Date:**	*<dd/mm/yyyy>*
Requested by:	*<The name of the requestor/group>*	**Category:**	
Priority:	☐ Very High ☐ High ☐ Medium ☐ Low ☐ Very Low		

Change Request Form	
Change Description & Details	
<The purpose of this form is to capture the need and characteristics of a project change request. The change request is the first step of the change request process. Once the change request is logged into the Change Log, then this form is updated with the assigned Change ID and the form is archived.>	
Current Situation:	
<Describe the current situation (a problem, an opportunity or a new need – why is there a need for a change in the project?>	
Desired Situation:	
< Describe the desired situation. What is the goal and benefits of this change request?>	
Impact or Risks:	
<Describe the impact or risks of not implementing this change. If this impact or risks can be quantified, then this can help with the analysis (cost benefit analysis) and final decision regarding the implementation (or not) and the priority of this change.>	
Out of Scope:	
<Clarify what is out of the scope of this change request. This clarifies further the boundaries of the requested change and ensures that only the needed change is implemented.>	
Approval	**Signature**
Project Sponsor	xx

Change Request Form	
Project Manager	xx
Change Control Board	xx

4.2 Scope Management Plan

4.2.1 Scope Management Plan

Chart 8 Scope Management Plan

PROJECT OVERVIEW

PROJECT REQUIREMENTS	The current land recording systems do not offer easy ways to examine land records for coastal areas. In many instances, individuals have to visit the Archives in Belmopan to determine land ownership dating far back in time. Beside the matter, there is no true compliance to acknowledging piers located on the coast of Belize and the rightful ownership of such tenures.
PURPOSE OF PROJECT	This project aims to develop a strategy to update the geo-spatial database of land parcels with tenure data of the coast and cayes in Belize.
GENERAL OBJECTIVES	To produce an updated geo-spatial database of land parcels with tenure data of the coast (up to 10 km) and cayes in Belize.
SPECIFIC OBJECTIVES	1. To integrate data and physical information/archives from the World Wildlife Fund (WWF) 2017 Coastal and Marine Land Tenure project and data existing from the Coastal Zone Management Authority and Institute (CZMAI). 2. To complete remote sensing and ground-truthing which will be used to create an updated geospatial database containing the land of the coastal-marine areas with existing mangrove cover, that is a 10 km area of interest on the mainland and all cayes. 3. To confirm physical approximation and verify all tenure data gathered is accurate. 4. Update the digital compilation of all surveys in the target area (Belize District) within the Landfolio system.
BUSINESS CASE	1. Belize today is characterized by a variety of landholdings with ownership (tenure) vested through both private freehold and leasehold titles in both urban and rural areas. In addition, National Estate lands are available for leases or currently in lease application process to a total of 8% of all rural lands available. 2. It has been estimated that at any given time, about 1% of available (national) land parcels in Belize are in the process of leasehold and that occupants claiming tenure through approved leases for which

	no Certificate of Leasehold title has been issued account for about 50% of land titles under adjudication. 3. There is a need to analyze or identify which areas can be identified as mangroves; the information will then be compiled and digitized to improve the land information management system.
EXPECTED DELIVERABLES	Updated geo-spatial database (Landfolio) of land parcels with tenure data of the coast and cayes in Belize assist with better management, polices and plans for Coastal Marine Tenure
CONSTRAINTS	We have to "backfill" some key project management and field engineer positions to ensure we have people "on the ground" to manage coastal land acquisition at the branch level.
ASSUMPTIONS	1. Access and permits for updating the landfolio system. 2. Availability of resoruces for guidance 3. Technical feasibility 4. Data accuracy and integrity 5. Stakeholder Participation
IN SCOPE	1. Updating existing landfolio registry of tenure in the coast and cayes of Belize city.
OUTSIDE OF SCOPE	1. Coastal Tenure outside of Belize City jurisdiction, other locations will be update din a sepearte project.
ESTIMATED BUDGET	Total $175,700 BZD

4.2.2 Roles and Responsibilities

As this project progresses, the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement, WBS, and WBS Dictionary. Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager and Sponsor will meet for formal acceptance of the deliverable. During this meeting, the Project Manager will present the deliverable to the Project Sponsor for formal acceptance. The Project Sponsor will accept the deliverable by signing a project deliverable acceptance document.

This will ensure that project work still is within the scope of the project consistently throughout the life of the project. Below outlined in Chart 9, is a breakdown of the roles and responsibilities for each assigned resources within this projecy lifecycle phase.

Chart 9 Roles and Responsibilities

Resource Role	Name	Functionality/ Duties	Departments
Project Manager:	Urania Garcia	The Project Manager will be Principal and Information Officer (PLIO) of the Land Information Centre (LIC). He/she will be responsible for preparing a monthly work plan and monthly reports to be submitted to the focal point for dissemination to the relevant partners. He/she will manage and coordinate the project activities of the LIC staff.	LIC
Project Sponsor	Amber Desgrassio	Responsible for approving Project Charter and project deliverables. Evaluate and approves/deny scope changes as well as approve Scope Management Plan.	LIC
GIS Supervisor	GIS Resource	The GIS Supervisor will be the Senior Land Information Officer who will be responsible for supervising the day to day activities and tasks of the GIS Technicians and the Researchers. He/she will report to the Project Manager.	GIS
GIS Technicians (6)	GIS Resource	The LIC currently have a staff two (2) Land Information Officers (LIO) and two (2) Land Information Technicians (LIT). Since the LIC cannot take on the responsibilities of the project with the current staffing, two (2) additional Land Information Technicians will be hired by the MNRPM. The two (2) LIO and the four (4) LIT of the Land Information Centre will be assigned to the project as GIS Technicians. Their collective responsibilities are as follows: Digitize and map the spatial geometry of all the parcels identified under this project. Develop and maintain a Land Tenure Geo-dataset for this	GIS

		project. Prepare and produce GIS related maps and statistics. Conduct field work in Target Areas Identified. Prepare Monthly Productivity Reports for submission to the project manager.	
Researchers (2)	MNRPM/ GIS Resource	Two (2) researchers will be hired by the MNRPM to work for this project. The researchers are to conduct tenure research and tabulate information for all cadastral parcels related to this project. Their responsibilities include. Search and investigate land tenure information for parcels under this project mainly at the Land Registry, Titles Unit and the Archives department Prepare spread sheets with Tenure Information collected Conduct field work in Target Areas Identified. Prepare Monthly Productivity Reports and statistics for submission to the Project manager	GIS

4.2.3 Work Breakdown Structure Description

Mobilization: During the mobilization component of the project, the following is expected to be undertaken.

- Signing of the MOU between MNRPM, and WWF and finalization of institutional and financial arrangements.
- Hiring of Project Staff and orientation of new and existing staff with the goals and objectives of the project.
- Procurement of equipment such as computers, scanners, laptops, and other office equipment to initiate the project. Activities under this component will include
- Obtaining, reviewing and validating data from the WWF 2017 Coastal Land Tenure database and relevant data from the CZMAI.

- Scanning and digitization of old survey plans in the target area (coast of Corozal and Belize Districts).
- Update the digital compilation of all surveys in the target area (coast of Corozal and Belize Districts).
- Conduct land tenure research will be conducted on digitized parcels (coast of Corozal and Belize Districts).

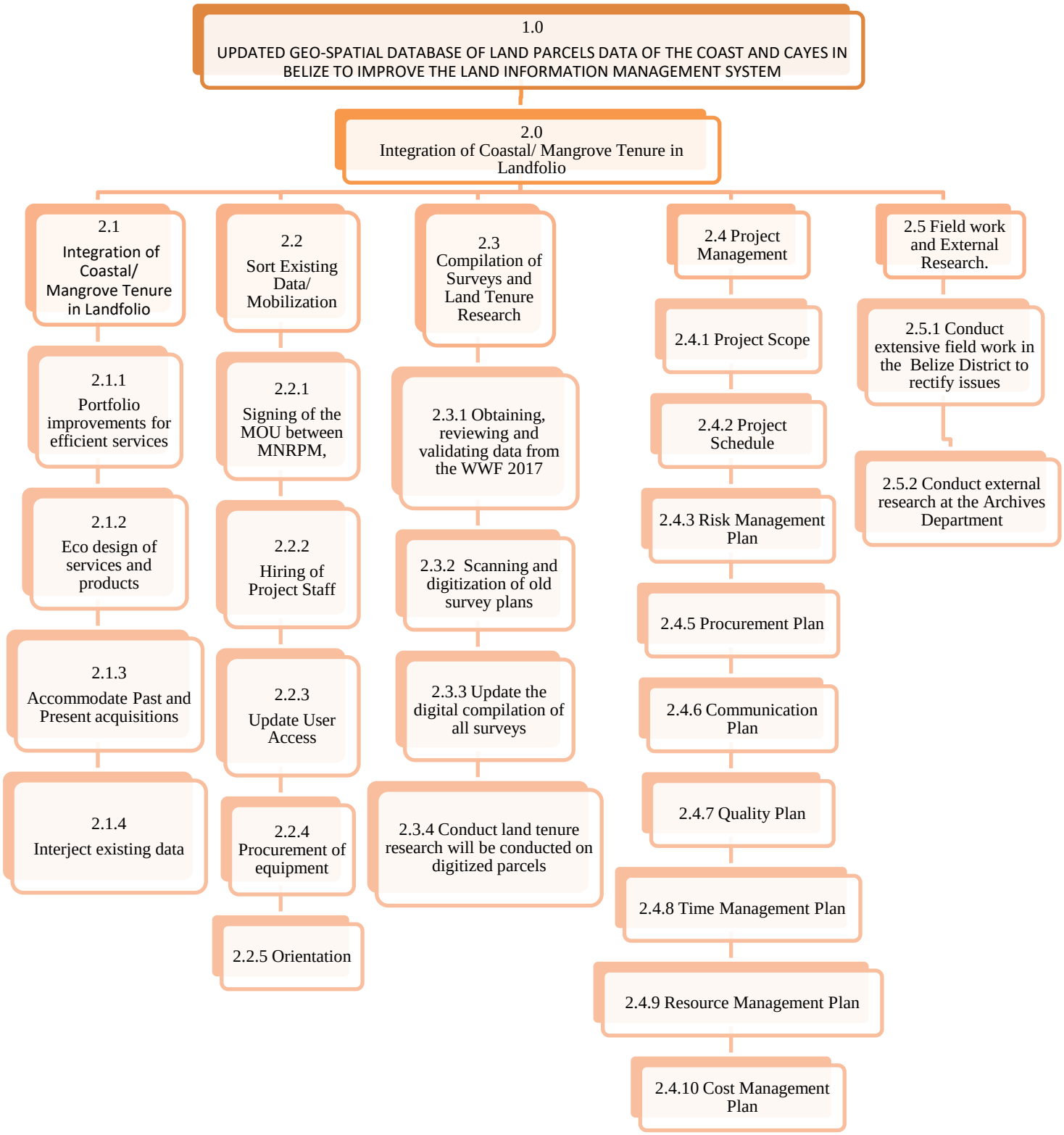
Field work and External Research.

- Conduct extensive field work in the Corozal and Belize District to rectify issues such as overlap of surveys, wrong location of parcel and uncertain geometry of parcels and to obtain and verify tenure information.
- Conduct external research at the Archives Department, local communities (Corozal and Belize Districts), and other governmental ministries to obtain and verify tenure information.

Reports and Meetings.

- Prepare a six-month report that details the status of the project, the activities completed and those outstanding; lessons learnt and best practices and considerations for the project continuation and completion.
- Conduct a meeting to discuss six-month report, and present geo-database of updated Coastal Land Tenure for Corozal and Belize District.

Figure 9: WORK BREAKDOWN STRUCTURE



4.2.4 Work Breakdown Structure Dictionary

The WBS Dictionary includes an entry for each WBS element. The WBS Dictionary includes a detailed description of work for each of the deliverables, and resources needed for that element. The project team will use the WBS Dictionary as a statement of work for each WBS element.

Chart 10 WBS Dictionary (Source: Own elaboration)

LEVEL	WBS CODE	ELEMENT NAME	DESCRIPTION OF WORK	DELIVERABLES	RESOURCES
1	1.0	• Updated Geo-Spatial Database Of Land Parcels Data Of The Coast And Cayes In Belize To Improve The Land Information Management System	Project Title		
3	2.0	• Integration of Coastal/ Mangrove Tenure in Landfolio	Define and establish projet concept & its impact on Landolfio to stakeholders	Acceptance Act	HR and Managing Director
4	2.1	• Promote Equity in the distribution of value to stakeholders	Outline ethical standards to be integrated as part of company culture	Completion Acceptance Act of Customer Service training	Executive Board members, Human Resource Department
5	2.1.1	• Portfolio improvements for efficient services	Updating of project portfolio to allow efficiency in services.	New Project Portfolio update	Training & Recruitment Officer, Project Manager
6	2.1.2	• Eco-design of services and products	Design and integrate eco-friendly practices and products.	Launch of eco-Friendly cards/contactless ATMS	Training & Recruitment Officer, Project Manager
7	2.1.3	• Accommodate Past and Present acquisitions	Assign and designate proper spaces and ease of transport for disabled staff members.		Project Sponsor

LEVEL	WBS CODE	ELEMENT NAME	DESCRIPTION OF WORK	DELIVERABLES	RESOURCES
2	2.1.4	• Interject existing data	Update job descriptions and disclose the salary scale for each post when advertised.	Phase Closure Deliverable	GIS Technician
3	2.2	• Sort Existing Data/ Mobilization	Compile all existing physical files & saved electronic files on coastal land tenure.	Completed Activities – Phase Deliverable	GIS Technician
4	2.2.1	• Signing of the MOU between MNRPM,	Signing of the MOU between MNRPM, and WWF and finalization of institutional and financial arrangements	MOU Signed Agreement	Project Manager, CEO, Porject sponsor
2	2.2.2	• Hiring of Project Staff	Hiring of Project Staff and orientation of new and existing staff with the goals and objectives of the project.	Acceptance Act	CEO, Project Sponsor
2	2.2.3	• Update User Access	Work with longstanding suppliers on adapting sustainable practices.	Phase deliverable	CEO, Project Sponsor
7	2.2.4	• Procurement of equipment	Procurement of equipment such as computers, scanners, laptops, and other office equipment to initiate the project.	Procurement Plan & Log	HR, Project Sponsor
5	2.2.5	• Orientation	Orientation and familiarization of the other units and departments within the MNRPM with the goals, objectives and impact of the project.	Attendance Sheet with Signatures	Project Manager
2	2.3	• Compilation of Surveys and Land Tenure Research	Obtaining, reviewing and validating data from the WWF 2017 Coastal Land Tenure database and relevant data from the CZMAI.	Phase Closure deliverable	Project Sponsor & Manager
3	2.3.3	• Obtaining, reviewing and validating data from the WWF 2017	Review and pass all environmental and safety regulations set forth by the labour department.	Acceptance Act	Project Sponsor & Manager, GIS Technician

LEVEL	WBS CODE	ELEMENT NAME	DESCRIPTION OF WORK	DELIVERABLES	RESOURCES
7	2.3.4	• Scanning and digitization of old survey plans	Scanning and digitization of old survey plans in the target area (coast of Corozal and Belize Districts).	Completiong of phase Deliverable – log of all archives scanned	Researcher, project Manager
5	2.3.5	• Update the digital compilation of all surveys	Update the digital compilation of all surveys in the target area (coast of Belize District)	Completiong of phase Deliverable – log of all surveys scanned	Researcher, project Manager
7	2.3.6	• Conduct land tenure research will be conducted on digitized parcels	Conduct land tenure research will be conducted on digitized parcels	N/A	Researcher, project Manager
3	2.4	• Project Management	Prepare the required project deliverables for planning, execution and project tracking.	Project Integration management Plan	Project Manager, GIS Supervisor
4	2.4.1	• Project Scope	Prepare action plan and scope for approval by the CEO of MNRPM	Scope Approal	Project Manager, GIS Supervisor
6	2.4.2	• Project Schedule	Prepare schedule of activites and WBS for approval	Schedule Approval	Project Manager, GIS Supervisor
5	2.4.3	• Risk Management Plan	Create Risk Plan and outlike foreseen risks to create mitigation plan where required.	Risk Matrix	Project Manager, GIS Supervisor Sponsor
7	2.4.4	• Procurement Plan	Prepare purchasing requirements for project activities	Purchase Invoice Approved	Project Manager, GIS Supervisor
5	2.4.5	• Communication Plan	Prepare escalation plan & communicatio namong resources for proper project tracking	Communication Plan Approved	Project Manager, GIS Supervisor
8	2.4.6	• Quality Plan	Assess requirements with the quality assurance unit	Quality Assurance Agreement Act	Project Manager, GIS Supervisor
9	2.4.7	• Time Management Plan	Create time managemnt plan		Project Manager, GIS Supervisor
10	2.4.8	• Field work and External Research	Conduct extensive field work in the Corozal and Belize District to rectify issues such as	Acceptance Act, Meeting minutes	Researcher, Project Manager

LEVEL	WBS CODE	ELEMENT NAME	DESCRIPTION OF WORK	DELIVERABLES	RESOURCES
			overlap of surveys, wrong location of parcel and uncertain geometry of parcels and to obtain and verify tenure information.		
4	2.5.1	• Conduct extensive field work in the Belize District to rectify issues	Conduct extensive field work in the Corozal and Belize District to rectify issues such as overlap of surveys, wrong location of parcel and uncertain geometry of parcels and to obtain and verify tenure information.	N/A	Researcher
5	2.5.2	• Conduct external research at the Archives Department	Conduct external research at the Archives Department, local communities (Belize District), and other governmental ministries to obtain and verify tenure information	N/A	Research, Project Manager

4.2.5 Requirements Traceability Matrix

Chart 11: Requirements Traceability Matrix

Project: Updated Geo-Spatial Database Of Land Parcels Data Of The Coast And Cayes In Belize To Improve The Land Information Management System						
Project Manager				**Urania Garcia**		
Requirement Information				**Relationship Traceability**		
WBS	Description	Acceptance Criteria	Priority	WBS Deliverable	Requested By	Responsible

1.0	To develop the integration management plan to outline and summarize project requirements existing mangrove	Project Approval	High	Project Charter Acceptance	Executive Boards	Project Sponsor
2.0	To create a scope management plan to define all the project work required.	Stakeholder Acceptance Act	Medium	Acceptance Act	Executive Board	Project Manager
2.1	To create a schedule management plan that will define the process for creating and effectively manage software update	Schedule Approval	Medium	Schedule	Stakeholders	Project Sponsor & Manager
2.1	To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the unit	Updated portfolio approval and launch training for staff	Medium	Completion Acceptance Act of Customer Service training	Customer Service Officers	Project Manager
2.1.2	To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively	Approval of new design by key stakeholders	High	New Project Portfolio update	Quality Assurance	Project Manager

	manage project and product quality from planning to final delivery.					
2.1.3	To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	Establishment sustainable development around areas of protection	High	Sustainable Development Clause	Executive Board	Project Manager

4.2.6 Scope Control

The project manager will have the exclusive responsibility of ensuring that the project scope stays consistent with the scope statement and Work Breakdown Structure (WBS). To manage the scope, the project manager will utilize the WBS Dictionary, treating it as a statement of work for each element and activity. Activities will be carried out in a logical order as specified in the WBS, following a top-down, left-right sequence.

4.3 Schedule Management Plan

4.3.1 Schedule Management Plan (Gantt Chart, Schedule, WBS)

The schedule plan will outline the project's approximate timeline, from its inception to its closure. Microsoft Project will be used to update the schedule & Gantt chart that illustrates the timeline and reflects the project deliverables as defined in the Work Breakdown Structure (WBS).

Chart 12 Schedule Management Plan

SCHEDULE MANAGEMENT				
Task Number	Task Name	Duration	Predecessors	Resource Names
1.	**Update GeoSpatial Database with Coastal Land Tenure**	**190 days**		
2.	**Project Management Deliverables**	**25 days**		
3.	Project Integration Plan	5 days		Urania Garcia
4.	Scope Approval	5 days	3	Urania Garcia
5.	Schedule Approval	5 days	3	Urania Garcia
6.	Procurement Plan	5 days	3	Urania Garcia
7.	Cost Plan	5 days	6	Urania Garcia
8.	Communication Plan	5 days	3	Urania Garcia
9.	Risk Matrix	5 days	6	Urania Garcia
10.	Resource Application	5 days	8	Urania Garcia
11.	Quality Assurance Plan	5 days	10	Urania Garcia
12.	Stakeholder Plan	5 days	11	
13.	**Mobilization**	**25 days**		
14.	Signing of MOU Between MNRPM, WWF	8 days	4	CEO, Project Sponsor
15.	Finalization of institutional agreements	2 days	14	CEO, Project Sponsor
16.	Financial Payments	15 days	15	CEO, Project Sponsor
17.	**Procurement**	**38 days**		
18.	Stationary equipment	3 days		Human Resources
19.	Computers	3 days	16	Human Resources
20.	scanners	3 days	16	Human Resources
21.	laptops	3 days	16	Human Resources
22.	Orientation	1 day	17	
23.	**Compilation of Research & Surveys**	**33 days**		
24.	Obtain Data Archives (Physical)	15 days	17	research
25.	Review and Validate data (sort)	5 days	24	GIS Technician, Researcher

26.	Scanning of physical archives	5 days	25	GIS Technician, Researcher
27.	Digitize archives in database	5 days	26	GIS Technician, Researcher
28.	Assign land tenure to Belize City	3 days	27	GIS Technician, Researcher
29.	**Conduct research for digitized parcels**	**88 days**		
30.	Field Work & External Research	35 days	28	GIS Technician, Project Manager, research
31.	Fieldwork in Belize District to review overlaps	35 days	30	GIS Technician, Project Manager, research
32.	Confirm parcel location	7 days	31	GIS Technician, Project Manager, research
33.	Review uncertain Geometry or parcels	7 days	32	GIS Technician, Project Manager, research
34.	Verify Tenure Information	4 days	33	GIS Technician, Project Manager, research
35.	**Conduct External research in archives Department**	**23 days**		
36.	Review local archives	10 days	34	Researcher
37.	verify tenure approval information	5 days	36	GIS Technician
38.	Input data into Landfolio	3 days	37	Project Manager
39.	Quality Assurance Acceptance Act	5 days	38	Quality Assurance
40.	**Presentation to CEO & Executives**	**8 days**		
41.	Prepare Six Month report review	5 days	39	Project Manager
42.	approve six-month report	1 day	41	CEO, Project Sponsor
43.	present report	1 day	42	Project Manager
44.	Approval for second phase	1 day	43	CEO

4.3.2 Schedule Management Control

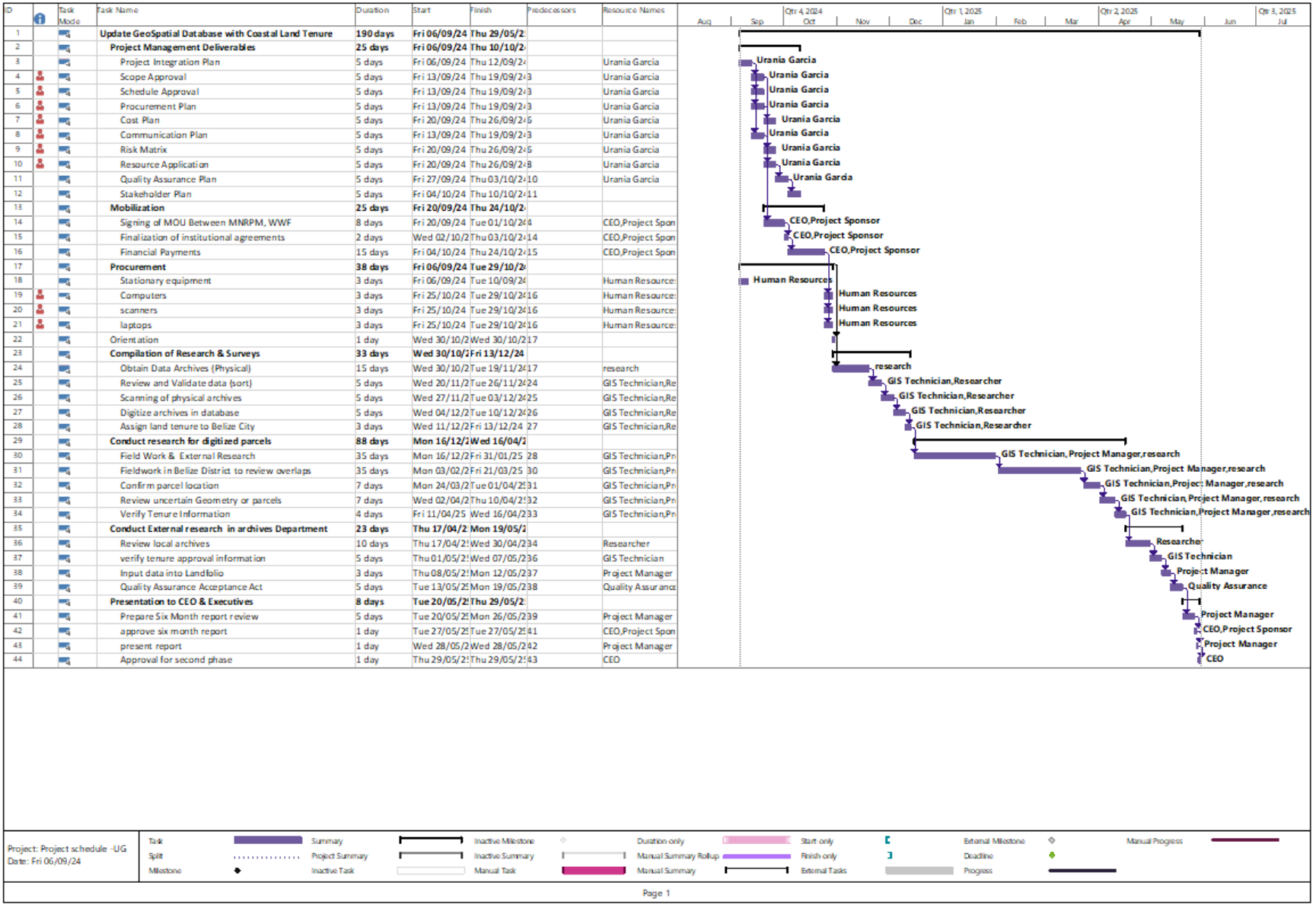
The project manager must adhere to the deadlines set by the project sponsor & stakeholders, which, in this instance, is a six month duration period. Additionally, MS Project will be used to visualize the project timeline, enabling stakeholders to track its progress. The project manager will regularly use MS Project to compare work packages and activities against the baseline. By sequencing

activities, the critical path will be identified, pinpointing project-critical tasks and highlighting areas where the schedule can be flexible.

4.3.3 Project Schedule Changes

Changes to the project schedule can stem from various factors, such as shifts in stakeholder requirements, stakeholders might request the digitization of additional types or tenure documents. To manage these changes effectively and avoid scope creep, a robust change control process is implemented.

Figure 10: Gantt Chart & Schedule



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		**Update GeoSpatial Database with Coastal Land Tenure**	**190 days**	**Fri 06/09/24**	**Thu 29/05/2**		
2		**Project Management Deliverables**	**25 days**	**Fri 06/09/24**	**Thu 10/10/2**		
3		Project Integration Plan	5 days	Fri 06/09/24	Thu 12/09/2		Urania Garcia
4		Scope Approval	5 days	Fri 13/09/24	Thu 19/09/2	3	Urania Garcia
5		Schedule Approval	5 days	Fri 13/09/24	Thu 19/09/2	3	Urania Garcia
6		Procurement Plan	5 days	Fri 13/09/24	Thu 19/09/2	3	Urania Garcia
7		Cost Plan	5 days	Fri 20/09/24	Thu 26/09/2	6	Urania Garcia
8		Communication Plan	5 days	Fri 13/09/24	Thu 19/09/2	3	Urania Garcia
9		Risk Matrix	5 days	Fri 20/09/24	Thu 26/09/2	6	Urania Garcia
10		Resource Application	5 days	Fri 20/09/24	Thu 26/09/2	8	Urania Garcia
11		Quality Assurance Plan	5 days	Fri 27/09/24	Thu 03/10/2	10	Urania Garcia
12		Stakeholder Plan	5 days	Fri 04/10/24	Thu 10/10/2	11	
13		**Mobilization**	**25 days**	**Fri 20/09/24**	**Thu 24/10/2**		
14		Signing of MOU Between MNRPM, WWF	8 days	Fri 20/09/24	Tue 01/10/2	4	CEO,Project Spon
15		Finalization of institutional agreements	2 days	Wed 02/10/2	Thu 03/10/2	14	CEO,Project Spon
16		Financial Payments	15 days	Fri 04/10/24	Thu 24/10/2	15	CEO,Project Spon
17		**Procurement**	**38 days**	**Fri 06/09/24**	**Tue 29/10/2**		
18		Stationary equipment	3 days	Fri 06/09/24	Tue 10/09/24		Human Resource:
19		Computers	3 days	Fri 25/10/24	Tue 29/10/24	16	Human Resource:
20		scanners	3 days	Fri 25/10/24	Tue 29/10/24	16	Human Resource:
21		laptops	3 days	Fri 25/10/24	Tue 29/10/24	16	Human Resource:
22		Orientation	1 day	Wed 30/10/2	Wed 30/10/2	17	
23		**Compilation of Research & Surveys**	**33 days**	**Wed 30/10/2**	**Fri 13/12/24**		
24		Obtain Data Archives (Physical)	15 days	Wed 30/10/2	Tue 19/11/24	17	research
25		Review and Validate data (sort)	5 days	Wed 20/11/2	Tue 26/11/24	24	GIS Technician,Re
26		Scanning of physical archives	5 days	Wed 27/11/2	Tue 03/12/24	25	GIS Technician,Re
27		Digitize archives in database	5 days	Wed 04/12/2	Tue 10/12/24	26	GIS Technician,Re
28		Assign land tenure to Belize City	3 days	Wed 11/12/2	Fri 13/12/24	27	GIS Technician,Re
29		**Conduct research for digitized parcels**	**88 days**	**Mon 16/12/2**	**Wed 16/04/2**		
30		Field Work & External Research	35 days	Mon 16/12/2	Fri 31/01/25	28	GIS Technician,Pr
31		Fieldwork in Belize District to review overlaps	35 days	Mon 03/02/2	Fri 21/03/25	30	GIS Technician,Pr
32		Confirm parcel location	7 days	Mon 24/03/2	Tue 01/04/25	31	GIS Technician,Pr
33		Review uncertain Geometry or parcels	7 days	Wed 02/04/2	Thu 10/04/2	32	GIS Technician,Pr
34		Verify Tenure Information	4 days	Fri 11/04/25	Wed 16/04/2	33	GIS Technician,Pr
35		**Conduct External research in archives Department**	**23 days**	**Thu 17/04/2**	**Mon 19/05/2**		
36		Review local archives	10 days	Thu 17/04/2	Wed 30/04/2	34	Researcher
37		verify tenure approval information	5 days	Thu 01/05/2	Wed 07/05/2	36	GIS Technician
38		Input data into Landfolio	3 days	Thu 08/05/2	Mon 12/05/2	37	Project Manager
39		Quality Assurance Acceptance Act	5 days	Tue 13/05/2	Mon 19/05/2	38	Quality Assurance
40		**Presentation to CEO & Executives**	**8 days**	**Tue 20/05/2**	**Thu 29/05/2**		
41		Prepare Six Month report review	5 days	Tue 20/05/2	Mon 26/05/2	39	Project Manager
42		approve six month report	1 day	Tue 27/05/2	Tue 27/05/2	41	CEO,Project Spon
43		present report	1 day	Wed 28/05/2	Wed 28/05/2	42	Project Manager
44		Approval for second phase	1 day	Thu 29/05/2	Thu 29/05/2	43	CEO

4.4 Cost Management Plan

4.4.1 Cost Management Plan

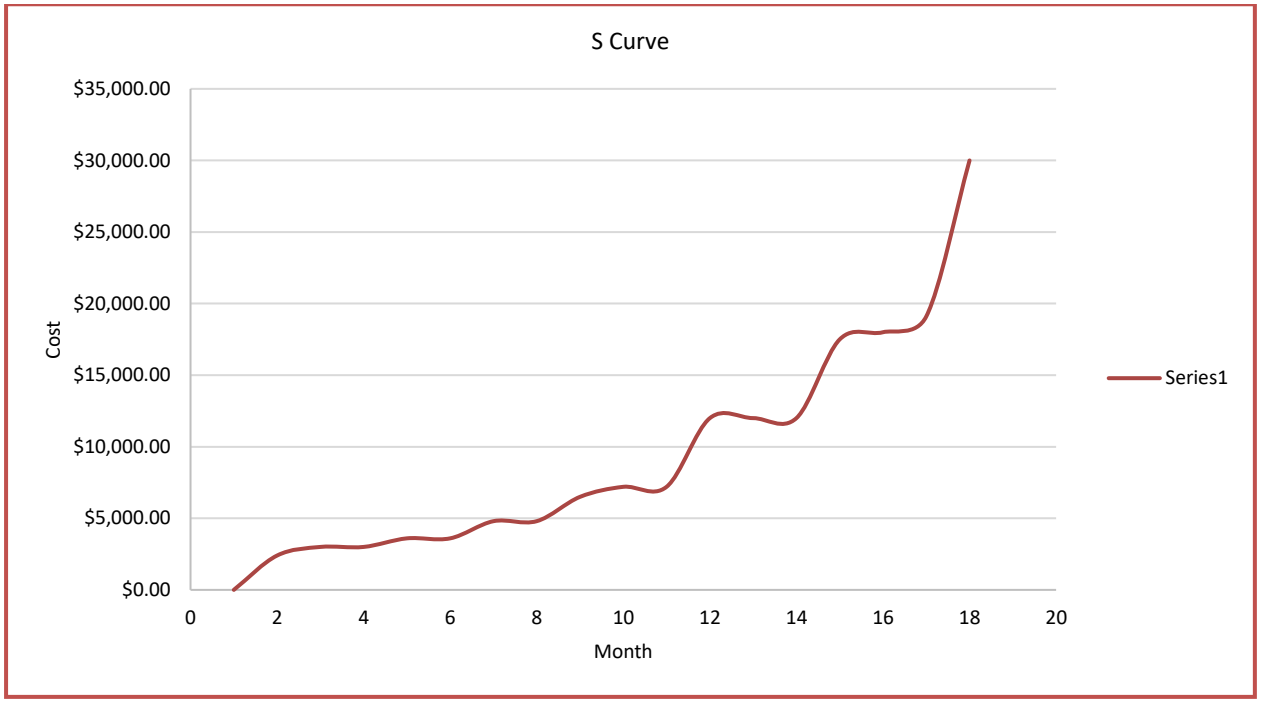
The cost of executing the project for the initial 6-months is estimated at BZ $175,700.00 This initial cost is high as it takes into account the retrofitting of office space to house additional staff in the LIC and the purchasing of equipment. In the subsequent phase of the project, the bulk of the projected expenses would be staffing allowances, field work in the cayes and southern coast of Belize.

Chart 13: Cost Management Plan

PROJECT COST MANAGEMENT				
Staffing				
Activity Name	Quantity	Mthly Allowances	Months	Rate (BZD$)
Project Manager	1	$800.00	6	$4,800.00
GIS Supervisor	1	$600.00	6	$3,600.00
GIS/ LIT Technician	6	$500.00	6	$18,000.00
Researchers	2	$400.00	6	$4,800.00
Field Work				
Activity Name	Quantity	Unit Cost		Rate (BZD$)
Transportation Mileage	6,000	$2.00		$12,000.00
Transportation (boat) Fuel.Gallon	500	$13.00		$6,500.00
Accomodation	96	$125.00		$12,000.00
Per Diem	96	$75.00		$7,200.00
Food/Refreshments	6	$600.00		3,600.00
Equipment				
Activity Name	Quantity	Unit Cost		Rate (BZD$)
Retrofit Work Space inclu. cabinets	4	$3,000.00		$12,000.00
Office Chairs	4	$600.00		$2,400.00
PCs - DELL OptiPlex 7000, 12th Gen Intel® Core ™ i9-12900K 3.20 GHz, 32.0 gb RAM	4	$7,500.00		$30,000.00
Monitors (DELL 27 Inch Wide Monitors)	12	$600.00		$7,200.00

UPS	4	$750.00	$3,000.00
Printer - HP Color Laser Jet Enterprise Flow, MFP 6800 zfsw	1	$19,100.00	$19,100.00
HP Design Jet T1700DR 44" PostScript 1VD88A Plotter	1	$17,500.00	$17,500.00
Scanner - Fujitsu ScanSnap iX1600 (Scanner)	2	$1,500.00	$3,000.00
Total			$175,700

Figure 11: S Curve



4.4.2 Control Costs

Earned Value Management (EVM) is a robust project management technique that incorporates scope, time, and cost data to evaluate project performance and forecast future performance and outcomes. The earned value management technique (EVM) is a tactic that cost management plans use to measure the cost performance of a project. This tactic helps evaluate the cost and benefits of equipment, replacements, upgrades, and even the entire functionality of the

department. It can also help evaluate the current efficiency of the employee base, which is why using EVM can be a helpful metric to include in this plan. Below is a guide to understanding the purpose for each EMV indicator:

Chart 14: EMV Indicator Questions

Planned Value (PV)	*How much work should be done?*
Earned Value (EV)	*How much work was done?*
Actual Cost (AC)	*How much did the work cost?*
Budget at Completion (BAC)	*What is the total job budgeted to cost?*
Estimate at Completion (EAC)	*What do we expect the total job to cost?*
Planned Value (PV)	*How much work should be done?*

Key EVM Indicators Include:

I. **Planned Value (PV)** - Budgeted Cost of Work Scheduled (BCWS), represents the budget authorized for the scheduled work. It is a key component in project performance measurement. PV = ∑(Budget for planned activities up to the current date) PV will be calculated based on the budgeted costs allocated for each activity in the project plan, distributed over the project's timeline.

II. **Earned Value (EV) -** or Budgeted Cost of Work Performed (BCWP), represents the value of work performed up to the current date, measured against the project budget. EV=∑(Budget for completed work up to the current date) EV is calculated by multiplying the percentage of completed work by the planned budget for each activity.

III. **Actual Cost (AC)** - also known as Actual Cost of Work Performed (ACWP), represents the total cost incurred for the work completed up to the current date. AC=∑(Actual costs incurred for completed work up to the current date)

IV. **Cost Performance Index (CPI)** - is a measure of cost efficiency. It is calculated as the ratio of EV to AC. CPI=EV/AC. A CPI value of 1 indicates that the project is on budget, a value greater than 1 indicates under budget (cost-efficient), and a value less than 1 indicates over budget (cost-efficient).

V. **Schedule Performance Index (SPI)** - measures schedule efficiency. It is calculated as the ratio of EV to PV. SPI=EV/PV An SPI value of 1 indicates that the project is on schedule, a value greater than 1 indicates ahead of schedule, and a value less than 1 indicates behind schedule.

VI. **Estimate at Completion (EAC)** - is a forecast of the total cost of the project at completion, based on current performance. EAC=Total Budget/CPI Alternatively, EAC can be adjusted based on different forecasting techniques depending on whether the project will continue performing at the current rate or if variances are expected to be atypical.

VII. **Variance at Completion (VAC)** - represents the difference between the total budget and the forecasted total cost. VAC = Total Budget – EAC

4.4.3 Cost Control

The project manager is usually responsible for the project's cost controls, including operating monitoring software and investigating any cost differences. Good project cost control requires a detailed knowledge of the project's planning and execution since the project manager must be able to identify when the project exceeds the projections and understand why.

4.5 Quality Management Plan

Chart 15 Quality Management Plan

GENERAL PROJECT INFORMATION	
EXPECTED START DATE	EXPECTED COMPLETION DATE
23 August 2024	14 February 2025
Essential to ensure the highest possible quality of deliverables and activities is through active participation and steering guidance offered by the Quality Assurance Officer The involvement of the Quality Assurance Team is encouraged throughout all day-to-day operations and partners are encouraged to reach out to, and involve, the QA members inputs whenever a deliverable is due or a task is initiated. Besides the general involvement, regular QA meetings are scheduled according to the meeting planning schedule	
Metric/ Specification	Measure
Quality Control Objectives	The quality management structure guarantees flexibility coordinating the various project activities, a clear decision process and a clear identification of potential risks and unforeseen situations.
Quality Control Steps	All deliverables undergo a quality control process prior to approval and release. The internal approval of the deliverables is considered complete after successful completion of the quality control process
Quality Control Responsibilities	• Structure, format and appearance: wherever applicable, deliverables are to be developed and released using the model template defined for the project

	• Data/information: a cross-check is made to ensure no contradictions between deliverables exist. Depending on the deliverable some overlap in the information might occur, however the deliverables are designed to each have a unique added value • Accordance with the timetable: a check of the delivery date, which must be in line with the one agreed
Quality Control Documented Standards	• All coordination and dissemination of land parcel information must be protected and handled at a high security level without tamperment by third parties.
Deliverable of Process to Review	
Requirements Analysis	The requirement analysis must be signed by all stakeholders and receive all approval signatures prior to entering the execution lifecycle.
Test Planning	The Test Acceptance criteria must be drafted alongside the sponsor and manager, with approvla signatures collected by all stakeholders prior to testing.
Test Design	Tests Scripts must be provided and annexed to the Test Acceptance Criteria
Text Execution	Execution of test must be accompanied by QA officer for dful visibility and transparency.

Retesting & regression testing	In the event that any update is carried out to the Landfolio, the team must perform regression testing to ensure changes have not impacted existing feature or data.
User Acceptance Testing	Upon completion of all testing requirements, the final product and update must be reviewed by stakeholders for approval.
Release Act	Upon signing and approvig the UAT Act, the release act is activated and signals the completion of all requirements.

The technical processes and procedures necessary to ensure that each step, from the product design through product use, maintenance, and disposition, are performed in conformance with the scope requirements and quality plans to ensure that quality is achieved throughout. A Quality Review Checklist will be used to assess the project's compliance with the planned activities (and related outputs) in domains such as scope, time, cost, quality, project organization, communications, risks, contracts, and client satisfaction.

Chart 17 RACI CHART

PROJECT DELIVERABLE / ACTIVITY	Project Leadership				Project Team Members					Additional Resources			
	Sponsor	CEO	Directors	Minister of MPRM	Project Manager	GIS Technician	QA	IT	Researchers	Consultant	TRIMBLE Consultant	Customer Officers	Branch CSO
Project Management Deliverables													
Project Integration Plan	R	A											

PROJECT DELIVERABLE / ACTIVITY	Sponsor	CEO	Directors	Minister of MPRM	Project Manager	GIS Technician	QA	IT	Researchers	Consultant	TRIMBLE Consultant	Customer Officers	Branch CSO
	Project Leadership				Project Team Members					Additional Resources			
Scope Approval	R				A					C			
Schedule Approval	R			I									
Procurement Plan		I											
Cost Plan	A				R								
Communication Plan	I				R								
Risk Matrix	I				R	C	C			C	C		
Resource Application	A	I			R	C	C	C	C	C	C		C
Quality Assurance Plan	A	I			R								
Stakeholder Plan	A	I	C	C	R								
Mobilization													
Signing of MOU Between MNRPM, WWF	R			R	I								
Finalization of institutional agreements		R			I								
Financial Payments	R			R	I								
Procurement													
Stationary equipment			A										
Computers			A										
scanners								R					
laptops								R					
Orientation													
Compilation of Research & Surveys													
Obtain Data Archives (Physical)					A	R			R	I			

PROJECT DELIVERABLE / ACTIVITY	Sponsor	CEO	Directors	Minister of MPRM	Project Manager	GIS Technician	QA	IT	Researchers	Consultant	TRIMBLE Consultant	Customer Officers	Branch CSO
	Project Leadership				Project Team Members					Additional Resources			
Review and Validate data (sort)									A	I			
Scanning of physical archives	I				R							I	
Digitize archives in database									R				
Assign land tenure to Belize City	I					R							
Conduct research for digitized parcels													
Field Work & External Research	I				A	R			R				
Fieldwork in Belize District to review overlaps	I				A	R							
Confirm parcel location	I					R							
Review uncertain Geometry or parcels	I					R							
Verify Tenure Information					A				R				
Conduct External research in archives Department													
Review local archives					R	I	I	I	I				
verify tenure approval information	C				C	C	R	C	R		I		
Input data into Landfolio					R	C	C	C	C		I		
Quality Assurance Acceptance Act	C	C			C		R				I		
Presentation to CEO & Executives													
Prepare Six Month report review			C	C	R		C		C				

PROJECT DELIVERABLE / ACTIVITY	Sponsor	CEO	Directors	Minister of MPRM	Project Manager	GIS Technician	QA	IT	Researchers	Consultant	TRIMBLE Consultant	Customer Officers	Branch CSO
	Project Leadership				Project Team Members					Additional Resources			
approve six month report	R												
present report	R												
Approval for second phase	C	R	C	C	I	I	I			I	I	I	I

4.5.1 Quality Control

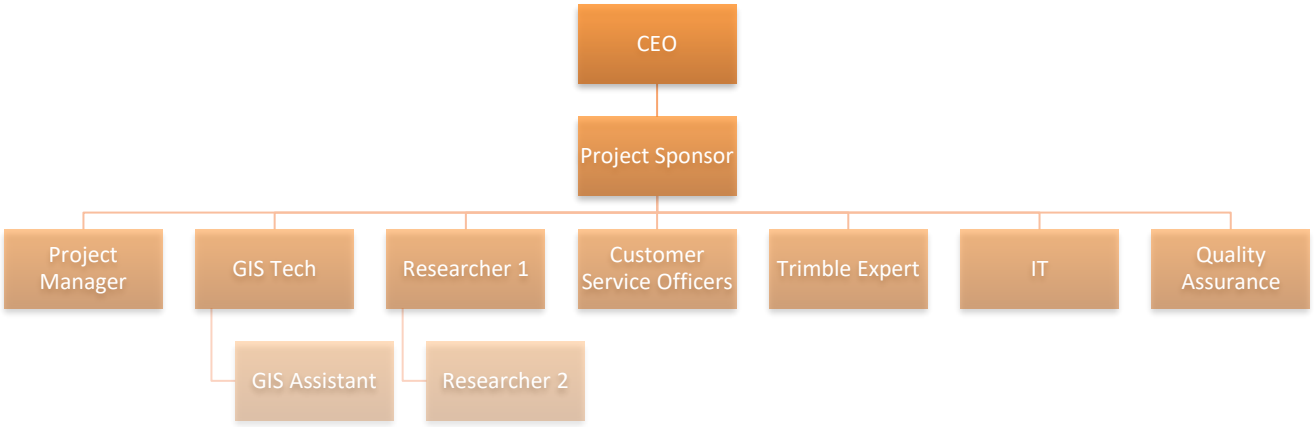
The Quality Review Checklist will be used by the Project Manager (PM) for evaluating the quality control activities and to validate compliance with the plans in terms of scope, time, cost, quality, project organization, communication, risks, contracts, and client satisfaction. Additionally, the Project Manager (PM) will summarize and document the Quality Review Checklist findings, their impact, recommendations along with any remediation/improvement actions. The project logs will then also be used to document related risk, issues, decisions and changes.

When controlling and verifying the adequacy of project quality management, the Project Manager (PM) will consider all events that may influence adversely or favourably the achievement of project objectives and refine the Quality Management Plan accordingly. Moreover, the Project Manager (PM) will determine the effectiveness of project processes, look for potential improvements in processes efficiencies, analyse measurement results and their effectiveness, and develop Quality Review Reports with the consolidation of the results and recommendations.

The results of the quality assurance activities will be used for improving the quality of project activities and so they may generate change requests for corrective or preventive actions, or updates in project documentation, e.g. in Project Work Plan.

After the identification of all non-conformities or opportunities to improve, the Project Manager (PM) will elaborate/validate recommendations and establish action plans, consulting the relevant stakeholders.Quality Management Plan Roles and Responsbilities

Figure 12: Roles and Responsibilities Organizational Chart



As depicted in Figure 12 above, the central decision maker is the CEO with direct communication with the project sponsor. The project will comprised of the Project Manager, the GIS Technician, researchers, CSO, software experts, IT, and the quality assurance team. All project team members are expected to attend a 30 minute weekly briefing on project status hosted by the project manager.

Chart 16 Roles and Responsibility List

Role	Responsibilities
Project Manager	➢ Align project team with project goals. ➢ Manage schedules, budgets, changes and project deliverables. ➢ Lead and coordinate requirements gathering and documentation ➢ Assist with communication among team members and stakeholders.
CEO	➢ Approve project budget ➢ Approve hiring of external resources ➢ Manager Project Contracts
Project Sponsor	➢ Approve Deliverables ➢ Manage & streamline direct communication with CEO & department leads ➢ Engage with stakeholders to understand needs.
GIS Techs	➢ Facilitate use of equipment for validating land features captured ➢ Ensure that system requirements are clear and comprehensive & reflect accurate date
Researchers	➢ Analyse existing and new land tenures according to provided data. ➢ Ensure consistency in data collection ➢ Support stakeholder engagement. ➢ Validate and approve requirement documents.
Customer Service Officers	➢ Attend workshop training on use of system & new processes to archive coastal tenure data ➢ Document requirements in clear and detailed formats for future reference of existing officers ➢ Communicate feedback to the project team.
Thrimble System Expert	➢ Design the overall system changes to support coastal land tenure ➢ Develop and maintain technical standards ➢ Address technical issues and challenges.
IT Support Team Manager	➢ Ensure technical support is available for development and deployment. ➢ Address and resolve technical issues promptly. ➢ Manage IT support specialists.
QA Team	➢ Manage QA activities and processes. ➢ Ensure system meets quality standards. ➢ Oversee development and execution of test plans.

	➢ Supervise QA testers. ➢ Develop and execute test cases. ➢ Identify and document defects. ➢ Validate system functionalities.

4.7 Communication Management Plan

The communication management plan outlines the protocols for information dissemination, this includes regular project updates, progress reports, meeting schedules, and feedback reports, all designed to keep stakeholders informed and involved, thereby reducing errors, and aligning efforts towards the project's objectives. The table below outlines the communication matrix for this particular project team:

Chart 18 Communication Management Plan

Type of Communication	Description	Medium	Frequency	Audience
Kick off	Communicate the start of the project, the composition of the work team, the scope and the general schedule.	PMO/ PM	At the start of the project (once)	Every member of the project team
Weekly status of the Project / Follow-up Meetings				
Issue Identification	Identify and document issues	Project Management Software, Email	As needed	Project Team
Initial Resolution Attempt	Resolve issues at the operational level	Team Meetings, Instant Messaging	As needed	Project Team
Escalation to Team Leads	Review and address unresolved issues	Virtual Meetings, Email	As needed	Project Team Leads
Escalation to Project Manager	Analyze and resolve issues with broader impact	Virtual Meetings, Email	Weekly (or as needed)	Project Manager
Escalation to Steering Committee	Address high-impact issues that require strategic decisions	Formal Meetings, Email	Bi-weekly (or as needed)	Project Steering Committee

Type of Communication	Description	Medium	Frequency	Audience
Escalation to Project Sponsor	Resolve critical issues impacting project success	Formal Meetings, Email	Monthly (or as needed)	Project Sponsor, DOE Leadership
Documentation of Escalation	Record details of issue and resolution steps	Project Management Software, Shared Documents	Continuous	Project Team, Project Manager
Status Reporting	Provide updates on escalated issues	Project Reports, Dashboards	Weekly	Project Team, Project Sponsor
Feedback Collection	Gather feedback on escalation handling	Surveys, Feedback Sessions	Post-resolution	Project Team, Stakeholders

4.7.1 Communication Escalation Process

Within this project, the escalation process for any risks presented will follow the escalation process depcited in table below.

Chart 19 Escalation Process

Rate	Level	Escalation Description	Plan
6	**Extreme**	Risk owner to immediately report to executive team and project manage/ sponsor	Put in place a treatment plan to immediately bring it within the organisation's risk appetite. Seek approval from the change control board to proceed with any activity associated with a risk with this risk score.
4-5	**High**	Risk owner to report directly to the project manager and sponsor. The head of the unit affected should review any risks at this level which are outside of organisation's risk appetite and report to project team.	Put in place a treatment plan to ensure risk remains within risk appetite and as low as is reasonably practical. Executive team to review treatment actions proposed by the head of the business unit if the risk is outside the organisation's risk appetite.
3	**Moderate**	Risk owner to monitor and treat within the business unit.	Develop treatment plan to ensure the risk is as low as is reasonably practical. Continue to watch and monitor.

		Inform the risk manager of anything that may lie outside of the organisation's risk appetite.	Include on the risk register. Risk owner should report to the risk manager if they are unable to ensure the risk is within risk appetite or as low as is reasonably practical.
1-2	**Low**	Risk owner to watch and monitor. If controls are in place, consider whether any further treatments are necessary.	Continue with current controls and monitor risk. If risk is managed consistently and controls are embedded within business activities, consider removing risk from risk register in consultation with Risk Manager.

4.8 Project Resource Management

4.8.1 Resource Management Plan

To effectively plan resources for a project aimed at updating a geo-spatial database with coastal tenure information, the team will first identify the required resoureces such as GIS specialists, fiel dusrveyors and database admin; technical resources such as GIS software (e.g., ArcGIS, QGIS), hardware (servers, workstations); and data collection tools (GPS devices, drones) that all ultimately incur the financial requirements for software licenses, equipment, personnel and training.

Chart 20 Resource Management Plan

Role	Responsibilities
Project Manager	➢ Oversee the entire project lifecycle, from planning to execution and closure. ➢ Coordinate between different teams and stakeholders. ➢ Manage project timelines, budgets, and resources. ➢ Ensure project objectives are met and deliverables are completed on time. ➢ Address any issues or risks that arise during the project
CEO	➢ Approve project budget ➢ Approve hiring of external resources ➢ Manager Project Contracts
Project Sponsor	➢ Act as the primary point of contact between the project team and stakeholders. ➢ Communicate project progress, updates, and any issues to stakeholders. ➢ Gather stakeholder requirements and feedback to inform project decisions. ➢ Ensure stakeholder expectations are managed and met. ➢ Facilitate stakeholder meetings and presentations.
GIS Techs	➢ Create, maintain, and update GIS databases and data layers. ➢ Perform spatial analyses and generate maps and other geospatial products.

	➢ Collect, edit, and manage high-quality geospatial data from various sources1. ➢ Ensure data accuracy and consistency within the database. ➢ Provide technical support and training to other team members on GIS tools and techniques.
Researchers	➢ Manage the database infrastructure, including setup, configuration, and maintenance. ➢ Ensure data integrity, security, and backup procedures are in place. ➢ Optimize database performance and troubleshoot any issues. ➢ Implement data validation and quality control measures. ➢ Coordinate with GIS specialists to integrate new data into the database.
Field Surveoy	➢ Conduct field surveys to collect accurate coastal tenure data. ➢ Use GPS devices, drones, and other tools to gather geospatial information. ➢ Ensure data collected in the field is accurate and properly documented. ➢ Collaborate with GIS specialists to integrate field data into the database. ➢ Report any discrepancies or issues encountered during data collections
Customer Service Officers	➢ Attend workshop training on use of system & new processes to archive coastal tenure data ➢ Document requirements in clear and detailed formats for future reference of existing officers ➢ Communicate feedback to the project team.
Thrimble System Expert	➢ Design the overall system changes to support coastal land tenure ➢ Develop and maintain technical standards ➢ Address technical issues and challenges.
IT Support Team Manager	➢ Ensure technical support is available for development and deployment. ➢ Address and resolve technical issues promptly. ➢ Manage IT support specialists.
QA Team	➢ Analyze geospatial data to identify trends, patterns, and insights. ➢ Generate reports and visualizations to support decision-making processes. ➢ Validate and clean data to ensure it meets quality standards. ➢ Work with GIS specialists to enhance data analysis capabilities. ➢ Provide recommendations based on data analysis to improve project outcomes.

4.9 Project Risk Management Plan

By having a comprehensive risk management plan, project teams can enhance their ability to achieve project objectives safely and efficiently, while also being prepared to handle unexpected challenges.

Chart 21 Risk Management Plan

Risk Management Plan		
RISK IDENTIFICATION		
RISK OVERVIEW		**EVENT OR THREAT TRIGGERS**
1	**Data Accuracy**	Quality Assurance revision of regression testing
2	**Software Issues**	Slow System use in production
3	**Hardware Failures**	Errors in TRIMBLE & Landfolio system
4	**Integration Challenges**	Errors or delays in updating customer data
5	**Resource Availability**	Delays in planned activities
6	**Project Delays**	Delays in any activities under the critical path
7	**Training Gaps**	Misunderstanding in changes within the system by users
RISK REGISTER		
IDENTIFIED RISK	**CURRENT STATUS**	**RISK MITIGATION STRATEGIES**
1	Monitoring	Implement rigorous data validation and quality control processes
2	Monitoring	Regularly update GIS software and perform compatibility testing before deployment.
3	Monitoring	Schedule regular maintenance and inspections of hardware. Keep spare parts and backup equipment readily available to minimize downtime
4	Monitoring	Develop a detailed integration plan and conduct thorough testing in a controlled environment before full-scale implementation. Use middleware solutions to facilitate data integration
5	Monitoring	Create a resource management plan that includes backup personnel and equipment.
6	Monitoring	Develop a detailed project schedule with buffer times for critical tasks. Monitor progress closely and adjust the schedule as needed to accommodate delays
7	Monitoring	Implement a robust quality assurance program with regular audits and reviews. Train team members on quality standards and best practices

8	Monitoring	Provide ongoing training and development opportunities for team members. Use a mix of in-person and online training sessions to ensure comprehensive coverage

RISK ANALYSIS AND EVALUATION		
Complete the following for each IDENTIFIED RISK. S*ee* RISK MATRIX *below.*		
IDENTIFIED RISK	**RISK GRADE**	**POTENTIAL IMPACT**
1	12	3
2	6	2
3	8	2
4	12	3
5	9	3
6	9	3
7	8	2
8	12	3

4.9.1 Risk Management Approach

To manage risks effectively for a project aimed at updating coastal tenure in a geo-spatial database, the team begins by identifying potential risks through brainstorming sessions and reviewing past projects.

Ensuring transparent communication with stakeholders about risk status and mitigation efforts. Finally, documenting all risk management activities and incorporate lessons learned to improve future risk management practices. This structured approach helps in proactively addressing potential issues, ensuring project success and stakeholder confidence.

4.9.2 Risk Breakdown Structure

By categorizing risks through a beakdown structure, the team can systematically address each area and develop targeted mitigation strategies to ensure the project's success.

Figure 13: Risk Breakdown Structure

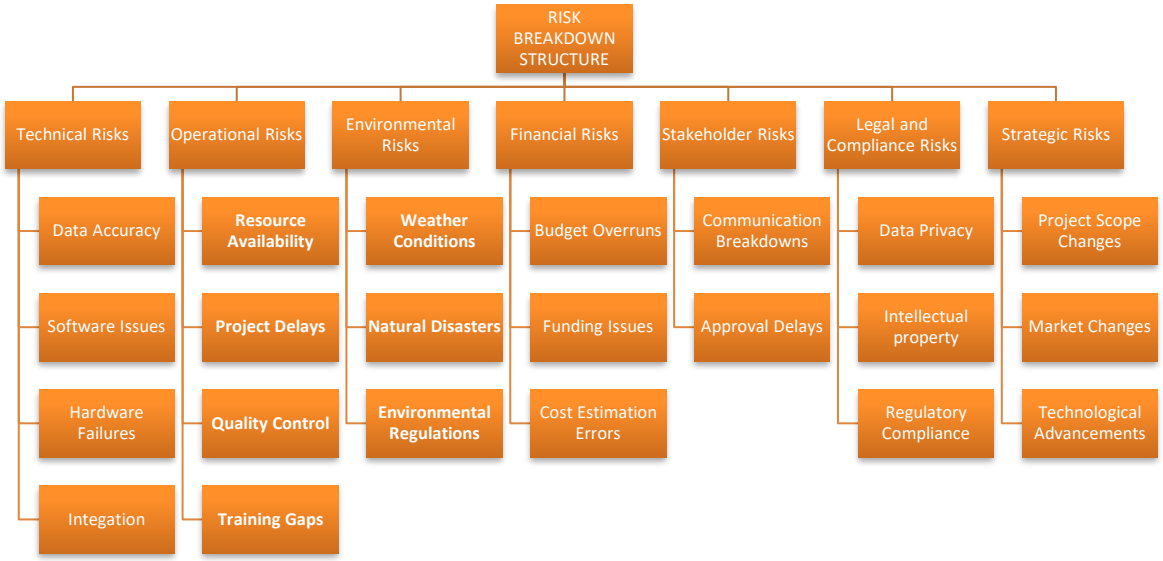


Chart 22: Probably Impact Matrix

Impact \ Probability	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Very High (5)	5	10	15	20	25
High (4)	4	8	12	16	20
Medium (3)	3	6	9	12	15
Low (2)	2	4	6	8	10
Very Low (1)	1	2	3	4	5

Explanation:

- **Probability**: The likelihood of a risk occurring, rated from Very Low (1) to Very High (5).
- **Impact**: The potential effect of the risk on the project, rated from Very Low (1) to Very High (5).

Risks Identified:

1. **Data Accuracy Issues**:
    - **Probability**: Medium (3)
    - **Impact**: High (4)
    - **Score**: 3 x 4 = 12 (Medium Risk)
2. **Software Compatibility Problems**:
    - **Probability**: Low (2)
    - **Impact**: Medium (3)
    - **Score**: 2 x 3 = 6 (Low Risk)
3. **Budget Overruns**:
    - **Probability**: Medium (3)
    - **Impact**: High (4)
    - **Score**: 3 x 4 = 12 (Medium Risk)

This matrix helps prioritize risks based on their combined probability and impact scores, allowing the project team to focus on the most critical risks first

Chart 23 Risk Register

No	Risk Title	Description	Risk Category	Impact Score	Probability	Overall Risk Score	*Mitigation*	Risk Owner	Risk Author
1	**Data Accuracy**	Inaccurate or outdated data collection.	Medium	4	3	12	Implement rigorous data validation and quality control processes	Sponsor	PM
2	**Software Issues**	Bugs or compatibility issues with GIS software.	Medium	3	2	6	Regularly update GIS software and perform compatibility testing before deployment.	Sponsor	PM
3	**Hardware Failures**	Malfunctions of GPS devices, drones, or servers.	High	4	2	8	Schedule regular maintenance and inspections of hardware. Keep spare parts and backup equipment readily available to minimize downtime	Software Tech	PM
4	**Integration Challenges**	Difficulties in integrating new data with existing databases.	High	4	3	12	Develop a detailed integration plan and conduct thorough testing in a controlled environment before full-scale implementation. Use middleware solutions to facilitate data integration	Software Tech	PM
5	**Resource Availability**	Unavailability of key personnel or equipment.	Medium	3	3	9	Create a resource management plan that includes backup personnel and equipment.	Sponsor	PM

No	Risk Title	Description	Risk Category	Impact Score	Probability	Overall Risk Score	*Mitigation*	Risk Owner	Risk Author
6	**Project Delays**	Delays due to unforeseen circumstances or dependencies.	Medium	3	3	9	Develop a detailed project schedule with buffer times for critical tasks. Monitor progress closely and adjust the schedule as needed to accommodate delays	Project Manager	PM
7	**Quality Control**	Inadequate quality assurance processes leading to errors.	High	4	2	8	Implement a robust quality assurance program with regular audits and reviews. Train team members on quality standards and best practices	QA Manager	PM
8	**Training Gaps**	Insufficient training for team members on new tools or techniques.	High	4	2	8	Provide ongoing training and development opportunities for team members. Use a mix of in-person and online training sessions to ensure comprehensive coverage	HR	PM
9	**Weather Conditions**	Adverse weather affecting field surveys.	Medium	3	2	6	Plan field surveys during favourable weather conditions and have contingency plans for adverse weather	PM	PM
10	**Natural Disasters**	Risks from hurricanes, floods, or other natural events.	Medium	3	2	6	Develop an emergency response plan that includes evacuation procedures and data protection measures.	PM	PM
11	**Budget Overruns**	Costs exceeding the allocated budget.	low	2	3	6	Implement strict budget monitoring and control measures. Use project management software to track expenses and forecast future costs	Sponsor	PM
12	**Communication Breakdowns**	Ineffective communication with stakeholders.	Medium	3	2	6	Establish a communication plan that includes regular meetings, reports, and feedback mechanisms.	PM	PM
13	**Intellectual Property**	Issues related to the use of proprietary data or software.	High	4	1	4	Use licensed software and data sources. Consult with legal advisors to ensure compliance with intellectual property laws.	Sponsor	PM
14	**Project Scope Changes**	Changes in project scope leading to increased complexity.	High	4	2	8	Use a change management process to evaluate and approve scope changes. Communicate the impact of	PM	PM

No	Risk Title	Description	Risk Category	Impact Score	Probability	Overall Risk Score	*Mitigation*	Risk Owner	Risk Author
							changes on project timelines and budgets to stakeholders.		

4.9.3 Risk Monitoring and Controlling

The project's risk levels will be continuously tracked, monitored, and reported throughout its lifecycle using the Planview Software Application managed by the project management office. The project team will develop and maintain a Risk Listing, which will be included in the project's status reports. Additionally, a monthly risk management meeting will be held with all project team members to review, address, and identify any new risks that may arise during the project's execution.

4.10 Procurement Management Plan

Chart 24 Procurement Plan

Resource	Quantity	Description	Purpose
Project Management Software	1	Software for planning, tracking, and managing project tasks and timelines	To ensure efficient project management
GIS Software Licenses	3	Licenses for Geographic Information System software (e.g., ArcGIS, QGIS)	For geospatial data analysis and integration
High-Performance Computers	3	Computers with high processing power and large storage capacity	To handle large geospatial datasets
GPS Devices	5	High-accuracy GPS devices for field data collection	For accurate land parcel and coastal data collection
Drones	2	Unmanned aerial vehicles for aerial surveys and data collection	To collect high-resolution imagery and data
Surveying Equipment	5	Equipment such as total stations and theodolites	For precise land surveying
IT Support Tools	1 set	Tools for maintaining and troubleshooting IT infrastructure	To ensure smooth IT operations
Cybersecurity Software	1	Software to protect project data from cyber threats	To ensure data security
Procurement Management Software	1	Software for managing procurement processes and supplier relationships	To streamline procurement activities
Quality Assurance Tools	1 set	Tools for conducting quality checks and inspections	To ensure project deliverables meet standards
Transportation	1 vehicle	Vehicle for transporting the data collection team and equipment	For field survey logistics
Communication Tools	1 set	Tools such as video conferencing software and communication platforms	For effective team and stakeholder communication
Financial Management Software	1	Software for tracking project expenses and managing the budget	To ensure financial oversight and control

The procurement management approach for the “Updating Geo-Spatial Database of Land Parcels Data with Coastal Marine Tenure” project will ensure that all necessary goods and services are acquired efficiently, cost-effectively, and in compliance with organizational policies and regulations. The approach includes the following key components:

1. **Procurement Planning**:
    - **Needs Assessment**: Identify and document the specific goods and services required for the project.
    - **Market Research**: Conduct market analysis to identify potential suppliers and assess market conditions.
    - **Procurement Strategy**: Develop a strategy that outlines the procurement methods, timelines, and responsibilities.
2. **Solicitation and Selection**:
    - **Request for Proposals (RFPs)**: Prepare and issue RFPs to potential suppliers, detailing the project requirements and evaluation criteria.
    - **Evaluation and Selection**: Evaluate proposals based on predefined criteria such as cost, technical capability, and past performance. Select the most suitable supplier(s).
3. **Contract Management**:
    - **Contract Negotiation**: Negotiate terms and conditions with selected suppliers to ensure favorable terms.
    - **Contract Award**: Formalize agreements with suppliers through contract awards.

- **Performance Monitoring**: Monitor supplier performance to ensure compliance with contract terms and project requirements.

4. **Procurement Execution**:
    - **Order Placement**: Place orders with selected suppliers and ensure timely delivery of goods and services.
    - **Quality Assurance**: Implement quality control measures to verify that delivered goods and services meet project specifications.
5. **Procurement Closeout**:
    - **Final Inspection**: Conduct a final inspection of delivered goods and services to ensure all requirements are met.
    - **Supplier Evaluation**: Evaluate supplier performance and document lessons learned for future procurement activities.
    - **Contract Closure**: Complete all contractual obligations and close out contracts.

This approach will ensure that the procurement process is transparent, competitive, and aligned with the project's goals and objectives.

4.10.1 Roles & Responsibilities

This structure ensures that all aspects of the project are covered, with clear responsibilities and the necessary resources allocated to each team member.

Chart 25 Roles and Responsibilties

Role	Responsibilities
Project Manager	➢ Oversee the entire project, ensure timelines and budgets are met, coordinate between teams, and manage stakeholder communicatio

Geospatial Analysts	➢ Analyze and update geospatial data, integrate coastal marine tenure information, and ensure data accuracy and consistency.
Project Sponsor	➢ Provide input and feedback, review project progress, and ensure alignment with organizational goals. ➢ Monitor project budget, manage financial records, and ensure cost-effectiveness.
GIS Techs	➢ Facilitate use of equipment for validating land features captured ➢ Ensure that system requirements are clear and comprehensive & reflect accurate date
Researchers	➢ Conduct field surveys, collect new data on land parcels and coastal marine tenure, and validate existing data.
Customer Service Officers	➢ Attend workshop training on use of system & new processes to archive coastal tenure data ➢ Document requirements in clear and detailed formats for future reference of existing officers ➢ Communicate feedback to the project team.
Thrimble System Expert	➢ Design the overall system changes to support coastal land tenure ➢ Develop and maintain technical standards ➢ Address technical issues and challenges.
IT Support Team Manager	➢ Provide technical support for software and hardware, ensure data security, and maintain the project's IT infrastructure.
Procurement Officer	➢ Manage the procurement process, liaise with suppliers, and ensure timely delivery of goods and services.
QA Team	➢ Implement quality control measures, conduct inspections, and ensure all project deliverables meet specified standards.

4.10.2 Risks and Constraints

The procurement plan for updating a geo-spatial database of land parcels data with coastal marine tenure involves several risks and constraints. Data accuracy and integrity are vital, as any discrepancies can lead to significant legal and environmental implications. Technological constraints include ensuring compatibility between existing systems and new software or hardware, which may require substantial investment and training by the MRPM. Regulatory compliance is another critical factor, as the project must adhere to local, national, and international laws governing land and marine data. Stakeholder engagement poses a risk, as the project requires collaboration between various governmental and non-governmental entities, each with their own interests and priorities. Environmental factors, such as changing coastal conditions and climate impacts, can affect data collection and accuracy. Additionally, budgetary constraints may limit the scope of the project, necessitating careful financial planning and resource allocation. Finally, timeline pressures can lead to rushed procurement processes, increasing the risk of selecting suboptimal vendors or solutions.

4.11 Stakeholder Management

4.11.1 Stakeholder Management Plan

This process involves recognizing all parties affected by or interested in the project, including government agencies, local authorities, NGOs, private sector partners, community members, and academic institutions. The following stakeholders have been identified:

- Government Agencies: Land and marine regulatory bodies, environmental protection agencies.
- Local Authorities: Municipalities and local councils.
- Non-Governmental Organizations (NGOs): Environmental and community advocacy groups.
- Private Sector: Technology vendors, data analytics firms, and consultants.
- Community Members: Residents, landowners, and coastal users.
- Academic Institutions: University of Belize and research organizations specializing in geospatial data and marine studies.

4.11.2 Stakeholder Analysis

Interest and Influence: Assessing each stakeholder's level of interest and influence on the project is determined by levels. Figure 18 provides the Power Interest Table for each resource.

- **High Influence, High Interest**: Government agencies, local authorities.
- **High Influence, Low Interest**: Private sector vendors.
- **Low Influence, High Interest**: Community members, NGOs.

- **Low Influence, Low Interest**: Academic institutions (depending on their involvement).

Chart 26 Power Interest Matrix

Stakeholder Group	Power	Interest	Engagement Strategy
Government Agencies	High	High	Regular briefings, compliance updates, collaborative workshops
Local Authorities	High	High	Monthly meetings, progress reports, public consultations
NGOs	Low	High	Stakeholder forums, feedback sessions, partnership agreements
Private Sector	High	Low	Contract negotiations, performance reviews, technical support sessions
Community Members	Low	High	Public meetings, surveys, informational campaigns
Academic Institutions	Low	Low	Research collaborations, data sharing agreements, academic conferences

4.11.3 Engagement Strategies

- **Government Agencies**: Regular briefings, compliance updates, and collaborative workshops.
- **Local Authorities**: Monthly meetings, progress reports, and public consultations.
- **NGOs**: Stakeholder forums, feedback sessions, and partnership agreements.
- **Private Sector**: Contract negotiations, performance reviews, and technical support sessions.
- **Community Members**: Public meetings, surveys, and informational campaigns.
- **Academic Institutions**: Research collaborations, data sharing agreements, and academic conferences.

4.11.4 Communication Plan

- **Frequency**: Define how often each stakeholder group will be communicated with (e.g., weekly, monthly, quarterly).
- **Methods**: Use a mix of communication methods such as emails, newsletters, face-to-face meetings, and online platforms.
- **Content**: Tailor the content to the stakeholder's interests and influence, ensuring transparency and clarity.

4.11.5 Feedback Mechanisms

.In addition focusing on Workshops and Focus Group which engages with government agencies and local authorities for in-depth discussions. As any stress-induced environment and project execution, the reduction of any conflict will follow a Conflict Resolution plan by reviewing and udnerstanding the following plans:

- Mediation and Negotiation: Establish a process for resolving conflicts between stakeholders.
- Clear Escalation Pathways: Define how issues will be escalated and addressed within the project team.

Monitoring and Reporting will undergo regular updates and provide stakeholders with regular updates on project progress and any changes. Project team members will be reviewed through existing performance Metrics: Use key performance indicators (KPIs) to measure stakeholder engagement effectiveness. Given the project methodology the team will be open to adjustments and be prepared to adjust the stakeholder management plan based on feedback and changing project dynamics.

5. CONCLUSIONS

The accumulated Project Management Plans within the PMBOK framework, has adequately prepared the project team to assess and develop robust frameworks that will not only assist in the execution of the Geo-Spatial database update at MNRPM, but it has also laid the foundation planning method for

I. The successful integration of the Updated Geo-Spatial Database Of Land Parcels With Coastal Marine Tenure Data in Belize marks a significant milestone within the project. The enhancement not only improves the accuracy and comprehensiveness of the MNRPM's spatial data but also provides a robust foundation for future land and marine management initiatives. The meticulous planning, coordination, and execution of this integration ensures that all data is seamlessly aligned and accessible, thereby facilitating better decision-making and resource management. Moving forward, the updated database will serve as a critical tool for stakeholders, enabling more informed and sustainable management of coastal and marine environments. This project exemplifies the MNRPM's commitment to leveraging advanced technologies to enhance data integrity and support environmental stewardship.

II. The scope management plan for updating the geo-spatial database of land parcels with coastal marine tenure data has been meticulously crafted to ensure the project's objectives are clearly defined and achievable. By establishing precise scope boundaries and implementing rigorous change control processes, the team effectively manages scope creep and maintains project focus. This plan has facilitated clear communication among

stakeholders, ensuring that all requirements are understood and met. The successful execution of this scope management plan underscores the MNRPM's commitment to delivering high-quality, accurate, and comprehensive spatial data. The updated database will significantly enhance MNRPM's ability to manage and protect coastal and marine resources, reflecting Belize's dedication to sustainable environmental management and technological distinction.

III. The schedule management plan for this project has been meticulously designed to ensure timely and efficient project completion. By establishing clear timelines, milestones, and deliverables, the project creates a structured framework that facilitates effective time management and resource allocation. The implementation of strong monitoring and control mechanisms enabled the proper tracking of progress accurately and address any deviations promptly. This plan ensures that all project activities are aligned with the overall timeline, minimizing delays and optimizes productivity. The adherence to this schedule management plan is crucial in maintaining project momentum and achieving objectives within the stipulated timeframe. The schedule management plan exemplifies commitment and dedication to delivering high-quality, timely results.

IV. The cost management plan for the integration of coastal marine tenure digitally within the existing database establishes a comprehensive budget, detailed cost estimates, and vital financial controls, thr framework supports effective cost management throughout the project lifecycle. The implementation of continuous monitoring and variance analysis enables the MNRPM to identify and address any financial discrepancies promptly, ensuring that the project remains within budget. This plan facilitates transparent

communication regarding financial status among stakeholders, fostering trust and collaboration. Adherence to this cost management plan will be crucial in maintaining financial discipline and achieving project objectives within the allocated budget. This project exemplifies MNRPM's commitment to fiscal responsibility to the public sector and, holistically, the people of Belize.

V. Quality management plan is produced to ensure the highest standards of data accuracy and integrity. By defining clear quality objectives, criteria, and control measures that supports continuous quality assurance throughout the project lifecycle the Public Sector and MNRPM will ensure quality output to the public. The implementation of systematic quality audits and reviews enables the team to identify and rectify any discrepancies promptly, ensuring that all deliverables meet or exceed stakeholder expectations. This plan facilitates a culture of quality awareness and accountability among the project team, fostering a commitment to transparency and responsiveness. Adherence to this quality management plan will be crucial in maintaining the reliability and usability of the updated database. The plan will allow for the dissimentation of dependable spatial data of coastal tenure in Belize.

VI. The resource management plan for the integration of coastal marine tenure data into the existing geo-spatial database of land parcels has been designed to ensure optimal utilization of both human and material resources. By identifying and allocating the necessary resources efficiently, the team establishes a framework that supports the successful execution of project tasks. This plan facilitates effective communication and coordination among team members, fostering a collaborative and productive work environment.

VII. The communication management plan developed ensures clear and consistent communication among all stakeholders in varying level of power/interest. By establishing defined communication channels, protocols, and schedules, the framework supports timely and accurate information exchange throughout the project lifecycle. The implementation of regular status updates, meetings, and feedback mechanisms has enabled us to address any issues promptly and keep all parties informed of project progress. This plan facilitates transparency and collaboration, fostering a shared understanding of project goals and expectation.

VIII. The risk management identifies, assesses, and mitigates potential risks throughout the project lifecycle. By establishing a comprehensive risk register and implementing proactive risk response strategies, this plan supports the early detection and effective management of risks. The continuous monitoring and review of risk factors have enables the team to respond to changing circumstances and minimize the impact of unforeseen events. This plan ensures that all potential risks are addressed promptly and efficiently.

IX. The procurement management plan for the integration of coastal marine tenure data into the existing geo-spatial database of land parcels has been meticulously developed to ensure the efficient and effective acquisition of necessary goods and services. By establishing clear procurement processes, criteria, and timelines, supports transparent and competitive procurement practices. The implementation of rigorous vendor selection and contract management procedures has enabled us to secure high-quality resources while maintaining cost-effectiveness. This plan has facilitated strong relationships with suppliers and ensures that all procurement activities align with project objectives and timelines. Th

X. Stakeholder management plan for the integration of coastal marine tenure data into the existing geo-spatial database ensures effective engagement and collaboration with all stakeholders. By identifying key stakeholders and their interests, it establishes a framework that supports transparent and proactive communication. The implementation of regular updates, feedback mechanisms, and stakeholder meetings esnables prompt response for concerns and incorporate valuable input throughout the project lifecycle. This plan has facilitated a strong partnership with stakeholders, fostering trust and mutual understanding.

6. RECOMMENDATIONS

During the development of the project management plans, it seems optimal for The Ministry of Natural Resources Petroleum and Mining in Belize to account for a defined Quality Assurance Team with specific principles in the planning,testing, and the execution process of a project. Specifically for the Public Sector in a general concept. A governmental quality assurance team is important for Belize to ensure high standards by maintaining a vigorous public service delivery, ensuring that services provided to citizens are efficient, effective and established with quality standards. A change such as the updating of a database used daily by Land Officers, to serve the public on a daily basis, should not be able to launch without proper testing and training. During the discussion process for the development of the Final Graduation Project, it became abdundantly clear the Ministry would require a specific sequence of project activities that are transparent, measurable and compliance oriented. As such, the development of project template were sparse and widely unaccounted for, requiring a lot of development and a more structured approach.

A second recommendation is the outsourcing of project managers from an external or private provider to adequately manage and establish a project of such magnitude with complete transparency. Upon revision of the Landfolio provider, Trimble, their experience in introducing the system was an upheaval and proved to be a difficult transition. Regardless of the size of the project, politics will have an impact. This could be a result of legislative changes, elections, intragovernmental rivalries or other related issues. Whilst difficult to predict and/ or identify, they should be included in the project risk profile.

7. VALIDATION OF THE FGP IN THE FIELD OF REGENERATIVE AND SUSTAINABLE DEVELOPMENT

There is currently no digitized data for Belize Coastal Marine Tenure available in the landfolio system. By digitizing and archiving coastal tenure data in the Landfolio System, there is a planned increase in efficiency and sustainability that assists with improving polices and plans for coastal marine tenure. By creating a virtual database of Coastal Marine tenure, the government of Belize is able to monitor the procurement of maritime land, piers, development of infrastructure in protected coastal areas that will enable the push of sustainable development. Effective coastal management not only helps in maintaining the natural landscape but also ensures sustainable development along coastlines, balancing ecological preservation with human needs. All parcels of land that are idenfified to have a lease owner but lease is expired, renewal of leases will not be grant only if land is not developed; these parcels will be kept for reservation.By holding coastal tenure data within the Landfolio system, the MNRPM is able to seek the balance for ecological preservation with human activities, ensuring that coastal and marine resources are used wisely to benefit present and future generations. Enforcing the coastal marine tenure database will allow for proper records management and policy improvement for the procurement of these areas that may be considered under preservation.

Annex 1: FGP CHARTER

CHARTER OF THE PROPOSED

FINAL GRADUATION PROJECT (FGP)

1. Student name

Urania Garcia

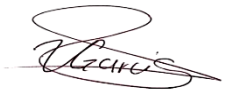
2. FGP name

Create a project management plan to produce an updated geo-spatial database of land parcels data of the coast and cayes in Belize to improve the land information management system.

3. Application Area (Sector or activity)

Government of Belize: Lands and Surveys Department, Land Registry Department and Archives Department

4. Student signature



5. Name of the Graduation Seminar facilitator

Professor Paula Villalta

6. Signature of the facilitator

7. Date of charter approval

8. Project start and finish date

1/10/2024	30/05/2025

9. Research question

What plans are needed to develop & digitized existing coastal marine tenure that accounts for parcels data of the coast and cayes in Belize within the Landfolio system in the most effective manner?

10. Research hypothesis

Will developing a geo-spatial database of land parcels with tenure data of the coast and cayes in Belize assist with better management, polices and plans for Coastal Marine Tenure?

11. General objective

To develop a comprehensive Project Management Plan to update the geo-spatial database of land parcels with tenure data of the coast and cayes in Belize by 2025.

12. Specific objectives

Specific objectives

I. To develop the integration management plan to outline and summarize project requirements existing mangrove cover that is,

II. To create a scope management plan to define all the project work required.

III. To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.

IV. To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.

V. To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.

VI. To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.

VII. To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among

various sections in the Lands and Surveys Department, Land Registry Department and Archives Department to conduct research purposes.

VIII. To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.

IX. To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.

X. To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies.

13. FGP purpose or justification

I. This project, with an urgent need, aims to create a project management plan to develop an updated geo-spatial database of land parcels with tenure data for Belize's coastal and Cayes regions. The primary motivation behind this research stems from the pressing need for digitized data within the Landfolio system for the Belize Coastal Marine Tenure. This gap in the system hampers efficient land management, policy formulation, and sustainable development planning for coastal areas.

II. The project will also identify and map areas covered by mangroves, a vital ecosystem for coastal protection and carbon sequestration. The updated and

digitized data will provide a comprehensive and reliable land information management system that facilitates better management of coastal and marine resources, ensuring their sustainable use for current and future generations.

III. This project addresses this critical issue by analyzing, compiling, and digitizing the existing physical tenure data for these coastal and Cayes regions. Doing so will enhance the accessibility and accuracy of land information, which is essential for informed decision-making and policy development. Digitizing this data will contribute to developing and protecting Belize's coastal marine infrastructure. For instance, the project will support the Blue Carbon Initiatives by providing accurate data on carbon-storing ecosystems like mangroves, which are crucial for carbon accounting and climate change mitigation. It will also aid in meeting the targets set by Belize's Nationally Determined Contributions (NDCs) by ensuring that land use planning aligns with climate resilience goals.

14. Work Breakdown Structure (WBS). In table form, describing the main deliverable as well as secondary, products or services to be created by the FGP.

I. Graduation Seminar (July 2nd, 2024)

i. Tutoring/ FGP Theory

I. Introduction

II. Theoretical framework

III. Methodological framework

IV. Preliminary bibliographical research

V. Annexes (FGP schedule, FGP WBS, FGP Charter)

II. Assignments

i. FGP Charter (1-10)

ii. FGP Charter &WBS (11-12)

iii. FGP Charter Item

iv. Methodological framework-Appendix 1 & FGP Charter item 21

v. Adjustments to previous charters

vi. Charter development results

vii. Conclusion

viii. Recommendations

III. Deliverables Submitted

i. Integration Management Plan

ii. Scope Management Plan

iii. Schedule Management Plan

iv. Cost Management Plan

v. Quality Management Plan

vi. Risk Management Plan

vii. Communication Management Plan

viii. Resource Management Plan

ix. Procurement Plan

x. Stakeholder Management Plan

IV. Research on existing geo-spatial database

V. Communication with Project Sponsor & Stakeholders

i. Gather information on Belize Marin Coastal Land Tenure.

ii. Development of project objectives based on the data gathered.

iii. Requested research on Belize Marin Coastal Land Tenure undertaken to present day.

VI. Additional Research

i. Creation of bibliography relevant to thesis subjects

ii. Additional Bibliography research

VII. Editing Process

i. Reading by Reviewers

ii. Reviewers' assignment request

iii. Assignment of two reviewers

iv. Reviewer feedback

v. FGP submission to reviewers

vi. Reviewers work

vii. Reviewer 1 FGP reading.

viii. FGP Reader 1 Report

ix. Review 2 FGP Reading

x. FGP Reader 2 Report

xi. Adjustments

I. Presentation to Boards of Examiners

i. Final Review by Board

ii. FGP Grade Report

15. FGP budget

The budget will integrate costs for Software License Access, Report and Field Work, Data Analysis Report, Survey Fees & allowances for technicians as follows:

I. Equipment for research purposes:

1. 1 Assigned UPS: $750.00
2. 1 Assigned Printer - HP Color Laser Jet Enterprise Flow, MFP 6800 $19,100.00
3. 1 Scanner - Fujitsu ScanSnap iX1600 (Scanner) $1,500.00
4. 1 Trimble TDC100 handheld Data Collector $2,250.00
5. Researcher Software License (Trimble): $4,500
6. GIS Supervisor & technician Monthly allowance: $700

II. Staffing & Field Work Initiatives:

Two (2) researchers will be hired by the MNRPM to work for this project. The researchers are to conduct tenure research and tabulate information for all cadastral parcels related to this project. It is expected that all project staff will be paid monthly allowances by the project for the execution of the additional duties.

1. 1 Project Manager at $800.00 stipend for a six months duration
2. 2 GIS Supervisor at $600.00 stipend for a six months period
3. 2 GIS/LIT Technician at $500.00 stipend for a six months period

The total cost is equating to approximately $30,700

16. FGP planning and development assumptions

II. It is assumed that the MNRPM recognize and archive physical documents of Coastal area tenure in an organized portfolio

III. It is assumed that funding will be made available for the updating of the Trimble Lanfolio Development & Upgrades to support coastal marine tenure data

IV. It is assumed resources are vailable to assist in digitizng the physical documents of land tenure

V. It is assumed the researcher time for the FGP will be at least 15 hours per week during the FGP development process and will be available during the states time periods

VI. It is assumed access to the Landfolio database is accessible at any point in time for research purposes thorughout the duration of the project.

17. FGP constraints

I. Time manaement constraint as the maximuma mount of time to finalize the FGP is 13 weeks.

II. Budget may be increased depending on the field works extension to caye aras and the related costs to travel to those areas within the project.

III. Human Resources minimal knowledge, experience and training may hindrance to collecting data.

IV. Existing physical data may be inaccurate or unreliable for the completion of the FGP content.

V. Software development from Trimble may extend for a longer period of time, depending on requirements alotted for server to support more digitized files.

18. FGP development risks

I. A strong hurricane season might delay the work tours and the data collection in the field, which might delay the deliverable development.

II. Scope of project pertains to coastal-marine areas with existing mangrove cover that is, 10 km area of the interest on mainland and all cayes for the Corozal and Belize District only.

III. Project only pertains to work within the Land Registry Department and not to the agricultural sector.

IV. Scanning and digitization plan will only be created for parcels requested as of 2020 and not prior to that.

19. FGP main milestones

Deliverable	Finish estimated date
1.1 FGP profile approval	July 8th, 2023
1.2 FGP: Project Plan development	July 9th, 2024
1. Integration Management Plan	July 15th, 2024
2. Scope Management Plan	July 15th, 2024
3. Schedule Management Plan	July 29th, 2024
4. Cost Management Plan	August 5th, 2024
5. Quality Management Plan	August 6th, 2024
6. Risk Management Plan	August 6th, 2024
7. Communication Management Plan	August 12th, 2024
8. Resource Management Plan	August 12th, 2024
9. Procurement Plan	August 13th, 2024
10. Stakeholder Management Plan	August 13th, 2024
1.3 FGP Preliminary Review	August 19th, 2024
1.4 Preliminary Scope Development	August 19th, 2024
1.5 Readers review	September 3rd, 2024
1.5.1 Revision 1	September 10th, 2024

1.5.1 Revision 2	September 17th, 2024
1.5.1 Revision 3	September 23rd, 2024
1.6 Board of examiners evaluation	September 30th, 2024

19.1 Estate of the "matter"

The Department of Land and Survey is subdivided into five sections, namely, National estate, Survey and Mapping, Physical Planning, Valuation, and the Land Information Center (LIC). These sections collectively have the prime responsibility of overseeing all aspects of land tenure in Belize to ensure compliance with the standards provided in accordance with relevant Belize Acts and Regulations.

In June 1992, the Land Information Centre (LIC) was established to serve as the databank for land information in Belize and to provide policy and decision makers in government and other agencies with standardized-up-to-date information. The LIC had/has three sections:

1. The Geographic Information System (GIS), which handles information on land resources, land use/cover and environment as an aid to planning, management and monitoring activities.
2. The Land Information System (LIS), which is still under construction, when completed, will handle land records and cadastral data. This will in effect computerize many of the activities of the Lands and Survey Department.

Suffice to mention that, at present, there is no single directory or index of all properties in Belize.

3. The Conservation and Environmental Data System (CEDS) is still in its infancy but when completed will formalize and coordinate environmental data gathering in Belize. The CEDS will form a network of data gathering groups and ensure open data exchange between them.
4. In 1993, the Physical Planning Section was established to facilitate the following: urban and rural planning, land subdivision, licensing (piers, land reclamation and creation, alien landholding) and land use zoning. The role of the Section has also witnessed some changes, one of which is the new responsibility for the production of a comprehensive national land use plan.

Belize today is characterized by a variety of landholdings with ownership (tenure) vested through both private freehold and leasehold titles in both urban and rural areas. In addition, National Estate lands are available for leases or currently in lease application process to a total of 8% of all rural lands available.1 It has been estimated that at any given time, about 1% of available (national) land parcels in Belize are in the process of leasehold and that occupants claiming tenure through approved leases for which no Certificate of Leasehold title has been issued account for about 50% of land titles under adjudication.

It is worth noting that the current land recording systems do not offer easy ways to examine land records. In many instances, individuals have to visit the Archives in Belmopan to determine land ownership dating far back in time. Beside the matter, there is no true compliance to acknowledging piers located on the coast of Belize and the rightful ownership of such tenures. As a result, this project aims to develop a strategy to update the geo-spatial database of land parcels with tenure data of the coast and cayes in Belize.

19.2 Basic conceptual framework

Sustainable Development, Geographic Information Systems, Land Information System, Laws of Belize, Land Management and Administration, Land Acquisition

20. Methodological framework

Objective	**Name of deliverable**	**Information sources**	**Research method**	**Tools**	**Restrictions**
To develop the integration management plan to outline and summarize project	**Integration Management Plan**	Discussion with heads of departments	Quantitative, Revision of the	Land's DataBase	Limited to sector (location)

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
requirementsxisting mangrove cover that is,		belonging to the ministry of natural resources, mining, & petroleum	geospatial database existing data.		data availability
To create a scope management plan to define all the project work required.	**Scope Management Plan**	Discussion with stakeholders involved in existing related projects	Qualitative, Interviews	Research documents, existing reports	Access & monitoring of these reports.
To create a schedule management plan that will define the process for creating and effectively manage the anticipated launch.	**Gantt Chart, Schedule, WBS**	Discussion with key stakeholders	Quantitative to calculate timelines.	Microsoft Project	Expertise in using MS Project
To develop a cost management plan that focuses on the key processes necessary for establishing a project budget within the Department.	**Budget, Cost Management Plan**	PMBOK Guide	Quantitative to collect and calculate software acquisition	Templates	Restricted access to branch databases

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
To develop a quality management plan that defines the project's quality policies, procedures, and requirements to effectively manage project and product quality from planning to final delivery.	**Quality Management Plan**	Land's work instructions for inputting land data	Review with a Quality Assurance Department	Land registry Database	Restricted Access
To create a resource management plan to identify, acquire, and manage all resources needed to successfully complete the project.	**Resource Management Plan, Cost Estimate Report**	PMBOK Guide	Interview existing staff and their training	Previous and current project documents	Access & time to interview required staff
To create a communications management plan that details the communication needs and expectations for the project with timely and effective communication strategies to disseminate key information among various sections in the Lands and Surveys Department,	**Communications Management Plan**	PMBOK Guide, Online Templates	Quantitative	Previous and current project documents	Access & time to interview required staff

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
Land Registry Department and Archives Department to conduct research purposes..					
To develop a risk management plan that outlines the project risk management approach from identifying to categorizing and effectively responding to project risks.	**Risk Management Plan**	Reports in archives	Qualitative – physical report revision	Libraries	Access permissions
To develop a procurement plan that identifies the external and internal consultants required for the execution of the project.	**Procurement Plan**	PMBOK Guide	Qualitative – reviewing online articles	Templates	Access & time to interview required staff
To create a stakeholder engagement plan that ensures the proper identification and categorization of stakeholders across all departments with appropriate engagement strategies	**Stakeholder Engagement Plan**	PMBOK Guide	Qualitative – reading related project requirements	Templates	Access & time to interview required staff

21. Validation of the work in the field of the regenerative and sustainable development.

There is currently no project management plan for the Belize Coastal Marine Tenure that provides increased efficiency and sustainability that assists with improving polices and plans for Coastal Marin Tenure. By creating a virtual database of Coastal Marine tenure, the government of Belize is able to monitor the procurement of maritime land, piers, development of infrastructure in protected coastal areas.

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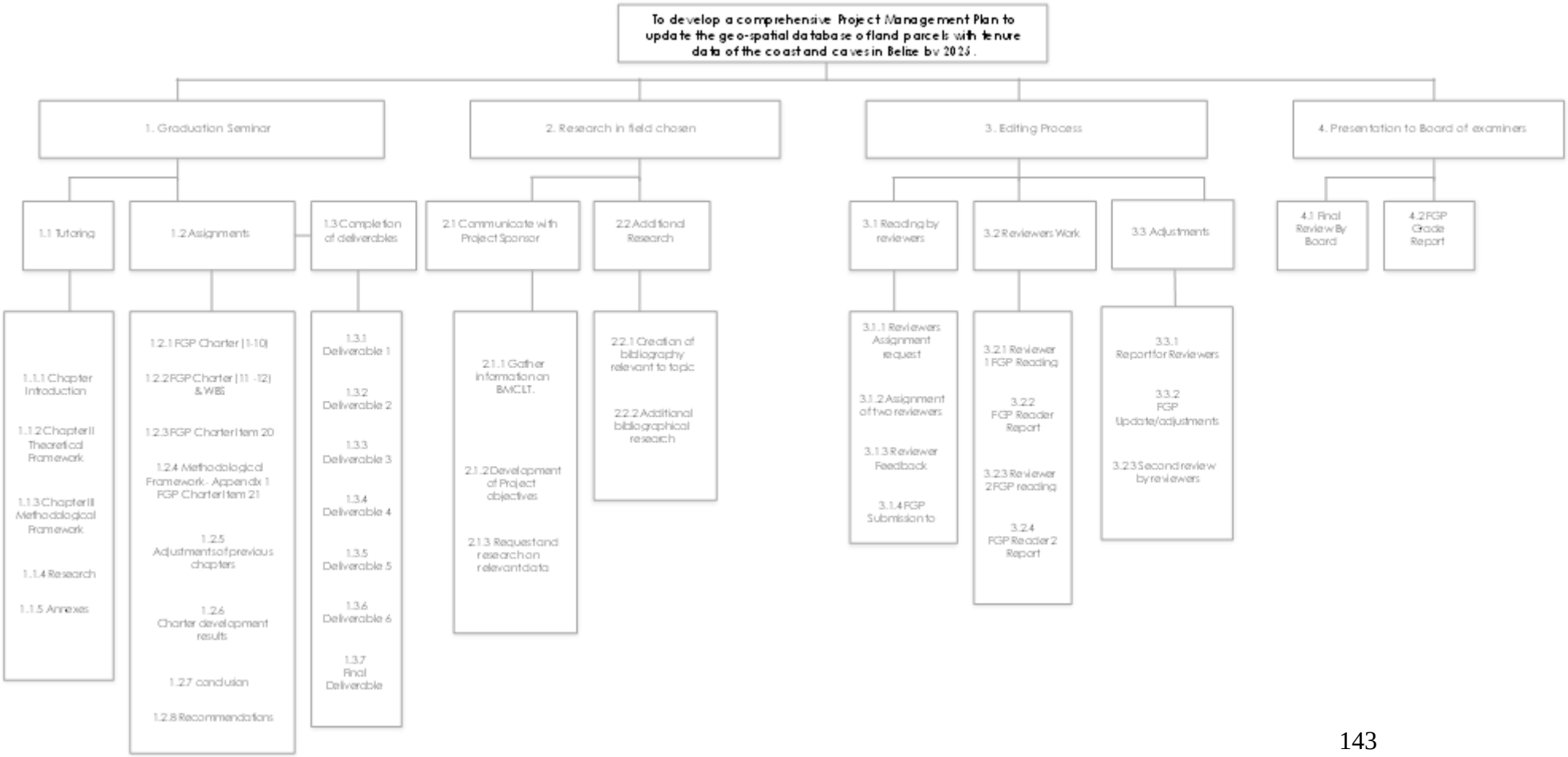
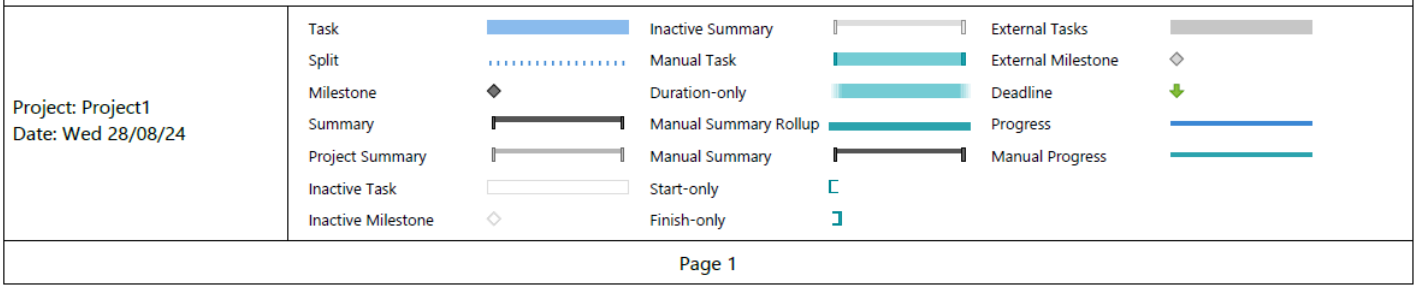
Appendix 1: Work Breakdown Structure



Appendix 2: FGP Schedule & Gantt

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		1.1 FGP profile approval	35 days	Wed 28/08/24	Tue 15/10/24		
2		**1.2 FGP: Project Plan development**	60 days	Wed 28/08/24	Tue 19/11/24		
3		Integration Management Plan	10 days	Wed 28/08/24	Tue 10/09/24		Urania Garcia
4		Scope Management Plan	10 days	Wed 11/09/24	Tue 24/09/24	3	Urania Garcia
5		Schedule Management Plan	5 days	Wed 25/09/24	Tue 01/10/24	4	Urania Garcia
6		Cost Management Plan	5 days	Wed 02/10/24	Tue 08/10/24	5	Urania Garcia
7		Quality Management Plan	5 days	Wed 09/10/24	Tue 15/10/24	6	Urania Garcia
8		Risk Management Plan	5 days	Wed 16/10/24	Tue 22/10/24	7	Urania Garcia
9		Communication Management Plan	5 days	Wed 23/10/24	Tue 29/10/24	8	Urania Garcia
10		Resource Management Plan	5 days	Wed 30/10/24	Tue 05/11/24	9	Urania Garcia
11		Procurement Plan	5 days	Wed 06/11/24	Tue 12/11/24	10	Urania Garcia
12		Stakeholder Management Plan	5 days	Wed 13/11/24	Tue 19/11/24	11	Urania Garcia
13		1.3 FGP Preliminary Review	5 days	Wed 20/11/24	Tue 26/11/24	12	Urania Garcia
14		1.4 Preliminary FGP Development & Review	7 days?	Wed 20/11/24	Thu 28/11/24	12	Urania Garcia
15		**Readers review**	**36 days**	**Fri 29/11/24**	**Fri 17/01/25**		
16		1.5.1 Revision 1	7 days	Fri 29/11/24	Mon 09/12/24	14	Tutors
17		Adjustments	5 days	Tue 10/12/24	Mon 16/12/24	16	Urania Garcia
18		1.5.1 Revision 2	7 days	Tue 17/12/24	Wed 25/12/24	17	Tutors
19		Adjustments	5 days	Thu 26/12/24	Wed 01/01/25	18	Urania Garcia
20		1.5.1 Revision 3	7 days	Thu 02/01/25	Fri 10/01/25	19	Tutors
21		Urania garcia	5 days	Mon 13/01/25	Fri 17/01/25	20	Urania Grcia
22		**1.6 Board of examiners evaluation**	7 days	Mon 20/01/25	Tue 28/01/25	21	



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Appendix 3: Certificate Review

Ms. Jenny J. Chan; B.Ed

Chan Pine Ridge Village, Orange Walk District, Belize. Ph. No. 610-5431. ch4nj3nny@gmail.com

Academic Tutor
Master's Degree in Project Management
Universidad para la Cooperacion Internacional
C. 35, Barrio Escalante
San Jose 10101
Costa Rica

November 20th, 2024

Dear Academic Advisor:

Re: Thorough Review and Proofreading of Final Graduation Project submitted by Urania Garcia in partial fulfillment of requirements for a Master's Degree in Project Management. (MPM)

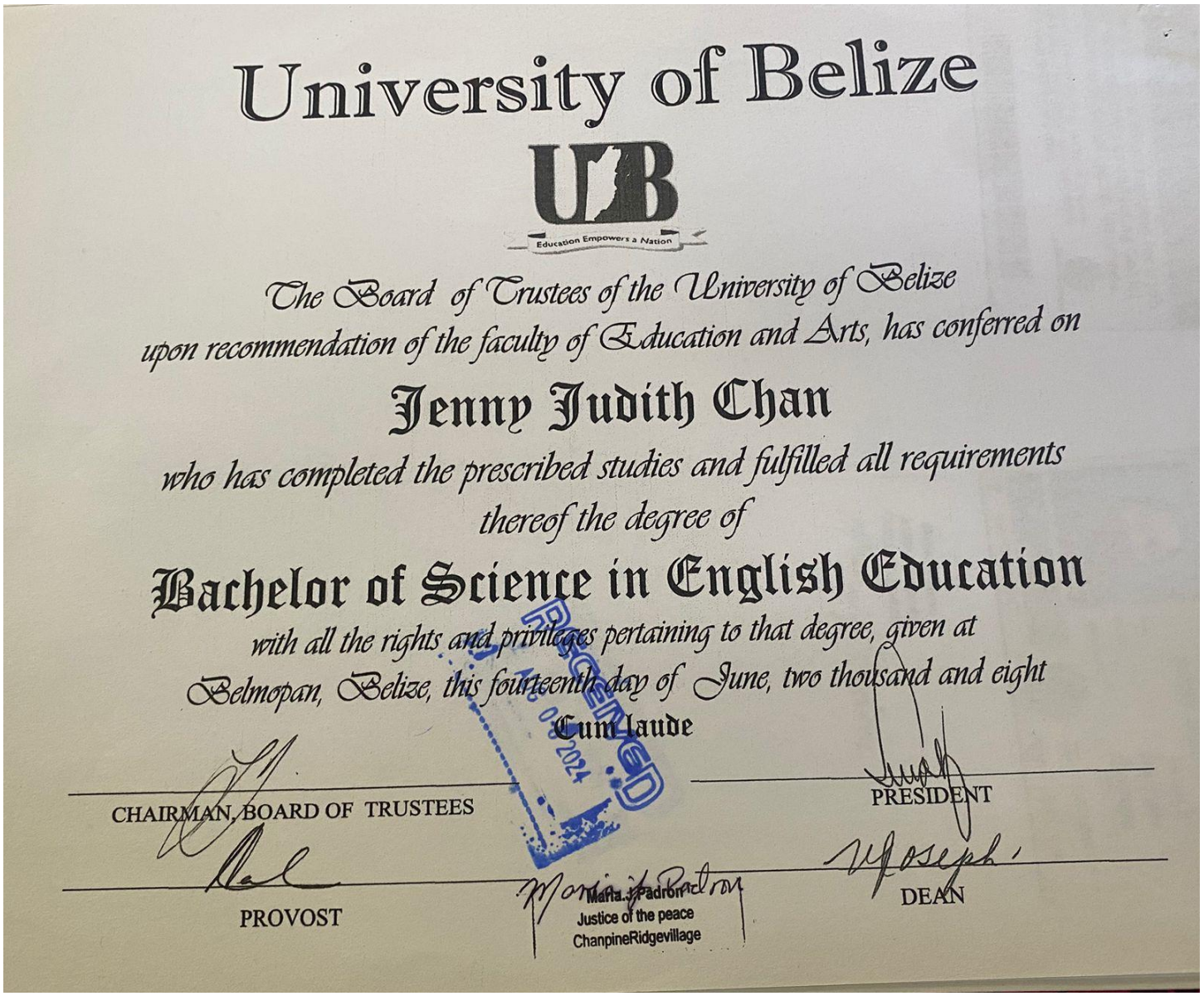
I hereby approve and confirm that Urania Garcia has made all corrections to the final graduation project document. The final graduation project document meets the required literary and linguistic standards. The content has been thoroughly reviewed for clarity, coherence, and adherence to academic conventions, ensuring it reflects the quality and rigor expected of a student at a Master's Degree Level.

Sincerely,

Ms. Jenny Judith Chan; B. Ed.

(English and Literature Teacher

Appendix 4: Linguistic Credentials



University of Belize

UB

Education Empowers a Nation

The Board of Trustees of the University of Belize
upon recommendation of the faculty of Education and Arts, has conferred on

Jenny Judith Chan

who has completed the prescribed studies and fulfilled all requirements
thereof the degree of

Bachelor of Science in English Education

with all the rights and privileges pertaining to that degree, given at
Belmopan, Belize, this fourteenth day of June, two thousand and eight

Cum laude

CHAIRMAN, BOARD OF TRUSTEES

PRESIDENT

PROVOST

DEAN

RECEIVED 16 08 2024

Maria Padron
Justice of the peace
ChanpineRidgevillage