

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR THE CONSTRUCTION OF NEW
RESIDENTIAL BUILDING AT PARCEL 1757 CELESTE GARDENS, LADYVILLE,
BELIZE

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DEDICATION

I dedicate this project in the loving memory of my dear mother, Mercedes Torres, who resides in heaven and whose unwavering love and guidance have been the cornerstone of my journey. Her spirit continues to be my guiding light, even though she is no longer with us. Her sacrifice and unending support have brought me to this moment. I am eternally grateful to my beloved wife, whose unwavering support has sustained me through this academic endeavor. Your belief in me has been my anchor, even during the most challenging times. This project is as much yours as it is mine, and I dedicate it to our continuing partnership and love. To my precious daughters Aaliyah and Amiyah, you have witnessed firsthand the pursuit of knowledge and the power of dedication. My journey has inspired you to reach for the stars and pursue your dreams. May this project serve as a testament to the love and commitment we share as a family and as a source of inspiration for the bright future ahead for both of you. To my family and friends who stood by my side with unwavering support and encouragement, I also dedicate this project to you. Your faith in my abilities strengthened me, and I cherish our bond. Your presence in my life has been instrumental in my success, and I thank you from the bottom of my heart.

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To all those who have been a part of this journey, thank you for your invaluable support and contributions that have shaped the culmination of my academic efforts.

ABSTRACT

The primary objective of this document is to develop a Project Management Plan for the construction of a sustainable residential building, addressing housing needs, environmental impact reduction, and energy efficient promotion through a hybrid approach. To achieve this objective, we will utilize the expertise of the ten knowledge areas, encompassing scope, schedule, cost, quality, resources, communications, stakeholder, procurement, risk, integration, and sustainable management plans. The project management methods will utilize quantitative, qualitative, and mixed research approaches guided by the principles and best practices of the project management institute (PMI).

This research endeavor represents a significant step towards creating efficient, sustainable residential structures that align with contemporary housing requirements while reducing their ecological footprint and enhancing energy efficiency. It underscores the integration of diverse knowledge areas and research methodologies to achieve the overarching goal of sustainable residential construction, thereby contributing to a more environmentally conscious and energy-efficient future.

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INDEX OF ABBREVIATIONS AND ACRONYMS

FGP	Final Graduation Project
HVAC	Heating Ventilation and Air Conditioning
KPI'S	Key Performance Indicators
MOA'S	Memoranda of Agreements
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
RACI	Responsible, Accountable, Consulted, and Informed Matrix
RBS	Risk Breakdown Structure
SDG'S	Sustainable Development Goals
SLA'S	Service Level Agreements
SV	Schedule Variance
VOC	Volatile Organic Compounds
WBS	Work Breakdown Structure
WBS Dictionary	Work Breakdown Structure Dictionary

EXECUTIVE SUMMARY

Project management is the cornerstone of successful project execution. Organizations had to adapt and refine their project management practices in an increasingly complex and dynamic business environment, ensuring successful project outcomes. GTS Engineering recognized the need for an in-depth exploration of their project management. The primary problem addressed was the inconsistent application of the project management principles across the organization's projects. This inconsistency often resulted in scope creep, schedule delays, budget overruns, quality issues, and suboptimal stakeholder management, impacting the project's success. GTS Engineering took an interest in developing a project management plan for constructing a new residential building, which would take a hybrid approach rather than the traditional one often used for construction projects.

The project's primary purpose was to create a project management plan tailored for the construction of a residential building using a hybrid approach that integrated the best practices from traditional methodologies with innovation techniques and principles. This approach was the cornerstone of efficient, sustainable, and environmentally responsible residential construction within Celeste Garden.

The project's general objective was to develop a comprehensive Project Management Plan for the construction of a residential building within Celeste Garden, Ladyville, Belize. The plan encompassed a range of specific objectives, each ensuring project success and aligning with sustainability goals. These specific objectives included developing a scope management plan that efficiently delineated all project tasks required and only the project task essential for project success; creating the schedule management plan to effectively allocate resources establish clear project timeline and ensure timely task completion though the project lifecycle; developing the cost management plan to systematically plan, monitor, and control project costs to ensure the project's completion within the approved budget; developing a quality management plan to define, implement, and maintain a comprehensive quality assurance and control framework; developing a resource management plan to efficiently and effectively plan allocate, monitor, and optimize project resources; developing a communication management plan to established structured and efficient framework for planning, execution, and monitoring project communication to ensure timely, relevant, and accurate information flow among project stakeholders; developing the stakeholder management plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions; developing a procurement management plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goals of obtaining the necessary goods and services; developing a risk management plan to identify, assess, mitigate, and monitor project risks, minimizing the likelihood and impact of adverse events and maximizing opportunities; developing an integration management plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the projects overall objectives; and developing a sustainable management plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic environmental and social sustainability.

The methodology employed for the research and development of the project management plan followed a comprehensive approach, drawing upon various valuable

sources of information and techniques. The foundation of this methodology was rooted in the Project Management Body of Knowledge (PMBOK) Guide 6th Edition (2017), which provided a robust framework for project management best practices. Additionally, we leveraged project documents from past and similar projects undertaken by GTS Engineering to extract relevant insights and lessons learned and thoroughly reviewed lecture notes, conference papers, and peer-reviewed journals to gather theoretical and practical knowledge from academic and industry perspectives. Historical data from past projects was instrumental in identifying trends and patterns that informed decision-making. A mixed-method approach, combining qualitative and quantitative analysis, was employed to ensure a well-rounded understanding of project dynamics. Expert judgment played a critical role in assessing and validating project management practices. Data analysis tools were employed to process and interpret data effectively. Meeting templates facilitated communication and collaboration among project stakeholders. This methodological blend provided a comprehensive, evidence-based foundation for developing the Project Management Plan, incorporating the best practices and lessons learned from past experiences to ensure the successful execution of the residential building project in Celeste Gardens.

The conclusions drawn from the plan highlighted the critical areas for improvement across various knowledge areas. These included the need to enhance integration, scope validation, resource utilization, stakeholder engagement, and sustainability performance, among others. To address these conclusions effectively, a series of recommendations were formulated. These recommendations emphasize proactive risk management, open communication channels, regular monitoring of key performance indicators, stakeholder engagement, and ongoing training and skill enhancement. BY adhering to these recommendations, GTS Engineering can significantly enhance project management practices, ensuring the success execution of the residential building project while advancing sustainability objectives and fostering positive impacts on the community and environment.

1 INTRODUCTION

1.1. Background

GTS Engineering, a locally owned design and construction company based in Belize, Central America, has been a prominent force in the construction industry since its establishment in 2015. It has a stellar reputation as a dependable partner in the Belizean community's residential and commercial building projects. GTS Engineering is renowned for its unwavering commitment to sustainability, exceptional quality standards, strict adherence to project schedules, and meticulously controlled budgets. However, what sets GTS Engineering apart is its visionary transition towards a hybrid approach in project management, departing from traditional methodologies. Its comprehensive services encompass sustainable building design and construction, sustainable consulting, energy-efficient technologies integrations, and quality insurance and compliance. With this holistic approach, GTS Engineering aims to transform aspirations into sustainable realities. It champions sustainable development, minimizes environmental impact, and creates structures that symbolize progress, quality, and environmental responsibility. Now, as GTS Engineering sets its sights on embracing a hybrid project management approach, it is poised to redefine how projects are executed in the construction industry.

The development of a hybrid project management plan for constructing a new residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize, is a visionary step by GTS Engineering. This comprehensive plan will encompass all ten knowledge areas covered by the Project Management body of knowledge (PMBOK) as published by the

Project Management Institute (PMI). By adopting this hybrid approach, GTS Engineering aims to revolutionize project management within the company's construction industry. Traditional project management approaches can often be challenging and even catastrophic for complex projects. The hybrid approach will combine traditional and innovative methods, providing a dynamic and adaptive framework. Moreover, GTS Engineering is committed to aligning this project with Sustainable Development Goals (SDGs). This means achieving the project's immediate objectives and ensuring that it contributes positively to long-term environmental, social, and economic sustainability. The hybrid project management plan represents a forward-thinking strategy to ensure successful project execution while minimizing adverse impacts and advancing the broader goals of sustainable development.

1.2. Statement of the problem

GTS Engineering, a Belize-based construction company renowned for its commitment to sustainability and quality, has successfully undertaken numerous residential and commercial projects. GTS Engineering aims to bridge existing gaps in its project management systems by adopting a hybrid approach. This approach seeks to seamlessly integrate sustainability practices and adhere to Sustainable Development Goals (SDGs) while ensuring the success of future construction endeavors. The current deficiency in fully integrating sustainable practices into projects obstructs alignment with SDGs and undermines the company's commitment to environmentally responsible and energy-efficient construction, impacting its balance scorecard.

This Project management plan endeavors to validate the necessity of a comprehensive hybrid project management strategy to optimize outcomes, boost efficiency, mitigate risks, and foster long term sustainability. Presently, the company's construction projects have achieved only 60% integration of sustainable practices, falling short of the desired 90% benchmark for SDG Alignment. Consequently, this shortfall has led to a 15% decline in overall sustainability ratings on the balance scorecard.

Moreover, Project delivery timelines have extended by an average of 20%, resulting in a 10% decrease in overall project efficiency. The absence of a holistic hybrid project management approach has also led to a 25% increase in project-related risks, thereby straining GTS Engineering's Risk Management strategy.

1.3. Purpose

The primary purpose of this project is to create a Project Management Plan tailored explicitly for constructing a residential building within Celeste Gardens, situated in Ladyville, Belize, using a hybrid approach. What distinguishes this project is its commitment to implementing a hybrid project management approach that integrates the best practices from traditional methodologies with innovative techniques and principles. This approach will serve as the cornerstone of efficient, sustainable, and environmentally responsible residential construction within Celeste Gardens.

Celeste Gardens Residential Subdivision, nested in the heart of Ladyville, Belize, will meet the growing demand for sustainable and environmentally responsible housing in the community and will set a pioneering example of modern residential development. This

project aims to address the pressing need for housing solutions to provide comfortable and modern living and adhere to principles of environmental stewardship and energy efficiency. By constructing a residential building that aligns with sustainable goals, GTS Engineering seeks to demonstrate the feasibility of sustainable living practices and inspire future eco-conscious development within Celeste Gardens and beyond.

Through the creation of a tailored Project Management Plan and the pioneering integration of a hybrid project management approach, this endeavor signifies a paradigm shift in how GTS Engineering conceptualizes, plans, and executes residential development. Beyond the mere construction of a building, this project symbolizes a commitment to meet the community's surging demand for sustainable living and to illuminate a path toward a future.

1.4. General objective

To develop a Project Management Plan for constructing a residential building using a hybrid approach.

1.5. Specific objectives

1. To develop the Scope Management Plan that efficiently delineates all the project tasks required and the project tasks essential for the project's success.
2. To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.

3. To develop the Cost Management Plan to systematically plan, monitor, and control project costs by ensuring the project is completed within the approved budget while delivering the desired quality and meeting the stakeholders' expectations.
4. To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and control framework throughout the project lifecycle.
5. To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.
6. To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.
7. To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interests, expectations, and contributions throughout the project lifecycle.
8. To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, to obtain the necessary goods and services on time, within budget, and in alignment with project requirements.

9. To create the Risk Management Plan to identify, assess, mitigate, and monitor project risks, minimizing the likelihood and impact of adverse events and to maximizing opportunities.
10. To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's objectives and goals.
11. To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project to promote economic, environmental, and social sustainability.

2 THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

GTS Engineering is a small, locally owned design and construction company based in Belize, Central America. GTS Engineering was founded in 2015. The company has become a trusted name in the construction industry within its community. GTS delivers residential and commercial building projects that meet and exceed clients' expectations. GTS is also known for its commitment to sustainability, quality, schedule adherence, and budget controls.

2.1.2 Mission and vision statements

Mission:

The mission of GTS Engineering is “to transform vision into sustainable reality.” GTS Engineering provides exceptional design and construction services that meet and exceed the client’s expectations, with unwavering commitment to quality, budget-consciousness, and sustainability, to build spaces that enrich lives and community.

Vision:

The vision of GTS Engineering is “to be the trusted leader in innovative, sustainable, and cost-effective construction solutions.” GTS Engineering aspires to be the go-to company for clients seeking excellence in design and construction”. Through dedication to quality, innovation, and environmental responsibility, GTS envisions a future where every building created is a symbol of progress, sustainability, and enduring value.

2.1.3 Organizational structure

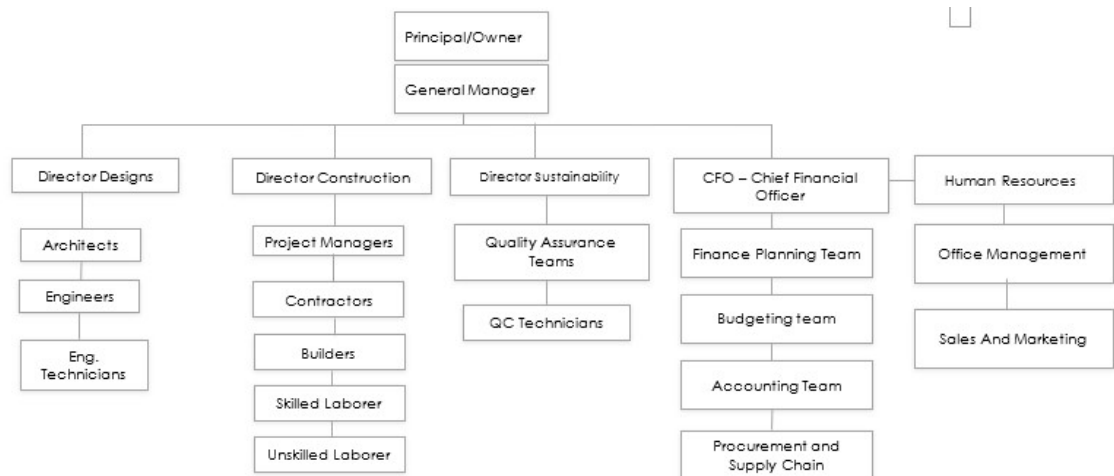


Figure 1: Organizational structure (Source: E. Torres, 2023)

2.1.4 Products Offered

GTS Engineering offers building solutions for sustainable residential and commercial building projects. These may include:

- Sustainable Building Designs Services
- Construction Services
- Project Management Services
- Sustainable Consulting
- Energy-Efficient Technology Integration
- Quality Assurance and Compliance Services

In summary, GTS Engineering is a trusted partner in the construction industry, dedicated to providing a comprehensive range of services. GTS Engineering services

encompass every aspect of creating sustainable, environmentally responsible, and energy-efficient residential and commercial buildings. From the initial sustainable building design to the physical construction phase, GTS expertise ensures that projects meet and exceed expectations. Project management services guarantee that all projects stay within budget, adhere to schedules, and prioritize quality and sustainability. GTS offers sustainability consulting to empower clients with knowledge and insights into eco-friendly construction practices, helping them make informed decisions. Integrating energy-efficient technologies further enhances energy efficiency, while quality assurance and compliance services guarantee that every project complies with sustainability standards and local regulations. GTS Engineering is committed to transforming vision into sustainable realities. Its services are designed to promote sustainable development, minimize environmental impact, and create buildings that stand as a symbol of progress, quality, and environmental responsibility. GTS Engineering looks forward to collaborating with each client to make their sustainable building aspiration a reality.

2.2 Project Management concepts

2.2.1 Project management principles

Project

The PMBOK Body of Knowledge Guide 7th Edition (2021) defines a project as a temporary endeavor undertaken to create a unique product, service, or result.

Projects Groups

The PMBOK Body of knowledge Guide 6th Edition (2017) outlines the five (5) project management groups which are:

- **Initiating Process Group:** those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project.
- **Planning Process Group:** those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** those processes performed to complete the work defined in the project management plan to satisfy the project requirement.
- **Monitoring and Controlling Process Group:** those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
- **Closing Process Group:** those processes performed to formally complete or close the project, phase, or contract.

2.2.2 Project management domains

The PMBOK Body of Knowledge 7th Edition (2021) states that project performance domains “is a group of related activities that are critical for the effective delivery of project outcomes.” Therefore, these can be interpreted as that the domains are a collection of interrelated tasks, processes, and responsibilities that contribute to achieving projects success. These activities are connected and often rely on each other for effective project management. Critical and effective delivery means they play a crucial role in ensuring that

the projects are executed successfully as they are integral to achieving project objectives, meeting stakeholder expectations, and delivering value. The project performance domains are related to achieving outcomes such as project completions, launch of new products, or implementation of new systems. These eight (8) projects performance domains are:

- **Stakeholders:** In the context of the FGP, managing stakeholders is critical as it involves collaboration with various parties, including clients, architects, contractors, and sustainability experts. Effective stakeholder management ensures that the project aligns with sustainability goals and quality standards and meets the expectations of all relevant parties.
- **Team:** Effective team management is vital for the FGP as it ensures that the project team is motivated, aligned with sustainable goals, and capable of delivering quality results. It involves collaboration among diverse professionals working on sustainable construction projects.
- **Development Approach and Life Cycle:** In the FGP, selecting the right development approach and understanding the project lifecycle is essential. Sustainable construction projects may benefit from agile elements to adapt to changing sustainability requirements and practices while ensuring quality and efficiency.
- **Planning:** Planning is a critical aspect for the FGP as it involves creating a comprehensive project management plan tailored to hybrid and sustainable residential building projects.

- **Project Works:** Project works involves the physical construction of sustainable building while adhering to quality and sustainable standards. It ensures that the FGP's objectives are translated into tangible results.
- **Delivery:** Successful delivery means not only completing projects on time and within budget but also ensuring that sustainable and quality objectives are met, delivering value to both the company and the community.
- **Measurement:** Measurement is crucial for tracking sustainability metrics and quantifying sustainability-related indicators such as energy-efficiency ratings, waste reductions figures, and eco-friendly materials usage.
- **Uncertainty:** Uncertainty management is critical in sustainable or hybrid construction projects as numerous factors such as evolving sustainability regulations or uncertainties in the availability of green technologies can affect project outcomes. In the FGP, the uncertainty domain plays a vital role in identifying and addressing risks related to sustainability, ensuring that the project can adapt to changing circumstances, and making informed choices to optimize outcomes while managing potential challenges effectively.

2.2.3 Predictive, adaptative and hybrid projects

Predictive Projects

Predictive Projects, also known as traditional or waterfall projects, are characterized by a well-defined scope, detailed planning, and a sequential, linear approach. In predictive projects, the entire project is planned upfront, and changes are discouraged once the project

begins. This approach assumes that requirements and conditions will remain relatively stable through the projects' life cycle.

Adaptive Projects (agile)

Adaptive Projects, often associated with agile methodologies, prioritize flexibility and responsiveness to change. Agile projects embrace the idea that requirements may evolve, and they promote iterative development and incremental delivery. Key features include customer collaboration, short development cycles (sprints), continuous feedback, and a focus on delivery of high-value features early and frequently.

Hybrid Projects

Hybrid Projects combine elements of both predictive and adaptive approaches. These projects recognize that not all aspects of a project can be predictive or planned upfront, especially in complex and evolving environments. The hybrid approach allows for flexibility in certain project aspects while maintaining structure in others.

The FGP (Project Management Plan – Hybrid Residential Building Construction Project) will concentrate in the Hybrid approach because of its unique characteristics such as:

- **Flexible Sustainability Scope:** Sustainability construction projects often require adaptability to evolving environment standards, green technologies, and changing stakeholder expectations. This flexibility aligns with the adaptive aspects of the hybrid approach.
- **Structured Planning:** While certain aspects of the project may be adaptable, the FGP requires a structured planning phase to ensure adherence to budget, quality, and regulatory compliance, which are essential in sustainable construction.

- **Iterative Elements:** The FGP may incorporate iterative cycles for sustainability assessment and technology integrations, allowing for ongoing adjustments to maximize sustainability outcomes.
- **Risk Management:** The FGP recognizes the importance of managing uncertainties related to sustainable practices, emphasizing proactive risk mitigation to address potential challenges effectively.
- **Continuous Communication:** Effective communication with stakeholders, including clients, architects, contractors, and sustainable experts, is vital to ensure alignment with sustainability goals and evolving requirements.

2.2.4 Project management

According to the PMBOK Body of Knowledge 7th Edition (2021), project management “is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management refers to guiding the project works to deliver the intended outcomes.”

2.2.5 Project management knowledge areas and processes

Project Scope Management

“Project Scope Management includes the process required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project.” (PMI, 2017, p. 129)

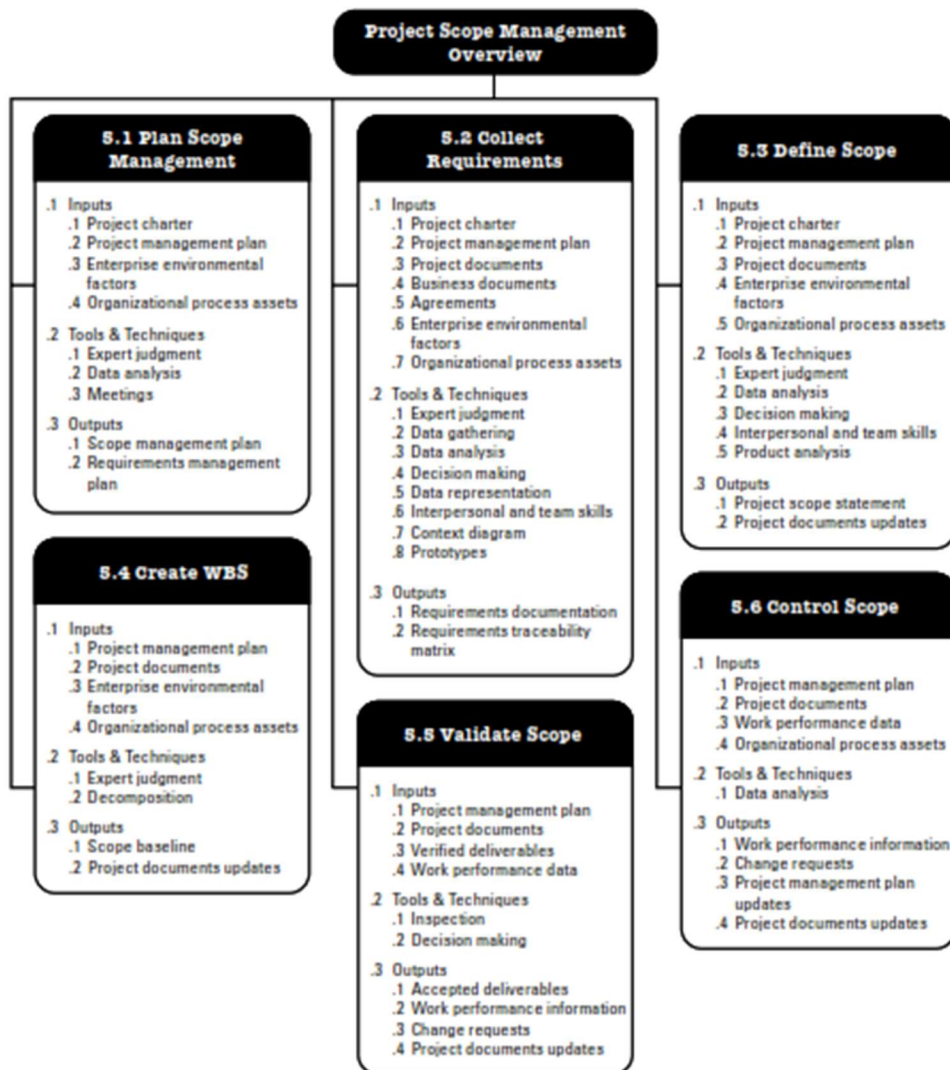


Figure 2: Project Scope Management Overview (Source: PMI, 2017, p. 130)

Project Schedule Management

“Project Schedule Management includes the process required to manage the timely completion of the Project.” (PMI, 2017, p. 173)

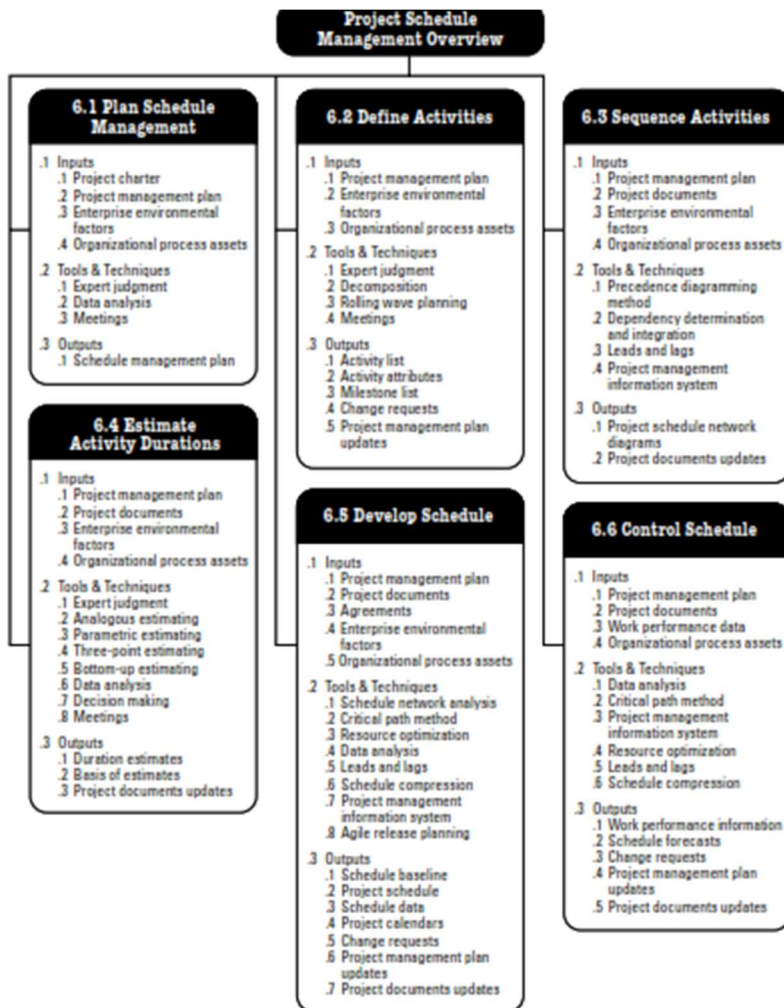


Figure 3: Project Schedule Management Overview (Source: PMI, 2017, p. 174)

Project Cost Management

“Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing and controlling costs so that the project can be completed within approved budget.” (PMI, 2017, p. 231)

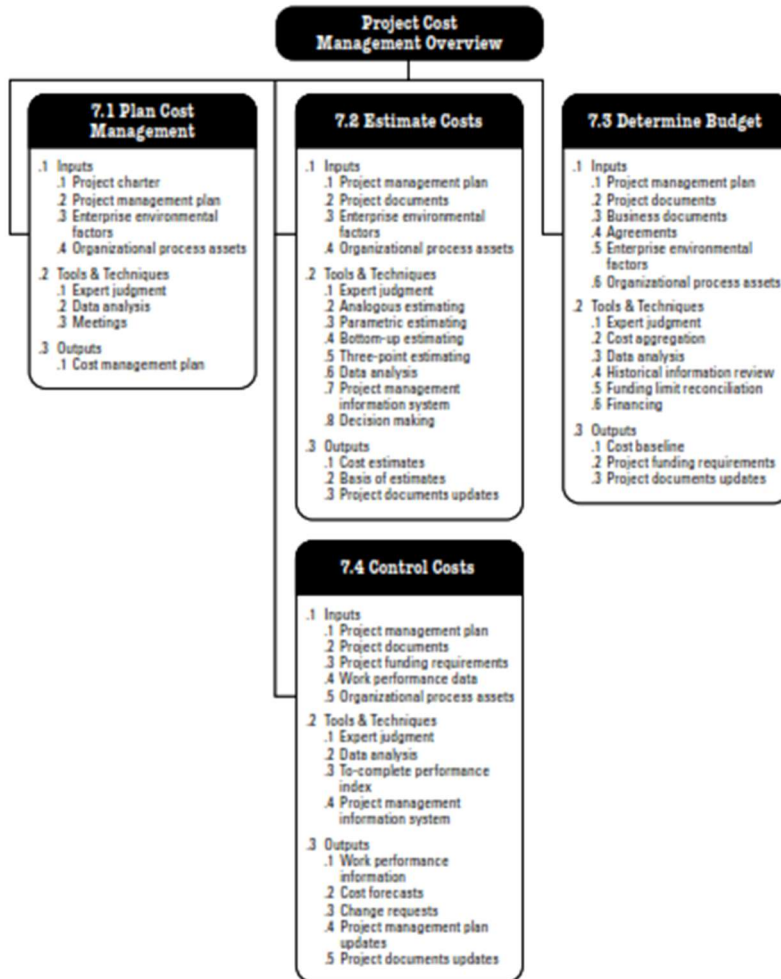


Figure 4: Project Cost Management Overview (source: PMI, 2017, p. 232)

Project Quality Management

“Project Quality Management includes the processes for incorporating the organization’s quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders’ objectives.” (PMI, 2017, p. 271)

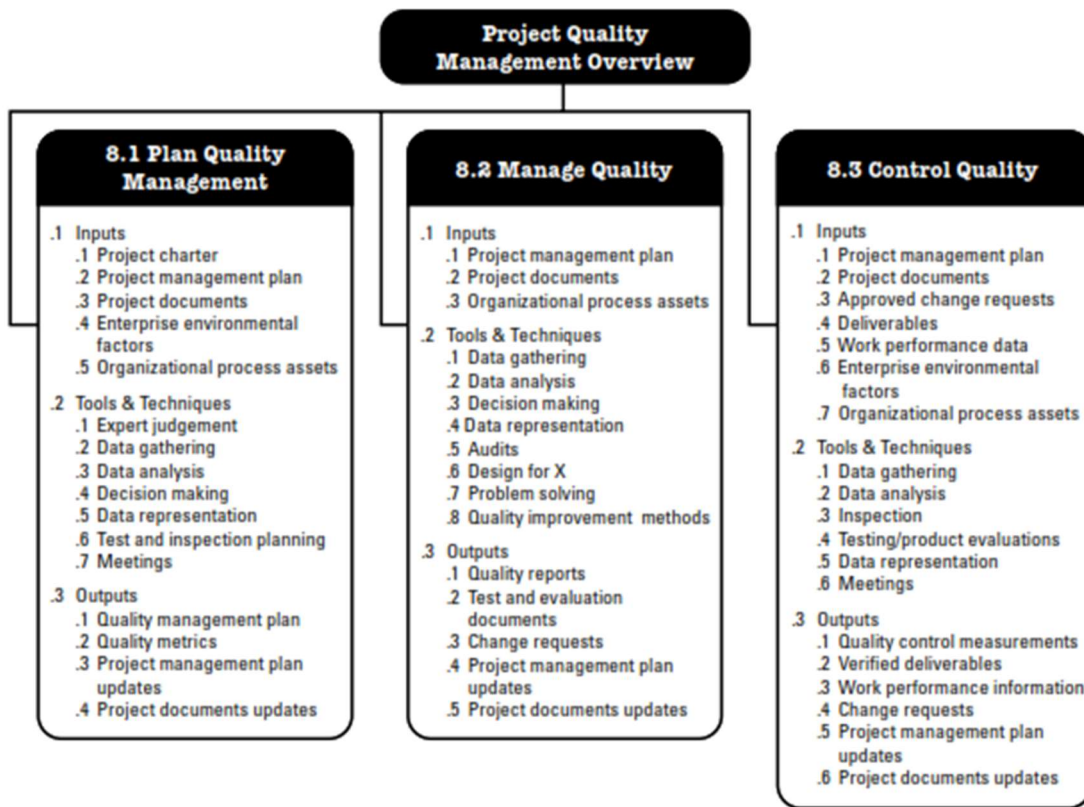


Figure 5: Project Quality Management Overview (source: PMI, 2017, p. 272)

Project Resource Management

“Project Resource Management includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project. These processes help ensure that the right resources will be available to the project manager and project team at the right time and place.” (PMI, 2017, p. 307)

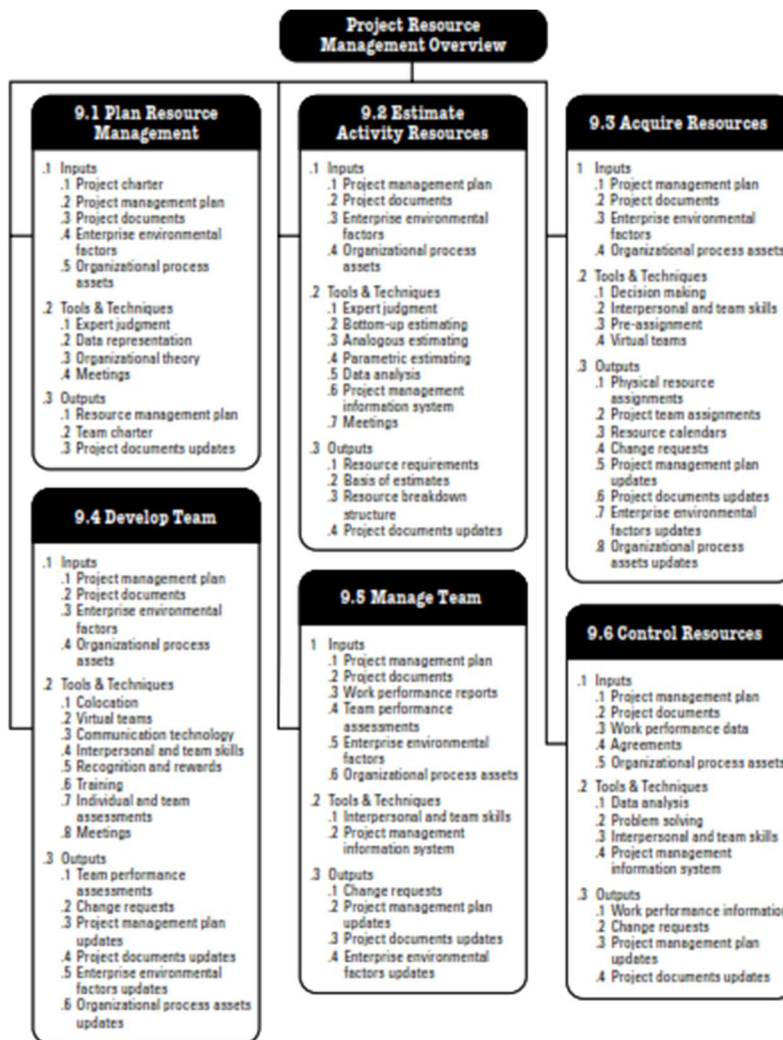


Figure 6: Project Resource Management Overview (source: PMI, 2017, p. 308)

Project Communications Management

“Project Communications Management includes the processes necessary to ensure that the information needs of the project and its stakeholders are met through development of artifacts and implementation of the activities designed to achieve effective information exchange. Project Communications Management consists of two parts. The first part is developing a strategy to ensure communication is effective for stakeholders. The second

part is conducting the activities necessary to implement the communication strategy.”

(PMI, 2017, p. 359)

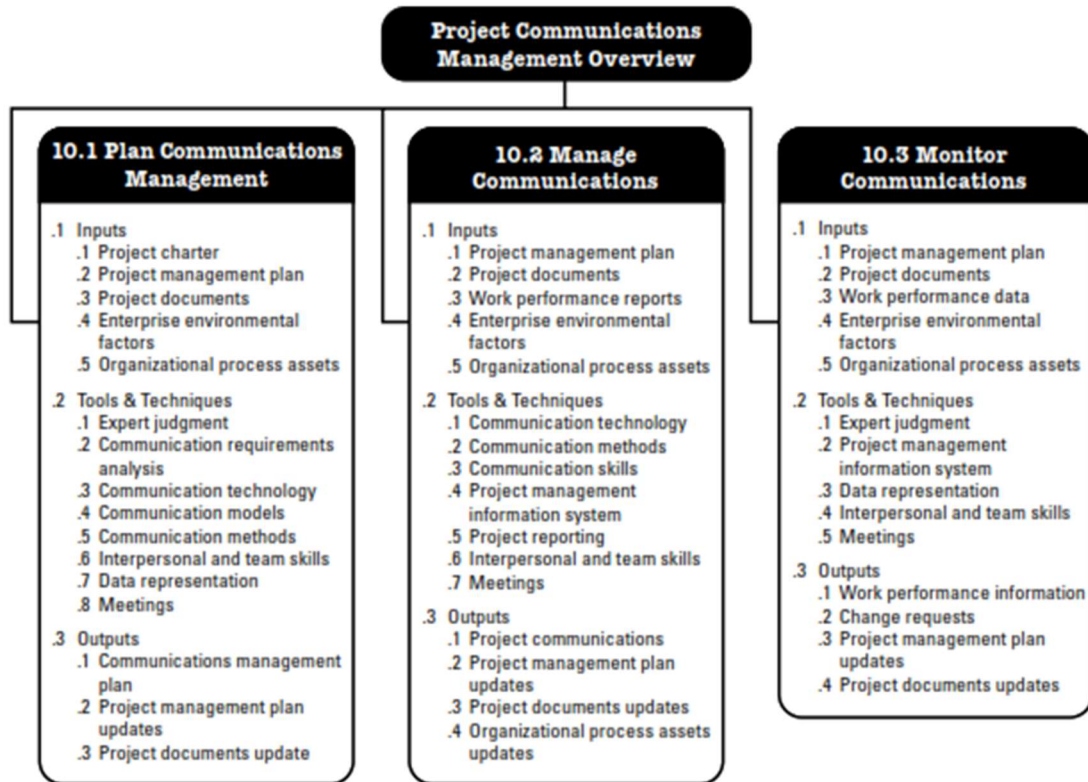


Figure 7: Project Communication Management Overview (source: PMI, 2017, p. 360)

Project Stakeholder Management

“Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholder in project decision and execution. The processes support the work of the project team to analyze stakeholder expectation, assess the degree to which they impact or are impacted by the project, and

develop strategies to effectively engage stakeholders in support of project decision and the planning and execution of the work of the project.” (PMI, 2017, p. 503)

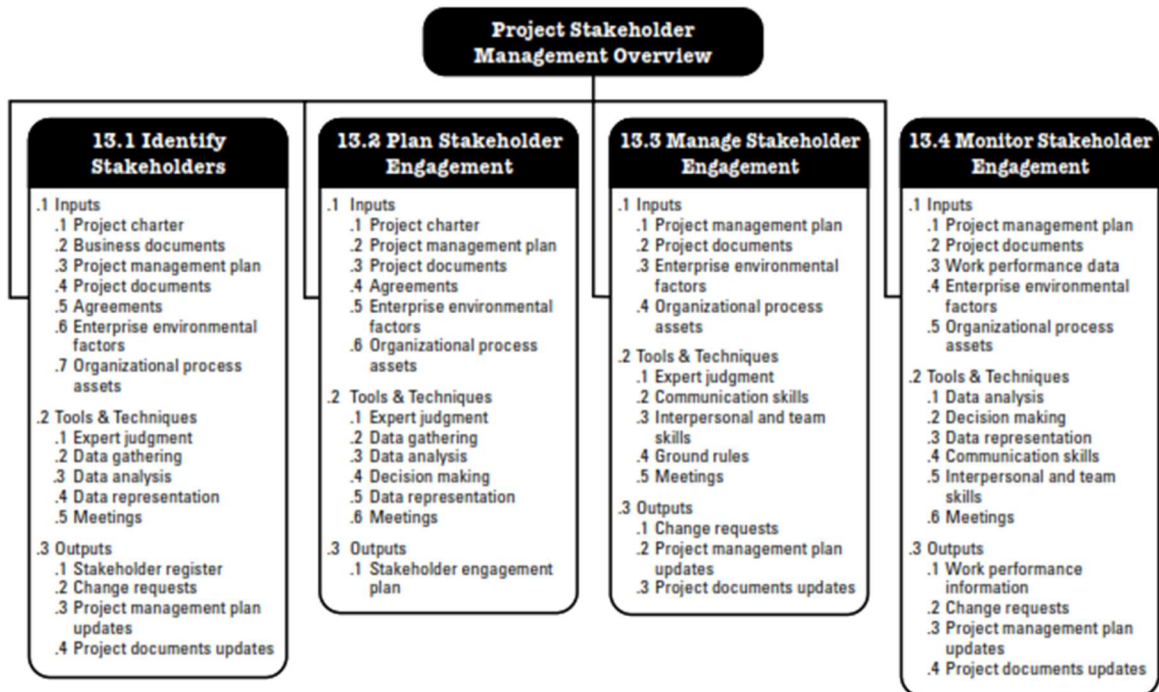


Figure 8: Project Stakeholder Management Overview (source: PMI, 2017, p. 504)

Project Procurement Management

“Project Procurement Management includes the processes necessary to purchase or acquire products, services, r results needed from outside the project team. Project Procurement Management includes the management and control processes required to develop and administer agreements such as contracts, purchase orders memoranda of agreements (MOA’s), or internal service level agreements (SLA’s). The personnel authorized to procure the goods and/or services required for the project may be member of

the project team, management, or part of the organization’s purchasing department if applicable.” (PMI, 2017, p. 459)

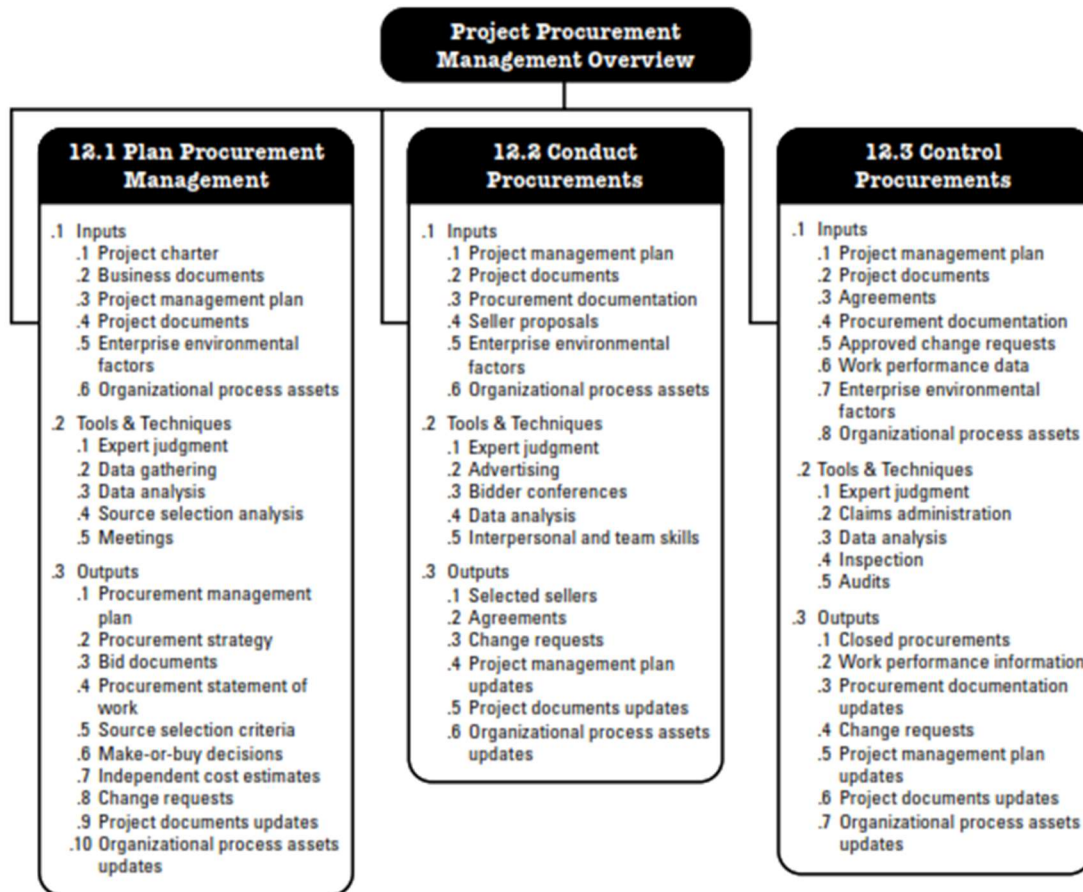


Figure 9: Project Procurement Management Overview (source: PMI, 2017, p. 460)

Project Risk Management

“Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project. The objectives of project risk management are to increase the probability and/or impact of positive risk and to decrease the probability and/or impact of negative risk, to optimize the chances of project success.” (PMI, 2017, p. 395)

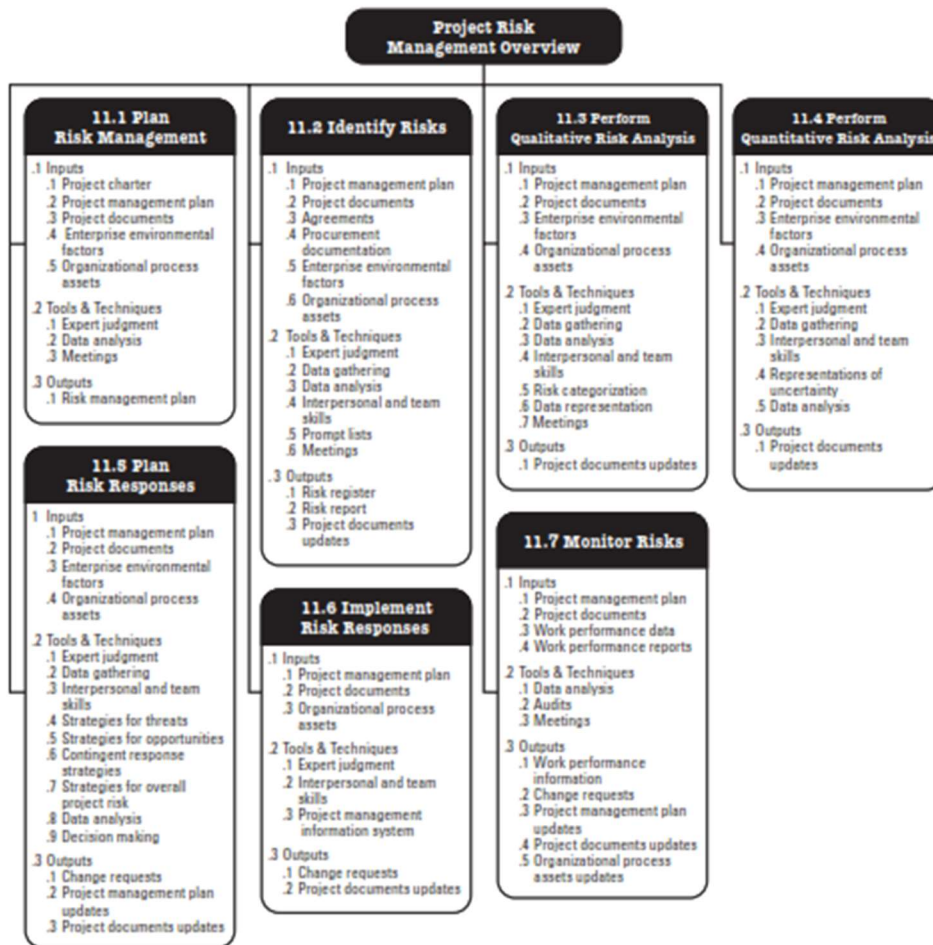


Figure 10: Project Risk Management Overview (source: PMI, 2017, p. 396)

Project Integration Management

“Project Integration Management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups. In the project management context, integration includes characteristics of unification, consolidation, communication, and interrelationship. These actions should be applied from the start of the project through completion.” (PMI, 2017, p. 69)

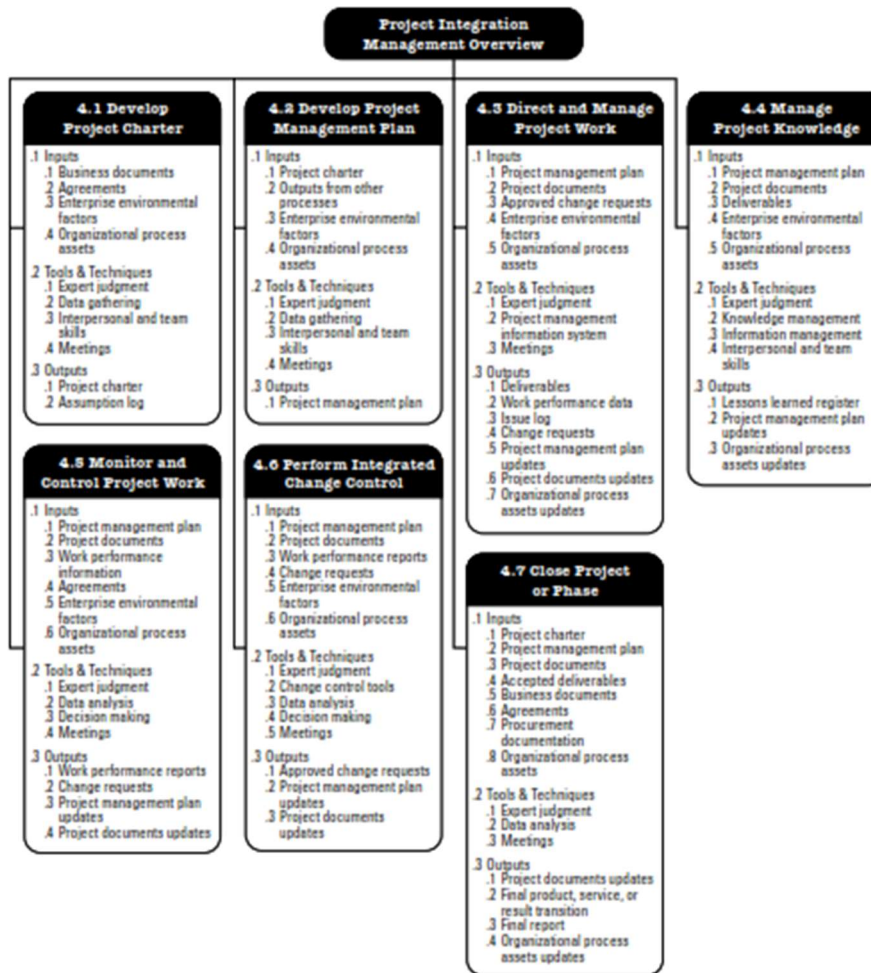


Figure 11: Project Integration Management Overview (source: PMI, 2017, p. 71)

2.2.6 Project life cycle

According to the PMBOK Body of Knowledge 6th Edition (2017), the project life cycle is “the series of phases that a project passes through its start to its completion.” (PMI, 2017, p. 18). The project management life cycle refers to the series of phases or stages that a project goes through from its initiation to its closure. Each phase in the project management life cycle has a specific set of activities, deliverables, and objectives that guide the project from conception to completion. The project management life cycle is a

structured framework that helps project managers and teams effectively plan, execute, monitor, and control a project. The project life cycles are Initiation, Planning, Execution, Monitoring and Controlling, and Closing.

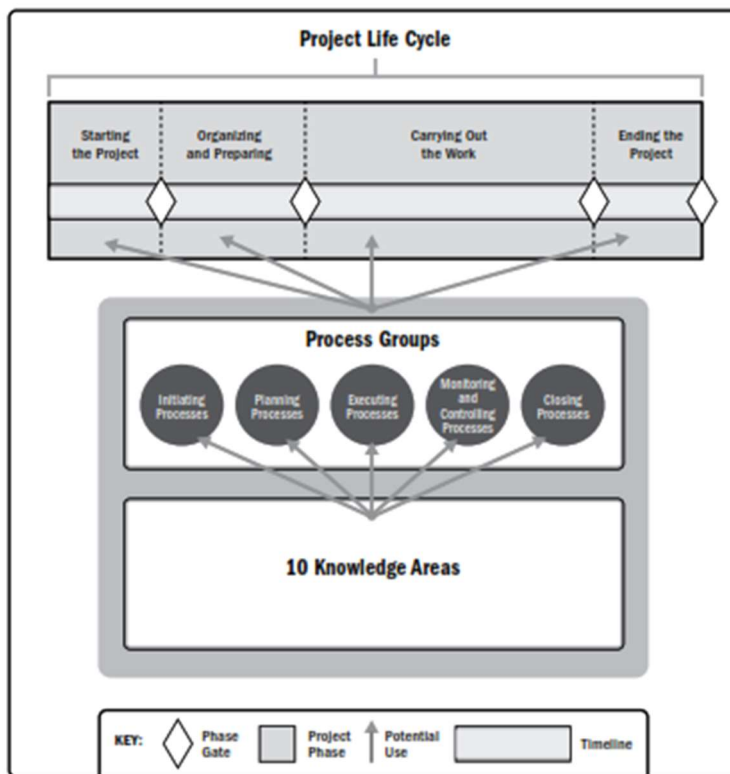


Figure 12: Interrelationship of PMBOK Guide Key Component in Project (source: PMI, 2017, p. 18)

Hybrid Project Life Cycles

The PMBOK Body of Knowledge 7th Edition (2021) states that Hybrid Approach “is a combination of adaptive and predictive approaches. This means that some elements from a predictive approach are used and some from an adaptive approach are used. This development approach is useful when there is uncertainty or risk around the requirements.

Hybrid is also useful when deliverables can be modularized, or when there are deliverables that can be developed by different project teams. A hybrid approach is more adaptive than a predictive approach, but less so than a purely adaptive approach. Hybrid approaches often use an iterative or incremental development approach. An iterative approach is useful for clarifying requirements and investigating diverse options. An iterative approach may produce a deliverable throughout a series of iterations. Each iteration adds functionality within a predetermined time frame. The deliverable contains the capacity to be considered as completed only after the final iteration.” (PMI, 2021, p. 36)

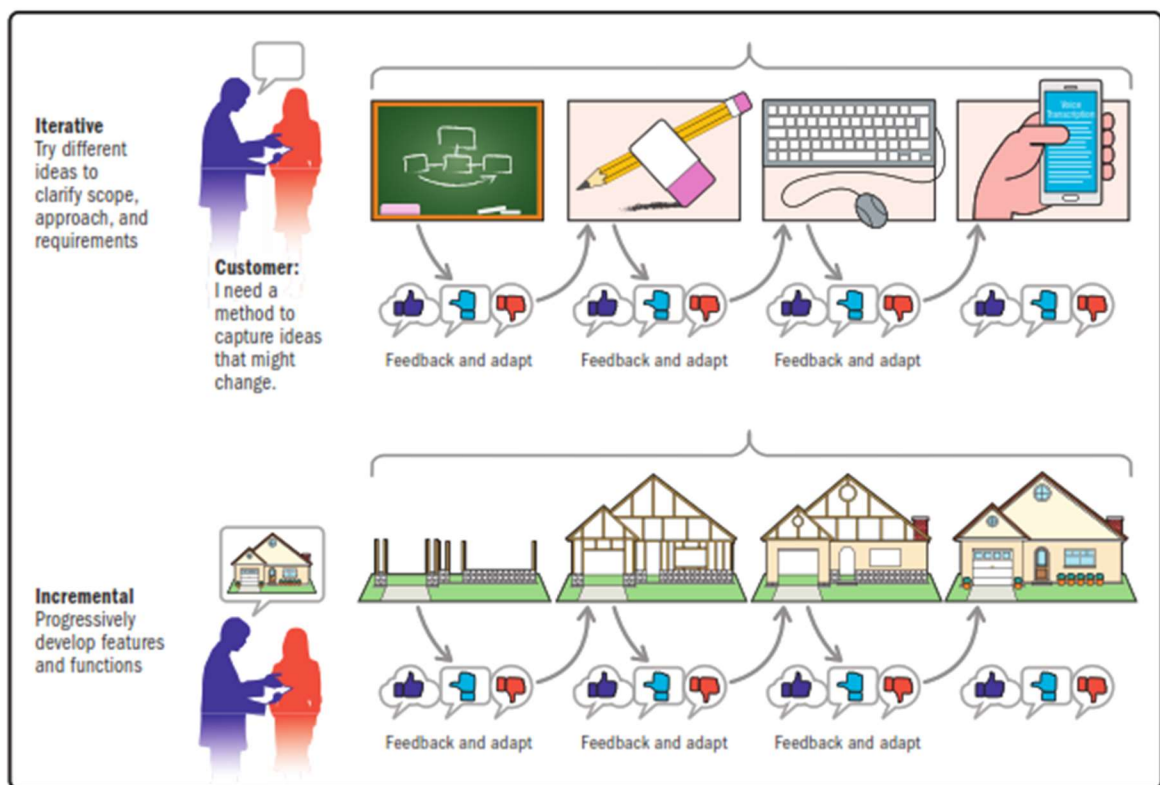


Figure 13: Iterative and incremental Development (source: PMI, 2021, p. 37)

In summary, the Hybrid Project life cycle is well-suited to the FGP as it allows for the necessary balance between structured planning and adaptability required for successful sustainable residential building projects.

2.2.7 Company strategy, portfolios, programs, and projects

Company Strategy

GTS Engineering strategy is to become a leader in sustainable construction within the region by prioritizing environmentally responsible building practices and energy-efficient technologies.

Portfolios

The company's portfolios encompass the following domains:

- Residential and Commercial Building Construction
- Green Design Packages of Residential and Commercial Building and Systems
- Project Management Consulting
- Sustainable Consulting
- Energy-Efficient Technology Integration
- Quality Assurance and Compliance Services

Projects

The company's upcoming, ongoing, and completed projects include:

- Residential design and building of two-story structure in August Pine Ridge Village, Orange Walk District
- Residential building in Orange Walk Town

- Residential building in Lords Bank, Ladyville Village, Belize District
- Design and consultancy for water and sewerage system for 500 lots in San Pedro, Belize
- Residential building in Celeste Garden, Ladyville Village, Belize District

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

2.3.1 Current situation of the problem or opportunity in study

Currently, within the construction industry, specifically in the context of residential building projects, there is an increasing demand for sustainable and environmentally responsible construction practices. This demand is driven by concerns over environmental impact, energy efficiency, and desire for modern, eco-friendly living spaces. The construction industry is evolving to meet these demands by adopting sustainability measures and exploring hybrid execution methodologies that combine traditional project management approaches with agile practices.

Extensive research has been conducted in recent years to address the challenges and opportunities in residential construction with a focus on Hybrid execution and sustainability. Hybrid Project Management studies have investigated the integration of agile project management principles into traditional projects management methodologies for residential construction. This research seeks to enhance project adaptability and efficiency. Sustainable residential construction also has explored sustainable design, construction materials, and energy-efficient technologies specific to residential buildings. This research aims to reduce the environmental footprint of residential buildings.

2.3.2 Previous research done for the topic in study

Based on the preliminary research conducted for the topic of the FGP (Project Management Plan for the construction of a new residential building project with hybrid execution), here is a summary of the main research findings:

- Research Source 1: “Agile Construction Management – Kanban Software for Agile Project Management” by Kanbanize. This source will help to explore and gain insights into how agile principles and methodologies can be applied to construction project management. The insights from the source can be used to understand how agility can improve planning, execution, and delivery in construction projects. It may provide examples of agile practices that can be adapted to enhance adaptability and efficiency in the project management plan.
- Research Source 2: “AGISTRUCT – Improve model for agile construction project management” by Al Behairi T.A. (n.d.). This research reference can help on how to improve agile in the construction industry and enhance the adaptability and efficiency of construction projects. The FGP can explore the model presented in this source to identify specific elements or strategies that can be integrated into the project management plan. It can offer insights into how to tailor agile methodologies for the construction context, enhancing project outcomes.
- Research Source 3: “Lean Construction: An effective approach for project management” by Ansah R.H., & Sorooshian S. (2016). Incorporating insights from this article into the project management plan can help leverage lean construction principles to enhance efficiency and effectiveness while minimizing waste. The

FGP can draw upon the principles of lean construction to optimize resources allocation and improve project workflow. It may provide guidance on how to reduce resource water and enhance construction efficiency, aligning with sustainability goals.

- Research Source 4: “The GPM P5 Standard for Sustainability in Project Management” by GPM Global (2023). This standard is a valuable resource that can guide efforts to incorporate sustainability principles into construction projects. The FGP can use this GPM P5 Standard as a structural framework for integrating sustainability into project management practices. It can ensure that the project aligns with environmental and social responsibilities objectives, contributing to sustainable goals.
- Research Source 5: “The Regenerative Design Approach in Building Construction” by IFyalem K.J, LinkedIn (2023). This source can provide insights into emerging trends, the introduction to regenerative designs, benefits, challenges, innovation, and integration with sustainability. The FGP can incorporate insights from this source to explore innovative approaches like regenerative design in the context of residential construction. It may help identify opportunities to integrate regenerative principles to enhance sustainability in the project.
- Research Source 6: “A conceptual hybrid project management model for construction projects” by Lalmi, A.,Fernandes, G., & Boudemagh, S.s. (2020) *Procedia Computer Science*, I (2020). This article can be a valuable resource for exploring hybrid project management models and their potential application in

construction projects. The FGP can leverage insights from this source to explore hybrid project management approaches and potential integration elements of hybrid project management into the project management plan. It may offer innovative approaches to enhance project adaptability and efficiency.

2.3.3 Other theory related to the topic in study

Hybrid Project Management is an approach that combines elements of traditional (predictive) project management and agile methodologies. It allows flexibility in project execution while maintaining structured planning and control in areas where predictability is essential. The importance in the context of the FGP which focuses on residential building projects, understanding and implementing hybrid project management principles is vital. It enables the project team to adapt to the changing sustainability requirement and emerging technologies while ensuring the core project elements are managed effectively. Another concept to have applied is the sustainability Metrics and Key Performance Indicators (KPIs). Tracking sustainability metrics and KPIs is integral to the FGP's objectives of sustainable construction. It allows for data-driven decision making, helps measure progress towards sustainability goals, and provides transparency in demonstrating the project's environmental and social contribution. Sustainable design and materials play a significant role in the FGP's focus on hybrid residential building projects. These concepts guide decisions related to the construction practices, materials selections, and energy-efficient technologies, all aimed at reducing the project's environmental footprint. Agile project management principles can be applied within the FGP to enhance adaptability and responsiveness, particularly in aspects of the project where requirements may evolve, such

as sustainability practices or technology integration. Lean Construction Principles focus can enhance project efficiency and resource allocation, aligning with sustainable goals by reducing resource waste and optimizing construction practices.

These additional theory and concepts further enrich the understanding of sustainable construction projects and the development of the FGP (Project Management Plan for Hybrid Residential building project). They provide a comprehensive framework for managing hybrid residential building projects with a strong focus on sustainability, adaptability, and environmental responsibility.

3 METHODOLOGICAL FRAMEWORK

3.1 Information sources

According to Suresh, M., & Rav, S. (2020) information sources can be either “a person, or place from which information comes, arises, or is obtained.” Overall, information sources can take various forms, including books, articles, websites, interview, databases, and more. They are fundamental to the process of gathering and disseminating information for research, education, and various other purposes, for example, information sources can be classified as primary or secondary.

3.1.1 Primary sources

“Primary Source is an original material created at the time a historical event occurs, or a soon afterward, and can be original documents, create works, material published in modern times, institutional and governmental documents, or relics and artifacts.” (Western Governors University, 2023)

3.1.2 Secondary sources

“Secondary sources are created by someone who did not experience firsthand or participate in the events or conditions being researched. Secondary sources are used to interpret and analyze primary sources.” (Western Governors University, 2023)

Charts 1: Information sources (Source: E. Torres, Author, 2023)

Objectives	Information sources	
	Primary	Secondary
To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task which will be essential for the project success.	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks

<p>that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations.</p>	<p>of pass of similar nature</p>	<ul style="list-style-type: none"> • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
<p>To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and control framework throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
<p>To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials

<p>To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
<p>To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
<p>To develop the Procurement Management Plan to strategically execute and control all procurement activities</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions

<p>and contracts associated with the project, with the overarching goal of obtaining the necessary goods and service on time, within budget, and in alignment with project requirements.</p>	<p>of pass of similar nature</p>	<ul style="list-style-type: none"> • Consulting Reports (historical data and reports) • Training Materials
<p>To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
<p>To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's overall objectives and goals.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials

<p>To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic, environmental, and social sustainability.</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documentation of pass of similar nature 	<ul style="list-style-type: none"> • Literature Reviews • Project Case Studies • Project Management Textbooks • Online Forums and Discussions • Consulting Reports (historical data and reports) • Training Materials
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3.2 Research methods

“Research methods are the strategies, processes or techniques utilized in the collection of data, or evidence for analysis in order to uncover new information or create better understanding of a topic.” (LibGuides: Research Methods: What Are Research Methods? University of Newcastle, 2023)

3.2.1 Qualitative Method

“Qualitative method gathers data about lived experiences, emotions and behaviors, and the meaning individuals attach to them. It assists in enabling researchers to gain a better understanding of complex concepts, social interactions, or cultural phenomena.” (LibGuides: Research Methods: What Are Research Methods? University of Newcastle, 2023)

3.2.2 Quantitative Method

“Quantitative Methods gathers numerical data which can be ranked, measured, and categorized through statistical analysis. It assists with uncovering patterns or relationships, and for generalizing.” (LibGuides: Research Methods: What Are Research Methods? University of Newcastle, 2023)

3.2.3 Mixed Method

“Mixed Methods integrates both qualitative and quantitative research. It provides a holistic approach combining and analyzing the statistical data with deeper contextualized insights.” (LibGuides: Research Methods: What Are Research Methods? University of Newcastle, 2023)

Charts 2 : Research methods (Source: E Torres, 2023)

Objectives	Research methods		
	Qualitative	Quantitative	Mixed
To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task which will be essential for the project success.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Scope Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Scope Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Scope Management Plan

<p>To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.</p>	<p>The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Schedule Management Plan</p>	<p>The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Schedule Management Plan</p>	<p>To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Schedule Management Plan</p>
<p>To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations.</p>	<p>The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Stakeholder Management Plan</p>	<p>The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Stakeholder Management Plan</p>	<p>To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Stakeholder Management Plan</p>
<p>To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and control framework throughout the project lifecycle.</p>	<p>The Qualitative method to gain in-depth insights, understanding and subjective perspectives to</p>	<p>The Qualitative method to gather structure numerical and objective data that can be analyzed to</p>	<p>To combine the strengths of both qualitative and Quantitative methods to provide comprehensive</p>

	create the Quality Management Plan	develop the Quality Management Plan	Quality Management Plan
To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Resource Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Resource Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Resource Management Plan
To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Communication Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Communication Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Communication Management Plan
To develop the Stakeholder Management Plan to identify, analyze, and	The Qualitative method to gain in-depth insights,	The Qualitative method to gather structure	To combine the strengths of both qualitative and

engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.	understanding and subjective perspectives to create the Stakeholder Management Plan	numerical and objective data that can be analyzed to develop the Stakeholder Management Plan	Quantitative methods to provide comprehensive Stakeholder Management Plan
To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goal of obtaining the necessary goods and service on time, within budget, and in alignment with project requirements.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Procurement Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Procurement Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Procurement Management Plan
To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Risk Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Risk	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Risk

		Management Plan	Management Plan
To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's overall objectives and goals.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Integration Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Integration Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Integration Management Plan
To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic, environmental, and social sustainability.	The Qualitative method to gain in-depth insights, understanding and subjective perspectives to create the Sustainable Management Plan	The Qualitative method to gather structure numerical and objective data that can be analyzed to develop the Sustainable Management Plan	To combine the strengths of both qualitative and Quantitative methods to provide comprehensive Sustainable Management Plan

3.3 Tools

According to the Project Management Institute (2017), a tool is defined as “something tangible, such as a template or software program, used in performing an activity to produce a product or result.”

Tools to be used for the FGP Project include the following:

- Scope Management Plan Template – to define, develop, monitor, control, and validate the Scope Management Plan
- Schedule Management Plan Template – to define, develop, monitor, and control the Schedule Management Plan
- Cost Management Plan Template – to define, develop, monitor, and control the Cost Management Plan
- Quality Management Plan Template – to define, develop, monitor, and control the Quality Management Plan
- Resources Management Plan Template – to define, develop, monitor, and control the Resources Management Plan
- Communication Management Plan Template – to define, develop, monitor, and control the Communications Management Plan
- Stakeholder Management Plan Template – to define, develop, monitor, and control the Stakeholder Management Plan
- Procurement Management Plan Template – to define, develop, monitor, and control the Procurement Management Plan

- Risk Management Plan Template – to define, develop, monitor, and control the Risk Management Plan
- Integration Management Plan Template – to define, develop, monitor, and control the Integration Management Plan
- Sustainable Management Plan Template – to define, develop, monitor, and control the Sustainable Management Plan
- Activity List Template – tool to be used to outline scheduled activities
- Responsibility Assignment Matrix – tool to be used to denote project resources assigned to each work package
- Communication Matrix – tool to be used to outline project communications.
- Stakeholder Engagement Assessment Matrix – tool to be used to compare current with desired stakeholders' engagement levels
- Stakeholder Prioritization Matrix – tool to be used to prioritize project stakeholders
- Stakeholder Register – tool to be used to document, identify, assess, and classify project stakeholders
- Quality Activities Matrix – tool to be used to outline how the project quality will be managed
- Risk Register Template – tool to register all project risks
- Requirement Traceability Matrix – tool to be used to match project requirement with deliverables
- Project Charter Template – document to outline major project information

- Work Breakdown Structure Dictionary – tool to be used to provide deliverables, activities, and scheduling information
- Work Breakdown Structure – tool to be used to input the total project scope of works for all the required deliverables
- Project Management Scheduling Software – software to be used to create project schedule activities
- Bottom-Up Estimation – tool to be used to estimate project duration and cost for the project
- P5 Impact Analysis – tool to be used to determine project sustainability

Charts 3 : Tools (Source: E. Torres, 2023)

Objectives	Tools
<p>To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task which will be essential for the project success.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Meeting • Scope Management Plan Template • Requirements Traceability Matrix • Work Breakdown Structure • Work Breakdown Structure Dictionary
<p>To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Meeting • MS Projects • Decomposition (Activity Listing) • Schedule Management Template
<p>To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations.</p>	<ul style="list-style-type: none"> • Expert Judgement • Bottom – Up Estimating • Data Analysis – Reverse Analysis • Meeting • Cost Management Template
<p>To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and control framework throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data gathering • Data Analysis • Decision Making • Data Representation • Meeting

Objectives	Tools
	<ul style="list-style-type: none"> • Test and inspection Planning • Quality Management Template • Quality Activities Matrix Template
<p>To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Representation • Organizational Theory • Meeting • RACI Chart • Resource Management Template
<p>To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Representation • Meeting • Communication requirement • Communication technology • Communication models and methods • Interpersonal and team skills • Communication Management Template
<p>To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Representation • Data Analysis and representation • Meeting • Stakeholder Register Template • Stakeholder Assessment Matrix

Objectives	Tools
	<ul style="list-style-type: none"> • Stakeholder Management Template
<p>To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goal of obtaining the necessary goods and service on time, within budget, and in alignment with project requirements.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Data Gathering • Meeting • Source Selection Analysis • Procurement Management Template
<p>To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Meeting • Risk Register Template • Risk Management Template
<p>To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's overall objectives and goals.</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Data gathering • Data representation • Meeting • Project Management Information Systems • Integration Management Template
<p>To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project</p>	<ul style="list-style-type: none"> • Expert Judgement • Data Gathering • Data Analysis

Objectives	Tools
in a manner that promotes economic, environmental, and social sustainability.	<ul style="list-style-type: none"> • Meeting • P5 Impact Analysis • Sustainable Management Template

3.4 Assumptions and constraints

Assumptions

The PMBOK Body of Knowledge 7th Edition (2021) states that assumption “is a factor in the planning process that is considered to be true, real, or certain, without proof or demonstration.”

Constraints

The PMBOK Body of Knowledge 7th Edition (2021) states that constraints “are a limiting factor that affects the execution of a project, program, portfolio, or process.”

Charts 4 : Assumptions and Constraints (Source: E. Torres, 2023)

Objectives	Assumptions	Constraints
To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task which will be essential for the project success.	The Project scope is well-defined and that changes will be minimal	Unexpected changes in project scope due to regulatory requirements or unforeseen site conditions
To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.	Construction schedule is well-planned and that the tasks can be completed as scheduled.	Weather-related delays, resources shortage, or unexpected site disruptions.
To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations.	Project Budget is accurate and that cost estimates are reliable.	Costs overruns due to unforeseen expenses, material price fluctuations or changes in project scope.
To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and control framework throughout the project lifecycle.	Quality standards are well-established and can be consistently met throughout the project	Budget limitations affecting the ability to implement certain quality enhancement or by unforeseen quality control issues.

Objectives	Assumptions	Constraints
To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.	Resources will be available as planned and that resources allocation will be optimized	May be constrained by Resource shortage, skill gaps, or labor disputes affecting project progress
To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.	Communications channels and protocol will facilitate effective and timely information exchange	May be constrained by communication breakdown, language barrier, or limited access to communication technology on-site.
To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.	Stakeholder expectations are well-understood and engagement strategies will maintain their support.	Limited by unexpected stakeholder resistance or changing stakeholder demands impacting project decisions.
To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goal of obtaining the necessary goods and	Procurement processes will proceed smoothly, and that vendor	Limit delays in procurement process, vendor performance issues,

Objectives	Assumptions	Constraints
service on time, within budget, and in alignment with project requirements.	performance will meet expectation.	or contractual disputes.
To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.	Identified risks are comprehensive and mitigation strategies will be effective.	Constrained by unforeseen risks or changes in risk severity, requiring dynamic risk response strategies.
To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's overall objectives and goals.	Project components and phases will be seamlessly integrated.	May be limited by unforeseen conflicts between project components, changes in project objectives, or disruptions in the integration process.
To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic, environmental, and social sustainability.	Sustainability initiatives will be effectively integrated into project practices and yield the anticipated environmental benefits	May be limited by budget limitations for sustainability features or unexpected obstacles to sustainable practices.

3.5 Deliverables

The PMBOK Body of Knowledge 7th Edition (2021) states that deliverables are “the product, service, or result of a project.”

Charts 5 : Deliverables (Source: E. Torres, 2023)

Objectives	Deliverables
To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task which will be essential for the project success.	Scope Management Plan
To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task completion throughout the project lifecycle.	Schedule Management Plan
To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations.	Cost Management Plan
To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality assurance and	Quality Management Plan

control framework throughout the project lifecycle.	
To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor, and optimize project resources, including personnel, equipment, materials, and finances.	Resource Management Plan
To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.	Communication Management Plan
To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.	Stakeholder Management Plan
To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goal of obtaining the necessary goods and service on time, within budget, and in alignment with project requirements.	Procurement Management Plan

<p>To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.</p>	<p>Risk Management Plan</p>
<p>To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless integration and alignment with the project's overall objectives and goals.</p>	<p>Integration Management Plan</p>
<p>To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic, environmental, and social sustainability.</p>	<p>Sustainable Management Plan</p>

4 RESULTS

4.1 Integration Management Plan

4.1.1 Integration Management

This section will include the project charter, develop the project management plan, direct, and manage project tasks, manage project knowledge, monitor, and control project tasks, perform integration change management and how the project will close.

4.1.2 Develop Project Charter

The project charter is a formal document that authorizes the existence of a project and provides it with a clear definition, purpose, and direction. It is typically created at the beginning of a project and serves as a critical reference point throughout its lifecycle. The project charter outlines the project's objectives, scope, stakeholders, roles and responsibilities, timeline, and other key information.

Charts 6: Project Charter (Source: E. Torres, 2023)

PROJECT CHARTER	
Date	Project Name
November 1, 2023	Construction of new residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize
Knowledge Areas / Processes	Application Area (Sector / Activity)
Knowledge areas: <ul style="list-style-type: none"> - Project Integration Management - Project Scope Management - Project Time Management - Project Cost Management 	Residential Building – Construction

<ul style="list-style-type: none"> - Project Quality Management - Project Human Resource Management - Project Communications Management - Project Risk Management - Project Procurement Management - Project Stakeholders Management <p>Process groups: Initiating, Planning, Executing, Monitoring & Controlling, Closing</p>	
Start Date	Finish Date
September 30, 2024	March 30, 2025
Project Objectives (General and Specific)	
<p>General Objective: To plan, manage, and execute the construction of a high-quality residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize</p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> 1. Architectural Excellence: Design and construct the residential building at Parcel 1757 Celeste Gardens, with a focus on architectural excellence, ensuring a visually appealing and aesthetically pleasing structure. 2. Structural Integrity: Ensure the structural integrity of the residential building by adhering to engineering standards and best practices, guaranteeing a safe and durable living space for occupants. 3. Compliance with Local Regulations: Strictly adhere to local building codes and regulations throughout the construction process to obtain all necessary permits and approvals, ensuring legal compliance and project sustainability. 4. Timely Project Delivery: Develop and adhere to a well-defined project timeline, efficiently managing construction activities to ensure the timely completion of the residential building at Parcel 1757 Celeste Gardens. 5. Cost-Effective Construction: Implement effective cost management strategies to optimize the use of resources and materials, ensuring that the construction project remains within the specified budget without compromising quality. 	

6. **Environmental Sustainability:** Integrate sustainable construction practices and materials to minimize the environmental impact of the residential building, promoting energy efficiency, and environmental responsibility.
7. **Stakeholder Satisfaction:** Engage with and address the needs and concerns of stakeholders, including future occupants, local communities, and regulatory authorities, to ensure overall satisfaction and positive community impact.
8. **Quality Assurance:** Implement a rigorous quality assurance program to monitor and control the construction processes, ensuring that the residential building meets or exceeds industry standards and client expectations.
9. **Safety Standards:** Prioritize the safety of construction workers and all involved parties by strictly adhering to occupational health and safety standards throughout the construction phases.
10. **Community Integration:** Foster positive community relations by communicating transparently, addressing community concerns, and incorporating feedback into the construction process to enhance community integration and acceptance.

Project Purpose or Justification (Merit and Expected Results)

The purpose of the project is to plan, manage, and execute the construction of a high-quality residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize. This undertaking aims to provide a well-designed and structurally sound living space that aligns with the needs and preferences of future occupants. The project seeks to contribute positively to the community by enhancing the local real estate landscape and providing a safe, aesthetically pleasing, and sustainable residential environment.

Description of Product or Service to be generated by the Project – Project Final Deliverables

The project aims to generate a high-quality residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize. The residential building will serve as a modern and comfortable living space, providing essential amenities and adhering to the highest standards of construction, design, and sustainability.

1. **Completed Residential Building:**
 - a. A fully constructed, architecturally designed residential building meeting all specifications outlined in the project plan and adhering to local building codes and regulations.
2. **Architectural Plans and Designs:**
 - a. Detailed architectural plans and designs showcasing the layout, structural elements, and aesthetic features of the residential building.
3. **Structural Engineering Documentation:**
 - a. Comprehensive structural engineering documentation ensuring the structural integrity of the building, including calculations, drawings, and specifications.
4. **Legal Compliance Documents:**
 - a. All necessary permits, approvals, and legal compliance documentation obtained from relevant authorities throughout the construction process.
5. **Project Timeline and Progress Reports:**
 - a. A detailed project timeline outlining key milestones and progress reports documenting the evolution of the construction from initiation to completion.
6. **Budget and Expenditure Reports:**

- a. Transparent and comprehensive reports detailing the budget allocation, expenditures, and financial management throughout the project's lifecycle.
- 7. **Quality Assurance and Inspection Reports:**
 - a. Documentation of a rigorous quality assurance program, including inspection reports ensuring that construction adheres to industry standards and project specifications.
- 8. **Environmental Sustainability Report:**
 - a. Documentation of sustainable construction practices and materials utilized, with an emphasis on energy efficiency, waste reduction, and environmentally responsible building methods.
- 9. **Occupancy Ready Residential Units:**
 - a. Residential units ready for occupancy, complete with all necessary utilities, fixtures, and finishes to meet the comfort and functional needs of future occupants.
- 10. **Community Integration Report:**
 - a. Documentation of efforts made to address community concerns, foster positive relations, and integrate community feedback into the construction process.
- 11. **Safety Compliance Documentation:**
 - a. Documentation confirming adherence to occupational health and safety standards throughout the construction phases, prioritizing the well-being of construction workers and future occupants.
- 12. **Final Inspection and Acceptance Certificates:**
 - a. Certificates of final inspection and acceptance, confirming that the completed residential building meets all specified requirements and is ready for occupancy.


Assumptions

1. Weather Conditions
2. Regulatory Approvals
3. Stakeholder Cooperation
4. Availability of Skilled Labor
5. Materials Availability
6. Budget Accuracy
7. Technological Dependencies
8. Community Support
9. Safety Precautions
10. Timely Decision-Making
11. Subcontractor Performance
12. Economic Stability

Constraints

1. Budget
2. Time
3. Regulatory and Permitting
4. Environmental
5. Resource Availability
6. Land Use Restrictions
7. Community Concerns
8. Weather Conditions
9. Technical Constraints

10. Contractual Agreements 11. Economic Fluctuations 12. Health and Safety Regulations		
Preliminary Risks		
1. Weather Related Risks 2. Regulatory Approval Delays 3. Budget Overruns 4. Designs Changes 5. Supply Chain Disruptions 6. Community Opposition 7. Contractual Disputes		
Budget		
1. Project Planning \$10,000.00 2. Architectural Design \$14,350.00 3. Foundation Construction \$41,300.00 4. Utilities Installation \$39,800.00 5. Construction \$160,950.00 6. Landscaping \$20,800.00 7. Project Closeout \$9,750.00 8. Project Management \$126,500.00		
Total \$423,450.00		
Milestones and Dates		
Milestones	Start Date	End Date
Architectural Design and Engineering Approval	September 30, 2024	October 30, 2024
Obtaining Permits and Approvals	October 30, 2024	November 30, 2024
Foundation and Structural Completion	November 30, 2024	January 30, 2025
Commencement of Vertical Construction	January 30, 2025	February 28, 2025
Enclosed Structure	January 30, 2025	February 28, 2025
Interior & Exterior Finishes	February 28, 2025	February 28, 2025
Mechanical and Electrical Systems	February 28, 2025	March 15, 2025
Utilities Installations	March 15, 2025	March 30, 2025
Quality Assurance Inspection	March 30, 2025	March 30, 2025
Project Completion	March 30, 2025	March 30, 2025
Relevant Historical Information		
Not Applicable		
Stakeholders		
Direct Stakeholders:		

<ol style="list-style-type: none"> 1. Final Graduation Project Tutor 2. Final Graduation Project Author 3. Project Owner 4. Architects/Designer 5. Contractors and Subcontractors 6. Project Managers 7. Regulatory Authorities 8. Construction Workers and Laborer 9. Residents and Communities 10. Financial Institutions <p>Indirect Stakeholders:</p> <ol style="list-style-type: none"> 1. Suppliers and materials providers 2. Legal and Environmental consultants 3. Real Estate Agents 4. Utility Service Providers 5. Environmental agencies 6. Insurance Providers <p>Community Groups</p>	
<p>Project Manager: Elias Torres</p>	<p>Signature: </p>
<p>Authorized by:</p>	<p>Signature:</p>

4.1.3 Project Management Plan

As per PMBOK 6th Edition (2017), the Project Management Plan is defined as the document that describes how the project will be executed, monitored, and controlled.

a. Change Control

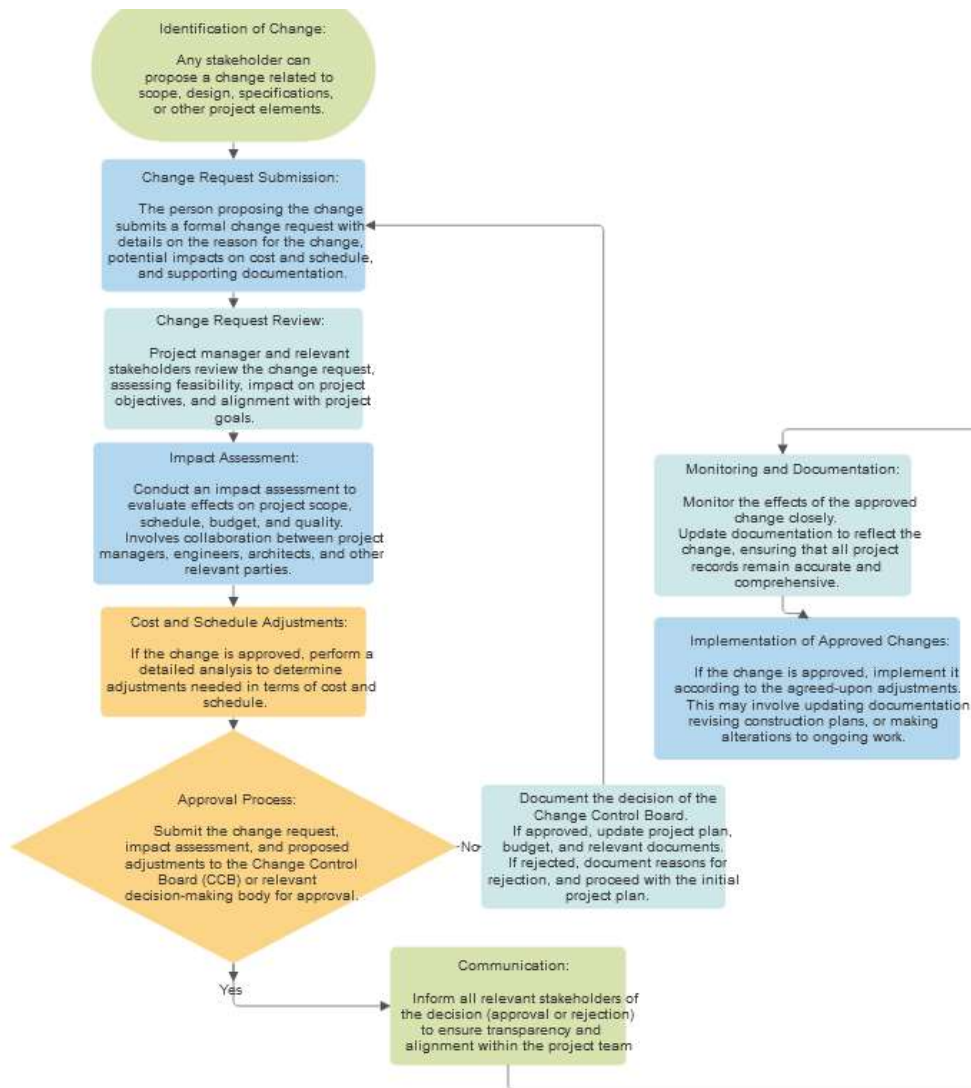
Change control is a construction project that refers to the process of managing and controlling changes to the project scope, design, or other aspects that may impact the project's time, cost, or quality. The purpose of change control is to ensure that changes are rigorously evaluated, documented, approved, and implemented in a systematic and controlled manner. The project will follow the below structured change control process:

1. Identification of change: Any stakeholder, whether internal or external, can propose a change. Change can be related to scope design, specifications, or other project elements.
2. Change request submission: The person proposing the change submits a formal change request. This request should include details such as the reason for the change, potential impacts on cost and schedule, and any supporting documentation.
3. Change request review: The project manager and relevant stakeholders review the change request. This includes assessing its feasibility, impact on project objectives, and alignment with the project's goals.
4. Impact assessment: An impact assessment is conducted to evaluate the effects of the proposed change on the project' scope, schedule, budget, and quality. This assessment will involve collaboration between project managers, engineers, architects, and other relevant parties.
5. Cost and schedule adjustments: If the change is approved, a detailed analysis is performed to determine the adjustments needed in terms of cost and schedule. This ensures that the project remains within its constraints and objectives.
6. Approval process: The change request, along with the impact assessment and proposed adjustments, is submitted to the Change Control Board (CCB) or relevant decision-making body for approval.
7. Documentation of approval or rejection: The decision of the change control board is documented. If approved, the project plan, budget, and other relevant documents

are updated accordingly. If rejected, reasons for rejection are documented, and the project proceeds as initially planned.

8. **Communication:** All relevant stakeholders are informed of the decision, whether the change is approved or rejected. This ensures transparency and alignment throughout the project team.
9. **Implementation of approved changes:** If the change I approved, it is implemented according to the agreed-upon adjustments. This may involve updating the documentation, revising construction plans, or making alterations to ongoing work.
10. **Monitoring and documentation:** The effects of the approved change are monitored closely. Documentation is updated to reflect the change, ensuring that all project records remain accurate and comprehensive.

Figure 14 Change Control Process Flow (Source: E. Torres, 2023)



b. Lessons Learned

A lesson learned register will be used to document insights, experiences, and knowledge gained throughout the course of the project lifecycle.

Charts 7: Lessons Learned Register (Source: E. Torres, 2023)

Project Name:	Residential Building Construction		
Location:	Parcel 1757 Celeste Gardens, Ladyville		
Project Duration:	September 26, 2024 to March 30, 2025		

Lesson Learned Details					
Lesson Number	Date Identified	Project Phase	Lesson Description	Impact of Project	Action Taken

c. Project Closure

Project closure is a critical phase in project management that involves completing all project activities, obtaining stakeholder acceptance, and formally closing the project.

Project Closure Process:

1. Final Deliverable Verification
2. Quality Assurance Review
3. Regulatory Compliance Check
4. Financial Closeout
5. Stakeholder Acceptance
6. Documentation Completion
7. Release of project Resources

8. Lesson Learned Review
9. Project Closeout Report
10. Final Stakeholder Communication
11. Equipment and Asset Handover
12. Archiving of Project Documentation
13. Closure of Project Accounts
14. Celebration and Recognition
15. Post- Project Evaluation
16. Formal Project Closure
17. Transition to Operations and Maintenance
18. Client Handover

4.2 Scope Management Plan

4.2.1 Scope Management Introduction

The objective of project scope management is to ensure that a project includes all the work required to complete its objectives while excluding any work that is not necessary. It involves defining, controlling, and managing what is and is not part of the project. The primary goals of the project scope management include collecting requirements, defining scope, creating WBS, WBS dictionary, roles, and responsibilities, validating scope, and controlling scope.

4.2.2 Collect Requirements

Collecting requirements is a crucial step in the project management process. It involves gathering information from stakeholders to understand their needs, expectations, and constraints. For the construction of a residential building at Parcel 1757 Celeste Gardens, the requirement collected will span various aspects of the projects.

Charts 8 Requirements Traceability Matrix (Source: E. Torres, 2023)

ID	Requirements Description	Business Needs, Opportunities, Goals, Objectives	Project Objectives	Verification
R1	Architectural Design	Improved Aesthetics	Achieve a modern design	Design Approval by Client
R2	Foundation and main structure Construction	Structural Integrity	Achieve Building code compliance	Inspection by Structural Engineer
R3	Utilities Installation	Access to Essential Services	Ensure reliable water electricity and sewer systems	Utility service provider confirmation
R4	Interior Finishes	Comfort and Functionality	Achieve high quality interior	Quality inspection by interior designer
R5	Environmental Compliance	Minimize Environmental Impact	Achieve Environmental Compliance Plan (ECP) from DOE	Certification from DOE
R6	Project Budget Management	Cost Control and Efficiency	Achieve Cost savings where possible	Budget Review and approval
R7	Timeline Adherence	Timely Project Completion	Achieve on time project completion	Project Timeline Review and Approval

4.2.3 Define Scope

Project Scope Statement

Project Description

The project entails the construction of a residential building designed to meet the growing demand for high-quality housing in the Ladyville Community. This project aims to create a modern and comfortable living space that aligns with aesthetic, functional, and environmental standards.

Project Deliverables:

1. Architectural design drawings and plans
2. Completed foundation and main structure meeting structural integrity standards.
3. Functional and compliant utilities infrastructure
4. Finished interior spaces meeting design specifications.
5. Landscaped and aesthetically pleasing surroundings

Acceptance Criteria

1. Architectural designs approved by client
2. Foundation and main structure inspected and approved by the structural engineer
3. Utilities infrastructure confirmed by relevant service providers
4. The interior finishes meeting the design and quality standards
5. Landscaping approval from landscape architect

Project Exclusions

1. Land Acquisition: The project does not include the acquisition of additional land beyond Parcel 1757 Celeste Gardens. Any requirement related to obtaining additional land will not be a part of this project's scope.

2. **Demolition of Existing Structures:** The demolition of existing structures on Parcel 1757 Celeste Gardens is not included in this project. The project assumes a clear and ready-to-build site.
3. **Furnishing and Personal Items:** The project excludes the provision of furnishings, personal items, and decorative elements within the residential building. This includes but is not limited to furniture, appliances, and personal belongings of future residents.
4. **Future Maintenance and Repairs:** Ongoing maintenance and repairs of the residential building beyond the completion of the construction projects are not within the scope. Future maintenance responsibilities will be transferred to the relevant parties upon project completion.
5. **Legal Fees and Permits:** Legal fees, permit costs, and other legal obligations related to the project are excluded from the project scope. The responsibility for obtaining necessary permits and addressing legal requirements lies with the project owner.
6. **Additional Unforeseen Costs:** Any additional cost arising from unforeseen circumstances, changes in regulatory requirements, or force majeure events are excluded from the project scope. The project is based on known factors at the time of planning.
7. **Community Amenities:** The project does not encompass the development of community amenities or facilities beyond the immediate residential building and its surroundings. Any community-related projects are beyond the scope of this initiative.

Constraints

1. Budgetary Constraints
2. Time Constraints
3. Regulatory Constraints
4. Resources Constraints
5. Community Impact Constraints

Assumptions

1. Stable Economic Conditions
2. Cooperation of Stakeholders
3. Weather Conditions
4. Availability of Utilities
5. Accurate Project Information
6. Uninterrupted Site Access
7. Compliance with Design Specifications

4.2.4 Create WBS

Figure 15 Work Breakdown Structure (Source: E. Torres, 2023)



4.2.5 WBS Dictionary

The PMBOK Guide 7th Edition defines WBS Dictionary as a document that provides detailed deliverables, activity, and scheduling information about each component in the work breakdown structure. Below is the WBS Dictionary for the construction of a residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize.

Charts 9 WBS Dictionary (Source: E. Torres, 2023)

Level	WBS Code	WBS Name	Description/Definition	Budget (BZDS)	Resources
0	1	Construction of Residential Building	Entire project encompassing all phases	\$ 296,950.00	
1	1.1	Project Planning	Planning phase of the construction project	\$ 10,000.00	Project Manager, Planner
2	1.1.1	Develop Project Plan	Create a comprehensive project management plan	\$ 3,500.00	Project Manager, Planner

Level	WBS Code	WBS Name	Description/Definition	Budget (BZD\$)	Resources
2	1.1.2	Define Scope and Objectives	Clearly outline project scope and objectives	\$ 3,500.00	Project Manager, Team
2	1.1.3	Stakeholder Identification and Analysis	Identify and analyse stakeholders and their needs	\$ 1,500.00	Project Manager, Analyst
2	1.1.4	Risk Assessment and Mitigation Planning	Identify project risks and plan risk mitigation	\$ 1,500.00	Project Manager, Risk mgr.
1	1.2	Architectural Design	Design phase of the residential building	\$ 14,350.00	
2	1.2.1	Conceptual Design	Develop initial design concepts for the building	\$ 3,500.00	Architect, Design Team
2	1.2.2	Detailed Design	Create detailed architectural plans and specifications	\$ 4,500.00	Architect, Design Team
2	1.2.3	Design Review and Approval	Review and obtain approval for the architectural design	\$ 3,850.00	Architect, Stakeholders
2	1.2.4	Design Documentation	Create comprehensive documentation of the architectural design	\$ 2,500.00	Architect, Design Team
1	1.3	Foundation Construction	Construction of the building's foundation	\$ 41,300.00	
2	1.3.1	Excavation and Site Preparation	Clearing the site and excavating for foundation construction	\$ 5,800.00	Construction Team
2	1.3.2	Foundation Design and Layout	Design and layout of the foundation based on architectural plans	\$ 3,500.00	Architect, Construction Team
2	1.3.3	Concrete Pouring	Pouring concrete to form the foundation	\$ 28,500.00	Construction Team
2	1.3.4	Foundation Inspection and Approval	Inspection of the completed foundation and obtaining approval	\$ 3,500.00	Inspector, Project Manager
1	1.4	Utilities Installation	Installation of essential utilities for the residential building	\$ 39,800.00	

Level	WBS Code	WBS Name	Description/Definition	Budget (BZDS)	Resources
2	1.4.1	Water System Installation	Installation of water supply systems	\$ 3,500.00	Utilities Team
2	1.4.2	Electrical System Installation	Installation of electrical systems	\$ 14,800.00	Utilities Team
2	1.4.3	Sewer System Installation	Installation of sewer systems	\$ 18,000.00	Utilities Team
2	1.4.4	Utilities Inspection and Approval	Inspection of installed utilities and obtaining approval	\$ 3,500.00	Inspector, Utilities Team
1	1.5	Construction	Actual construction of the residential building	\$ 160,950.00	
2	1.5.1	Framing	Construction of the building's frame	\$ 28,500.00	Construction Team
2	1.5.2	Roofing	Installation of the roof structure	\$ 35,000.00	Construction Team
2	1.5.3	Exterior Finishes	Application of exterior finishes	\$ 18,500.00	Construction Team, Finishers
2	1.5.4	Interior Finishes	Application of interior finishes	\$ 24,000.00	Construction Team, Finishers
2	1.5.5	Plumbing and HVAC	Installation of plumbing and HVAC systems	\$ 16,750.00	Construction Team, HVAC Team
2	1.5.6	Electrical Wiring and Fixtures	Wiring and installation of electrical fixtures	\$ 15,800.00	Construction Team, Electricians
2	1.5.7	Flooring Installation	Installation of flooring materials	\$ 18,900.00	Construction Team
2	1.5.8	Interior Inspection and Approval	Inspection of interior spaces and obtaining approval	\$ 3,500.00	Inspector, Project Manager
1	1.6	Landscaping	Enhancing the outdoor surroundings of the residential building	\$ 20,800.00	
2	1.6.1	Lawn Installation	Planting and nurturing of lawn areas	\$ 4,800.00	Landscaping Team
2	1.6.2	Planting and Garden Design	Design and planting of gardens	\$ 5,000.00	Landscaping Team, Designer

Level	WBS Code	WBS Name	Description/Definition	Budget (BZD\$)	Resources
2	1.6.3	Hardscape Installation	Installation of hardscape elements (e.g., pathways, patios)	\$ 7,500.00	Landscaping Team
2	1.6.4	Landscaping Inspection and Approval	Inspection of landscaped areas and obtaining approval	\$ 3,500.00	Inspector, Landscaping Team
1	1.7	Project Closeout	Finalizing and closing the construction project	\$ 9,750.00	
2	1.7.1	Final Inspection	Comprehensive inspection of the completed project	\$ 3,500.00	Inspector, Project Manager
2	1.7.2	Documentation Completion	Completion and organization of all project documentation	\$ 3,850.00	Project Manager, Team
2	1.7.3	Handover to Client	Formal handover of the residential building to the client	\$ 1,200.00	Project Manager, Client
2	1.7.4	Post-Project Evaluation	Evaluation and review of the project's performance	\$ 1,200.00	Project Manager, Team
1	1.8	Project Management	Application of project management processes and procedures to the entire project lifetime	\$ 126,500.00	
2	1.8.1	Meetings	Meeting with all stakeholders for overall project communication (Update, Inform and Decision Making)	\$ 77,000.00	Project Manager, Team
2	1.8.2	Reports	Administer project reports such as daily logs, weekly reports, and monthly progress reports	\$ 11,000.00	Project Manager, Team
2	1.8.3	Monitoring and controlling	Daily Project Planning activities, scheduling throughout the project lifetime	\$ 38,500.00	Project Manager, Team

4.2.6 Roles and Responsibilities

The below roles and responsibilities provide a framework for organizing and managing the diverse tasks involved in the construction project. The clear delineation of responsibilities helps ensure accountability and effective coordination among team members.

Charts 10 Roles and Responsibilities (Source: E. Torres, 2023)

Project Role	Responsibilities
Project Manager	<ul style="list-style-type: none"> Develop and maintain the project plan Coordinate and communicate with stakeholders Manage project resources and budget Monitor project progress and address issues Approve project deliverables and changes
Architect	<ul style="list-style-type: none"> Develop conceptual and detailed architectural designs Collaborate with the project manager and construction team Ensure compliance with building codes and regulations Review and approve design documentation
Construction Manager	<ul style="list-style-type: none"> Manage the construction team and subcontractors Ensure construction activities align with the project plan Monitor safety and quality on the construction site Coordinate with utilities and landscaping teams
Utilities Engineer	<ul style="list-style-type: none"> Design utilities systems based on project requirements Coordinate installation activities with the construction team Ensure compliance with relevant standards and regulations Inspect and approve utilities installations
Interior Designer	<ul style="list-style-type: none"> Collaborate with the architect on interior design concepts Select finishes, fixtures, and furnishings Ensure interior spaces meet design specifications Participate in interior inspections
Landscape Architect	<ul style="list-style-type: none"> Plan and design outdoor spaces, including lawns and gardens Collaborate with the construction and utilities teams Oversee the installation of landscaping elements Inspect and approve landscaped areas

Inspector	<ul style="list-style-type: none"> Conduct inspections at various project stages Verify compliance with building codes and regulations Approve or reject completed work based on standards Provide feedback to the project manager
Client/Project Owner	<ul style="list-style-type: none"> Approve project plans, designs, and budgets Provide input and feedback throughout the project Attend key project milestones, such as inspections and handover Approve the final project and assume ownership
Finishers	<ul style="list-style-type: none"> Execute tasks related to their specialization (e.g., flooring installation) Ensure high-quality finishes in line with project specifications Collaborate with the construction manager and interior designer
Team Members	<ul style="list-style-type: none"> Execute tasks assigned by the project manager and construction manager Follow safety guidelines on the construction site Collaborate with specialized teams for various project phases Report progress and issues to project management

4.2.7 Validate Scope

Validation of scope is a crucial step in the project management process. It ensures that the project deliverables meet the specific requirement, and that the client or stakeholder are satisfied, which they can either accept or reject. For this project validating the scope will use the Requirement Traceability Matrix (RTM). The RTM serves as a valuable tool for ensuring that each requirement, as outlined in the project's scope, is met. The RTM provides a systematic way to trace and validate requirements through the project life cycle.

4.2.8 Control Scope

Scope control is a critical aspect of project management that involves managing changes and ensuring that the project stays on track in terms of its defined objectives and deliverables. It encompasses a process to monitor, evaluate, and control changes to the

project scope to prevent scope creeps and maintain alignment with the proper plan. To control this process, it will ensure that monitoring of variances and change request procedures are followed. Effective monitoring of variances in the project scope will include regular progress reviews, performance metrics, stakeholder communication, and quality assurance inspections. Change request procedure will include key components such as change request submission, change request evaluation, approval process, documentation, and communication.

4.3 Schedule Management Plan

4.3.1 Schedule Management Introduction

According to the PMBOK Guide 7th edition, Schedule Management Plan is a component of the project or program management plan that establishes the criteria and the activities for developing, monitoring, and controlling the schedule.

4.3.2 Schedule Management Approach

The Schedule Management Plan will leverage knowledge and insights from past projects, utilizing detailed work packages outlined in the WBS as its foundation. The initial steps will involve a thorough review of work packages to ensure alignment with project objectives. Subsequently, activities are sequences based on the logical dependences, and duration will be estimated, drawing upon historical data and expert judgement. Resource allocation follows, considering availability and skillsets. Critical Path Analysis identifies key activities crucial for project completion, and the schedule baseline is established with stakeholder approval. Continuous monitoring and control of the schedule involves regular

updates, performance reporting, and corrective action as needed. The holistic approach aims to develop and maintain a realistic schedule while facilitating adaptability throughout the project lifecycle.

4.3.3 Define Activities

The identification of activities drew upon expert judgement and insights gathered from previous project. Furthermore, the relationships between activities were detailed, specifying predecessors and successors, to comprehensively grasp the interdependences of all tasks within the project.

Charts 11 Activity List (Source: E. Torres, 2023)

Activity Listing			Activity Attributes		
Activity ID	Activity Name	Activity Description	Predecessor Activity ID	Successor Activity ID	Resources Requirements
1.1.1	Develop Project Planning	Create a comprehensive project management plan			Project Manager, Planner
1.1.2	Define Scope and Objectives	Clearly outline project scope and objectives	1.1.1		Project Manager, Team
1.1.3	Stakeholder Identification and Analysis	Identify and analyse stakeholders and their needs	1.1.1		Project Manager, Analyst
1.1.4	Risk Assessment and Mitigation Planning Meetings	Identify project risks and plan risk mitigation	1.1.1		Project Manager, Risk Mgr.

Activity Listing			Activity Attributes		
Activity ID	Activity Name	Activity Description	Predecessor Activity ID	Successor Activity ID	Resources Requirements
1.2.1	Conceptual Design	Develop initial design concepts for the building	1.1.4	1.2.2	Architect, Design Team
1.2.2	Detailed Design	Create detailed architectural plans and specifications	1.2.1	1.2.3	Architect, Design Team
1.2.3	Design Review and Approval	Review and obtain approval for the architectural design	1.2.2	1.2.4	Architect, Stakeholders
1.2.4	Design Documentation	Create comprehensive documentation of the architectural design	1.2.3		Architect, Design Team
1.3.1	Excavation and Site Preparation	Clearing the site and excavating for foundation construction	1.2.4	1.3.2	Construction Team
1.3.2	Foundation Design and Layout	Design and layout of the foundation based on architectural plans	1.3.1	1.3.3	Architect, Construction Team
1.3.3	Concrete Pouring	Pouring concrete to form the foundation	1.3.2	1.3.4	Construction Team
1.3.4	Foundation Inspection and Approval	Inspection of the completed foundation and obtaining approval	1.3.3		Inspector, Project Manager
1.4.1	Water System Installation	Installation of water supply systems	1.3.4	1.4.2	Utilities Team

Activity Listing			Activity Attributes		
Activity ID	Activity Name	Activity Description	Predecessor Activity ID	Successor Activity ID	Resources Requirements
1.4.2	Electrical System Installation	Installation of electrical systems	1.4.1	1.4.3	Utilities Team
1.4.3	Sewer System Installation	Installation of sewer systems	1.4.2	1.4.4	Utilities Team
1.4.4	Utilities Inspection and Approval	Inspection of installed utilities and obtaining approval	1.4.3		Inspector, Utilities Team
1.5.1	Framing	Construction of the building's frame	1.4.4	1.5.2	Construction Team
1.5.2	Roofing	Installation of the roof structure	1.5.1	1.5.3	Construction Team
1.5.3	Exterior Finishes	Application of exterior finishes	1.5.2	1.5.4	Construction Team, Finishers
1.5.4	Interior Finishes	Application of interior finishes	1.5.3	1.5.5	Construction Team, Finishers
1.5.5	Plumbing and HVAC	Installation of plumbing and HVAC systems	1.5.4	1.5.6	Construction Team, HVAC Team
1.5.6	Electrical Wiring and Fixtures	Wiring and installation of electrical fixtures	1.5.5	1.5.7	Construction Team, Electricians
1.5.7	Flooring Installation	Installation of flooring materials	1.5.6	1.5.8	Construction Team
1.5.8	Interior Inspection and Approval	Inspection of interior spaces and obtaining approval	1.5.7		Inspector, Project Manager

Activity Listing			Activity Attributes		
Activity ID	Activity Name	Activity Description	Predecessor Activity ID	Successor Activity ID	Resources Requirements
1.6.1	Lawn Installation	Planting and nurturing of lawn areas	1.5.8	1.6.2	Landscaping Team
1.6.2	Planting and Garden Design	Design and planting of gardens	1.6.1	1.6.3	Landscaping Team, Designer
1.6.3	Hardscape Installation	Installation of hardscape elements (e.g., pathways, patios)	1.6.2	1.6.4	Landscaping Team
1.6.4	Landscaping Inspection and Approval	Inspection of landscaped areas and obtaining approval	1.6.3		Inspector, Landscaping Team
1.7.1	Final Inspection	Comprehensive inspection of the completed project	1.6.4	1.7.2	Inspector, Project Manager
1.7.2	Documentation Completion	Completion and organization of all project documentation	1.7.1	1.7.3	Project Manager, Team
1.7.3	Handover to Client	Formal handover of the residential building to the client	1.7.2	1.7.4	Project Manager, Client
1.7.4	Post-Project Evaluation	Evaluation and review of the project's performance	1.7.3		Project Manager, Team
1.8.1	Meetings	Meeting with all stakeholders for overall project communication (Update, Inform and Decision Making)	1.1.1		Project Manager, Team

Activity Listing			Activity Attributes		
Activity ID	Activity Name	Activity Description	Predecessor Activity ID	Successor Activity ID	Resources Requirements
1.8.2	Reports	Administer project reports such as daily logs, weekly reports, and monthly progress reports	1.1.1		Project Manager, Team
1.8.3	Monitoring and controlling	Daily Project Planning activities, scheduling throughout the project lifetime	1.1.1		Project Manager, Team

4.3.4 Sequence Activities

All the activities were placed in their subsequent sequence using their determined relationships.

4.3.5 Estimate Activity Durations

In estimating the duration for a building construction project, a dual approach was adopted, combining expert judgment and past project data. Recognizing the inherent complexities in construction, where variables like site conditions and unforeseen challenges impact timeline, seasoned professionals in construction provide insights based on their expertise. Simultaneously, historical data from comparable projects was leveraged to enhance accuracy, considering the specific intricacies associated with building construction. This hybrid method acknowledges the dynamic nature of construction projects,

emphasizing the need for both expert perspective and empirical insights to generate reliable duration estimates for effective project planning and management.

4.3.6 Develop Schedule

Figure 16 Project Schedule (Source: E. Torres, 2023)

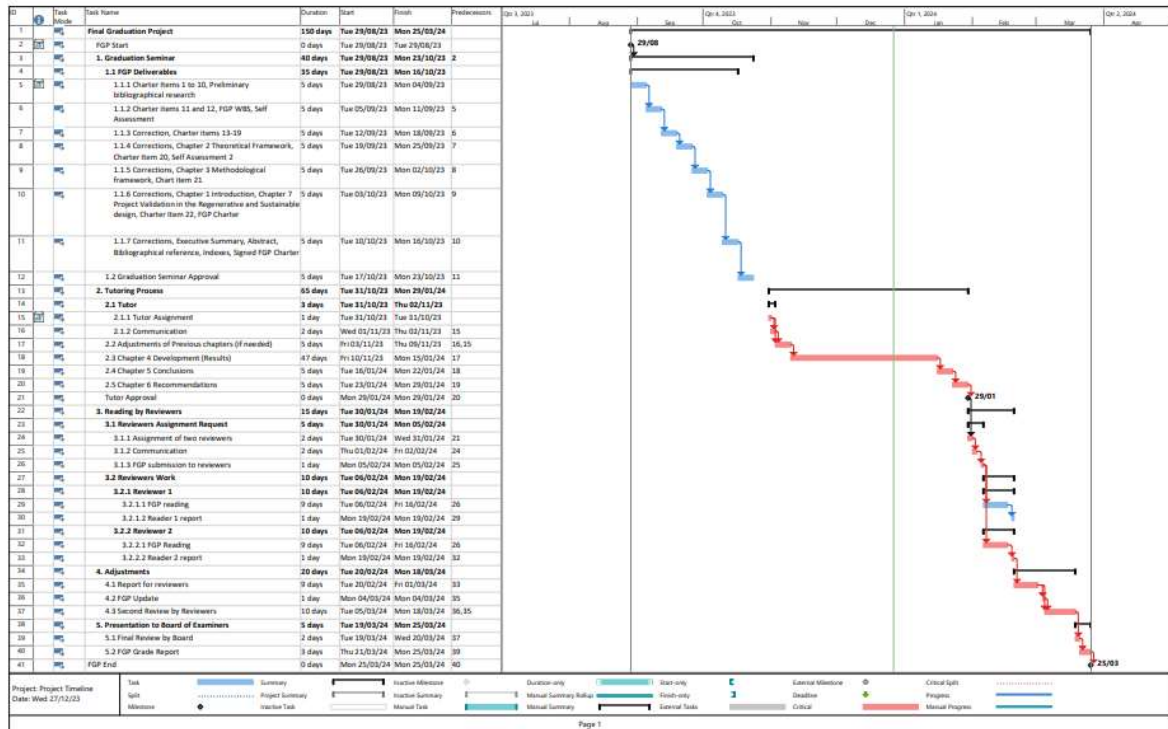
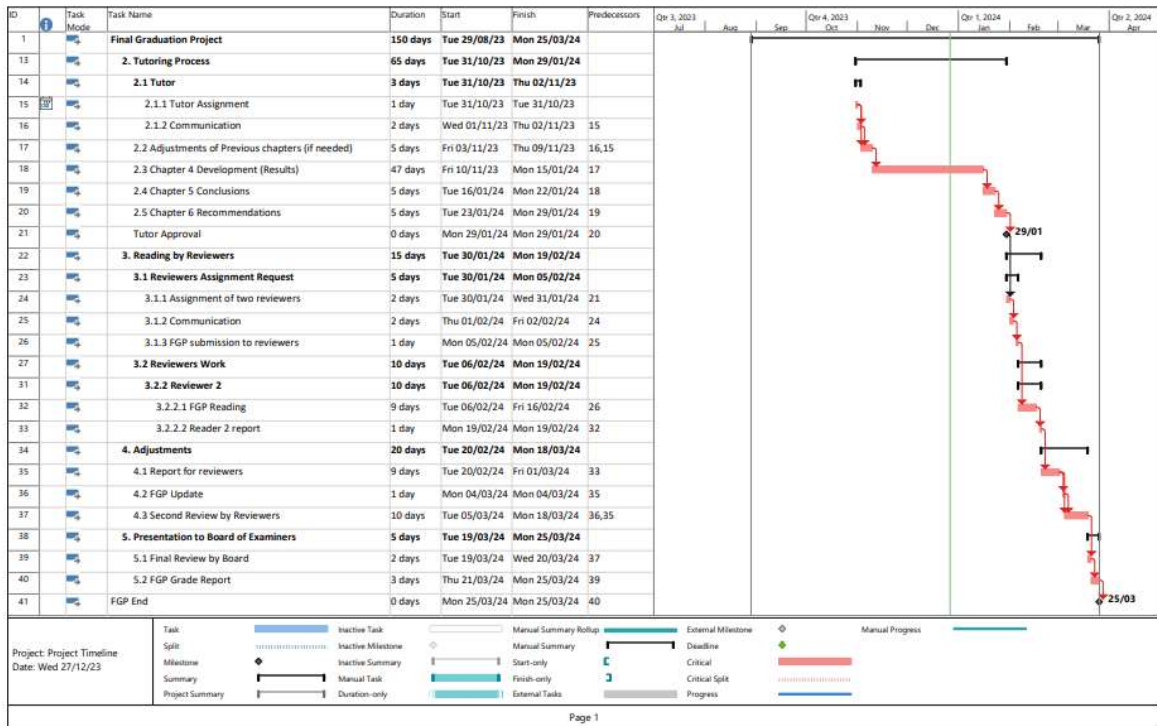


Figure 17 Project Critical Path (Source: E. Torres, 2023)



Monitoring and controlling the critical path on the project schedule are a crucial aspect ensuring timely and efficient project delivery. The project team will employ a robust system for tracking and managing the critical path, involving regular reviews and updates. Continuous monitoring will involve comparing the actual progress against the baseline schedule, with a specific focus on the critical path activities. Regular communication and collaboration among the team members will play a critical role in addressing challenges promptly, allowing for effective control over the critical path and consequently the overall project schedule.

4.3.7 Project Schedule Changes

According to the Project Management Institute (PMI), project schedule changes refer to modifications made to the project’s timeline, sequence of activities, or milestones. These

changes can result from various factors such as unforeseen risks, shifts in project scope, resources constraint, or adjustments to stakeholder priorities. Managing project schedule changes effectively is critical for maintaining project alignment with goals and ensuring successful delivery. The project will implement a structured change control process to monitor and manage schedule changes. See Figure 14 Change Control Process.

4.4 Cost Management Plan

4.4.1 Cost Management Introduction

Cost management is a critical aspect of project management, encompassing the processes and activities that enable the project team to make informed financial decisions. It involves estimating the cost associated with the project activities, developing a budget, and systematically controlling expenditures to prevent cost overruns.

4.4.2 Estimate Cost

The estimation of costs for the construction of the residential building project will employ a combination of bottom-up estimating and expert judgment. This dual approach was chosen to enhance the accuracy and reliability of cost estimates, recognizing the unique and intricate nature of the construction process. By integrating bottom-up estimating with expert judgement, the residential building project aims to develop a cost estimate that is both detailed and informed, facilitating more accurate budgeting and resource allocation. This hybrid approach aligns with the complex and dynamic nature of construction projects, enhancing the project's ability to manage costs effectively throughout its lifecycle.

Charts 12 Cost Estimate (Source: E. Torres, 2023)

Activity ID	Activity Name	Description	Resources	Unit	Rate (BZD\$)	Qty	Amount (BZD)
1.1.1	Develop Project Plan	Create a comprehensive project management plan	Project Manager, Planner	LS	\$ 3,500.00	1	\$ 3,500.00
1.1.2	Define Scope and Objectives	Clearly outline project scope and objectives	Project Manager, Team	LS	\$ 3,500.00	1	\$ 3,500.00
1.1.3	Stakeholder Identification and Analysis	Identify and analyse stakeholders and their needs	Project Manager, Analyst	LS	\$ 1,500.00	1	\$ 1,500.00
1.1.4	Risk Assessment and Mitigation Planning	Identify project risks and plan risk mitigation	Project Manager, Risk mgr.	LS	\$ 1,500.00	1	\$ 1,500.00
1.2.1	Conceptual Design	Develop initial design concepts for the building	Architect, Design Team	LS	\$ 3,500.00	1	\$ 3,500.00
1.2.2	Detailed Design	Create detailed architectural plans and specifications	Architect, Design Team	LS	\$ 4,500.00	1	\$ 4,500.00
1.2.3	Design Review and Approval	Review and obtain approval for the architectural design	Architect, Stakeholders	LS	\$ 3,850.00	1	\$ 3,850.00
1.2.4	Design Documentation	Create comprehensive documentation of the architectural design	Architect, Design Team	LS	\$ 2,500.00	1	\$ 2,500.00

Activity ID	Activity Name	Description	Resources	Unit	Rate (BZD\$)	Qty	Amount (BZD)
1.3.1	Excavation and Site Preparation	Clearing the site and excavating for foundation construction	Construction Team	LS	\$ 5,800.00	1	\$ 5,800.00
1.3.2	Foundation Design and Layout	Design and layout of the foundation based on architectural plans	Architect, Construction Team	LS	\$ 3,500.00	1	\$ 3,500.00
1.3.3	Concrete Pouring	Pouring concrete to form the foundation	Construction Team	LS	\$ 28,500.00	1	\$ 28,500.00
1.3.4	Foundation Inspection and Approval	Inspection of the completed foundation and obtaining approval	Inspector, Project Manager	LS	\$ 3,500.00	1	\$ 3,500.00
1.4.1	Water System Installation	Installation of water supply systems	Utilities Team	LS	\$ 3,500.00	1	\$ 3,500.00
1.4.2	Electrical System Installation	Installation of electrical systems	Utilities Team	LS	\$ 14,800.00	1	\$ 14,800.00
1.4.3	Sewer System Installation	Installation of sewer systems	Utilities Team	LS	\$ 18,000.00	1	\$ 18,000.00
1.4.4	Utilities Inspection and Approval	Inspection of installed utilities and obtaining approval	Inspector, Utilities Team	LS	\$ 3,500.00	1	\$ 3,500.00
1.5.1	Framing	Construction of the building's frame	Construction Team	LS	\$ 28,500.00	1	\$ 28,500.00

Activity ID	Activity Name	Description	Resources	Unit	Rate (BZD\$)	Qty	Amount (BZD)
1.5.2	Roofing	Installation of the roof structure	Construction Team	LS	\$ 35,000.00	1	\$ 35,000.00
1.5.3	Exterior Finishes	Application of exterior finishes	Construction Team, Finishers	LS	\$ 18,500.00	1	\$ 18,500.00
1.5.4	Interior Finishes	Application of interior finishes	Construction Team, Finishers	LS	\$ 24,000.00	1	\$ 24,000.00
1.5.5	Plumbing and HVAC	Installation of plumbing and HVAC systems	Construction Team, HVAC Team	LS	\$ 16,750.00	1	\$ 16,750.00
1.5.6	Electrical Wiring and Fixtures	Wiring and installation of electrical fixtures	Construction Team, Electricians	LS	\$ 15,800.00	1	\$ 15,800.00
1.5.7	Flooring Installation	Installation of flooring materials	Construction Team	LS	\$ 18,900.00	1	\$ 18,900.00
1.5.8	Interior Inspection and Approval	Inspection of interior spaces and obtaining approval	Inspector, Project Manager	LS	\$ 3,500.00	1	\$ 3,500.00
1.6.1	Lawn Installation	Planting and nurturing of lawn areas	Landscaping Team	LS	\$ 4,800.00	1	\$ 4,800.00
1.6.2	Planting and Garden Design	Design and planting of gardens	Landscaping Team, Designer	LS	\$ 5,000.00	1	\$ 5,000.00
1.6.3	Hardscape Installation	Installation of hardscape elements (e.g., pathways, patios)	Landscaping Team	LS	\$ 7,500.00	1	\$ 7,500.00
1.6.4	Landscaping Inspection and Approval	Inspection of landscaped areas and obtaining approval	Inspector, Landscaping Team	LS	\$ 3,500.00	1	\$ 3,500.00

Activity ID	Activity Name	Description	Resources	Unit	Rate (BZD\$)	Qty	Amount (BZD)
1.7.1	Final Inspection	Comprehensive inspection of the completed project	Inspector, Project Manager	LS	\$ 3,500.00	1	\$ 3,500.00
1.7.2	Documentation Completion	Completion and organization of all project documentation	Project Manager, Team	LS	\$ 3,850.00	1	\$ 3,850.00
1.7.3	Handover to Client	Formal handover of the residential building to the client	Project Manager, Client	LS	\$ 1,200.00	1	\$ 1,200.00
1.7.4	Post-Project Evaluation	Evaluation and review of the project's performance	Project Manager, Team	LS	\$ 1,200.00	1	\$ 1,200.00
1.8.1	Meetings	Meeting with all stakeholders for overall project communication (Update, Inform and Decision Making)	Project Manager, Team	LS	\$ 77,000.00	1	\$ 77,000.00
1.8.2	Reports	Administer project reports such as daily logs, weekly reports, and monthly progress reports	Project Manager Office Assistant	LS	\$ 11,000.00	1	\$ 11,000.00
1.8.3	Monitoring and controlling	Daily Project Planning activities, scheduling throughout the project lifetime	Project Manager, Team	LS	\$ 38,500.00	1	\$ 38,500.00
Grand Total \$(BZD)							\$ 423,450.00

Figure 19 Project Budget 1.3.3 - 1.5.6 (Source: E. Torres, 2023)

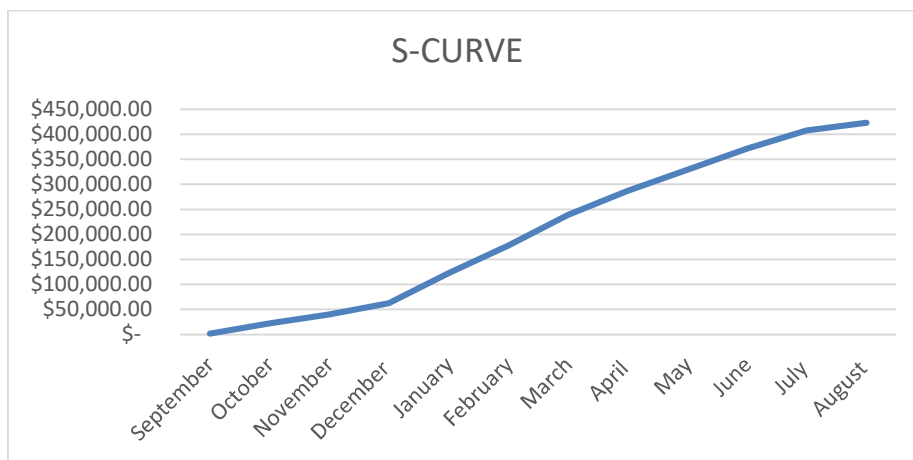
Activity ID	Activity Name	Description	Cost (\$ZD)	Start	Finish	Duration (weeks)	Project Budget Chart													
							2024				2025									
							September	October	November	December	January	February	March	April	May	June	July	August	September	
1.3.3	Concrete Pouring	Pouring concrete to form the foundation	\$ 20,500.00	Fri 17/01/25	Mon 20/01/25	0.4					\$ 20,500.00									
1.3.4	Foundation Inspection and Approval	Inspection of the completed foundation and obtaining approval	\$ 3,500.00	Tue 21/01/25	Tue 21/01/25	0.2					\$ 3,500.00									
1.4.1	Water System Installation	Installation of water supply systems	\$ 3,500.00	Wed 22/01/25	Tue 28/01/25	1					\$ 3,500.00									
1.4.2	Electrical System Installation	Installation of electrical systems	\$ 14,000.00	Wed 29/01/25	Tue 11/02/25	2					\$ 4,440.00	\$ 10,240.00								
1.4.3	Sewer System Installation	Installation of sewer systems	\$ 18,000.00	Wed 12/02/25	Tue 19/02/25	1						\$ 18,000.00								
1.4.4	Utilities Inspection and Approval	Inspection of installed utilities and obtaining approval	\$ 3,500.00	Wed 19/02/25	Thu 20/02/25	0.4						\$ 3,500.00								
1.5.1	Framing	Construction of the building's frame	\$ 20,500.00	Fri 21/02/25	Thu 13/03/25	3						\$ 11,400.00	\$ 17,100.00							
1.5.2	Roofing	Installation of the roof structure	\$ 35,000.00	Fri 14/03/25	Tue 01/04/25	2.6							\$ 22,307.65	\$ 2,692.31						
1.5.3	Exterior Finisher	Application of exterior finisher	\$ 18,500.00	Wed 02/04/25	Thu 17/04/25	2.4								\$ 18,500.00						
1.5.4	Interior Finisher	Application of interior finisher	\$ 24,000.00	Fri 18/04/25	Thu 03/05/25	3								\$ 14,400.00	\$ 9,600.00					
1.5.5	Plumbing and HVAC	Installation of plumbing and HVAC systems	\$ 16,750.00	Fri 09/05/25	Mon 26/05/25	1.4									\$ 16,750.00					
1.5.6	Electrical Wiring and Fixtures	Wiring and installation of electrical fixtures	\$ 15,000.00	Tue 27/05/25	Mon 16/06/25	3									\$ 4,213.33	\$ 11,586.67				

Figure 20 Project Budget 1.5.7 - 1.7.4 (Source: E. Torres, 2023)

Project Budget Chart																			
2024																			
Activity ID	Activity Name	Description	Cost (B2D)	Start	Finish	Duration (weeks)	September	October	November	December	January	February	March	April	May	June	July	August	September
1.5.7	Flooring Installation	Installation of flooring materials	\$ 19,900.00	Tue 17/06/25	Mon 20/06/25	2										\$ 19,900.00			
1.5.8	Interior Inspection and Approval	Inspection of interior space and obtaining approval	\$ 3,500.00	Tue 01/07/25	Wed 02/07/25	0.4											\$ 3,500.00		
1.6.1	Laun Installation	Planting and watering of laun area	\$ 4,800.00	Thu 03/07/25	Wed 16/07/25	2											\$ 4,800.00		
1.6.2	Planting and Garden Design	Design and planting of garden	\$ 5,000.00	Thu 17/07/25	Wed 23/07/25	1											\$ 5,000.00		
1.6.3	Hardcape Installation	Installation of hardcape elements (e.g., pathways, patio)	\$ 7,500.00	Thu 24/07/25	Wed 30/07/25	1											\$ 7,500.00		
1.6.4	Landscaping Inspection and Approval	Inspection of landscaped area and obtaining approval	\$ 3,500.00	Thu 31/07/25	Thu 31/07/25	0.2											\$ 3,500.00		
1.7.1	Final Inspection	Comprehensive inspection of the completed project	\$ 3,500.00	Fri 01/08/25	Mon 04/08/25	0.4												\$ 3,500.00	
1.7.2	Documentation Completion	Completion and organization of all project documentation	\$ 3,850.00	Tue 05/08/25	Mon 11/08/25	1												\$ 3,850.00	
1.7.3	Handover to Client	Formal handover of the residential building to the client	\$ 1,200.00	Tue 12/08/25	Tue 12/08/25	0.2												\$ 1,200.00	
1.7.4	Post-Project Evaluation	Evaluation and review of the project's performance	\$ 1,200.00	Wed 13/08/25	Wed 13/08/25	0.2												\$ 1,200.00	

As highlighted above integrating bottom-up estimating with expert judgement, the residential building project will aim to will seek to create a comprehensive and insightful cost estimate, promoting precise budgeting and optimal resource allocation. Below figure represents S-Curve projected monthly expenditure and was determined based on the activities and its duration for the overall project.

Figure 22 S-Curve (Source: E. Torres, 2023)



4.4.4 Control Costs

Cost control is a pivotal aspect of project management, ensuring that financial resources are utilized efficiently and effectively throughout a project lifecycle. In this project, maintaining a tight grip on cost is crucial to achieving budgetary objectives while delivering a high-quality project. To facilitate this, the project will implement Earned Value Management (EVM), a robust methodology that integrates cost, schedule, and performance metrics to provide a comprehensive and real time overview of the project health. By implementing EVM, the project aims to enhance its cost control mechanisms, providing a robust framework for monitoring, analyzing, and managing project expenditures. This

approach aligns with the project's commitment to fiscal responsibility and the delivery of a successful construction venture.

The Earned Value Management (EVM) indicators for the project are as follows:

1. PV (Planned Value) represents the authorized budget assigned to the work schedule to be accomplished by a certain point in time. It is the planned cost of the work scheduled.
2. EV (Earned Value) is the value of the work performed, expressed in terms of the authorized budget assigned to that work. It represents the value of completed work at a specific point in time.
3. AC (Actual Cost) is the total cost actually incurred and recorded in accomplishing the work performed for a specific period.
4. BAC (Budget at Completion) is the total budget allocated to the project, representing the total planned cost for all the work.
5. CV (Cost Variance) measures the cost performance of the project and is calculated as $EV - AC$. A positive CV indicated cost savings.
6. SV (Schedule Variance) measures the schedule performance of the project and is calculated as $EV - PV$. A positive SV indicated work performed ahead of schedule.
7. CPI (Cost Performance Index) is a ratio of EV to AC, indicating the value of work obtained for each unit of cost spent.
8. SPI (Schedule Performance Index) is the ratio of EV to PV, indicating the value of work obtained for each unit of planned value.

The S-Curve (Figure 22) is an excellent tool that illustrates the planned, earned, and actual progress overtime, providing a clear picture of how the project will track against the planned schedule and budget.

4.4.5 Cost Variance Response

Cost variance response refers to the systematic process of identifying, analyzing, and addressing discrepancies between planned and actual projects cost. This involves taking proactive measures to understand the root causes of cost variations and implementing corrective actions to realign the projects' financial performance with the established budget. The goal of the cost variance response is to ensure effective financial management, prevent budget overruns, and optimize resource allocation throughout the project lifecycle. This process typically includes steps such as a variance identification, root cause analysis, impact assessment, corrective action development, implementation of changes, communication with stakeholders, documentation and ongoing monitoring and adjustment, by diligently responding to cost variances, project teams can maintain control over project finances, enhance decision-making and increase the likelihood of achieving the project objectives within the approved budget.

Charts 13 Cost Variance Response Process (Source: E. Torres, 2023)

Performance Measure	Green Condition	Yellow Condition	Red Condition	
Schedule Performance Index (SPI)	≥ 0.95	$0.85 \leq$ or < 0.95	< 0.85	
Cost Performance Index (CPI)	≥ 0.95	$0.85 \leq$ or < 0.95	< 0.85	
Indicators	Response			

Green	Project is on schedule or ahead or project is under budget or on target.	
Yellow (Alert)	Some concerns, monitor closely, or some cost concerns, investigate and consider corrective actions.	
Red (Critical)	Project is behind schedule, take corrective actions immediately, or project is over budget, implement corrective actions urgently.	

It is essential to regularly monitor the Schedule Performance Index, Cost Performance Index, and take initiative-taking measures to address issues as they arise to ensure project success.

4.4.6 Cost Change Control Process

The cost change control process is a systematic approach to managing changes to the project budget. It involves identifying, evaluating, approving, and implementing changes to project cost to ensure that the project remains within the approved financial constraints.

Charts 14 Cost Change Control Process (Source: E. Torres, 2023)

Item	Process	Description	Responsibility
1.1	Change Identification	Identify and document any proposed change that could impact project cost.	Project Team Members, stakeholders
1.2	Change Request Submission	Submit a formal change request outlining the details of the proposed cost change.	Initiator of the change, project manager

Item	Process	Description	Responsibility
1.3	Change Request Review	Review the change request to assess its impact on project costs, scope, schedule, and other relevant factors.	Change Control Board (CCB), Project manager relevant stakeholders
1.4	Cost Estimation for Change	Estimate the potential cost associated with the proposed change.	Project estimator, cost management team
1.5	Impact Analysis	Analyse the broader impact of the proposed change on the project, considering schedule implications, resources requirements and potential risk.	Project manager, relevant subject matter experts
1.6	Change Approval/Rejection	The CCB or designated authority reviews the change request, considering the cost estimates and impact analysis and approves or rejects the change.	CCB, project manager and project sponsor '
1.7	Documentation	Document the decision, including the rationale for approval or rejection and update project documentation.	Project manager and project documentation team
1.8	Implementation of Approved Changes	If the change is approved, implement the necessary adjustments to project plans, budget, and schedules.	Project manager and project team
1.9	Communication	Communicate the approved changes to relevant stakeholders ensuring transparency and understanding.	Project manager

Item	Process	Description	Responsibility
1.10	Monitoring and Control	Monitor the implementation of approved changes and assess their impact on ongoing project activities,	Project manager
1.11	Documentation of Lesson Learned	Document lessons learnt from the change control process to improve future change management,	Project manager

4.5 Quality Management Plan

4.5.1 Quality Management Plan Introduction

The primary purpose of this section is to ensure that the project consistently delivers outputs that meet or exceed the stakeholders' expectations. It provides a structural framework for managing and enhancing quality through the project lifecycle, promoting transparency, accountability, and continuous improvement in project outcomes.

4.5.2 Quality Management Approach

The quality management approach for this project is driven by a commitment to adherence to established regulations, standards, and procedures while prioritizing the delivery of high-quality products and ensuring health and safety standards. To achieve this, a comprehensive set of quality requirements has been outlined, encompassing specific metrics and means of verification. The overarching objective of this quality management approach is to instill confidence in the project's ability to deliver outcomes that meet the highest quality standards consistently. By outlining specific requirements, metrics, and

means of verification, the project aims to create a transparent and accountable framework that ensures compliance and facilitates continuous improvement. This approach serves as a proactive means to identify, address, and mitigate any potential deviations from quality expectations, contributing to the overall success and reliability of the project.

4.5.3 Customer Prioritization

Charts 15 Customer Prioritization (Source: E. Torres, 2023)

Customer Prioritization	Project Sponsor	Project Management Team	Suppliers	Local Community	Regulatory Authorities	Row Total	Relative Decimal Value
Project Sponsor		10	5	1/5	10	25.2	0.25
Project Management Team	10		10	5	5	30	0.30
Suppliers	5	10		1/5	1/5	15.4	0.15
Local Community	1/5	5	1/5		5	10.4	0.10
Regulatory Authorities	10	1/5	5	5		20.2	0.20
					Grand Total	101.2	

Based on the customer prioritization, the below is denoted based on the level of importance.

- Project Management Team
- Project Sponsor
- Regulatory Authorities
- Suppliers
- Local Community

4.5.4 Quality Requirements

- Structural Integrity

- Sustainable
- Regulatory Complaint
- Efficiency
- Aesthetic Quality

4.5.5 Requirement Prioritization

Charts 16 Requirements Prioritization (Project Sponsor) (Source: E. Torres, 2023)

Requirement Prioritization Project Sponser	Structural Integrity	Sustainable	Regulatory complaint	Efficiency	Aesthetic Quality	Row Total	Relative Decimal Value
Structural Integrity		5	10	5	5	25	0.29
Sustainable	5		5	1/5	5	15.2	0.18
Regulatory compliant	1/5	5		1/5	1/5	5.6	0.06
Efficiency	10	5	1/5		5	20.2	0.23
Aesthetic Quality	1/5	5	5	10		20.2	0.23
					Grand Total	86.2	

The grand total for the Project sponsor is 86.2, which is an aggregation of the individual scores. These scores represent the overall prioritization of quality requirements by the project sponsor. The higher the score, the more importance is placed on these requirements. The importance of this chart lies in helping the project team understand the relative priorities of different quality requirements according to the project sponsor. It aids in focusing efforts and resources on aspects that are deemed more critical for project success from the perspective of quality management.

Charts 17 Requirements Prioritization (Project Management Team) (Source: E. Torres, 2023)

Requirement Prioritization Project Management Team	Structural Integrity	Sustainable	Regulatory complaint	Efficiency	Aesthetic Quality	Row Total	Relative Decimal Value
Structural Integrity		10	1/5	10	10	30.2	0.30
Sustainable	5		1/5	5	10	20.2	0.20
Regulatory compliant	1/5	1/5		5	5	10.4	0.10
Efficiency	5	10	5		10	30	0.30
Aesthetic Quality	1/5	5	1/5	5		10.4	0.10
					Grand Total	101.2	

The grand total is 101.2. These scores represent prioritization of the quality requirements by the project management team. This information guides the decision-making processes, resource allocation, and project planning to align with the teams' expectation and enhance the overall quality of the project.

Charts 18 Requirements Prioritization (Suppliers) (Source: E. Torres, 2023)

Requirement Prioritization Suppliers	Structural Integrity	Sustainable	Regulatory complaint	Efficiency	Aesthetic Quality	Row Total	Relative Decimal Value
Structural Integrity		5	10	5	10	30	0.35
Sustainable	5		1/5	5	5	15.2	0.18
Regulatory compliant	1/5	1/5		1/5	1/5	0.8	0.01
Efficiency	5	10	5		10	30	0.35
Aesthetic Quality	1/5	5	1/5	5		10.4	0.12
					Grand Total	86.4	

The grand total is 86.4. These scores represent prioritization of the quality requirements by the suppliers. Understanding suppliers' priorities is crucial in a project, as it helps in managing expectations, ensuring alignment with project goals, and fostering collaboration to achieve the desired quality outcomes. The information is valuable in

suppliers' selections, contract negotiations and ongoing collaboration throughout the project lifecycle.

Charts 19 Requirements Prioritization (Local Community) (Source: E. Torres, 2023)

Requirement Prioritization Local Community	Structural Integrity	Sustainable	Regulatory complaint	Efficiency	Aesthetic Quality	Row Total	Relative Decimal Value
Structural Integrity		10	5	5	10	30	0.28
Sustainable	5		1	5	10	21	0.19
Regulatory compliant	1	5		1	5	12	0.11
Efficiency	5	10	5		10	30	0.28
Aesthetic Quality	5	5	1	5		16	0.15
					Grand Total	109	

The grand total is 109. These scores represent prioritization of the quality requirements by the local community. This information is invaluable for project decision makers as it helps guide resources allocation and project activities to align with the expectations and preferences of the local community. Ensuring that the project addresses the highest-priority requirements for the local community enhances community satisfaction, stakeholder engagement and overall project success.

Charts 20 Requirements Prioritization (Regulatory Authority) (Source: E. Torres, 2023)

Requirement Prioritization Regulatory Authority	Structural Integrity	Sustainable	Regulatory complaint	Efficiency	Aesthetic Quality	Row Total	Relative Decimal Value
Structural Integrity		5	5	1	10	21	0.20
Sustainable	5		1	1	5	12	0.11
Regulatory compliant	5	10		5	10	30	0.29
Efficiency	5	10	5		10	30	0.29
Aesthetic Quality	1	5	1	5		12	0.11
					Grand Total	105	

The final score of 105. This reflects the collective prioritization of quality aspects by the regulatory authority. This information is crucial for ensuring that the project aligns with regulatory standards and requirements, minimizing the risk of regulatory complaints and ensuring compliance. Addressing the highest priority requirements for the regulatory authority contributes to a smoother project approval process and overall project success.

Based on the requirements prioritization, the following has been determined according to the level of importance:

- Efficiency
- Structural Integrity
- Sustainability
- Aesthetics Quality
- Regulatory Compliant

4.5.6 Roles and Responsibilities

Charts 21 Project Quality Roles and Responsibilities (Source: E. Torres, 2023)

Roles	Responsibilities
Project Sponsor	Clearly communicate quality expectations and objectives for the project <ul style="list-style-type: none"> - Ensure that adequate resources, including budget and personnel, are allocated for quality management - Oversee key quality metrics and performance indicators
Project Manager	Create a comprehensive quality management plan outlining processes, standards and responsibilities <ul style="list-style-type: none"> - Ensure that the project adheres to industry standards and follows established quality processes - Address Quality - related risk and implement risk mitigation
Quality Team	Perform inspections, audits, and tests to verify adherence to quality requirements <ul style="list-style-type: none"> - Drive continuous improvement initiatives and identify opportunities for enhance quality - Regularly report on the state of quality to project management and stakeholders
Contractors	Execute work in accordance with established quality standards and project specification <ul style="list-style-type: none"> - Report any non-conformities or deviations to the project manager and quality Team - Actively participate in continuous improvement efforts related to quality

4.5.7 Factors related to Quality

Charts 22 Key Factors related to Quality (Source: E. Torres, 2023)

Factor	Factor Definition
Structural Integrity	The ability of the building's structure to withstand loads and environmental conditions, ensuring safety and stability
Materials Quality	The suitability and durability of materials used in construction, ensuring they meet specified standards and contribute to the building longevity
Workmanship	The quality of craftsmanship and construction practices, ensuring that the construction meets legal and safety requirements
Code Compliance	Adherence to local building codes and regulations, ensuring that the construction meets legal and safety requirements
Energy Efficiency	the effectiveness of the building's design and systems in minimizing energy consumption, promoting sustainability, and reducing long-term operational costs.
Aesthetic Quality	the visual appeal and architectural design of the building, contributing to its overall aesthetics and harmony with the surrounding environment

4.5.8 Quality Metrics

Quality Metrics in this project will serve as quantifiable measures to monitor, assess, and enhance the adherence to defined quality standards and objectives. These metrics are utilized through the project lifecycle to track progress, outcomes, and customer satisfaction, enabling informed decision-making and continuous improvement.

Charts 23 Metrics and quality Baseline (Source: E. Torres, 2023)

Quality Objective	Metric	Metric Definition	Expected Outcome/Result	Measurement frequency	Responsible
Ensure Structural Stability	Deflections Limits -Materials Testing	Maximum allowance deflections of structural elements under load - Conduct testing to verify the strength and durability if structural elements	Structural elements meet deflections limits - Materials meet or exceed specific standards	During Structural analysis During materials delivery	Structural Engineer -Quality Control Team
Use high-quality construction materials	Materials compliance -Durability Testing	Verify that materials conform to industry standard and project specifications - Assess the durability and resistance of materials to environmental factors	Materials comply with quality standards -Materials demonstrate expected durability	During Materials inspection -Periodic testing during construction	Quality Control Team -Quality assurance team

Quality Objective	Metric	Metric Definition	Expected Outcome/Result	Measurement frequency	Responsible
Ensure precision in construction	Error rate in construction Inspection compliance	Measure the frequency of errors or deviations from construction plans and specifications - Verify adherence to construction and workmanship standards through regular inspections	Low error rate in construction activities - High compliance with construction materials	Daily during construction Regulate Inspection during construction	Construction Supervisor Quality control team
Adhere to building codes and regulations	Code Violations -Inspection Compliance	Identify and rectify any deviations from local building codes and regulations - Verify compliance with building codes through regular inspections	No unresolved code violations - High Compliance with building codes	Throughout construction -Regular inspection during construction	Code Compliance Officer Quality Control Team

Quality Objective	Metric	Metric Definition	Expected Outcome/Result	Measurement frequency	Responsible
Optimize energy consumption	Energy Performance rating HVAC Systems Efficiency	Measure the efficiency of heating, ventilations, and air conditioning systems - Assess the energy performance of the building using industry - standard metrics	Building meet or exceeds energy efficiency - HVAC systems operate with high efficiency	Post construction assessments Periodic testing during construction	Quality Control Team -Quality assurance team
Achieve desired aesthetic appeal	Design conformance -Finish Quality	Ensure that the constructed building aligns with the approved architectural and design plans -Evaluate the quality of finishes, including paint, floorings, and other aesthetics elements	Building matches the approved design -High-quality finishes contribute to the desired aesthetics	Regular Design reviews -Post Construction Assessment	Architect Interior Designer

4.5.9 Quality Activities

Quality activities refer to the specific actions and processes implemented within a project to ensure that deliverables meet predefined quality standards and requirements.

These activities are designed to systematically manage and control the quality of processes and outputs throughout the project lifecycle. The quality activities encompass planning, assurance, and control mechanisms to enhance the project's ability to consistently produce high quality results.


Charts 24 Quality Activities Metrics (Source: E. Torres, 2023)

Deliverable	Requirements	Manage and Control Activities	Frequency	Responsible
Architecture Design	Compliance with design specifications	Conduct design reviews; verify design against requirements and standards	Throughout the design phase	Architect; quality assurance team
Foundation Construction	Compliance with structural engineering standards	Implement quality control measures during construction; conduct regular inspections	Throughout construction phase	Structural Engineer; Quality Control Team
Utilities Installation	Compliance with safety and utilities standards	Conduct quality checks during installation; verify compliance with safety and utility standards	During installation phase	Utilities Engineer, Quality control team

Deliverable	Requirements	Manage and Control Activities	Frequency	Responsible
Interior Finishes	Adherence to design and quality standards	Implement quality control for finishes; conduct inspections to ensure adherence to standards	Throughout finishing phase	Interior designer, Quality Control Team
Environmental Compliance	Adherence to environmental regulations and impact mitigation	Execute environmental compliance plan; conduct regular audits and assessments	Throughout the project	Project Team, Quality Assurance Team
Project Budget Management	Adherence to budget allocations and financial accountability	Implement budget management plan; conduct regular budget reviews and audits	Throughout the project	Project Manager, Finance Team
Timeline Adherence	Adherence to project milestones and completion dates	Implement project timeline plan; conduct regular progress reviews and adjustments	Throughout the project	Project Manager, Quality Assurance Team

4.5.10 Quality Documents

Compressive Strength Result Form

		CUBE COMPRESSIVE STRENGTH REPORT										MONTH	QUALITY IN CHARGE	Elías Torres					
													PROJECT IN CHARGE	NAME					
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	
SR NO	DD/MM/YY	Reference casting Element	Quantity	Grade	RMC	Notes	7Day :DD/MM/YY			Notes	14Day :DD/MM/YY			Notes	28Day :DD/MM/YY			Notes	
	DATE	BLOCK- FLOOR-					1				1				1				
							2				2				2				
							3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	3	AVG	SIGN-QC	SIGN-PM	

Cost Variation Order:

Cost Variation Order	V001	Time & Materials
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P R O J E C T : Residential Building

Name	Address	Date of Commencement
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C H A N G E S : Description of the added/deleted/revised Work
WORK:

REASON FOR CHANGES:

LIST OF SUPPLEMENTAL INFORMATION/DRAWINGS (ATTACHED):

<u>C O N T R A C T S U M :</u>						
Unit Costs:	(dollars)	/	(units)	x	Anticipated Units	= \$0.00
Unit Costs:	(dollars)	/	(units)	x	Anticipated Units	= \$0.00
Unit Costs:	(dollars)	/	(units)	x	Anticipated Units	= \$0.00
Unit Costs:	(dollars)	/	(units)	x	Anticipated Units	= \$0.00
Unit Costs:	(dollars)	/	(units)	x	Anticipated Units	= \$0.00
Antipated Cost:						\$0.00
Contract Sum PRIOR to this Change (including previously approved Change Orders):						\$0.00
Contract Sum AFTER to this Change:						0.00

C O N T R A C T D U R A T I O N :

Substantial Completion PRIOR to this Change (including previously approved Change Orders): _____

Substantial Completion AFTER this Change: _____

TOTAL CHANGE: _____ days + or - _____ 0

A P P R O V A L S :

CHANGE SUBMITTED BY: _____

APPROVED BY: _____

GENERAL CONTRACTOR:	DATE:
---------------------	-------

ARCHITECT:	DATE:
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4.5.11 Continuous Improvement Plan

The continuous improvement process is an integral to ensuring quality and efficiency throughout the project. It involves systematically planning, executing, monitoring, and adjusting activities to enhance performance, meet project objectives, and adapt to changing conditions. This continuous improvement process ensures that this project is responsive to evolving conditions, maintains high-quality standards, and adapts to unforeseen challenges. Regular feedback loops and a commitment to learning contribute to the project's overall success and stakeholder satisfaction.

The PDCA Process is not just a cycle; it is a mindset that enters the company's project management approach. It empowers the company to plan meticulously, execute with precision, monitor effectively, and adapt proactively.

Charts 25 Continuous Improvement Chart (Source: E. Torres, 2023)

Process Description:	The PDCA (Plan - Do- Check-Act) process will serve as the cornerstone for ensuring the success, quality, and adaptability the project.
Plan:	In the planning phase, we meticulously define the project activities requirements, set clear objectives, and create detailed plans for architectural design, construction, utilities, interior finishes. This stage will establish the foundation for the entire project

Do:	In the doing phase, we will implement the plans and execute each project component with precision. This phase is about translating plans into tangible actions, ensuring alignment with Project goals.
Check:	In the checking phase involves continuous monitoring, inspection, and assessment. Regular reviews and audits are conducted to verify compliance with the design specifications, safety standards and environmental regulations. This phase is crucial for identifying areas of improvement and address any deviations from the plan.
Act:	In the acting phase, take proactive measures based on the findings a from the checking phase. Adjustments are made to construction methods, design specifications and budget allocations. Corrective actions are implemented promptly to ensure that the project stays on track and meet or exceed quality standards. This phase fosters a culture of continuous improvement and adaptability.

4.6 Resource Management Plan

4.6.1 Resource Management Introduction

As per PMBOK 7th Edition, the Resource Management Plan is a component of the project management plan that describes how project resources are acquired, allocated, monitored, and controlled.

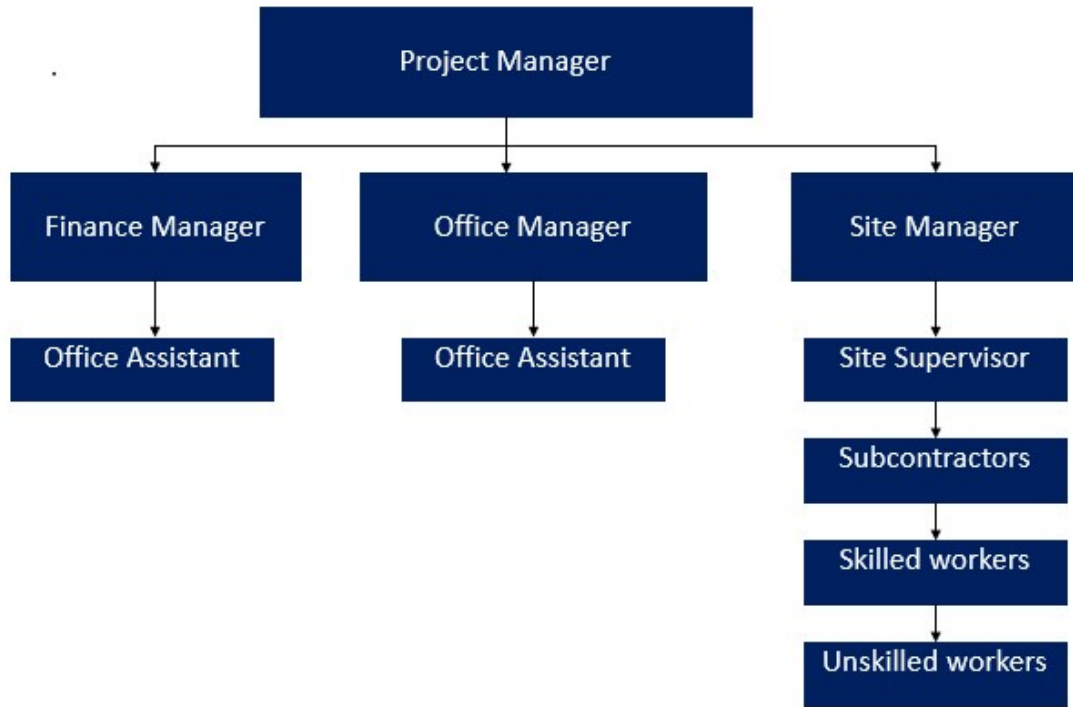
4.6.2 Resource Management Approach

The resource management approach for this project is a holistic plan that encompasses the creation and management of the project team, defining roles and responsibilities, outlining strategies for the procurement and management of the physical resources such as materials and equipment. The teams' roles are clearly defined based on skills and project requirements, and team members are selected for their qualifications and compatibility. Team building activities and training opportunities are implemented to foster collaborations and enhance skills. The plan addresses the acquisition of construction materials and equipment through a procurement strategy, emphasizing timeline and cost-efficient sourcing. Resource allocation is dynamic, adjusting to the project progress, and real-time monitoring mechanisms ensure efficient resource utilization. Key roles, including project managers, procurement manager, and construction manager, have defined responsibilities, and continuous improvement is integrated through regular assessments and adaptability to changing project needs. This approach aims to optimize resource utilization, mitigate risks, and contribute to the overall success of the project.

4.6.3 Roles and Responsibilities

Below illustrates the organizational structure for the project.

Figure 23 Project Team Organizational Structure (Source: E. Torres, 2023)



Charts 26 Project Resource Management Roles and Responsibilities (Source: E. Torres, 2023)

Role	Responsibilities
Project Manager	-Overall project leadership and management -Develop and execute project plans -Coordinate project team and resources -Report progress to stakeholders
Finance Manager	-Financial planning and budgeting -Monitor project expenditures and financial health -Provide financial guidance to the project manager
Office Manager	-Administrative oversight of office operations -Manage documentation, filing, and record keeping -Coordinate communication with the office

Site Manager	<ul style="list-style-type: none"> -Oversee on-site construction activities -Ensure adherence to safety regulations -Coordinate with subcontractors and site personnel
Finance Office Assistant	<ul style="list-style-type: none"> -Assist finance manager with budgeting and financial monitoring -Handle financial documentation and record keeping
Office Assistant	<ul style="list-style-type: none"> -Provide administrative support to the project and office manage -Assist with documentation, scheduling, and communication
Site Supervisor	<ul style="list-style-type: none"> -Supervise on-site activities and workers -Implement safety protocols and ensure compliance -Report site progress to the site manager
Subcontractor	<ul style="list-style-type: none"> -Execute specific tasks or services as outlined in the contract -Coordinate with the site manager for seamless integration
Skilled Workers	<ul style="list-style-type: none"> -Perform specialized construction tasks -Adhere to project specifications and timeliness
Unskilled Workers	<ul style="list-style-type: none"> -Assist with general construction labour -Follow instructions from skilled workers and supervisors

Project Organizational Chart RACI Matrix

The RACI chart defines and communicates the roles and responsibilities of individuals or groups in relation to specific tasks or activities within the project.

Project Team Members										
Task Name	Project Manager	Finance Manager	Office Manager	Site Manager	Finance Assistant	Office Assistant	Site Supervisor	Subcontractor	Skilled Workers	Unskilled Workers
Excavation and Site Preparation	R	I	I	R	I	I	A	I	C	I
Foundation Design and Layout	R	I	I	A	I	I	C	I	I	I
Concrete Pouring	R	I	I	A	I	I	C	I	I	I
Foundation Inspection and Approval	R	A	I	R	I	I	C	I	I	I
Water System Installation	R	I	I	A	I	I	C	I	I	I
Electrical System Installation	R	I	I	A	I	I	C	I	I	I
Sewer System Installation	R	I	I	A	I	I	C	I	I	I
Utilities Inspection and Approval	R	A	I	R	I	I	C	I	I	I
Framing	R	I	I	A	I	I	C	I	I	I
Roofing	R	I	I	A	I	I	C	I	I	I

Project Team Members										
Task Name	Project Manager	Finance Manager	Office Manager	Site Manager	Finance Assistant	Office Assistant	Site Supervisor	Subcontractor	Skilled Workers	Unskilled Workers
Exterior Finishes	R	I	I	A	I	I	C	I	I	I
Interior Finishes	R	I	I	A	I	I	C	I	I	I
Plumbing and HVAC	R	I	I	A	I	I	C	I	I	I
Electrical Wiring and Fixtures	R	I	I	A	I	I	C	I	I	I
Flooring Installation	R	I	I	A	I	I	C	I	I	I
Interior Inspection and Approval	R	A	I	R	I	I	C	I	I	I
Lawn Installation	R	I	I	A	I	I	C	I	I	I
Planting and Garden Design	R	I	I	A	I	I	C	I	I	I
Hardscape Installation	R	I	I	A	I	I	C	I	I	I
Landscaping Inspection and Approval	R	A	I	R	I	I	C	I	I	I

Project Team Members										
Task Name	Project Manager	Finance Manager	Office Manager	Site Manager	Finance Assistant	Office Assistant	Site Supervisor	Subcontractor	Skilled Workers	Unskilled Workers
Final Inspection	R	A	I	R	I	I	C	I	I	I
Documentation Completion	R	C	A	I	I	I	I	I	I	I
Handover to Client	R	A	I	I	I	I	I	I	I	I
Post-Project Evaluation	R	C	I	I	I	I	I	I	I	I
R= Responsible A=Accountable C= Consult I= Inform										

4.6.4 Acquisition of Team Members

The acquisition of team members refers to the strategic and systematic process of identifying, attracting, selecting, and onboarding individual with the required skills, qualifications, and experience to fulfil specific roles within the project. This process ensures that the project team is composed of individuals who collectively contribute to the successful planning and execution of the project. The acquisition strategy considers the unique requirements of each role, aiming to assemble a diverse and skilled team that aligns with the project's goals and objectives.

The project team members acquisition approach will be the following:

1. Project Manager, Financial Manager, Office Manager, Site Manager, and Site Supervisor will be sourced internally from the company (GTS Engineering), ensuring they possess substantial experience in managing similar projects, relevant educational backgrounds, and proven history of successful project delivery.
2. Contractors: The selection of contractors will involve a fair and transparent bidding process. This process will encourage healthy competition among potential contractors, emphasizing factors such as expertise, cost-effectiveness, and adherence to the project timelines.
3. Assistants will be selected through a fair process that promotes equal opportunities. This will include a comprehensive assessment of qualification, skills, and the alignment of candidates with the project requirements.

4. Skilled and unskilled labour will be acquired from the local community fostering sustainable development by providing job opportunities within the project vicinity. The selection process will consider both skilled proficiency and a commitment to the project objective.

4.6.5 Team Development

Team development strategy for this project is designed to facilitate a seamless progression through the stages of forming, storming, norming, performing, and adjourning. Initially, team members will be introduced to the roles and responsibilities, fostering relationship, and understanding project objectives. As potential conflicts arise during the storming phase, the project manager will guide open communication and conflict resolution. The norming stage focuses on solidifying roles and building a cohesive working environment. In the performing phase, the team optimizes collaboration to achieve project goals, while the adjourning stage involves recognizing accomplishments and conducting project reviews. Key principles include open communication, skill enhancement, aiming to create a unified and high-performing team capable of navigating the project's challenges effectively.

4.6.6 Team Safety and Welfare

The team safety and welfare for this project prioritizes the well-being of the team members through comprehensive measures. Safety training sessions will familiarize the team with project hazards, and the provision of personal protective gear ensures a secure working environment. Health and wellness programs, including access to check-ups and

counseling, support overall team well-being. An effective emergency response plan and open communication channel address potentials risk promptly. This project acknowledges the importance of work-life balance and commits to reasonable workloads. Continuous improvement initiatives, such as a safety audit and feedback mechanisms, ensuring ongoing refinement of safety practices. Overall, the project aims to foster a secure and supportive team environment throughout the construction process.

4.6.7 Recognition and Rewards

This project recognizes the significance of fostering a positive and motivated team atmosphere through a robust recognition and reward strategy. Individual and collective achievement will be publicly acknowledged, with a focus on exceptional performance, safety adherence, and collaboration. Celebrations of project milestones and a structured employee of the month/quarter program aim to foster a positive atmosphere. Monetary incentives, tied to specific project objectives, provide additional motivation, while training and development opportunities support continuous growth. Team building events and flexible work arrangement further contribute to a positive team culture, emphasizing the project commitment to recognizing and appreciating the contribution of its team members throughout the project lifecycle.

4.6.8 Physical Resources

Managing physical resources encompasses a holistic approach to ensure efficiency, quality, and sustainability. Through meticulous inventory management and procurement planning, the project aims to acquire tools, equipment, and materials from reliable sources.

Regular maintenance schedules and adherence to stringent quality standards will be enforced to guarantee optimal functionality and durability. The strategy prioritizes safety through strict adherence to safety protocols and investment in safety features. Efficient resource allocation and tracking systems will minimize waste and enhance productivity. Sustainability practices, including the exploration of eco-friendly materials and responsible disposal, align with the project's commitment to environmental responsibility. Contingency planning and the integration of technology further enhance the project ability to adapt to unforeseen circumstances and streamline resource management process.

4.7 Communication Management Plan

4.7.1 Communication Management Introduction

As per PMBOK 7th Edition Communication Management plan is a component of the project, program, or portfolio management plan that describes how, when, and by whom information about the project will be administered and disseminated.

On this project the communication plan is designed to ensure effective and transparent communication among stakeholders. It begins with a thorough identification of stakeholders (audiences), followed by the establishment of clear communication objectives. Various channels, including meetings, email, and project management software, will be utilized and communication frequency will be tailored to meet the specific need of different stakeholder groups. The plan emphasizes key messages, escalation procedures, and feedback mechanisms to maintain a unified understanding of the project goals and address any issues promptly.

4.7.2 Audiences

1. The major audiences within the projects are as follows:
 - a. Project Sponsor
 - b. Project Management Team
 - c. Contractor
 - d. Suppliers and Vendors
 - e. Local Community
 - f. Regulatory Authorities
 - g. End Users

4.7.3 Communication Delivery Methods and Technologies

Throughout the entire project lifecycle, the primary modes of communication will be the followings:

1. Project Meetings: regular face-to-face meetings, virtual meetings to discuss project updates, milestones and address any issues. Technologies: video conferencing platform, project management software for scheduling and documentation
2. Email Communication: timely dissemination of essential information, updates, and announcements.
3. Regular Reports: periodic reports and newsletters summarizing project progress, achievements, and upcoming milestones.
4. Text Messaging (SMS) or WhatsApp quickly updates and alerts sent directly to stakeholder's mobile devices.
5. Community forum and discussion sessions: online platform for stakeholders to discuss project related matters and share feedback.

4.7.4 Communication Escalation Process

The communication escalation process outlines the procedures for addressing issues or concerns that cannot be resolved at lower levels of project management. It ensures a structural approach to escalating matters to higher levels of authority for timely resolution. This project will follow a two-level escalation process. Level 1 involves addressing issues within the project team, while level 2 escalates unresolved matters to the project management team. Escalation criteria includes impact on milestones, quality standards, and deviations from schedule or budget. Communication will be formalized through established channels and documentation. The process included a feedback loop from continuous improvement, ensuring a systematic and efficient resolution of escalations.

Figure 24 Escalation Chart (Source E. Torres, 2023)

Level	Description	Responsibility	Communication Channels	Escalation Triggers	Documentation	Resolution and feedback	Communication responsibilities	Continuous Improvement
1	Within Project Team	Project Team Members and Managers	Project Management Software, Formal Email	Timeliness, Impact Repetition	Formal Reporting, Issue Logs	Resolution Plan, Feedback loop	Escalation Owner, Communication Lead	Review and adjust regularly
2	Project Management Team	Project Manger and Higher level Management	Project Management Software, Formal Email, Meetings	Timeliness, Impact Repetition	Formal Reporting, Issue Logs	Resolution Plan, Feedback loop	Escalation Owner, Communication Lead	Review and adjust regularly

4.7.5 Monitor Communication

Project monitor communication is an ongoing process of observing, assessing, and evaluating the effectiveness of communication strategies, channels, and messages with the project. The below communication matrix outlines the various types of communication medium, frequencies, and targets audiences. It serves as a guide to ensure that the right

information is communicated through the appropriate channels to the relevant stakeholders at the right intervals.

Charts 28 Communication Matrix (Source: E. Torres, 2023)

Type of Communication	Purpose	Medium	Frequency	Audience
Project Updates	Provide overall project progress and milestones	Project reports and emails	Monthly	All stakeholders
Weekly meetings	Discuss ongoing tasks, challenges, and upcoming activities	Virtual Meetings	Weekly	Project Team
Urgent Announcements	Communicate critical and time sensitive information	Text messages, WhatsApp, phone calls	As needed	All stakeholders
Designs Reviews	Present and discuss architectural and design elements	Virtual meeting, design presentations	Bi-Weekly	Project Team, Designers
Construction Updates	Share Progress and timelines for construction phases	Project website, Emails	Bi-monthly	All Stakeholders
Safety Alerts	Communicate Safety Guidelines and Updates	Posters, Email, Safety Meetings	As needed	Construction Team, Workers
Budget and Resource Allocation	Discuss budgetary considerations and resources allocation	Financial Report Meetings	Quarterly	Project Management Team, Finance Team

Type of Communication	Purpose	Medium	Frequency	Audience
Quality Assurance Updates	Provide updates on quality control measure	Reports, Meetings	Monthly	Quality Team, Project Team
Change Request	Communicate and discuss proposed changes to project scope	Change request forms, meetings	As needed	Project management team, Relevant stakeholders
Post-Project Evaluation	Gather Feedback and Lessons learned for future improvement	Surveys, Meetings	After Project Completion	All stakeholders, Project Team

4.8 Risk Management Plan

4.8.1 Risk Management Introduction

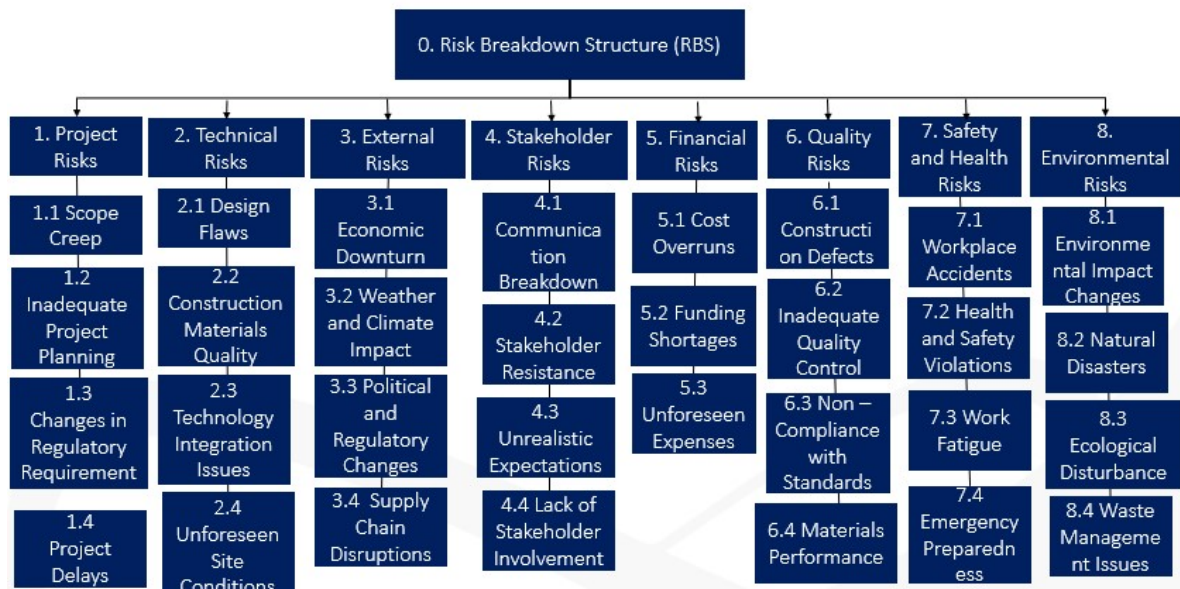
As per the PMBOK 7th Edition, the Risk Management Plan is a component of the project, program, or portfolio management plan that describes how risk management activities will be structured and performed. The PMBOK 6th Edition denotes that Project Risk Management includes the process of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.

The Risk Management Plan for the project is a dynamic framework designed to proactively identify, assess, mitigate, and monitor potential risks that may impact project objectives. Employing both quantitative and qualitative analysis, the plan outlines comprehensive strategies for risk avoidance, transfer, mitigation, and acceptance. It

emphasizes continuous monitoring and adaptation, integrating lessons learned and maintaining transparent communication channels. Key components include risk identification, detailed assessment, clear mitigation strategies, ongoing monitoring and control mechanism defined roles and responsibilities, and comprehensive documentation. By fostering a proactive and adaptive approach, the plan aims to enhance the projects' resilience and ensure successful outcomes in the face of uncertainties.

4.8.2 Identify Risks

Figure 25 Risk Breakdown Structure (RBS) (Source: E. Torres, 2023)



Charts 29 Probability and Impact Scale (Source: E. Torres, 2023)

		Time	Cost	Quality
Very High	> 70%	>6 months	\$10.1K - \$30K	Very high impact on overall Budget and Schedule
High	51-70%	3-6 months	\$5.1K - \$10K	Significant impact on overall Budget and Schedule
Medium	31-50%	1-3 months	\$2.1K - \$5K	Some impact on overall Budget and Schedule

Low	11-30%	2-3 weeks	\$1.1K- \$2K	Minor impact on overall Budget and Schedule
Very Low	1-10%	1 week	< \$1K	Insignificant impact on Budget and Schedule
Nil	<1%	No change	No change	Exceedingly high impact on overall Budget and Schedule

4.8.3 Probability and Impact Matrix

A probability and impact matrix is a tool used in risk management to assess and prioritize risk based on their likelihood (probability) and potential consequence (impact on project objectives). Probability quantifies the likelihood of a specific event occurring, often expressed as a percentage or fraction, while impact measures the magnitude of the effect of these events on project objectives. Risk is the amalgamation of probability and impact, encapsulating the potential for both threats and opportunities. Uncertainty, inherent in projects, arises from a lack of knowledge about future events, contributing to the challenge of predicting outcomes accurately. Recognizing and managing these elements is integral to effective risk management, enabling project teams to navigate uncertainties and capitalize on opportunities for project success. Within this matrix, each cell is given one of the four (4) colors Red (Very High Risk/Critical), Orange (High Risk/Warning), Yellow (Moderate Risk /Caution), Green (Low Risk/Safe). The colors determine the urgency of the risk response levels as describe below:

1. Green (Very Low/Low): Risk in the green zone has low likelihood and low impact, signifying a low level of concern. These are typically manageable risks that may not require immediate attention. These risks require regular monitoring, periodic updates of the project team.

2. Yellow (Moderate): Risk in the yellow zone has a moderate likelihood and impact, warranting caution attention. This risk may need active monitoring and come proactive management; requires regular updates, potential inclusion in the project status report.
3. Red (Very High): These risks in the red zone have a high likelihood and impact, posing a critical threat to project success. Urgent and comprehensive mitigation strategies are essential; these risks require immediate and escalated reporting to project sponsors and senior management, emergency risk response and mitigation planning.

Figure 26 Probability and Impact Matrix (Source: E. Torres, 2023)

Risk Matrix						
Probability Ratings	0.90 - Very High	VL, VH	L, VH	M, VH	H, VH	VH, VH
	0.70 - High	VL, H	L, H	M, H	H, H	VH, H
	0.50 - Moderate	VL, M	L, M	M, M	H, M	VH, M
	0.30 - Low	VL, L	L, L	M, L	H, L	VH, L
	0.10 - Very Low	VL, VL	L, VL	M, VL	H, VL	VH, VL
		0.10	0.30	0.50	0.70	0.90
	Very Low	Low	Moderate	High	Very High	
Impact Rating						

Charts 30 Risk Register (Source: E. Torres, 2023)

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
R001	Inadequate Project Planning	Scope creep leading to project delays	Project Plan	1.1	0.10	0.90	0.09	Establish change control procedures	Develop a comprehensive project plan
R002	Inadequate Project Planning	Inadequate project planning causing delays	Project Plan	1.2	0.5	0.3	0.15	Conduct thorough project planning	Engage experienced project planners
R003	Changes in Regulatory Requirements	Delays due to changes in regulatory requirements	Regulatory Compliance	1.3	0.3	0.9	0.27	Establish a regulatory monitoring system	Regularly engage with regulatory authorities
R004	Project Delays	Delays due to unforeseen circumstances	Project Plan	1.4	0.5	0.5	0.25	Implement risk management strategies	Develop contingency plans
R005	Design Flaws	Design flaws leading to rework	Design Plan	2.1	0.3	0.5	0.15	Enhance design review processes	Engage experienced architects
R006	Construction Material Quality	Quality issues with construction materials	Material Quality	2.2	0.5	0.9	0.45	Implement rigorous material testing	Source materials from reputable suppliers

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
R007	Technology Integration Issues	Challenges in integrating recent technologies	Technology Integration	2.3	0.3	0.3	0.09	Conduct thorough technology feasibility studies	Engage technology experts
R008	Unforeseen Site Conditions	Delays due to unexpected site conditions	Site Conditions	2.4	0.7	0.9	0.63	Conduct thorough site assessments	Implement robust site monitoring
R009	Economic Downturn	Funding challenges due to economic recession	Market Conditions	3.1	0.3	0.7	0.21	Diversify funding sources	Regularly assess economic indicators
R010	Weather and Climate Impact	Delays due to adverse weather conditions	Weather Impact	3.2	0.5	0.3	0.15	Implement weather monitoring systems	Develop contingency plans for weather-related delays
R011	Political and Regulatory Changes	Delays due to changes in political and regulatory landscape	Regulatory Changes	3.3	0.1	0.1	0.01	Regularly monitor political and regulatory environments	Engage with relevant authorities
R012	Supply Chain Disruptions	Delays due to disruptions in the supply chain	Supply Chain	3.4	0.3	0.5	0.15	Diversify suppliers	Establish strong relationships with suppliers

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
R013	Communication Breakdown	Miscommunication leading to project misunderstandings	Stakeholder Communication	4.1	0.5	0.7	0.35	Establish clear communication channels	Conduct regular stakeholder meetings
R014	Stakeholder Resistance	Resistance from stakeholders affecting project progress	Stakeholder Involvement	4.2	0.3	0.7	0.21	Engage stakeholders early in the project	Develop stakeholder engagement strategies
R015	Unrealistic Expectations	Unrealistic stakeholder expectations leading to dissatisfaction	Stakeholder Expectations	4.3	0.3	0.3	0.09	Set realistic project expectations	Regularly communicate project progress
R016	Lack of Stakeholder Involvement	Insufficient involvement affecting project decisions	Stakeholder Involvement	4.4	0.3	0.7	0.21	Implement stakeholder engagement strategies	Regularly update stakeholders on project developments
R017	Cost Overruns	Exceeding budgeted costs	Project Budget	5.1	0.5	0.9	0.45	Implement cost control measures	Regularly monitor project expenses
R018	Funding Shortages	Insufficient funds causing delays	Funding Shortages	5.2	0.1	0.9	0.90	Diversify funding sources	Develop a contingency fund

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
R019	Currency Exchange Fluctuations	Currency fluctuations affecting project costs	Market Conditions	5.3	0.5	0.5	0.25	Implement currency risk management strategies	Engage with financial experts
R020	Unforeseen Expenses	Unexpected expenses impacting budget	Project Budget	5.4	0.1	0.9	0.90	Develop a comprehensive budget	Regularly assess project expenses
R021	Construction Defects	Defects in construction affecting quality	Quality Control	6.1	0.5	0.5	0.25	Implement rigorous quality control measures	Engage experienced quality control professionals
R022	Inadequate Quality Control	Lack of effective quality control procedures	Quality Control	6.2	0.5	0.9	0.45	Enhance quality control processes	Regularly audit quality control procedures
R023	Non-Compliance with Standards	Violations of regulatory and industry standards	Regulatory Compliance	6.3	0.1	0.5	0.05	Establish a compliance monitoring system	Regularly train project teams on standards
R024	Material Performance Issues	Inferior performance of materials affecting quality	Material Quality	6.4	0.3	0.7	0.21	Source materials from reputable suppliers	Implement rigorous material testing

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
R025	Workplace Accidents	Accidents affecting worker safety	Safety Violations	7.1	0.7	0.5	0.35	Implement stringent safety protocols	Conduct regular safety training
R026	Health and Safety Violations	Failure to comply with health and safety regulations	Occupational Health	7.2	0.7	0.5	0.35	Implement rigorous safety training programs	Regular safety audits and inspections
R027	Worker Fatigue	Exhaustion and fatigue among workers	Occupational Health	7.3	0.3	0.3	0.09	Implement proper work shift schedules	Promote awareness of the importance of rest and breaks
R028	Emergency Preparedness	Lack of preparedness for emergencies	Safety Protocols	7.4	0.3	0.3	0.09	Develop and regularly update emergency response plans	Conduct regular emergency drills
R029	Environmental Impact Changes	Changes in environmental regulations affecting the project	Environmental Impact	8.1	0.5	0.5	0.25	Regularly monitor environmental regulations	Engage with environmental authorities (DOE)
R030	Natural Disasters	Impact of natural disasters on project progress	Natural Disasters	8.2	0.7	0.9	0.63	Develop contingency plans for	Implement disaster-resistant

Code	Cause	Risk Description	Reference	RBS	Probability	Impact	Rank (PxI)	Response	Preventative Actions
								natural disasters	construction methods
R031	Ecological Disturbances	Disturbances affecting local ecosystems	Ecological Impact	8.3	0.3	0.3	0.09	Implement measures to minimize ecological impact	Engage with environmental experts
R032	Waste Management Issues	Challenges in managing construction waste	Waste Management	8.4	0.3	0.3	0.09	Develop a comprehensive waste management plan	Engage with waste management experts

4.8.4 Risk Monitoring and Control

The project management teams assume the crucial responsibility on monitoring and controlling all risks throughout the project lifecycle. The Project Manager will implement a proactive approach to risk management by ensuring that potential risks are identified, highlighted, and tracked consistently. This will be achieved throughout regular discussion in weekly meetings, where risks will be a focal point of deliberation, and through daily reports that comprehensively document that status and updates on the risk management activities, by integrating risk discussion into these routines' interactions, the project team aims to maintain a vigilant stance, fostering adaptability and responsiveness to emerging challenges and thereby enhancing the overall resilience and success of the project.

4.8.5 Risk Management Change Process

The project risk management change process will follow the established change management process as previously stated on the document.

4.9 Procurement Management Plan

4.9.1 Procurement Management Introduction

As per the PMBOK 7th Edition, the Procurement Management Plan is a component of a project or program management plan that describes how a project team will acquire goods and services from outside of the performing organization. As per the PMBOK 6th Edition, Project Procurement Management includes the processes necessary to purchase and acquire products, services, or results needed from outside the project team.

This plan outlines the strategies and methodologies to be employed for acquiring goods and services from external sources, ensuring efficiency, cost effectiveness, and adherence to project objectives. It encompasses the identification of procurement needs, the selection of appropriate suppliers or vendors, contract management, and risk mitigation strategies associated with procurement activities. The goal is to provide a structured approach to procurement that aligns with the project's goals, timeline and budget while maintaining a high standard of quality and compliance with the relevant regulations.

4.9.2 Procurement Management Approach

The procurement management approach for this project will be directed and managed by the Project Manager, in collaboration with the Office Manager and the Finance Manager. Procurement Activities, including the acquisition of materials, and contracts, will be executed in alignment with the project work schedule to ensure optimal project cash flow. This approach aims to streamline the procurement process, enhance cost-

effectiveness, and maintain adherence to project timelines while upholding financial prudence.

Charts 31 Procurement Roles and Responsibilities (Source: E. Torres, 2023)

Role	Responsibilities
Project Manager	Establishing procurement objectives and strategies Selecting vendor and negotiating contract Ensuring procurement activities align with project goals Overseeing the overall procurement process and vendor performance
Office Manager	Coordinating administrative aspects of procurement, such as documentation and filing Assisting in the preparation of procurement related documents Managing communication between project team and vendors
Finance Manager	Budgeting for procurement activities Monitoring and controlling cost related to procurement Coordinating financial transactions and payment to vendors

4.9.3 Procurement Definition (Bill of Materials)

A Bill of Materials (BOM) is a comprehensive list of materials, components, sub assemblies, and quantities needed to construct a product. It serves as a crucial document in procurement and building processes, providing a detailed breakdown of all items required for the final product. The BOM typically includes descriptions, units of measure and quantity of each item. This document is essential for effective planning, cost estimation, ordering and tracking materials throughout the construction lifecycle. In procurement, the BOM helps streamline the purchasing process by specifying exactly what components are need and in what quantities.

Charts 32 Bill of Materials (Source: E. Torres, 2023)

Item	Description	Quantity	Unit
1	General	1	L.s
	Allow all preliminary items necessary for the proper execution and completion of the work.		
	Setting Out Labor	1	L.s
	2"x4"x12' rough lumber for setting out 30 pcs	240	Bft.
2	Foundation Footings	0	L.s
	Strip Footing (2'-6" width) 745lf	1	L.s
	Rebar #4	128	lgths
	Concrete	58.0	Cy.
	Cement	348	Bags
	Gravel	56	Cy.
	Sand	49	Cy.
	Nails and Tying wire	50	lbs
3	Pad Footing (4'-0" width) 2 un	2	L.s
	Rebar #4	4	lgths
	Concrete	2.0	Cy.
	Cement	12	Bags
	Gravel	2	Cy.
	Sand	2	Cy.
	Nails and Tying wire	5	L.s
	Stub Columns	1	L.s
4	6" Cob Wall (745'-0")	1	L.s
	Reinforcement		
	Rebar #3	146	lgths
	6" Blocks		
	6" Block Wall	3911	Blocks
	Cavity Fill	27.0	Cy.
	Cement (3bags/CY)	81	Bags
	Gravel	25.0	Cy.
	Sand	23.0	Cy.
5	8" Columns (745'-0")	1	L.s
	Reinforcement		
	Rebar #3	35	lgths
	Rebar #4	35	lgths
	Concrete	7.0	Cy.
	Cement	42	Bags
	Gravel	7	Cy.

Item	Description	Quantity	Unit
	Sand	6	Cy.
	Nails and Tying wire	20	lbs
	lumber 1*10*12 = 50pcs	500.0	Bft.
	lumber 1*4*12 = 10pcs	40	Bft.
	lumber 1*16*12 = 4pcs	64	Bft.
6	Reinforced 5" concrete Slab	1	L.s
	Fill		
	Backfilling Material	345	Cy.
	Reinforcement		
	Rebar #3	208	lgths
	Formwork		
	1"x12"x10' (27 Lengths)	270	Bft.
	Concrete	57	Cy.
	Cement	342	Bags
	Gravel	54	Cy.
	Sand	48	Cy.
	Nails and tying wire	30	L.s
7	8" External Block wall	1	L.s
	8" Block wall	6736	Blocks
	Rebar #3 starter bars	150	lgths
	Cavity fill	15	Cy.
	Cement (CF and Block Laying)	307	Bags
	Gravel	44.0	Cy.
	Sand	40	Cy.
	Nails and tying wire	240	L.s
8	4" Partition Plycem wall 120lf - 13 ft height	1	L.s
	1/2" Plycem/Sheetrock moist resistance	98	Sheets
	1 X 4" X 20' - Lumber @ 16c/c - 180 pcs	1200	Bft.
	5-Gal joint Compound (Easy Finish)	9	Buckets
	Sheetrock tape 250ft.	10	Rolls
	Sheetrock screws 1 1/4" (5lb)	20	Box
	Other accessories (Nail & .22 cal. Bullet, sandpaper)	3	L.s
9	Lintels (190 lf)	1	L.s
	Reinforcement		
	Rebar #3 Stirrups	28	lgths
	Rebar #3 mains bars	19	lgths
	Formwork		
	1"x8"x10 (57 pcs)	380	Bft.
	1"x4"x10 (32 pcs)	107	Bft.
	Concrete (5cy)	2	Cy.
	Cement	30	Bags

Item	Description	Quantity	Unit
	Gravel	5.0	Cy.
	Sand	4.5	Cy.
	Nails and tying wire	30	L.s
10	Window Ledge	1	L.s
	Reinforcement		
	Rebar #3	8	lgths
	Formwork		
	1"x4"x10' (8pcs)	27	Bft.
	1"x8"X 10' (16 Pcs)	107	Bft.
	Concrete	2.0	Cy.
	Cement	12	Bags
	Gravel	2.0	Cy.
	Sand	2.0	Cy.
	Nails and tying wire	15	L.s
11	3 Concrete steps 35 ft wide	1	L.s
	Reinforcement		
	Rebar #3	11	lgths
	Rebar #4	16	lgths
	Formwork		
	1"x12"x10' 6 pcs	60	Bft.
	1"x8"x10' 11 pcs	74	Bft.
	1"x4"x10' 10 pcs	34	Bft.
	1/2" plywood	4	Sheets
	Concrete (5cy)	4	Cy.
	Cement	30	Bags
	Gravel	5.0	Cy.
	Sand	5	Cy.
	Nails and tying wire	30	L.s
12	Roof Beam	1	L.s
	Reinforcement		
	Rebar #3	120	lgths
	Rebar #4	86	lgths
	Rebar #6	5	lgths
	Formwork		
	1"x14"x10' (54 Pcs)	630	Bft.
	2"x4"x10' (30pcs)	200	Bft.
	1"x3"x10' (80pcs)	70	Bft.
	1/2" plywood	63	Sheets
	Concrete	36	Cy.
	Cement	216	Bags

Item	Description	Quantity	Unit
	Gravel	33.0	Cy.
	Sand	32	Cy.
	Pumping of Concrete	36	Cy.
	Nails and tying wire	150	L.s
13	Parapet wall	373	FT
	Reinforcement		
	Rebar #3	58	lgths
	Formwork		
	To used same formwork from beams	0	Bft.
	Props	500	pcs
	Concrete	11	Cy.
	Cement	66	Bags
	Gravel	10.5	Cy.
	Sand	10	Cy.
	Pumping of Concrete	11	Cy.
	Nails and tying wire	150	L.s
14	Reinforced 5.5" Concrete Roof Slab	273	SY
	Rebar #4 Bottom bars both ways	281	lgths
	Rebar #4 Top bars both ways	251	lgths
	Formwork		
	2"x4"x10' (405pcs)	2700	Bft.
	1"x4"x10' (80pcs)	266	Bft.
	1/2" plywood	123	Sheets
	Props	3050	un
	Concrete	74	Cy.
	Cement	444	Bags
	Gravel	71.0	Cy.
	Sand	70	Cy.
	Pumping of Concrete	74	Cy.
	Nails and tying wire	500	L.s
15	Septic and soak away	1	No.
	Reinforcement #3	17	lgths
	Concrete	3.5	Cy.
	Cement	31	Bags
	Gravel	4.5	Cy.
	Sand	4.5	Cy.
	4" Block Wall	220	Blocks
	6" Block Wall	220	Blocks
	Rendering Exterior and interior Walls	38	S. y
	Cement	6	Bags

Item	Description	Quantity	Unit
	Sand	1	Cy.
	Finishing		
16	Plastering	1	L.s
	1/2" Plastering	880	S. y
	Cement	269	Bags
	Sand	68	Cy.
17	Sheetrock Works	1	L.s
	Sheetrock Ceiling	1	L.s
	Sheetrock ceiling	311	S. y
	1/2" Sheetrock moist resistance	97	Sheets
	2 X 4" X 20' - Galvanized Steel C Channel Joist 16 c/c	224	lgths
	5-Gal joint Compound (Easy Finish)	6	Buckets
	Sheetrock tape 250ft.	5	Rolls
	Sheetrock screws 1 1/4" (5lb)	4	Box
	Other accessories (Nail & .22 cal. Bullet, sandpaper)	2	L.s
18	Tile works	1	L.s
	Interior Floor Tiles	2551	S. ft
	Bathroom Wall Tiles	500	S. ft
	Skirting	351	S. ft
	Thinset (50 lbs bag)	90	Bags
	Grout (25 lb bag)	8	Bags
	1/16" spacers	45	Packs
19	Painting of House	1	L.s
	Total area for painting	880	S. y
	Primer (Sherwin Williams)	5	Buckets
	Paint (Colour as client needs)	10	Buckets
20	Windows	1	L.s
	36" x 74" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	6	No.
	60" x 74" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	3	No.
	60" x 70" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	1	No.
	36" x 7' aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	4	No.

Item	Description	Quantity	Unit
	36" x 10' aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	1	No.
	48" x 48" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	2	No.
	36" x 48" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	1	No.
	7'-4" x 9'-4" aluminium window with tinted glass French type with metal mesh fly screen (vertical Roller Window)	1	No.
21	Door	1	L.s
	66" w x 84" h x 1 3/4" thick glass door	1	No.
	60" w x 84" h x 1 3/4" thick sliding door	3	No.
	36" w x 80" h x 1 1/2" thick panel mahogany door	3	No.
	32" w x 80" h x 1 1/2" thick fixed louver mahogany door	4	No.
	30" w x 80" h x 1 1/2" thick panel mahogany door	4	No.
	72" w x 80" h x 1 1/2" thick fixed louver mahogany door	1	No.
	32" w x 80" h x 1 1/2" thick fixed louver mahogany door	3	No.
	24" w x 80" h x 1 1/2" thick fixed louver mahogany door	1	No.
22	Kitchen		
	24'-0" counter cabinet base	1	No.
	31'-0" counter cabinet wall	1	No.
	Double kitchen sink with drained board and fittings.	1	No.
	Kitchen Island	1	L.s
23	Plumbing		
	S' Trap water closet (coloured) with fittings	4	No.
	Oval wash-hand basin (coloured) with fittings	5	No.
	wash-hand basin cabinets	5	No.
	1/2", 3/4", 1 1/2" and 4" diameter PVC CPVC pipes, tees, elbows, couplings, capping's, reducers, supply tubing's, plugs, PVC glue, cleaning compound, straps, etc	5	L.s
24	Electrical		

Item	Description	Quantity	Unit
	60 watts LED wall mount Light Fixture	1	No.
	60 watts LED 6" dia. Recessed Light Fixture	12	No.
	Pendant Light Fixture	3	No.
	45 watts LED 3" dia. Recessed Light Fixture	2	No.
	Cable TV Jack	6	No.
	120 volts duplex wall outlets.	44	No.
	120 volts GFI wall outlets.	12	No.
	120 volts GFI wall outlets with waterproof cover.	6	No.
	Single pole flush mounted wall switch.	31	No.
	two-way pole flush mounted wall switch.	10	No.
	Exhaust Fan with Light Fixture	4	No.
	On demand Water Heater	1	No.
	Photo Electric Cell	2	No.
	Vanity Light	5	No.
	52" Dia ceiling Fan with Light Fixture	5	No.
	AC Units	5	No.
	Motion Light Fixture	5	No.
	36" Dia Dining Room Chandelier	1	No.
	Rolls (each) 2.5 mm ² single electrical wire (red, black, green)	6	No.
	20 mm X 10' PVC Electrical Conduits.	200	No.
	Metal pans and gangables (Assorted) Earth rods, Clamps, Cable (6mm ²) 1 ¼" weather head, isolation knobs, 1 1/4" P V C pipe, one ¼" X 45-degree elbows, male and female adaptors, couplings, glue, 20 mm parallel bends, etc.	4	No.

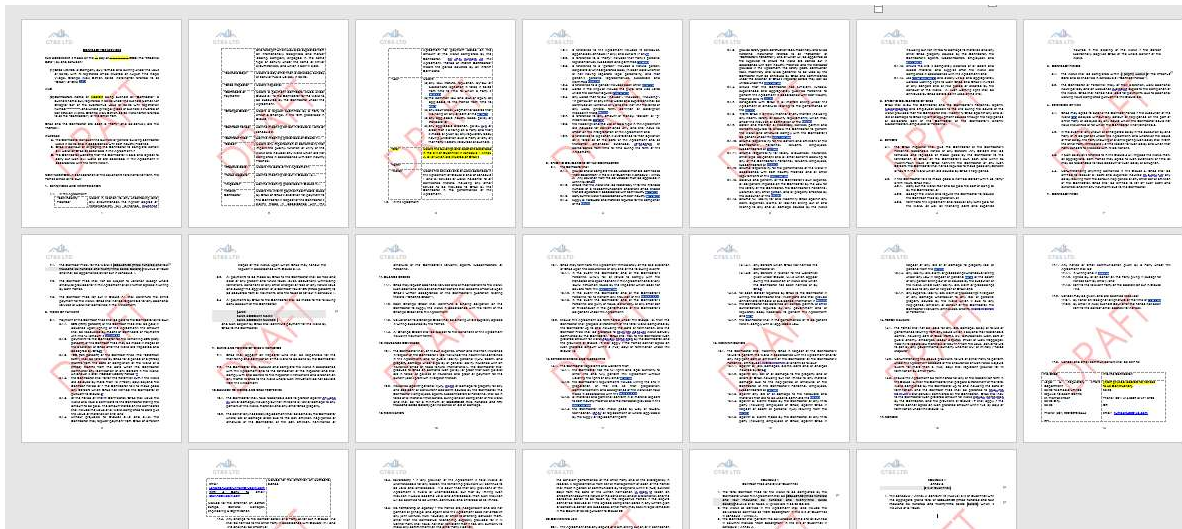
Item	Description	Quantity	Unit
	G.E. Distribution panel (load centre) completed with (circuit breakers 2 X 15 and 10 X 20 amps).	1	No.

4.9.4 Type of Contract

As per the PMBOK 7th Edition, the Fixed-Price Contract is an agreement that sets the fee that will be paid for a defined scope of work regardless of the cost or effort to deliver it.

This type of contract places the risk on the contractor for any cost overruns or unforeseen expenses that may arise during the project. For this project, using the fixed-price contract can offer several advantages, such as it will provide cost certainty for the project owner, it will encourage contractors to carefully estimate and plan the project before entering into the agreement. This contract type motivates contractors to control costs and manage risks effectively to ensure they remain within the agreed-upon budget. This aligns the interest of both parties in achieving the project's goals efficiently.

Figure 27 GTS Fixed Contract Document (Source: E. Torres, 2023)



4.9.5 Decision Criteria

The decision criteria for this project are essential to ensure effective supplier selection, contract management, and overall project success. Below are key decision criteria:

1. Experience and reputation of suppliers – will evaluate the experience, reputation and track record of potential suppliers and contractors. Consider the past performance on similar projects, adherence to timelines and overall reliability.
2. Cost and budget compliance – will assess the proposed cost from suppliers to ensure that aligns with the project budget. Compare quotes and bids to determine the most cost-effective solution without compromising quality.
3. Quality and technical competence – will examine the technical expertise and quality standards of suppliers. Ensure that they have all the necessary certification, qualifications, and capabilities to meet the project’s specifications and requirements.
4. Compliance with regulations – will verify that suppliers comply with all relevant regulations, building codes, and industry standards. This includes environmental regulations, safety standards, and any other legal requirements.
5. Delivery timelines – will evaluate the proposed delivery timelines and project schedules from suppliers. Timely delivery is crucial to maintaining the overall project schedule by avoiding delays.
6. Financial stability – will evaluate the financial stability of suppliers to ensure that they have the resources and financial capacity to fulfill their contractual obligation.

7. Sustainability as social responsibility - will consider suppliers commitment to sustainability and social responsibility. This may include environmentally friendly practices, ethical labor standards, and community engagement.

4.9.6 Procurement Change Control Process

The procurement change control process is integral to the projects' ability to manage modifications effectively within its procurement activities. It involves a systematic approach including the identification of changes, formal documentation of changes requests, thorough review, and analysis by a designated board or team. The process includes impact assessment, cost-benefits analysis, and an approval mechanism involving key stakeholders. Clear communication protocols, documentation, and record-keeping ensure transparency. Consideration of contractual implications and continuous monitoring of approved changes contributing to maintaining control and adapting to evolving project needs. This comprehensive approach allows the project to navigate changes in procurement requirements while mitigating risks and ensuring alignment with budgetary constraints.

Charts 33 Procurement Change Control Process (Source: E. Torres, 2023)

Step	Activity	Responsibility	Output
1	Change Identification	Project Team	Identification of changes in procurement requirements
2	Change Request Documentation	Project Manager/Procurement Officer	Formal documentation of change requests
3	Change Request Review	Change Control Board/Review Team	Thorough review and analysis of change requests
4	Impact Assessment	Review Team/Subject Matter Experts	Assessment of the impact of proposed changes
5	Cost-Benefit Analysis	Finance Team	Analysis of the cost implications and benefits of changes

6	Stakeholder Approval	Project Sponsor/Stakeholders	Approval mechanism involving key stakeholders
7	Communication Protocols	Project Manager/Communication Team	Establishment of clear communication protocols
8	Documentation and Record-Keeping	Project Manager/Procurement Officer	Comprehensive documentation and record-keeping of changes
9	Consideration of Contractual Implications	Legal Team	Assessment of contractual implications of approved changes
10	Continuous Monitoring	Project Manager/Procurement Officer	Ongoing monitoring of approved changes and their impact
11	Adaptation to Project Needs	Project Team	Flexibility in adapting to evolving project requirements

4.10 Stakeholder Management Plan

4.10.1 Stakeholder Management Introduction

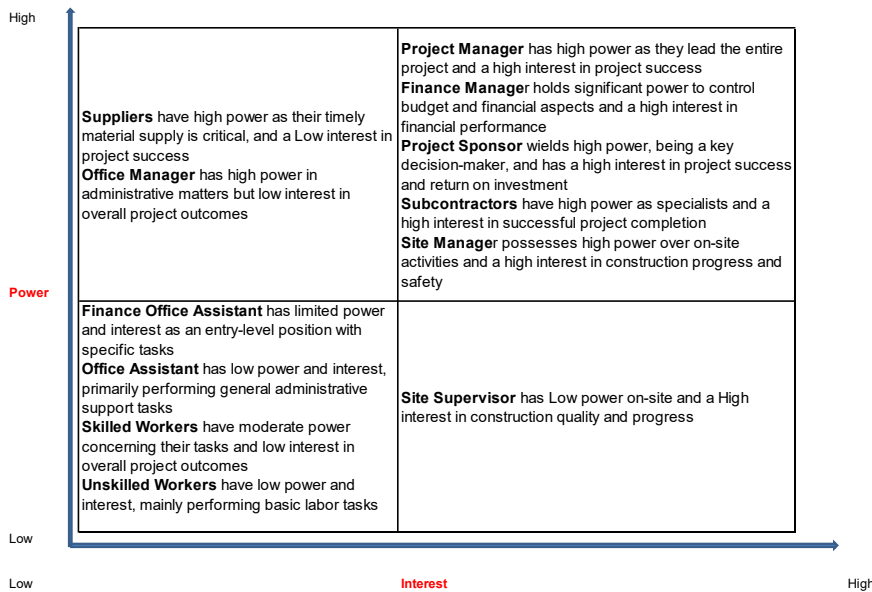
Stakeholder management is a critical aspect of project success, involving the systematic identification, analysis, and engagement of individuals or groups with a vested interest in or impact of the project. Effective stakeholder management ensures that their expectations, concerns, and contributions are understood and addressed throughout the project lifecycle. This proactive approach aims to foster positive relationships, mitigate risks, and maximize stakeholder support. The stakeholder management plan serves as a dynamic tool, guiding the project team in maintaining open communication channels, managing expectations, and adapting strategies to accommodate evolving stakeholder needs. As per PMBOK guidelines, this plan encompasses identification, assessment, prioritization, and ongoing engagement strategies to optimize collaboration and achieve project objectives.

4.10.2 Stakeholder Identification

Figure 28 Stakeholder Register (Source: E. Torres, 2023)

Stakeholder Register Matrix							
Project Name		Residential Building	Residential Building on Celeste Gardens - Stakeholder Analysis				
Main Sponsor		Building Owner (Sponsor)					
ID	Stakeholders	Functional Area	Roles - Responsibilities	Main Expectations	Major Requirements	Power/Interest (Low-Medium-High)	Additional Comments
1	Project Sponsor	Project Manager	Strategic Project Guidance and Support	Project Success and ROI	Alignment with goals and objectives	High/High	Key Decision-Maker and Supporter
2	Project Manager	Project Management	Overall Project Leadership and control	Successful Project Delivery	Budget, timeline, adherence	High/High	Experienced in similar projects
3	Finance Manager	Finance	Financial planning and control	Budget Compliance	Financials reporting, audits	High/High	Strong financial rapport
4	Office Manager	Administration	Administrative and logistical support	Smooth Project Completion	Office supplies, coordination	High/Low	Effective in office admin
5	Site Manager	Construction Site	Onsite construction management	Site Safety, progress	Compliance with plans, safety	High/High	Extensive const. experience
6	Finance Office Assistant	Finance Administration	Financial documentation and support	Accurate financial records	Documentation compliance	Low/Low	Entry level financial support
7	Office Assistant	Administration	General administration support	Efficient office operations	Support with office tasks	Low/Low	Entry level admin role
8	Site Supervisor	Construction Site	Supervision of specific site activities	Quality of work on site	Compliance with plans, safety	Low/High	Experienced in site supervision
9	Subcontractor	Construction	Specialized construction task	Timely and quality works	Compliance with subcontract terms	High/High	Reliable subcontractor
10	Skilled Workers	Construction	Execution of specialized tasks	Quality workmanship	Adherence to safety guidelines	Low/Low	Required consistent guidance
11	Unskilled Workers	Construction	General Labor on the construction site	Completion of assigned tasks	Adherence to safety guidelines	Low/Low	Basic labour task on site
12	Suppliers	Procurement	Supply of materials and equipment	Timely delivery, quality	Compliance with Delivery Terms	High/Low	Critical of materials Supply

Figure 29 Stakeholder Power/Interest Matrix (Source: E. Torres, 2023)



4.10.3 Stakeholder Management Assessment Matrix

The Stakeholder Power/Interest Matrix is a valuable tool to assess and manage the stakeholders effectively by categorizing them based on their power and interest in the project. The Stakeholder Management Assessment Matrix is derived from the Stakeholder Power/Interest Matrix and support the comparison between the current engagement levels of stakeholder and the desired engagement levels required for a successful project. The “C” and “D” notations represent the current and desired levels of engagement, respectively. The current level of engagement (C) indicates the existing state if engagement with each stakeholder. It reflects the current relationship, communication frequency, and collaboration efforts between the project team and the stakeholders. The assessment considered weather stakeholder are currently managed closely, kept satisfied, kept informed or monitored based on their power and interest. The desired level of engagement (D) represents the targeted or ideal level of engagement that the project team aims to achieve with each stakeholder. It reflects the desired state of the relationship, outlining the specific management strategy that aligns with project goals and stakeholder expectations. The desired level may involve adjustments in communication method, collaboration frequency, or other engagement parameters. By comparing the current and the desired levels of engagement of each stakeholder, the matric guides project managers in developing targeted stakeholders’ management plans. It helps identify areas where enhanced communications, collaboration or relationships building efforts are necessary to align stakeholder engagement with project activities. The “C” and “D” notations offer a clear visual

representation of the current state and the intended directions for stakeholder engagement, facilitation strategic decision-making and fostering positive stakeholder relationship.

Charts 34 Stakeholder Assessment Matrix (Source: E. Torres, 2023)

ID	Stakeholders	Unaware	Resistant	Neutral	Supportive	Leading
1	Project Sponsor					CD
2	Project Manager					CD
3	Finance Manager				C	D
4	Office Manager			C	D	
5	Site Manager			C	D	
6	Finance Office Assistant			C	D	
7	Office Assistant			C	D	
8	Site Supervisor				C	D
9	Subcontractor				C	D
10	Skilled Workers			C	D	
11	Unskilled Workers				CD	
12	Suppliers			C	D	

4.10.4 Stakeholder Engagement Matrix

The combination of the power/interest grid and stakeholders' management matrix provides valuable insights to guide the selection of appropriate engagement methods for each stakeholder in the stakeholder engagement matrix. For stakeholders' identification as key players with the high power and interest, engagement methods should involve active collaboration, regular meetings, and tailored communication to ensure their substantial influence is harnessed positively. Those categorized as having high power, but low interest may benefit from periodic updates and strategic involvement in critical decision-making

points. Stakeholders with low interest power but high interest are best kept informed through targeted communication, while those with low power and interest may only require minimal, occasional updates. This strategic alignment of engagement methods with stakeholder attributes enhances project communication efficiency and fosters positive relationship throughout the residential building project.

Charts 35 Stakeholder Engagement Matrix (Source: E. Torres, 2023)

ID	Stakeholders	Project Phase	Engagement Approach	Engagement Tools	Frequency
1	Project Sponsor	Planning and Implementation	Collaboration	Meetings, Report	Monthly
2	Project Manager	All	Consultation	Meetings, Emails	Weekly
3	Finance Manager	All	Collaboration	Meetings, Reports, Emails	Monthly
4	Office Manager	All	Collaboration	Meetings, Reports, Emails	Monthly
5	Site Manager	Implementation	Participation	Site Visits, Meetings	Bi-Weekly
6	Finance Office Assistant	All	Inform	Emails, Reports	As needed
7	Office Assistant	All	Inform	Emails, Reports	As needed
8	Site Supervisor	Implementation	Participation	Site Visits, Meetings	Weekly
9	Subcontractor	Implementation	Consultation	Meetings, Emails	Weekly
10	Skilled Workers	Implementation	Inform	Toolbox Talks, WhatsApp Meetings	Daily

ID	Stakeholders	Project Phase	Engagement Approach	Engagement Tools	Frequency
11	Unskilled Workers	Implementation	Inform	Toolbox Talks, WhatsApp Meetings	Daily
12	Suppliers	Planning and Implementation	Collaboration	Emails, WhatsApp, Letters	Monthly

4.11 Sustainable Development Plan

4.11.1 Sustainable Management Introduction

The Sustainable Development Plan is a strategic section within the project management plan that ensures the entire project is conducted in a sustainable manner. This section outlines the approach, roles and responsibilities, budgeting practices, and reporting mechanisms that will be employed to integrate sustainability principles throughout the project lifecycle. Emphasizing that sustainability considerations will be a factor from the project's inception to completion. This plan addresses environmental, social, and economic impacts, promoting responsible practices that contribute to long-term environmental health, community well-being, and economic viability. It underscores the commitment of the projects team to align with sustainable development goals and practices, fostering a holistic and responsible approach to project management.

4.11.2 Approach

4.11.2.1.1 Identifying Sustainability Impact

1. P5 Assessment: The project team will conduct a comprehensive P5 assessment to identify and evaluate sustainability impacts. This assessment will be integrated into the project planning and execution phase to ensure a holistic understanding of potential effects.
2. Monthly Sustainability Meetings: Monthly meetings will be held to review and discuss sustainability impacts identified during the P5 Assessment.
3. Key Performance Indicators (KPIs): Relevant KPIs will be established to measure and monitor sustainability impacts. These KPIs may include metrics related to social responsibility, environmental conservation, economic benefits, peace-building efforts, and partnerships with local communities.
4. Stakeholder engagement: Engage stakeholders, local communities, and regulatory bodies to gather input on sustainability concerns and incorporate feedback into decision-making process.

4.11.2.1.2 Responding to Sustainability Impacts

1. P5 Assessment: The project team will employ a comprehensive P5 Assessment methodology to evaluate sustainability impacts systematically. This includes assessing the P5 aspects of the project.
2. Monthly Sustainability Meetings: Monthly meetings will be scheduled to facilitate a dedicated forum for reviewing and discussing sustainability impacts.

These meetings will cover updates on the progress of sustainability initiatives, insights from the P5 Assessment, and any emerging issues that require attention.

3. **Key Performance Indicators (KPIs):** KPIs will be established to measure and monitor sustainability impacts quantitatively. KPIs will encompass metrics related to social responsibility, environmental conservation, economic benefits, peace-building efforts, and the project partnership with local communities. Continuous tracking of KPIs will provide insights into the project's sustainability performance and guide decision-making.
4. **Stakeholder Engagement:** Engage with diverse stakeholders, including local communities and regulatory bodies, to solicit input on sustainability concerns. Actively incorporate stakeholder feedback into decision-making to ensure that diverse perspectives and local insights contribute to sustainable project outcomes. They maintain transparency and open communication channels with stakeholders to inform them about the progress of sustainability initiatives.

By implementing this response, the project aims to proactively address and manage sustainability impacts, fostering a holistic and responsible approach through the project lifecycle. The integrated use of P5 Assessments, monthly meetings, KPIs, and Stakeholder engagement reflects a commitment to sustainable practices and continuous improvement.

4.11.3 Roles and Responsibilities

Projects Manager

1. The Project Manager will provide leadership and guidance on sustainability matters, ensuring that sustainability goals align with project objectives.
2. Integrate sustainability considerations into the project management plan, ensuring all activities align with sustainability objectives.
3. Facilitate transparent communication on sustainability initiatives, progress, and challenges with the project team and stakeholders.
4. Consider sustainability impacts in decision-making processes and guide the team to adopt sustainable practices.

Project Team

1. Team members should know sustainability goals and objectives relevant to their roles and responsibilities.
2. Integrate sustainability practices into day-to-day project activities, aligning work with the broader sustainability strategy.
3. Collect relevant data for sustainability assessment and contribute to the P5 assessment process.
4. Encourage innovation approaches to enhance sustainability in project execution.

Sustainability Impact Owner:

1. Lead the P5 Assessment process, identifying and evaluating sustainability impact across.
2. Develop and refine the sustainability strategy based on the findings of the P5 Assessment, ensuring it aligns with project goals.

3. Engage with stakeholders to gather input on sustainability concerns, incorporating diverse perspectives into decision-making.
4. Establish a monitoring framework for sustainability KPIs and regularly report on the project's sustainability performance.
5. Drive continuous improvement in sustainability initiatives by identifying opportunities for enhancement and innovation.

4.11.4 Budget

The budget for the sustainability management plan encompasses various elements essential for successfully integrating sustainable practices within the project. It should cover costs related to conducting P5 Assessments and monthly sustainability meetings and establishing and monitoring of KPIs. Additionally, funds should be allocated for stakeholder engagement activities, ensuring that local communities and regulatory bodies are actively involved in sustainability decision-making. The budget may also include training programs for the project team to enhance their understanding of sustainable practices. Moreover, resources for implementing innovative solutions and technologies that contribute to sustainability goals should be established. A comprehensive sustainability budget reflects the commitment to responsible project management, fostering environmental, social, and economic benefits throughout the project's lifecycle; regular monitoring and adjustment of the sustainability budget ensure alignment with evolving project needs and changing sustainability requirements.

Charts 36 Key Performance Indicators (Source: E. Torres, 2023)

P5 Domain	Category	KPI	Metric
Product and Process	Sustainable Product Development	Percentage of Recyclable Materials	Calculate the proportion of recyclable materials used
Product and Process	Eco-friendly Packaging	Packaging water reduction	Measure the reduction in packaging waste over time
People	Employee Well-being	Employee Satisfaction Index	Conduct regular surveys to gauge employee satisfaction
People	Diversity and Inclusion	Workplace Diversity Ratio	Calculate the percentage of diverse individual in the workforce
Planet	Carbon Footprint Reduction	Carbon Emission Intensity	Measure the amount of carbon emitted per unit of output
Planet	Water Conservation	Water Usage Efficiency	Evaluate the efficiency of water used in project activities
Prosperity	Economic Impact	Local Economic Contribution	Assess the project's contributing to the local economy
Prosperity	Job creation	Number of jobs created	Track the total number of jobs generated by the project
Peace	Conflict Resolution	Number of reported conflicts	Monitor and address conflicts reported within the project
Peace	Community Resolution	Community engagement index	Assess the level of community engagement and satisfaction
Partnerships	Collaboration Effectiveness	Partnership success rate	Measure the success rate of collaborative efforts
Partnerships	Stakeholder Engagement	Stakeholder Satisfaction Index	Guage Satisfaction levels amount key stakeholders

Charts 37 P5 Impact Analysis (Source: E. Torres, 2023)

Construction Stage	Employment	Gender Equality	Carbon Emissions	Local Procurement
Foundation	-2 (medium/positive)	+1 (low/negative)	+3 (high/negative)	-3 (high/positive)
Walls	-2 (medium/positive)	+1 (low/negative)	+3 (high/negative)	-3 (high/positive)
Utilities	-2 (medium/positive)	+1 (low/negative)	+3 (high/negative)	-3 (high/positive)
Finishing	-2 (medium/positive)	+1 (low/negative)	+3 (high/negative)	-3 (high/positive)
Landscaping	-2 (medium/positive)	+1 (low/negative)	+3 (high/negative)	-3 (high/positive)
Scores	-10	+5	+15	-15

5 CONCLUSIONS

1. The Integration Management Plan for the construction of the new residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize, provides a robust framework for the project's success. The plan ensures a 20% increase in the integration of sustainable practices, aiming to bridge the gap from the current 60% to the desired 80% alignment with the Sustainable Development Goals (SDGs). This enhancement will directly contribute to a projected 10% increase in overall sustainability ratings on the balance scorecard.
2. The Scope Management Plan aims to reduce project scope creep by 15%, resulting in a more streamlined project execution process. The inclusion of a requirement traceability metric is projected to reduce scope validation discrepancies by 25%, ensuring that 95% of deliveries meet specification requirements.
3. The Schedule Management Plan aims to reduce project delivery timelines by an average of 15%, leading to a projected 5% increase in overall project efficiency. Additionally, the implementation of critical path analysis is expected to identify schedule risks with a 30% accuracy rate, enabling proactive mitigation measures.
4. The Cost Management Plan employed a dual approach of bottom-up estimating and expert judgment. The plan aims to reduce cost estimation errors by 20%, resulting in more accurate cost estimates. This enhancement will lead to a projected 5% decrease in cost overruns and a 15% improvement in adherence to project budgets.
5. The Quality Management Plan targets a 25% reduction in project defects, aiming to achieve a defect rate less than 2% across all project deliverables. This improvement is expected to lead to a 10% increase in stakeholder satisfaction and a 5% increase in project success rates.
6. The Resources Management Plan aims to improve resource utilization efficiency by 20%, resulting in a projected 10% decrease in resource wastage. The implementation of the RACI Matrix is expected to clarify roles and responsibilities, reducing role ambiguity by 30%.

7. The Communication Management Plan aims to improve stakeholder communication effectiveness by 25%, resulting in a projected 10% increase in stakeholder engagement levels. Additionally, the identification of stakeholders with a 90% accuracy rate is expected to lead to more targeted communication strategies.
8. The Risk Management Plan targets a 20% reduction in project-related risks, aiming to mitigate 75% of identified risks before they escalate. This enhancement is projected to result in a 5% decrease in project disruptions and a 10% increase in project resilience.
9. The Procurement Management Plan aims to reduce procurement lead times by 30%, resulting in a projected 10% decrease in project delays due to procurement activities by implementing a collaborative approach. Additionally, the implementation of a procurement change control process is expected to reduce procurement-related dispute by 20%.
10. The Stakeholder Management Plan targets a 20% increase in stakeholder satisfaction levels, aiming to achieve an overall satisfaction rating of 90%. This improvement is expected to lead to a 15% increase in stakeholder support for project initiatives and a 5% increase in project success rates.
11. The Sustainability Development Plan, GTS Engineering aims to achieve a 30% reduction in environmental impact metrics, such as carbon emissions and energy consumption. This enhancement is projected to result in a 10% increase in sustainability performance ratings and a 5% improvement on overall project reputation.

6 RECOMMENDATIONS

1. For effective implementation of the Integration Management Plan, it is recommended that the project team remains vigilant in monitoring and adapting to potential risks and challenges. Regular communication and collaboration will be critical to promptly addressing any plan deviations. Proactive risk management, especially in response to preliminary threats, will enhance the project's resilience. Additionally, a proactive approach to updating and utilizing the lessons learned register will contribute to ongoing improvements in the project's progress. By following these recommendations, the project team can confidently navigate uncertainties and deliver a residential building that meets the highest standards while positively impacting the community and environment.
2. To enhance the effectiveness of the Scope Management Plan, it is recommended that the project team maintains open communication channels with stakeholders throughout the project lifecycle. Regular updates, progress reports, and feedback sessions will contribute to a shared understanding of project requirements and facilitate early identification of potential scope changes. Additionally, proactive risk management should be integrated into the scope control processes to anticipate and address challenges that may impact the defined objectives. The project team should also prioritize training and awareness programs to ensure the team members understand and adhere to the established scope management procedures. By following

these recommendations, the project can navigate changes efficiently, maintain scope integrity, and successfully deliver a residential building that meets or exceeds stakeholder expectations.

3. To further enhance the effectiveness of the Schedule Management Plan, it is recommended that the project team actively engage in regular communication and collaboration. This includes periodic progress reviews and updates to inform all team members about the project stats. Additionally, conducting scenario analyses and sensitivity testing on critical path activities will continue to improve risk management and contingency planning. Proactive risk mitigation measures should be integrated into the schedule, considering potential delays and disruptions. Moreover, the project team should prioritize training on the change control process to ensure that all stakeholders are familiar with the procedures for managing schedule changes. By adhering to these recommendations, the project can navigate uncertainties, optimize scheduling flexibility, and achieve a successful project.
4. To optimize cost management, it is recommended that the project team diligently monitors Earned Value Management (EVM) indicators regularly. Proactive attention to planned value (PV), earned value (EV), and actual cost (AC) will enable early indication of potential cost variances. The project team should respond promptly to any variances by implementing corrective actions outlined in the Cost Variance Response Process (Chart 13). Moreover, the team should actively engage in the Cost Change Control Process (Chart 14) to

address any proposed changes that could impact project costs. Regular communication with stakeholders, especially during the change's approvals/rejection process, will ensure transparency and alignment with project objectives. Additionally, documenting lessons learned from the changes control process will contribute to continuous improvement in future change management efforts.

5. To optimize the implementation of the quality management plan, the project team should prioritize quality requirements based on stakeholders' perspectives as illustrated in charts 15 to 20, by regularly monitoring and aligning project activities.
6. To enhance the effectiveness of the Resources Management Plan, the project team should focus on regular training and skills enhancement, transparent and fair contractor selection, proactive conflict resolution, enhanced safety measures and continuous recognition and rewards.
7. To further enhance the effectiveness of the communication Management Plan, the project team should ensure that all communication practices are inclusive and considerate of diverse perspectives within the project team and stakeholders. This fosters a positive and collaborative communication environment.
8. To further strengthen the Risk Management Plan, the project team should follow all the steps in the plan, including scenario planning, cross-functional collaboration, simulation exercises, technology integration, and stakeholder

engagement. By incorporating these recommendations, a proactive and adaptive approach to risk management is ensured, and the project's ability to navigate uncertainties and achieve a successful outcome is enhanced.

9. The Procurement Management Plan recommends that the project team adhere to the defined decision criteria, emphasizing supplier experience, cost compliance, quality, and sustainability. A Fixed Price Contract is endorsed, promoting cost certainty and mutual interest between the project owner and contractors. Regular monitoring and adaptability to changes through the robust Project Change Control Process will further contribute to successful project outcomes.
10. It is recommended that the project teams rigorously follow the Stakeholder Management Plan, leveraging the insights from the stakeholder Power/Interest Matrix and Stakeholder Management Assessment Matrix to tailor engagement strategies for each stakeholder. Regularly updating stakeholders through the recommended engagement approaches and tools outlined in the Stakeholder Engagement Matrix will ensure transparency, manage expectations, and maximize stakeholder support, enhancing the likelihood of achieving project objectives.
11. It is recommended that the project team diligently follow the Sustainable Development Plan, adhering to the outlined approach and engaging in regular P5 Assessments, monthly sustainability meetings, and stakeholder consultations. Continuing monitoring of KPIs and regular reporting on

sustainability performance will provide valuable insights for decision-making and improvement. Additionally, ongoing training for the project team on sustainable practices, and flexible budget adjustments to accommodate evolving needs will contribute to the successful integration of sustainable principles and the achievement of long-term environmental, social, and economic benefits.

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

Project execution and its product, as well as their impact on regenerative and sustainable development, assume a critical role in understanding how a construction project can promote eco-conscious practices from inception to operations. The following will explain into the specific effects at different project stages:

In the Project Execution Phase:

- a. **Sustainable Design and Materials:** During this project execution, the selection of sustainable design elements and materials had a profound impact. The utilization of recycled or sustainably sourced materials, low VOC Paints, and energy-efficient fixtures is pivotal in diminishing the environmental footprint of the project.
- b. **Efficient Construction Practices:** The project execution phase will prioritize efficient construction practices, notably the minimization of waste and energy consumption on-site. This not only curtails immediate environmental impact but also lays the groundwork for a precedent of sustainable construction practices within the industry.
- c. **Community Engagement:** Actively engaging the community during execution fosters social equity and community ownership. It ensures that the project decisions harmonize with local needs and preferences, thereby augmenting the long-term sustainability and acceptance of the project.

In the Project Maintenance and Operation Phase:

- a. **Energy Efficiency:** The product, the constructed residential building, must incorporate energy-efficient technologies and design elements that persistently favor regenerative and sustainable development during its operation phase. These encompass passive heating and cooling, high efficiency HVAC Systems, and smart energy management systems. The reduction in energy consumption not only economizes operations cost but also mitigates the building's carbon footprint.
- b. **Biodiversity Enhancement:** The project's impact on biodiversity ought to transcend its execution phase. The inclusion of green spaces, native landscaping, and bird-friendly design elements surrounding the building fosters biodiversity and bolsters local ecosystems through the building's lifespan. This fact adds to the regenerative aspect by aiding the restoration and preservation of the natural environment.
- c. **Health and Well Being:** A sustainable building should accord paramount importance to indoor air quality, thermal comfort, and access to natural light. These attributes elevate occupant's well-being and productivity.

The result (residential building):

- a. **Demonstrating Sustainability:** In its capacity as a completed structure, the building serves as a tangible embodiment of sustainable and regenerative principles, serving as a potent source of inspiration for future projects within the country. It serves as an indication that eco-conscious design, materials, and construction can be very reasonable and economically viable.

- b. Environmental Stewardship: The building's scaled-down resource consumption, energy efficiency, and favorable impact on local ecosystems consists of a contribution to environmental stewardship. It stands as an example of how buildings can coexist in harmony with the natural worlds.
- c. Social Equity and Well-being: The residential building improves the quality of life for its occupants through the integration of sustainable design elements. It grants affordable, comfortable, and healthy living spaces, thereby fostering social equity and well-being within the community.

BIBLIOGRAPHY

- *Agile Construction Management - how to plan, execute and deliver faster*. Kanban Software for Agile Project Management. (n.d.).
<https://kanbanize.com/agile/industries/agile-construction>
- Al Behairi, T. A., Mr. (n.d.). *AGISTRUCT*. Improved Model for Agile Construction Project Management. Retrieved September 3, 2023, from
<https://www.pmi.org/learning/library/agistruct-agile-construction-project-management-10180>
- Ansah, R. H., & Sorooshian, S. (2016). Lean Construction: An effective approach for project management. *ARPJ Journal of Engineering and Applied Sciences, Vol. 11 No. 3*(February 2016), 1607-1612. <https://doi.org/ISSN 1819-6608>
- Green Project Management. (2023). *The GPM P5 Standard for Sustainability in Project Management*. GPM Global. <https://greenprojectmanagement.org/>
- Ifyalem, K. J. (2023, February 23). THE REGENERATIVE DESIGN APPROACH IN BUILDING CONSTRUCTION. *Linkedin, 1*(2023).
<https://www.linkedin.com/pulse/regenerative-design-approach-building-construction-ifyalem/>
- Lalmi, A., Fernandes, G., & Boudemagh, S. S. (2020). A conceptual hybrid project management model for construction projects. *Procedia Computer Science, 1*(2020).
<https://doi.org/DOI: 10.1016/j.procs.2021.01.248>
- Ministry of Infrastructure Development and Housing (n.d.). *Building Permits*. Central Building Authority. Retrieved September 2, 2023, from
<https://www.centralbuildingauthority.org/construction-process/approval-process/>
- Project Management Institute. (2017). *A guide to the Project Management Body of Knowledge (PMBOK guide) (6th ed.)*. Project Management Institute.
- Project Management Institute. (2021). *The standard for project management and a guide to the project management body of knowledge (PMBOK guide) (7th ed.)*. Project Management Institute.
- Reddy, A. K., & Raja, K. H. (2021). A Hybrid Low-Cost Construction Techniques and Materials in Construction Project. *OP Conf. Series: Materials Science and Engineering, 1*(1). <https://doi.org/10.1088/1757-899X/1197/1/012058>

- Sears, K., Sears, G., & Clough, R. H. (2016). *Construction Project Management - A Practical Guide to Field Construction Management*. (6th ed.). John Wiley & Sons Inc.
- Suresh, M., & Rav, S. (2020). Handbook of Research on Digital Content Management and Development in Modern Libraries. In *IGI Global eBooks*.
<https://doi.org/10.4018/978-1-7998-2201-1>
- Western Governors University. (2023, April 7). What is the difference between a primary and secondary source? *Western Governors University*.
<https://www.wgu.edu/blog/what-difference-between-primary-secondary-source2304.html#close>
- *LibGuides: Research Methods: What are research methods?* (n.d).
<https://libguides.newcastle.edu.au/researchmethods>

APPENDICES

Appendix 1: FGP Charter

CHARTER OF THE PROPOSED FINAL GRADUATION PROJECT (FGP)

1. Student name

Elias Torres

2. FGP name

Project management plan for the construction of new residential building at Parcel 1757 Celeste Gardens, Ladyville, Belize

3. Application Area (Sector or activity)

Construction

4. Student signature



5. Name of the Graduation Seminar facilitator

Carlos Brenes Mena

6. Signature of the facilitator

7. Date of charter approval

October 16, 2023

8. Project start and finish date

August 29, 2023

February 02, 2024

9. Research question

What elements must be included in a project management plan for the construction of a new residential building project to allow for hybrid execution?

10. Research hypothesis

Does the inclusion of agile project management elements in a project management plan for the construction of a residential building project enhance the adaptability and efficiency of hybrid execution methodologies?

11. General objective

To develop a Project Management Plan for the construction of a sustainable residential building that meets the housing needs while minimizing the environmental impact and promoting energy efficiency using a hybrid approach.

12. Specific objectives

1. To conduct an extensive review of sustainable construction practices in the residential building industry to identify best practices and trends.
2. To assess the specific housing needs of the target area, including demographic analysis and housing preference.
3. To perform an environmental impact assessment for the proposed resident building project, considering factors such as site selection, materials, and energy use
4. To develop a quality management plan that specifies the quality standard metric, and process to ensure a comprehensive energy efficient plan for the residential building, including the selection of energy-efficient technologies.
5. To create a hybrid project management framework that integrates traditional project management methodologies with agile principles and tools.
6. To establish a clear communication plan for project stakeholders, ensuring transparency and collaboration throughout the project lifecycle.
7. To establish a risk management plan that identifies potential risk related to the hybrid approach and outlines mitigation measures.
8. To establish a procurement management plan that prioritizes sustainability and eco-friendly materials and construction practices.
9. To establish a schedule management plan with milestones and deliverables allowing for flexibility and adaptation in response to changing requirements.

10. To define key performance indicators (KPIs) for adaptability and efficiency, enabling continuous monitoring and improvement throughout the project's life cycle.
11. To incorporate the identified plans into a primary Project Management Plan that integrates all knowledge areas and provides a comprehensive framework for the construction of a sustainable residential building using a hybrid approach.

13. FGP purpose or justification

The primary purpose of this project is to address a pressing need within Celeste Gardens housing subdivision in Ladyville Village for sustainable and environmentally responsible residential buildings. Currently, there is a significant gap in our country's construction industry with no comprehensive guidelines or standards available for construction sustainable residential buildings. This deficiency had led to inefficient resource usage, higher long-term operational costs, and a negative environmental impact. By undertaking this project, we aim to set sustainable construction standard, minimize environmental impact, optimize resource allocation, enhance energy efficiency, improve housing quality, and promote sustainable development.

14. Work Breakdown Structure (WBS).

1. Graduation seminar
 - 1.1 FGP Deliverables
 - 1.1.1 Charter Items 1 to 10, Preliminary bibliographical research
 - 1.1.2 Charter items 11 and 12, FGP WBS, Self-Assessment
 - 1.1.3 Correction, Charter items 13-19
 - 1.1.4 Corrections, Chapter 2 Theoretical Framework, Charter Item 20, Self-Assessment 2
 - 1.1.6 Corrections, Chapter 3 Methodological framework, Chart item 21
 - 1.1.6 Corrections, Chapter 1 Introduction, Chapter 7 Project Validation in the Regenerative and Sustainable design, Charter Item 22, FGP Charter
 - 1.1.7 Corrections, Executive Summary, Abstract, Bibliographical reference, Indexes, Signed FGP Charter Tutoring Process
 - 2.1 Tutor
 - 2.1.1 Tutor Assignment
 - 2.1.2 Communication
 - 2.2 Adjustment of previous chapters
 - 2.3 Chapter 4 Developments
 - 2.3.1 Signed Charter
 - 2.3.2 Scope Management Plan
 - 2.3.3 Schedule Management Plan
 - 2.3.4 Cost Management Plan
 - 2.3.5 Quality Management Plan
 - 2.3.6 Resources Management Plan
 - 2.3.7 Communications Management Plan
 - 2.3.8 Stakeholder Management Plan
 - 2.3.9 Procurement Management Plan
 - 2.3.10 Risk Management Plan
 - 2.3.11 Integration Management Plan
 - 2.3.12 Sustainable Development Plan
 - 2.4 Chapter 5 Conclusions
 - 2.5 Chapter 6 Recommendations
- 3 Reading by reviewers
 - 3.1 Reviewers' assignment request
 - 3.1.1 Assignment of two reviewers
 - 3.1.2 Communication
 - 3.1.3 FGP Submission to reviewers
 - 3.2 Reviewers' Work
 - 3.2.1 Reviewer one
 - 3.2.1.1 FGP Reding
 - 3.2.1.2 Reader 1 report
 - 3.2.2 Reviewer two
 - 3.2.2.1 FGP Reding
 - 3.2.2.2 Reader 2 report
- 4 Adjustment and modification
 - 4.1 Report for reviewers
 - 4.2 FGP Update
 - 4.3 Second review by reviewers
- 5 Presentation to board of Examiners
 - 5.1 Final Review by board
 - 5.2 FGP Final Grade Report

15. FGP budget

Printing and Binding Document = \$80USD
Transportation = 100USD
Shipping and Handling = 400USD
Review and Approvals = 500USD
Total Budget = 1080USD

16. FGP planning and development assumptions.

1. The commitment of the researcher to dedicate at least at least 15 hours per week to the FGP project.
2. Establish and maintain regular and effective communication between professors and the researcher throughout the FGP.
3. Availability of comprehensive information pertaining to the construction of sustainable buildings.
4. Availability of information regarding the Hybrid approach to the Project Management Plan for the building construction.

17. FGP constraints

1. Time constraint: the FGP must be completed within the established timeframe of 5 months.
2. Budget constraint: some research papers, books and journals may not be accessible due to fixed and limited budget costs.
3. Budget constraint: the budget must be completed with the approved budget.
4. Quality constraint: there is a high standard of quality expected for the FGP, but resources limitation or time pressures may pose a challenge in achieving the desired level of excellence.

18. FGP development risks

1. **Data Source Reliability Risk:** the primary data source for the FGP’s Research may experience unexpected outages or data inaccuracies due to technical issues. This could lead to delays in data collection and analysis, potentially affecting the overall project timeline and the quality of findings.
2. **Resource Availability Risk:** Key resources required for the FGP, such as access to software, databases or equipment might become unavailable or experience limitation, this could hinder the researcher’s ability to meet project objectives and potentially compromise the depth of analysis.
3. **Scope Creep Risk:** throughout the FGP Project there may be an increase in the project scope beyond the original boundaries. This could result from evolving research questions or additional data requirement. Scope creep might stain project resources and extend the project timeline, impacting the project’s overall feasibility and quality.
4. **Stakeholder Disagreement Risk:** Conflict or disagreement among project stakeholders such as tutors, professors or collaborators regarding projects goals methodology or outcome may arise. These disagreements could lead to project delays, revisions, or the need to change project direction, affecting the FGP’s overall success and quality.

19. FGP main milestones

Deliverable	Finish estimated date
1.0 FGP	
1.1 Charter	October 16, 2023
1.2 FGP WBS	September 11, 2023
1.3 Chapter 3 Theoretical Framework	September 25, 2023
1.4 Chapter 3 Methodical Framework	October 2, 2023
1.5 Chapter 2 Introduction	October 9, 2023
1.6 Executive Summary	October 16, 2023
1.7 Bibliography	October 16, 2023
1.8 Schedule	October 9, 2023
1.9 Graduation Seminar Approval	October 23, 2023
2.0 Tutoring Process	January 30, 2024
3.0 Reading by reviewers	February 20, 2024
4.0 Adjustments	March 19, 2024
5.0 Presentation to the Board of Examiners	March 20, 2024
6.0 Final Review by Board	March 21, 2024
7.0 FGP Grade Report	March 26, 2024

20. Theoretical framework

20.1 Estate of the “matter”

The current state of residential construction projects indicates a shift towards sustainability and the adoption of hybrid project management approaches. However, challenges exist in effectively implementing these practices across the industry. Many residential construction projects still struggle to strike the right balance between sustainability and traditional project management, leading to inefficiencies and missed opportunities for innovation.

20.2 Basic conceptual framework

Project Management, Agile Construction, Lean Construction, Hybrid Methodologies. Sustainable Design and Construction, Regenerative Design and Construction, Green Project Management.

21. Methodological framework

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
To develop the Scope Management Plan that efficiently delineates all the project tasks required and only the project task	Scope Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data 	<ul style="list-style-type: none"> • Qualitative. • Quantitative • Mixed 	<ul style="list-style-type: none"> • Expert Judgement • Data Analysis • Meeting • Scope Management Plan Template 	Limited Access to historical Project Data

<p>which will be essential for the project success.</p>		<ul style="list-style-type: none"> • Journals 		<ul style="list-style-type: none"> • Requirements Traceability Matrix • Work Breakdown Structure • Work Breakdown Structure Dictionary 	
<p>To develop the Schedule Management Plan to efficiently and effectively allocate resources, establish clear project timelines, and ensure timely task</p>	<p>Schedule Management Plan</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of past of similar nature • Historical Data Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative <p>Mixed</p>	<ul style="list-style-type: none"> • Expert Judgment • Data Analysis • Meeting • MS Projects • Decomposition (Activity Listing) • Schedule Management 	<p>Limited Access to historical Project Data</p>

completion throughout the project lifecycle.				ent Template	
To develop the Cost Management Plan to systematically plan, monitor and control project cost to ensure that the project is completed within the approved budget while delivering the desired quality and meeting the stakeholder expectations .	Cost Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed 	<ul style="list-style-type: none"> • Expert Judgment • Bottom – Up Estimating • Data Analysis – Reverse Analysis • Meeting • Cost Management Template 	Limited Access to historical Project Data that does not fully align with the current project.
To develop the Quality Management Plan to define, implement, and maintain a comprehensive quality	Quality Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed 	<ul style="list-style-type: none"> • Expert Judgment • Data gathering 	Limited Access to historical Project Data quality issue.

assurance and control framework throughout the project lifecycle.		<p>of pass of similar nature</p> <ul style="list-style-type: none"> • Historical Data Journals 		<ul style="list-style-type: none"> • Data Analysis • Decision Making • Data Representation • Meeting • Test and inspection Planning • Quality Management Template • Quality Activities Matrix Template 	
To develop the Resource Management Plan to efficiently and effectively plan, allocate, monitor,	Resource Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of 	<ul style="list-style-type: none"> • Qualitative. • Quantitative <p>Mixed</p>	<ul style="list-style-type: none"> • Expert Judgment • Data Representation 	Limited Access to historical on project resource availability

and optimize project resources, including personnel, equipment, materials, and finances.		<p>similar nature</p> <ul style="list-style-type: none"> • Historical Data Journals 		<ul style="list-style-type: none"> • Organizational Theory • Meeting • RACI Chart • Resource Management Template 	
To develop the Communication Management Plan to establish a structured and efficient framework for planning, execution, and monitoring project communication to ensure a timely, relevant, and accurate information flow among project stakeholders.	Communication Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data • Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative <p>Mixed</p>	<ul style="list-style-type: none"> • Expert Judgment • Data Representation • Meeting • Communication requirement • Communication technology • Communication 	Limited Access to historical Project Data on communication bottleneck and areas of improvement

				<p>models and methods</p> <ul style="list-style-type: none"> • Interpersonal and team skills • Communication Management Template 	
<p>To develop the Stakeholder Management Plan to identify, analyze, and engage with project stakeholders to effectively manage their interest, expectations, and contributions throughout the project lifecycle.</p>	<p>Stakeholder Management Plan</p>	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data • Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative <p>Mixed</p>	<ul style="list-style-type: none"> • Expert Judgment • Data Representation • Data Analysis and representation • Meeting • Stakeholder 	<p>Limited Access to historical Project Data for stakeholder engagement</p>

				Register Template <ul style="list-style-type: none"> • Stakeholder Assessment Matrix • Stakeholder Management Template 	
To develop the Procurement Management Plan to strategically execute and control all procurement activities and contracts associated with the project, with the overarching goal of obtaining the necessary goods and service on time, within	Procurement Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data • Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed	<ul style="list-style-type: none"> • Expert Judgment • Data Analysis • Data Gathering • Meeting • Source Selection Analysis • Procurement Management Template 	Insufficient historical procurement data, suppliers, and vendors

budget, and in alignment with project requirements.					
To create the Risk Management Plan to identify, assess, mitigate, and monitor projects risks minimizing the likelihood and impact of adverse events and to maximize opportunities.	Risk Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data • Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed	<ul style="list-style-type: none"> • Expert Judgment • Data Analysis • Meeting • Risk Register Template • Risk Management Template 	
To create the Integration Management Plan to coordinate all project activities, processes, and components holistically and effectively, ensuring seamless	Integration Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed	<ul style="list-style-type: none"> • Expert Judgment • Data Analysis • Data gathering • Data representation 	Incomplete historical Project Data on past integration challenges

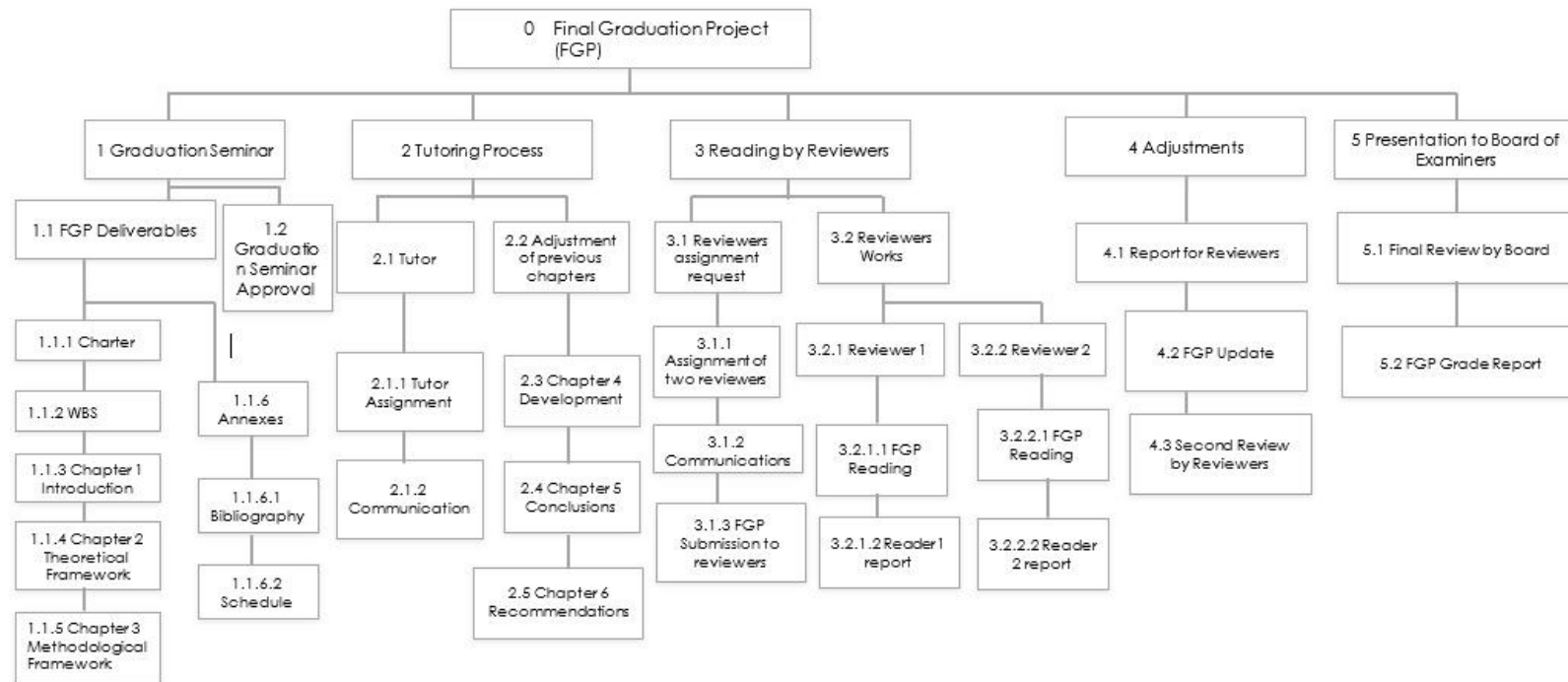
integration and alignment with the project's overall objectives and goals.		<ul style="list-style-type: none"> • Journals 		<ul style="list-style-type: none"> • Meeting • Project Management Information Systems • Integration Management Template 	
To create a Sustainable Management Plan to establish a comprehensive and forward-thinking strategy for managing the project in a manner that promotes economic, environmental, and social sustainability.	Sustainable Management Plan	<ul style="list-style-type: none"> • PMBOK Guide, 6th Edition, 2017 • Project Documents of pass of similar nature • Historical Data • Journals 	<ul style="list-style-type: none"> • Qualitative. • Quantitative Mixed	<ul style="list-style-type: none"> • Expert Judgment • Data Gathering • Data Analysis • Meeting • P5 Impact Analysis • Sustainable Management 	Limited Access to historical on project sustainability initiatives.

				ent Template	
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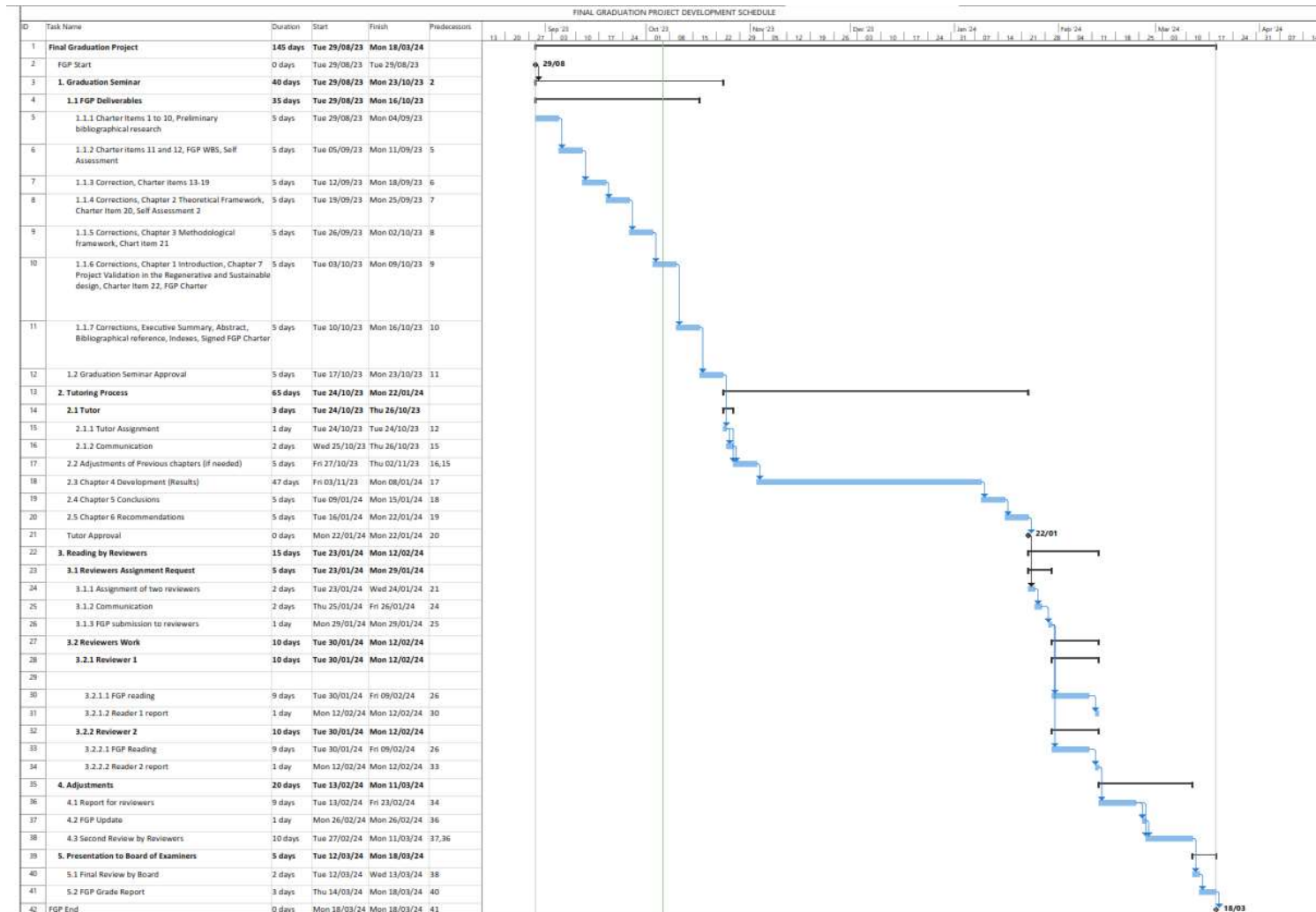
22. Validation of the work in the field of regenerative and sustainable development.

The proposed Hybrid Project Management Plan for constructing a residential building in Celeste Garden is intricately designed to align with regenerative and sustainable development principles. The projects contribute to sustainability using eco-friendly materials, energy efficient design, and renewable energy integration. It will minimize waste, enhance biodiversity, engage the community, improve occupant health, seek green certifications, and ensure economic viability. Environmental monitoring and ongoing assessment of various indicators will track the project's progress in fostering regenerative and sustainable development within Celeste Garden, emphasizing long-term environmental and social benefits.

Appendix 2: FGP WBS



Appendix 3: FGP Schedule



Appendix 4: Preliminary bibliographical research

- *Agile Construction Management - how to plan, execute and deliver faster*. Kanban Software for Agile Project Management. (n.d.).
<https://kanbanize.com/agile/industries/agile-construction>
 - This article will help us explore and gain insights into how agile principles and methodologies can be applied to construction project management. This can help understand how agility can improve planning, execution, and delivery in construction projects.
- Al Behairi, T. A., Mr. (n.d.). *AGISTRUCT*. Improved Model for Agile Construction Project Management. Retrieved September 3, 2023, from
<https://www.pmi.org/learning/library/agistruct-agile-construction-project-management-10180>
 - The research reference can help on how to improve on Agile in the Construction Industry. How to enhance the adaptability and efficiency of construction projects, identify specific elements or strategies from the model that can be integrated into the project management plan.
- Ansah , R. H., & Sorooshian, S. (2016). Lean Construction: An effective approach for project management. *ARPN Journal of Engineering and Applied Sciences, Vol. 11 No. 3*(February 2016), 1607-1612. <https://doi.org/ISSN 1819-6608>
 - Incorporating insights from this article into my project management plan can help leverage lean construction principles to enhance the efficiency and effectiveness of the project while minimizing waste and improving project outcomes.
- Green Project Management. (2023). *The GPM P5 Standard for Sustainability in Project Management*. GPM Global. <https://greenprojectmanagement.org/>
 - The GPM P5 Standard for sustainability in Project Management is a valuable resource that can guide efforts to incorporate sustainability principles into the construction project. It provides a structured framework for integrating sustainability into project management practice, ensuring that the project aligns with environmental and social responsibilities objectives.
- Ifyalem, K. J. (2023, February 23). THE REGENERATIVE DESIGN APPROACH IN BUILDING CONSTRUCTION. *Linkedin, 1*(2023).
<https://www.linkedin.com/pulse/regenerative-design-approach-building-construction-ifyalem/>
 - Incorporating insight from this article can help with emerging trends, introduction to regenerative designs, benefits and challenges, innovation, and integration with sustainability.
- Lalmi, A., Fernandes, G., & Boudemagh, S. S. (2020). A conceptual hybrid project management model for construction projects. *Procedia Computer Science, 1*(2020).
<https://doi.org/DOI: 10.1016/j.procs.2021.01.248>

- This article can be a valuable resource for the project management plan especially is the research question in relation to explore hybrid project management models and their potential application in the construction projects. It will offer insights into innovation approaches that can enhance project adaptability and efficiency.
- Ministry of Infrastructure Development and Housing (n.d.). *Building Permits*. Central Building Authority. Retrieved September 2, 2023, from <https://www.centralbuildingauthority.org/construction-process/approval-process/>
- Project Management Institute. (2017). A guide to the Project Management Body of Knowledge (PMBOK guide) (6th ed.). Project Management Institute.
 - To be used as a foundational reference when highlighting project management concepts, principles, and processes. The PMBOK Guide is intended to be used for the standardized framework in project management such as: Scope Management, Time and Schedule Management, Cost Management, Quality management, Risk Management, Communication and stakeholder management, integration and change management, resources management, Monitoring and control and closing and handover.
- Project Management Institute. (2021). *The standard for project management and a guide to the project management body of knowledge (PMBOK guide) (7th ed.)*. Project Management Institute.
 - The PMBOK Guide 7th Edition is intended to be used for current best practices, framework enhancements, adaptation of agile elements, incorporating sustainability, change management, continuous improvement, and quality assurance.
- Reddy, A. K., & Raja, K. H. (2021). A Hybrid Low-Cost Construction Techniques and Materials in Construction Project. *OP Conf. Series: Materials Science and Engineering, 1*(1). <https://doi.org/10.1088/1757-899X/1197/1/012058>
 - This article can provide insights on valuable resources on how in the construction industry can explore low-cost construction techniques and materials, especially when looking to balance cost effectiveness with project quality and efficiency.
- Sears, K., Sears, G., & Clough, R. H. (2016). *Construction Project Management - A Practical Guide to Field Construction Management*. (6th ed.). John Wiley & Sons Inc.
 - This reference is a comprehensive resource that can be used to inform various aspects of construction management plan. It covers essential topics and best practices relevant to the construction projects, making it a valuable reference for project management plan.
- The Central Building authority it sources related to building permits and regulation. Understanding the local regulations, compliance, documentation, risk assessment, project planning, legal compliances, and environmental impact assessments

- Suresh, M., & Rav, S. (2020). Handbook of Research on Digital Content Management and Development in Modern Libraries. In *IGI Global eBooks*.
<https://doi.org/10.4018/978-1-7998-2201-1>
- Western Governors University. (2023, April 7). What is the difference between a primary and secondary source? *Western Governors University*.
<https://www.wgu.edu/blog/what-difference-between-primary-secondary-source2304.html#close>
- *LibGuides: Research Methods: What are research methods?* (n.d.).
<https://libguides.newcastle.edu.au/researchmethods>

Appendix 5: Philologist Review Report

Stephanie Flores Bradshaw

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Academic Tutor
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January 25, 2024

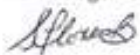
Re: Philological Review of Final Graduation Project submitted by Elias Torres in partial fulfilment of requirements for a Master's Degree in Project Management (MPM)

Dear Academic Tutor,

With this letter, I confirm that I have reviewed the Final Graduation Project (FGP) submitted by MPM candidate Elias Torres entitled "Project Management Plan to for the Construction of New Residential Building at Parcel 1757 Celeste Gardens, Ladyville, Belize."

I hereby confirm that Mr. Torres has made all the corrections to the FGP as I have advised as philologist. It is my professional opinion that the document meets the literary and linguistic standards in written English as required for the MPM by the Universidad para la Cooperación Internacional.

Warm Regards,



Stephanie Flores Bradshaw
Philologist