UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR THE CONSTRUCTION OF A NEW BUNGALOW RESIDENCE AT PARCEL 3972 GREEN ESTATE, LORD'S BANK, BELIZE

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FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
MASTER IN PROJECT MANAGEMENT (MPM) DEGREE

Belize City, Belize

June 2022

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

This Final Graduation Project was approved by the University as partial fulfillment of the requirements to opt for the Master in Project Management (MPM) Degree

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DEDICATION

Dedication goes out to my family, boyfriend, friends and colleagues for continued support, mentorship, and encouragement.

ACKNOWLEDGMENTS

Firstly, I give thanks to God for my life and blessings.

Secondly, I thank the Organization of American States for this opportunity to further my academic qualifications at a robust and affordable program.

Thirdly, I thank the University of International Cooperation, through its professors, academic assistants, tutors, and administrative staff, for their continued support, professionalism, and educational service to myself and all its students.

Lastly, I thank my classmates for their collaboration, encouragement in tough times and overall participation as we worked on individual and group assignments. Most especially, I thank Elizabeth Ayala and Ronalee McKenzie for their additional support, friendship, and comradery throughout and beyond this program. I thank Jaime Reyes, Juliet Neal, Jessamyn Ramos, Colin Mattis, Edwenson Toussaint and Jean Tham for their strong support and collaboration in our group assignments.

ABSTRACT

The objective of this document is to create an integrated project management plan, framed within the standards of the Project Management Institute, to effectively manage the construction of a new bungalow residence at Parcel 3972 Green Estate, Lord's Bank, Belize. The Energy Optimizer (T.E.O.) Company Limited has been selected to construct a three-bedroom, two-bathroom open concept home with an enclosed garage and large outdoor deck. With opportunity for growth in organizational structure and management approaches, T.E.O. needs effective and efficient planning and management practices for its building construction projects to be delivered within reasonable time, cost, quality, and customer satisfaction.

The final product of this project includes an integrated project management plan for the construction of the new residence. The project management plan consists of the final deliverables of the project that include the subsidiary management plans for scope, schedule, cost, quality, resources, communications, risks, procurement, and stakeholder. An analytical problem-solving methodology is used with particular emphasis on the Project Management Institute's guide.

As a result of this project, it is evident that better planning and organizational structure is needed to provide capacity building for the company to better manage its construction projects. The development of the project management plan is an important exercise that has shifted the management practices of the staff of The Energy Optimizer (T.E.O.) Company Limited, providing guidance to integrate all the processes involved in the project's execution. Thus, it is recommended that the construction of the new residence adheres to the project management plan developed, with the project manager conducting the necessary tailoring as the project progresses.

Key Words: Project Management, Project Management Plan, Construction

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ABBREVIATIONS AND ACRONYMS

ACI	American Concrete Institute
APM	Association for Project Management
ASTM	American Society for Testing and Materials
BF	Board feet
BRM	Business Research Methodology
CBA	Central Building Authority
CPI	Cost Performance Index
CY	Cubic yards
EVA	Earned Value Analysis
EVM	Earned Value Management
FGP	Final Graduation Project
GAL	Gallons
LBS	pounds
LS	Lump sum
NR	Number
OSHA	Occupational Safety and Health Administration
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PUC	Public Utilities Commission
SPI	Schedule Performance Index
SY	Square feet
T.E.O.	The Energy Optimizer Company Limited
TCPI	To Complete Cost Performance Index
YDS	Yards

EXECUTIVE SUMMARY

The Energy Optimizer (T.E.O.) Company Limited was awarded the contract for the construction of a three-bedroom, two-bathroom open concept home with an enclosed garage and large outdoor deck in Lord's Bank, Belize. T.E.O. was first established in September 2013 as a family-owned engineering firm specializing in the fields of telecommunications, electrical engineering, civil and structural engineering, construction, and project management. With the increase of construction activity, the company was determined to transition from an unstructured management style to an integrated and structured project management style.

Despite its experience and expertise in the engineering fields, the T.E.O. was faced with challenges with the management of its construction projects. With little to no formal management practices, issues such as cost overruns, time delays, subcontracting confusion, a strain on staff and cash flow issues were the main hurdles experienced by the company. As such, the need for the development of a comprehensive project management plan and industry best practices was identified.

Thus, the development of a project management plan, through the Final Graduation Project, was considered a crucial step towards the successful construction of the new residence project. T.E.O. found the objectives of the project management plan necessary to remove its past hurdles, build technical capacity, streamline its workflows, and elevate the quality of its services.

The general objective of the Final Graduation Project was to create an integrated project management plan, framed within the standards of the Project Management Institute, to effectively manage the construction of a new bungalow residence at Parcel 3972 Green Estate, Lord's Bank, Belize. The specific objectives were: objective 1 to create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion, objective 2 to create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements, objective 3 to create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe, objective 4 to create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum, objective 5 to create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company, objective 6 to create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project, objective 7 to create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored, objective 8 to create a risk management plan to establish how risk management activities will be structured and performed, objective 9 to create a procurement management plan to establish how goods and services will be acquired in the procurement process, objective 10 to create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project.

The analytical, problem-solving methodology was used to develop the FGP. Both primary and secondary sources were identified. Primary sources included interviews, company documents and correspondence, and relevant legislation and regulations pertaining to construction in Belize. The PMBOK guide was used as the main secondary source, along with books, journals, and other online publications. A variety of project management tools and techniques were employed in the analytical approach used to critically analyze the company's current practices to arrive at the best recommendations to bridge the gaps in its project management.

The final graduation project presented critical frameworks for the delivery of the Green Estate Bungalow Project. Through this elaboration, The Energy Optimizer (T.E.O.) Company Ltd has developed a better appreciation for the ten knowledge areas. Each subsidiary plan was prepared in conjunction with the Project Management Body of Knowledge Guide 6th Edition and has presented the tailored knowledge, tools and techniques, and expected deliverables for each knowledge area for the Green Estate Bungalow Project. The development of the project charter, scope management plan, schedule management plan, cost management plan and quality management plan as interlinked processes established a solid foundation for the subsequent plans. The final graduation project established a strong definition of these knowledge areas that then allowed for a cohesive integration of the resource management plan, communications management plan, risk management plan, procurement management plan and stakeholder engagement plan. Most importantly, the final graduation project establishes what must be done, how it will be achieved and how The Energy Optimizer (T.E.O.) Company Ltd will ensure that it is done.

It is highly recommended that The Energy Optimizer (T.E.O.) Company Ltd utilizes the Green Estate Bungalow Project Management Plan throughout the entire project lifecycle, making the necessary adjustments to cater to current and changing project environment. It is further recommended that the changes introduced through this elaboration are embraced by each member of the Project Team and key stakeholders. The construction of the bungalow home can be ensured through effective project management as elaborated in subsidiary plans. This will enhance the planning, development and control of the project's scope, costs, scheduling, risk response, communications, stakeholder engagements, procurement, resource management and quality. Finally, it is recommended that this project management plan be standardized for the implementation of future projects.

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1 INTRODUCTION

1.1. Background

The Energy Optimizer (T.E.O.) Company Limited is a multi-disciplined engineering firm owned and operated by a Belizean father-daughter duo of engineers. Since its inception and formal establishment in September 2013, T.E.O. has provided a range of technical and professional services in the fields of telecommunications, electrical engineering, civil and structural engineering, construction, and project management.

Presently, the company has directed its efforts towards building its capacity in construction and project management. The current approach to the execution of its construction projects has been an unstructured and day-to-day approach to project execution. General planning is conducted to start off the work week. However, an integrated or collective approach to the project activities has not been characteristic of its construction team. Additionally, the lack of structure and coordination within the company has created conflicts with subcontractors, especially since most of the labor is subcontracted.

Like many small construction firms, the company is no stranger to the common challenges of communication, scheduling, scope changes, poor document management and poor planning (Citizens General, 2015). Lessons learnt on its past construction projects has influenced a strategic shift from the informal, ad-hoc execution to a more structured and synchronized methodology. It is with this new approach that the company embarks on the construction of a three-bedroom, two-bathroom open concept home with an enclosed garage and large outdoor deck to be constructed at Green Estate in the Lord's Bank area of Belize. Through the development of a project management plan, the necessary best practices will be incorporated in the company's daily services.

1.2. Statement of the problem

T.E.O. has managed small-scale construction projects with little to no formal management process. This approach has created cost overruns and time delays in order to provide clients with the quality expected. Due to the lack of formality, structure, planning and general project management best practices, there has been a strain on the small staff, cash flow challenges

and confusion with subcontracting. Recently, T.E.O. has been awarded the construction of a residential home in Green Estate, Lord's Bank, Belize to commence in 2022, but its current construction management practices present foreseen challenges to a cost and time efficient construction. With the opportunity to improve its planning and management practices, T.E.O. has identified the need for the implementation of a well-structured and integrated approach to the construction of this new residence through the development of a comprehensive project management plan that will guide how the project will be executed from start to end to meet its client's expectations.

1.3. Purpose

The purpose of the development of a Project Management Plan is for The Energy Optimizer (T.E.O.) Company Limited to introduce an integrated project management approach to its construction projects, starting with the Green Estate residence.

First, the Project Management Plan is expected to firstly provide the necessary guidance for the execution of the home construction throughout its entire life cycle. According to the PMI (2017), one of the key benefits of establishing a project management plan is that it defines all the project work and establishes how all this work will be executed. This detailed and comprehensive document will provide the level of organization and structure needed to safeguard the success of the Green Estate project while simultaneously building the capacity of the company through the introduction of PMI best practices.

Secondly, the project management plan is expected to be used as the general template for project management plans for the company's future projects. While construction has occurred at a smaller scale and in separate implementation periods, it is expected that projects may be executed in tandem the future, as the company builds its clientele and experience. Hence, the development of the project management plan will provide the necessary framework to streamline future workflows.

Finally, the project management plan is expected to further benefit the growth and success of the company through (i) improved coordination with clients, suppliers and subcontractors; (ii) effective cost and time management; (iii) better use of project and company resources;

(iv) reduced overlaps in team roles and responsibilities; (v) better management of scope changes; (v) improved flexibility to respond to external factors; (vi) improved project tracking; and (vii) a general reduction of project risks.

As a growing firm, T.E.O. is highly motivated to introduce industry practices that will enrich the quality of its services.

1.4. General objective

To create an integrated project management plan, framed within the standards of the Project Management Institute that will effectively manage the construction of a new bungalow residence at Parcel 3972 Green Estate, Lord's Bank, Belize.

1.5. Specific objectives

1. To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion
2. To create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements.
3. To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe.
4. To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum.
5. To create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company.
6. To create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project.
7. To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored.
8. To create a risk management plan to establish how risk management activities will be structured and performed.

9. To create a procurement management plan to establish how goods and services will be acquired in the procurement process.
10. To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project.

2 THEORETICAL FRAMEWORK

Company/Enterprise framework

2.1.1 Company/Enterprise background

The Energy Optimizer (T.E.O.) Company Limited is a Belizean company established in September 2013. It is owned and operated by a father and daughter, an electrical engineer and a civil engineer respectively. It specializes in telecommunications, electrical engineering, civil/structural engineering, construction, and project management. Over the past eight years, T.E.O. has provided consultancy services in the private sector of Belize with projects spread across the entire country.

At its inception, the company embarked on successful electrical system designs and installation projects, including regular contracts with the local electrical company for routine services. As the company progressed, it took on building construction projects within Belize City. The addition of construction services has called for more advanced project and construction management approaches for the company.

2.1.2 Mission and vision statements

As described by the managing director M. Usher (personal communication, November 27, 2021), “quality, efficiency, value and safety are at core of T.E.O. values and standards of service”.

Mission: “T.E.O. is committed to improving the quality of life of all Belizeans through its service to both public and private sectors” (The Energy Optimizer Company Limited, 2015).

Vision: “Our vision is to maintain a collaborative approach where highly skilled Belizean laborers and professionals are employed to provide the highest level of value and service to meet our clients’ needs” (The Energy Optimizer Company Limited, 2015).

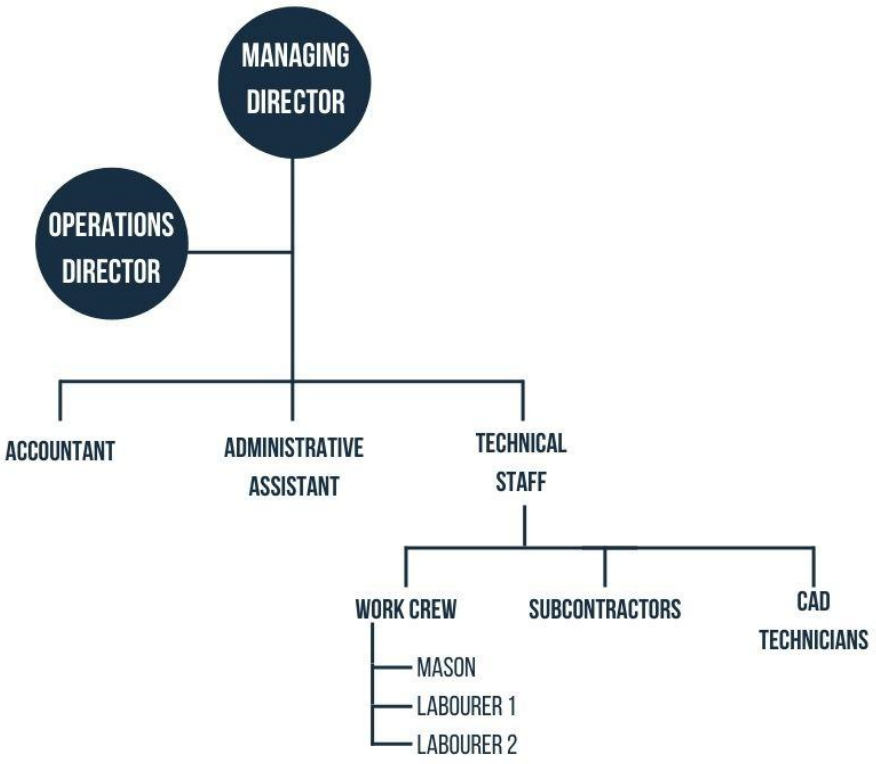
2.1.3 Organizational structure

As a small firm, the company operates within a family dynamic. The company is led by Mark Usher as Managing Director and Orchel Usher as Operations Director. The majority of the services offered focus on engineering design and consultancy services, hence the core professional and technical services are guided and conducted by the principal engineers.

However, T.E.O. is supported by a small team that includes CAD technicians, an administrative assistant, an accountant and a network of professional subcontractors and affiliates. For its construction projects, a small work crew is kept as permanent staff that includes a skilled mason and two skilled labourers. As services are required, additional staff is hired or subcontracted. Figure 1 depicts the organizational structure of the company.

Figure 1

T.E.O. Organizational Structure



Note. Own work.

2.1.4 Products offered

T.E.O. operates as a multi-disciplinary engineering firm, seeking to serve its clientele with top quality, code compliant services. It specializes in telecommunications, electrical engineering, civil/structural engineering, construction and project management services that can be further subdivided as follows:

Civil Engineering & Construction

- Analysis and Design
- General Construction

Electrical Engineering

- Consultancy and Design
- Troubleshooting
- Maintenance
- Renewable Energy Systems
- Electrical Utility Construction/Maintenance
- System Protection and Control
- Power System Studies and Power Quality Services

Telecommunications

- Planning and Engineering
- Outside Plant Construction
- Outside Plant Maintenance
- Troubleshooting

Project Management

The range of services offered by the company span across projects that can benefit from the implementation of a project management plan.

Project Management concepts

2.1.5 Project

According to the Project Management Institute (PMI, 2017), a project can be defined as a "temporary endeavor undertaken to create a unique product, service, or results". The Association for Project Management (APM) (APM, 2006, as cited in The Open University, 2016) similarly defines a project as "a unique, transient endeavor undertaken to achieve a desired outcome".

The Open University (2016) highlights how the terms *project* and *operations* are often used interchangeably, especially in the construction industry where daily work is essentially carrying out a project. In the United Kingdom, a British Standard prepared for project management defines a project as "a unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources" (BS 6079-2, 2000, as cited in The Open University, 2016).

Despite the exact definition adopted by a particular organization or tailored for a specific field, there are certain characteristics that are central to any project that sets out to accomplish an objective. As such, Schwalbe (2015) elaborates that a project is unique, temporary, requires resources and involves uncertainty. In consensus, the Open University (2016) also identifies other project attributes to include a specific project objective or goal and quality measures.

T.E.O. adopts the concept of a project as a unique and temporary endeavor. Its projects are essentially categorized under the umbrellas of an electrical project or a construction project. As such, the construction of the new residence at Green Estate in Lord's Bank, Belize falls under the portfolio of construction projects. This project possesses the fundamental characteristics of projects as it has a budget, timeframe, need for resources, quality

expectations, risks, and ultimately sets out to deliver a unique three-bedroom two-bedroom home to the homeowner's satisfaction.

2.1.6 Project management

As one of the areas of service offered by T.E.O., project management plays an important role in the day-to-day operations of the company. Most particularly, the area of construction project management is essential to the building construction services offered by the company. As T.E.O. branches out within the construction industry, the company has grown to appreciate the long-established practices of construction and project management.

As Fewings & Henjewele (2019) notes, "project management is not a new concept, but it has emerged since the Second World War". Fewings & Henjewele further describe project management as a methodology, emphasizing its application to "intensive periods of bounded work with a specific objective". Coauthors Fewing & Henjewele home in on the shared characteristics of project management and projects, stating that project management is also temporary, with focused expenditure and team efforts to deliver a whole. Extending beyond general management, project management can be further appreciated for its dynamic nature, since it can be easily integrated into construction work due to the temporary, unique and dynamic characteristics of this type of work.

Formally, the PMI defines project management as the "application of knowledge, skills, tools, and techniques to project activities to meet the project requirements". As an established profession globally, the field of project management has advanced to the development of a body of knowledge that is continuously reviewed, updated and validated by experts collaborating in entities such as the Project Management Institute (United States), International Project Management Association (Switzerland), Axelos and the Association for Project Management (United Kingdom) and other governing bodies.

A central theme of project management is the concept of integration as demonstrated in the development of the ten knowledge areas defined by the PMI. This underlying principle rests at the core of the role of project managers and everything that has to do with project management as the nature of projects warrants a comprehensive and holistic approach to the

many factors that define, affect or are affected by projects. As Schwalbe (2012) suggests, project managers must, through effective project management, facilitate the entire project management process in order to achieve the project objectives and meet stakeholder requirements.

As project management is applied in many different contexts, the construction industry is no stranger to its globally recognized practices. As Demirkesen & Ozorhon (2017) stated in their research *Impact of integration management on construction project management performance*, there is a heavy reliance on aspects of project management on construction project performance. For this reason, Demirkesen & Ozorhon (2017) emphasizes integration management as "paramount" to effective project management, linking the importance of the integration of processes and people in construction projects.

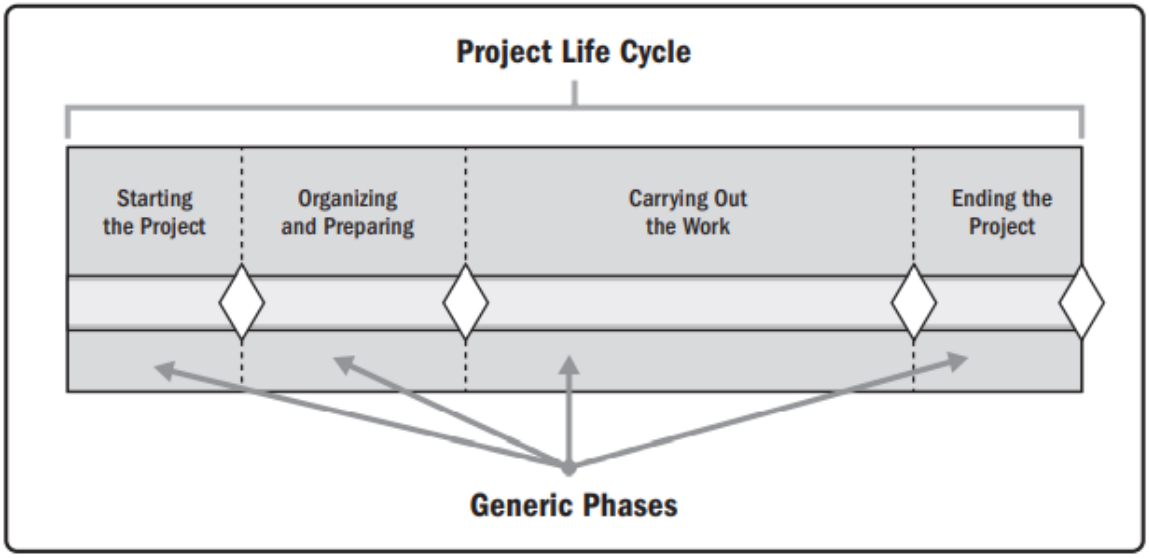
Thus, T.E.O. sees the value of effective project management in engineering and construction disciplines. Starting out as a small family venture has created informal management of work and projects in the past. Managing directors have seen the impact of this informal approach to its project execution. The company affirms its commitment to enhancing its project management and engineering services with the implementation of sound and globally accepted project management methodologies.

2.1.7 Project life cycle

Conceptualizing projects as temporary endeavors identifies common attributes that any project possesses, a start and an end. As such, the consideration of a project life cycle begins the conversation of how projects are managed. According to the PMI, a project life cycle can be defined as "the series of phases that a project passes through from its start to its completion". This is illustrated in Figure 2 in its simplest form. Dividing projects into different phases allows each phase to be more manageable, thus providing a basic framework for managing a project (PMI, 2017). A project phase is also defined as a "collection of logically related project activities that culminates in the completion of one or more deliverables" (PMI, 2017).

Figure 2

Generic Project Life Cycle

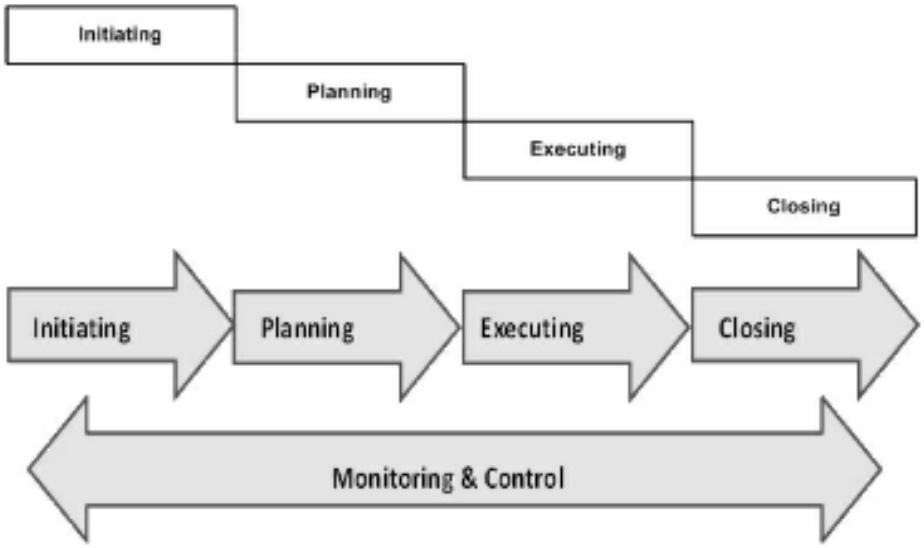


Note. Generic Project Life Cycle reprinted from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Sixth Edition*. Project Management Institute, 2017 Figure 1-5, p. 18 Copyright 2017 by Project Management Institute, Inc.

While there is much discussion on an "ideal" project life cycle, the unique nature of projects spread across multiple disciplines does not give way to a distinct way to organize all projects. However, most projects follow the basic four phases that include starting the project, organizing and preparing, carrying out the work and ending the project. As defined by Boyde (2014), the project life cycle can also be seen from the whole systems perspective, defining it as a "systemic way to get from the beginning to the end of the project". Boyde, however, expands the typical project life cycle to five distinct phases that include initiating, planning, executing, closing, monitoring and control. Furthermore, he explains these phases as occurring over either a linear/waterfall life cycle or an iterative/agile life cycle as depicted in Figures 3 and 4, respectively.

Figure 3

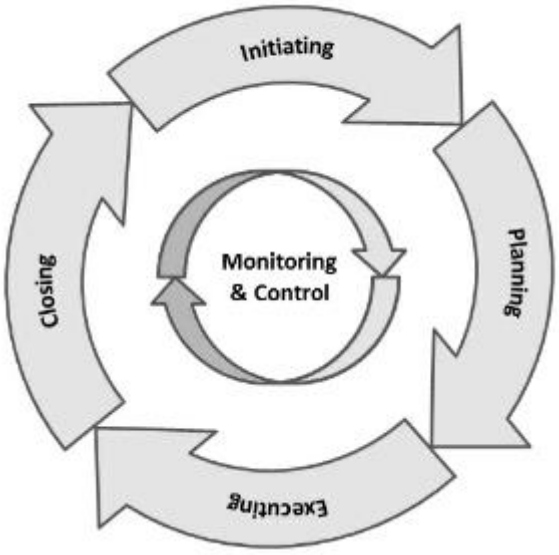
Project life cycle as waterfall model



Note. Reprinted from *A Down-To-Earth Guide to SDLC Project Management: Getting Your System/Software Development Life Cycle Project Successfully Across the Line Using PMBOK Adaptively 2nd Edition. Joshua Boyde, 2014 Figure 5, p. 37. Copyright 2014 by Createspace Independent Pub.*

Figure 4

Project life cycle as iterative model



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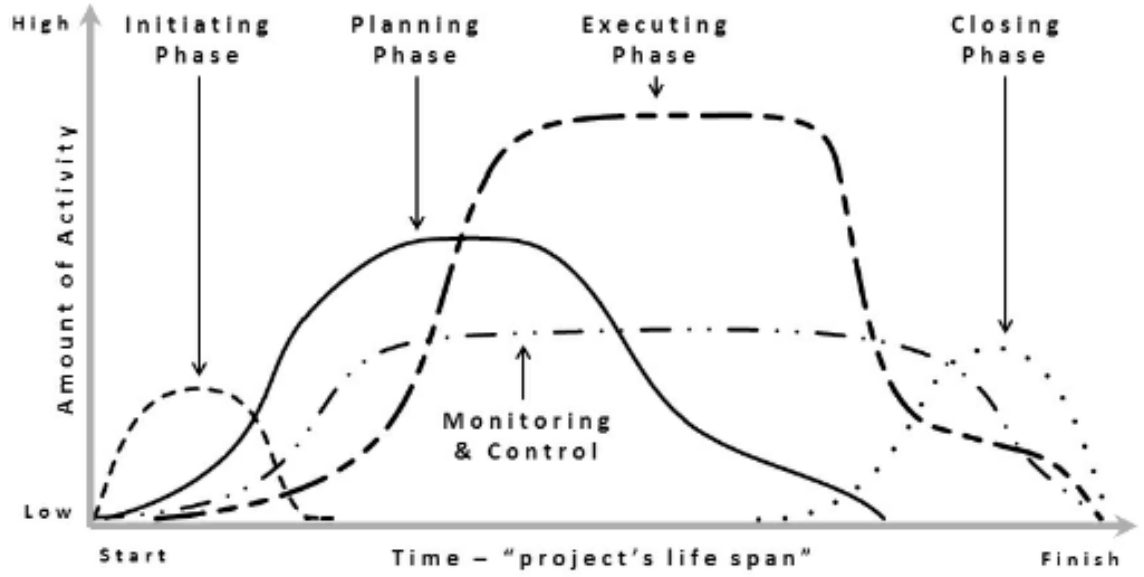
In reality, project work often overlaps as illustrated in Figure 5 as phases may begin before another is completed.

Figure 5

Overlap of life cycle phases

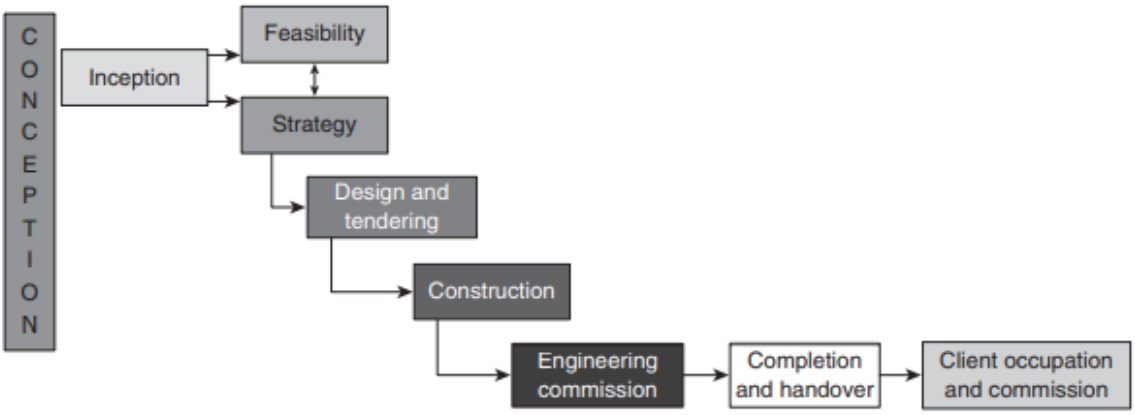


Note. Reprinted from *A Down-To-Earth Guide to SDLC Project Management: Getting Your System/Software Development Life Cycle Project Successfully Across the Line Using PMBOK Adaptively 2nd Edition. Joshua Boyde, 2014 Figure 6, p. 37. Copyright 2014 by Createspace Independent Pub.*

Similar to Boyde, the PMI (2017) recognizes that project phases can occur sequentially, iteratively or overlap as they pass through the generic life cycle. Figure 6 depicts a typical project life cycle adapted for construction projects.

Figure 6

Typical life cycle of construction projects



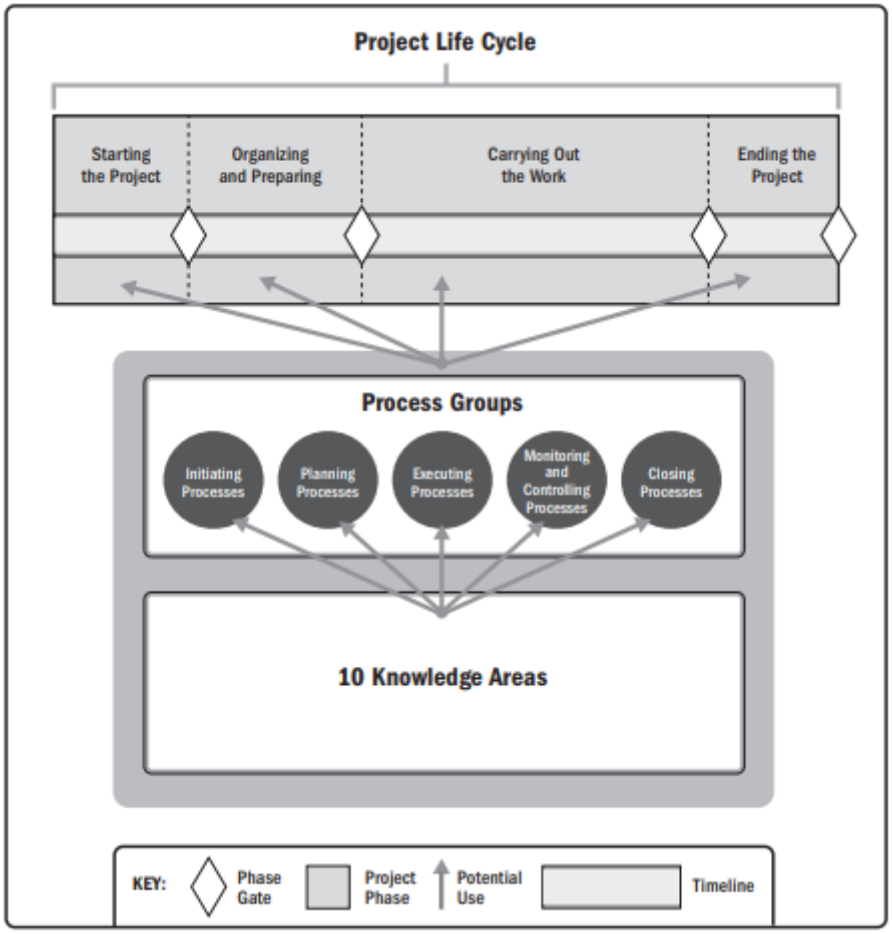
Note. Reprinted from *Construction Project Management An Integrated Approach Third Edition. Peter Fewings and Christian Henjewele, 2019 Figure 1.1, p. 10. Copyright 2019 by Peter Fewings and Christian Henjewele.*

2.1.8 Project management processes

While the PMI excludes the monitoring and control from the traditional project life cycle, it does integrate monitoring and control in the formulation of five distinct project management process groups that are not to be confused with the project phases. These process groups include initiating, planning, executing, monitoring and control, and closing. They are defined as a "logical grouping of project management inputs, tools and techniques, and outputs" and can be seen in Figure 7 (PMI, 2017).

Figure 7

Interrelationship of Project Management Concepts

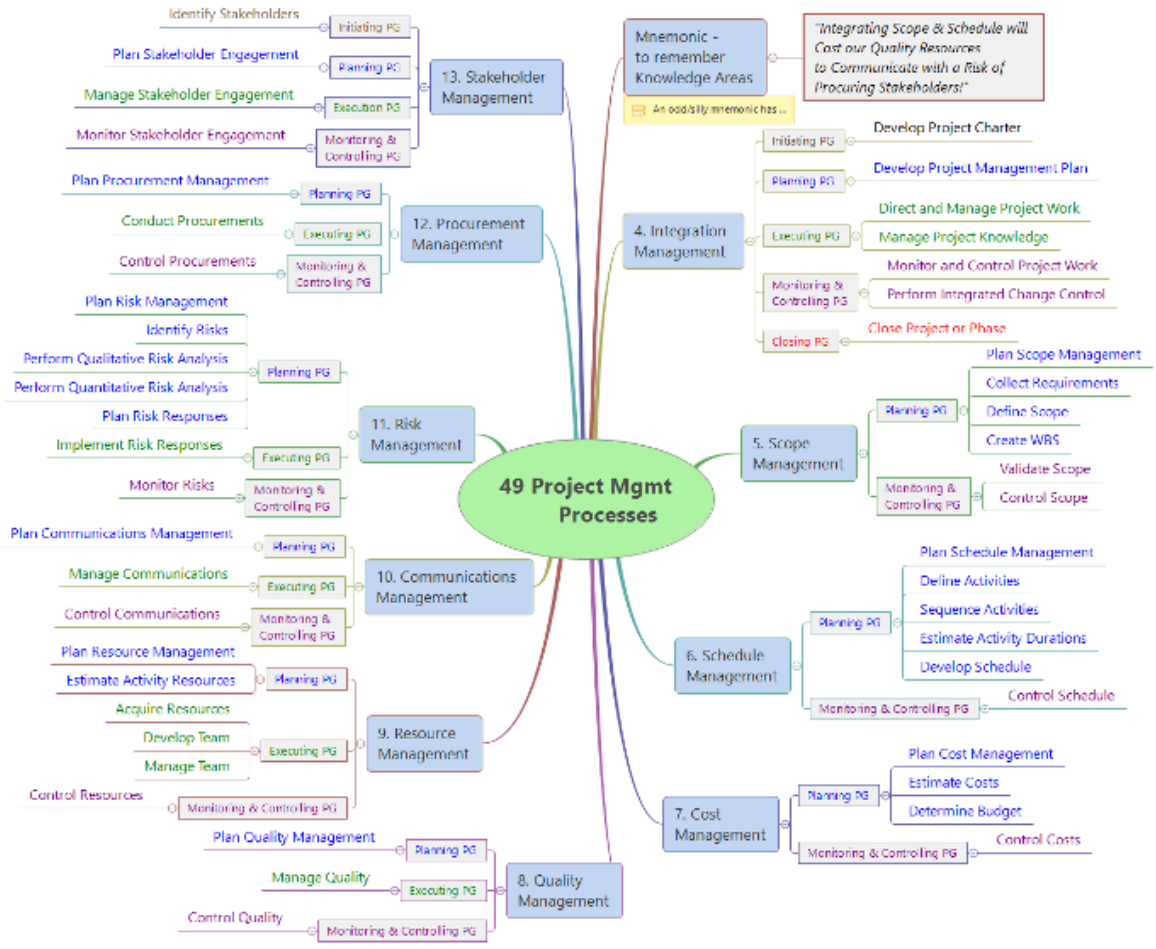


Note. Reprinted from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Sixth Edition*. Project Management Institute, 2017 Figure 1-5, p. 18 Copyright 2017 by Project Management Institute, Inc.

Each process group is characterized by individual project management processes. These processes are generally referred to as the project management activities. Technically, these processes refer to a "systematic series of activities directed toward causing an end result where one or more inputs will be acted upon to create one or more outputs" (PMI, 2017). The PMI defines 49 processes that make up the process groups and essentially comprises the ten project management knowledge areas. These processes are listed in Figure 8.

Figure 8

Project Management Processes



Note. Project management processes reprinted from *Introduction To Project Management Body of Knowledge 6th Version (PMBOK-6)* in *PM EXAM SMARTNOTES*, n.d., Retrieved November 15, 2021, from https://www.pmexamsmartnotes.com/project-management-body-of-knowledge/. Copyright 2021 by PMExamSmartNotes.com.

2.1.9 Project management knowledge areas

The project management processes also constitute one of ten knowledge areas established by the Project Management Institute, as illustrated in Figure 9. A knowledge area pertains to a specific field or area of specialization used for managing projects. It is better defined as a "set of processes associated with a particular topic in project management" (PMI, 2017).

Figure 9

PMBOK 10 Knowledge Areas

Note. Project management knowledge areas reprinted from *10 PMBOK Guide Knowledge Areas* in Pinterest, n.d., Retrieved November 15, 2021, from https://www.pinterest.com/pin/683491680940952713/ . Copyright 2021 by www.pmbypm.com.

2.2.5.1 Project Integration Management

Project Integration Management involves the identification, definition, combination, unification and coordination of the 49 processes and other project management activities within the process groups. Essentially, the activities involved in project integration occur throughout the entire project life cycle (PMI, 2017).

It is critical to note that the responsibility of project integration management rests solely on the project manager. This area places much needed emphasis on the ways in which the T.E.O. can grow from adopting the integrative approach to its project activities.

2.2.5.2 Project Scope Management

Project Scope Management involves the processes that are needed to ensure that the project work is comprehensive, including all the project work needed for a successful completion. Scope management also ensures that only the project that is required is sufficiently defined and identified. Aspects of the project that are not included should be made clear as a result of the processes conducted under this knowledge area (PMI, 2017).

2.2.5.3 Project Schedule Management

Project Schedule Management refers to all the processes involved in safeguarding a timely project completion. This kind of management usually involves the development of a comprehensive plan or schedule, clearly identifying how and when project deliverables will be delivered. Furthermore, it acts as an important communication and progress tracking tool (PMI, 2017).

2.2.5.4 Project Cost Management

Project Cost Management identifies the processes related to the planning, estimating, budgeting, financing, managing, and controlling of costs in order to meet project budget.

Typically, this type of management considers the cost of project resources but must also take into consideration the financial impact of project decisions (PMI, 2017).

2.2.5.5 Project Quality Management

Project Quality Management involves the implementation of the organization's quality policy pertaining to the planning, managing, and control of its projects. It also includes the quality requirements for products. The direct result of these processes must involve stakeholder satisfaction (PMI, 2017).

2.2.5.6 Project Resource Management

Project Resource Management involves the processes required for the identification, acquisition, and management of all project resources needed for a successful completion. Project resources can include physical or human resources. This knowledge area ensures that the right resources are available at the right time (PMI, 2017).

2.2.5.7 Project Communications Management

Project Communications Management includes the processes required to optimize communication on the project. This area includes effective information exchange and involves the understanding of how communication will be conducted and successfully implementing it. It is noted that communication is a soft skill that is paramount to successful stakeholder relationships on a project. Once effective, effective communication avoids misunderstandings and miscommunication that can derail a project (PMI, 2017).

2.2.5.8 Project Risk Management

Project Risk Management involves the processes related to the planning, identification, analysis, response planning and implementation, and monitoring of project risks. It seeks to reduce the probability/impact of negative risks (threats) and increase that of positive risks (opportunities) (PMI, 2017).

2.2.5.9 Project Procurement Management

Project Procurement Management includes the processes required for purchasing or acquiring products, services, or results needed from sources external to the project. It also

involves the management and control processes to effectively develop and manage agreements (PMI, 2017).

2.2.5.10 Project Stakeholder Management

Project Stakeholder Management involves the identification, analysis and development of stakeholders and appropriate stakeholder engagement and management strategies. This area is critical for project decision making as the outcome of projects can be impacted or impact its stakeholders significantly (PMI, 2017).

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

2.3.1 Building Regulations

In addition to the PMI knowledge areas, construction in Belize is also governed by the local regulations and guidelines. Currently, the country has not passed any building codes. However, construction and infrastructure development are regulated by numerous bodies such as the Central Building Authority, Local Building Authorities, Public Utilities Commission, Public Health Ministry, Fire Department, Department of the Environment and other governing bodies as stipulated under the Belize Building Act (Central Building Authority, 2021).

As a construction company, T.E.O. must be familiar with these institutions as specific regulations and requirements can impact its project completion. This process of regulation begins at the inception of a building project as detailed designs must be submitted and approved by the Central Building Authority, along with the necessary approvals from other governing bodies mentioned above.

2.3.2 Construction Extension to the PMBOK® Guide

The PMI provides industry-specific application-area extensions such as The Construction Extension to the PMBOK® Guide that focuses on the widely accepted principles for the construction industry. This guide aligns with PMI's knowledge areas but varies in specific processes. This document will provide additional guidance to T.E.O. in understanding and applying project management best practices on the Green Estate Bungalow project.

3 METHODOLOGICAL FRAMEWORK

Information sources

With access to a wide range of information in the world today, there are several resources that can be used as references when conducting research. However, reliable and credible information sources that have been validated are characteristic of academic work. As such, it is important to conduct thorough research and evaluation of information sources when preparing any form of writing.

According to IGI Global (2021), an information source refers to any "person, thing, or place from which information comes, arises, or is obtained". Generally, Information sources are categorized as primary and secondary sources. In some cases, tertiary sources can also be used.

While many libraries and professions have defined what a primary or secondary source is, many, like Scheuler (2014), have gone further into the complexity of labelling sources in this manner. Scheduler points out that the purpose of a particular source can also dictate its meaning or understanding as either a primary or secondary source. He postulates an example of a student that "wants to know how Japanese were portrayed in 1940s textbooks" versus a student wanting to "know about the actual treatment of Japanese Americans in the 1940s", identifying the former textbooks as primary sources and the latter as secondary sources.

Despite the nature or intent of a particular piece of information, academic and other forms of writing rely upon credible information sources to strengthen the work presented. As such, the Final Graduation Project will also evaluate and consider primary and secondary sources to complete its specific objectives.

3.1.1 Primary sources

The Tacoma Library (2021) defines a primary information source as "documents or artifacts created by a witness to or participant in an event". Lester & Lester Jr. (2015, p.134) lists novels, speeches, eyewitness accounts, interviews, letters, autobiographies, and the results of

original research as primary sources. Hamilton (2010) refers to primary sources as firsthand knowledge.

The FGP bases its primary information on sources that include one-on-one interviews from the company and its affiliates, important company documents and correspondences and the necessary government regulations and legislation that regulates building construction in Belize. These are identified in Chart 2.

3.1.2 Secondary sources

Cohen, Manion and Morrison (2018) discusses the importance and value of secondary data or sources in research, indicating that secondary data uses data that was collected originally for another purpose. As another way to investigate a research topic, Hamilton expresses in simple terms that a secondary source includes research done by someone else. Lester & Lester Jr. (2015) agrees by defining secondary sources as "writings about the primary sources". Secondary sources often include dictionaries, encyclopedias, textbooks, articles and editorials (Francis Willson Thompson Library, 2021).

Chart 2 also identifies the type of secondary sources that will be used in the FGP. These include a host of books, journals, libraries, articles and other online publications. As well, the PMBOK Guide Sixth Edition will serve as a critical secondary source for the completion of each specific objective of the FGP.

Chart 1

Information sources

Objectives	**Information sources**	
	Primary	**Secondary**
To create a project charter to formally authorize the project and provide the project manager with the	● Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers	● PMBOK Guide Sixth Edition ● Books

authority to utilize resources for project completion	• T.E.O. company profile, emails, correspondences, reports, and other relevant company documents • Legislation and regulations	• Journals (Trade, Scientific) and Libraries • Online Publications
To create the scope management plan to describe how the scope of the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondences, reports, and other relevant company documents • Legislation and regulations	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications
To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondence, reports, and other relevant company documents	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications

	• Legislation and regulations	
To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondence, reports, and other relevant company documents • Legislation and regulations	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications
To create a quality management plan to establish the policies, procedures and guidelines to be implemented in order to achieve quality objectives of the company	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondence, reports, and other relevant company documents • Legislation and regulations	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications
To create a resource management plan to establish how project resources will be categorized, allocated,	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers	• PMBOK Guide Sixth Edition • Books

managed, and released to complete the project	• T.E.O. company profile, emails, correspondence, reports, and other relevant company documents • Legislation and regulations	• Journals (Trade, Scientific) and Libraries • Online Publications
To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondence, reports, and other relevant company documents • Legislation and regulations	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications
To create a risk management plan to establish how risk management activities will be structured and performed	• Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers • T.E.O. company profile, emails, correspondence, reports, and other relevant company documents	• PMBOK Guide Sixth Edition • Books • Journals (Trade, Scientific) and Libraries • Online Publications

	● Legislation and regulations	
To create a procurement management plan to establish how goods and services will be acquired in the procurement process	● Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers ● T.E.O. company profile, emails, correspondence, reports, and other relevant company documents ● Legislation and regulations	● PMBOK Guide Sixth Edition ● Books ● Journals (Trade, Scientific) and Libraries ● Online Publications
To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project	● Personal Interviews with T.E.O. staff, Client, Subcontractors, Suppliers ● T.E.O. company profile, emails, correspondence, reports, and other relevant company documents ● Legislation and regulations	● PMBOK Guide Sixth Edition ● Books ● Journals (Trade, Scientific) and Libraries ● Online Publications

Note: Own work.

Research methods

Chu and Ki (2017) highlight the varied definitions of research methods in their article entitled *Research methods: What's in the name?* Co-authors, Chu and Ki, suggest that research methods are often categorized depending on the type of study or field. In some cases, research

methods can be categorized by data collection techniques such as interview, observation or even questionnaire. Alternatively, research methods can be categorized based on quantitative or qualitative data analysis techniques such as quantitative or qualitative. Other criteria can include research strategy (empirical or conceptual), time, and even case studies. (Chu & Ki, 2017) The study further investigates the preferred categorization for research methods with respect to libraries information systems, concluding that research methods are not specific to disciplines and should be named by data collection technique.

Similarly, the Business Research Methodology (BRM) (2021) refers to research methods as a broad term, where data collection and data analysis are critical to its definition. BRM further defines research methods in the business context as "a systematic and scientific procedure of data collection, compilation, analysis, interpretation, and implication pertaining to any business problem". The University of Newcastle Library (2020) also defines research methods as "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". In simpler terms, Thomas (2015) defines research methods as "the methods and procedures a researcher employs to accomplish a research task".

As evident, there are many types of research methods and criteria for its definition. For the purposes of this FGP, the type of research method that will be used is the analytical method.

3.2.1 Analytical Method

Thomas (2015) further defines an analytical research method as the process where facts or information that is already available is used and analyzed critically to arrive at a solution. With the body of knowledge already established by the PMI, this FGP will build upon the best practices recommended for the development of a project management plan. As such, Chart 2 outlines research method in the context of each specific objective of the FGP.

Chart 2

Research methods

Objectives	**Research methods**
	Analytical Method
To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion	The analytical method will be used to create the project charter based on the primary and secondary sources identified for the FGP. Company information will be instrumental in understanding the project and its needs.
To create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements	The analytical method will be used to create the scope management plan, ensuring that the primary and secondary sources are carefully analyzed to define all the project work accurately and completely.
To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe	The analytical method will be used to create the schedule management plan from the information sources available. A realistic plan is expected to be generated from company information and established best practices in project management.
To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum	The analytical method will be used to create the cost management plan for the project based on conclusions drawn from the information sources and project budget needs.
To create a quality management plan to establish the policies, procedures and guidelines to be implemented to	The analytical method will be used to create the quality management plan using the information

achieve quality objectives of the company	sources available to develop specific quality requirements for the project.
To create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project	The analytical method will be used to create the resource management plan based on company information and other information sources needed to deliver proper resource management.
To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored	The analytical method will be used to create the communications management plan using the selected information sources to ensure effective communication on the project.
To create a risk management plan to establish how risk management activities will be structured and performed	The analytical method will be used to create the risk management plan based on the identified information sources to consider all applicable risks of the project.
To create a procurement management plan to establish how goods and services will be acquired in the procurement process	The analytical method will be used to create the procurement management plan using the information sources identified for the project. This method will ensure all procurement work is planned.
To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project	The analytical method will be used to create the stakeholder management plan using the information sources available to ensure the project stakeholders are successfully engaged.

Note: Own work.

Tools

The PMI (2017) defines a tool as “something tangible, such as a template or software program, used in performing an activity to produce a product or result.” The Merriam-

Webster dictionary defines a tool as “something (such as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or profession (Merriam-Webster Inc., 2021). In both contexts, a project manager or project team can rely heavily upon the use of a wide range of tools to manage the project work effectively and efficiently. Tools provide necessary support and when combined with essential techniques, can contribute to a productive work environment.

The tools used in the development of the Final Graduation Project can be categorized as data analysis, data representation, decision-making, communication skills, interpersonal and team skills and ungrouped. These are often coupled with various techniques as identified in Chart 3 for the FGP.

Chart 3

Tools

Objectives	**Tools**
To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion	● Expert judgement ● Data gathering ○ Brainstorming ○ Focus groups ○ Interviews ● Interpersonal and Team Skills ○ Active Listening ○ Facilitation ○ Meeting management ○ Networking ○ Leadership ● Meetings
To create the scope management plan to describe how the scope for the residential	● Expert judgement ● Data gathering

construction will be defined, developed, monitored, controlled and validated to meet the client's requirements	○ Brainstorming ○ Interviews ● Data representation ○ Mind mapping ● Data analysis – document analysis ● Interpersonal & Team Skills ○ Facilitation ○ Observation / Conversation ● Prototypes – 3D model ● Decomposition ● Meetings
To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe	● Expert judgement ● Meetings ● Data analysis ○ Alternatives analysis ○ Reserve analysis ○ What-if scenario analysis ● Decision-making ● Decomposition ● Precedence diagramming method ● Dependency determination and integration ● Leads and lags ● Project management information system (MS Projects) ● Schedule network analysis ● Critical path method ● Resource optimization ● Estimating ○ Analogous ○ Parametric

	○ Bottom-up estimating
To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum	● Expert judgement ● Data analysis ○ Alternatives analysis ○ Reserve analysis ● Decision-making ● Estimating ○ Analogous ○ Parametric ○ Bottom-up estimating ● Cost aggregation ● Historical information review ● Financing ● Meetings
To create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company	● Expert judgement ● Data gathering ○ Brainstorming ○ Interviews ● Data analysis ○ Alternatives analysis ○ Document analysis ○ Process analysis ● Decision making ● Test and inspection planning ● Problem solving ● Meetings
To create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project	● Expert judgement ● Data representation ○ Hierarchical charts ○ Responsibility assignment matrix

	○ Text-oriented formats ● Organizational theories ● Estimating ○ Analogous ○ Parametric ○ Bottom-up ● Data analysis ● Project Management Information System ● Meetings ● Decision-making ● Negotiation ● Pre-assignment ● Virtual teams
To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored	● Expert judgment ● Communication requirements analysis ● Communication technology ● Communication models ● Communication methods ● Interpersonal and team skills ● Data representation ● Meetings
To create a risk management plan to establish how risk management activities will be structured and performed	● Expert judgement ● Data gathering ○ Brainstorming ○ Interviews ● Data analysis ● Data representation ● Interpersonal and team skills ● Prompt lists ● Risk categorization ● Strategies

	● Meetings
To create a procurement management plan to establish how goods and services will be acquired in the procurement process	● Expert judgement ● Data gathering ● Source selection analysis ● Interpersonal and team skills ● Meetings
To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project	● Expert judgement ● Data gathering ○ Brainstorming ● Data analysis ○ Stakeholder analysis ● Data representation ○ Power/Interest/Influence/ Impact grids ● Communication skills ● Interpersonal and team skills ● Meetings

Note: Own work.

Assumptions and constraints

According to the PMI (2017), an assumption is defined as "a factor in the planning process that is considered to be true, real, or certain, without proof or demonstration". The PMI also defines a constraint as "a limiting factor that affects the execution of a project, program, or process".

In the context of project management, it is important to understand that project assumptions can affect the project positively if true or negatively if false. As well, project constraints often create hindrances to the project team. For the Final Graduation Project, Chart 4 outlines some of the assumptions and constraints related to the FGP topic and objectives.

Chart 2

Assumptions and constraints

Objectives	Assumptions	Constraints
To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion	It is assumed that the company information will be readily available.	The available time to develop the charter is short.
To create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements	It is assumed that the company understands the client's requirements. It is assumed that there will be minimal changes to the project scope during execution.	The company favors modification to project designs.
To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe	It is assumed that the schedule is realistic for the completion of the project. It is assumed that scheduling software is available and functional.	The company has limited capacity with scheduling tools and practices.
To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum	It is assumed that the cost management plan will reflect current costs. It is assumed that the company has the required	There are predetermined disbursements for project funds from the Client's bank loan.

	capital and a line of credit to execute the project.	
To create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company	It is assumed that the quality management plan will consider all aspects (cost, durability, and safety).	The company and client may modify quality requirements.
To create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project	It is assumed that the available resources will be known.	There is limited staff and high subcontracting done by the company. There are restrictions countrywide due to pandemic.
To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored	It is assumed that all stakeholders have access to the selected methods of communication and can use them effectively. It is assumed that the communications plan will be tailored to the stakeholders.	There are unreliable telephone and internet services in the remote area of the project site.
To create a risk management plan to establish how risk management activities will be structured and performed	It is assumed that enough information is available for proper and thorough risk identification.	Unforeseen risks cannot be identified until they occur.
To create a procurement management plan to establish how goods and services will be acquired in the procurement process	It is assumed that all goods and services are available in country.	Limited resources and increase in costs due to the pandemic.

To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project	It is assumed that all key stakeholders will be engaged in decision making and identified.	The interest of stakeholders may change.

Note: Own work.

Deliverables

According to the PMI (2017), a deliverable is defined as "any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project". The PMI further explains that deliverables can be either tangible or intangible. It can even exist beyond the project itself. Deliverables also serve as a marker for the project phases as the completion of one or more deliverables is typically used as an exit criteria (PMI, 2017).

The Final Graduation Project (FGP) consists of the deliverables outlined in Chart 5. These deliverables are linked to each of the specific objectives and are consequent of each of the ten knowledge areas. Collectively, they achieve and support the general objective of the FGP.

Chart 5

Deliverables

Objectives	**Deliverables**
To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion	Project Charter The project charter is a document that officially authorizes the project's existence. It provides the project manager with the necessary authority over organizational resources to effectively manage and execute the project. The project charter

	defines the project, ensuring a common understanding by all stakeholders. (PMI, 2017)
To create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements	Scope Management Plan The scope management plan is a subsidiary of the project management plan. It addresses the definition, development, monitoring, control and validation of the project scope, outlining how these processes will be done. (PMI, 2017)
To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe	Schedule Management Plan The schedule management plan is a subsidiary of the project management plan that outlines how the project schedule will be developed, monitored and controlled. (PMI, 2017)
To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum	Cost Management Plan The cost management plan is a subsidiary of the project management plan that outlines how the project costs will be planned, structured and controlled. (PMI, 2017)
To create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company	Quality Management Plan The quality management plan is a subsidiary plan of the project management plan that dictates how the quality objectives of the company will be achieved. This involves the policies, procedures and guidelines that will be used by the company. (PMI, 2017)
To create a resource management plan to establish how project resources will	Resource Management Plan

be categorized, allocated, managed, and released to complete the project	The resource management plan is a subsidiary plan of the project management plan that addresses how the project resources will be categorized, allocated, managed and released. It involves both team and physical resource management. (PMI, 2017)
To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored	Communications Management Plan The communications management plan is a subsidiary plan of the project management concerned with project communications. It establishes how to plan, structure, implement and monitor project communications. (PMI, 2017)
To create a risk management plan to establish how risk management activities will be structured and performed	Risk Management Plan The risk management plan is a subsidiary plan of the project management plan that identifies how the risk management activities will be structured and performed. (PMI, 2017)
To create a procurement management plan to establish how goods and services will be acquired in the procurement process	Procurement Management Plan The procurement management plan is a subsidiary plan of the project management plan that outlines the activities to be done in the procurement process. (PMI, 2017)
To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project	Stakeholder Management Plan The stakeholder management plan is a subsidiary plan of the project management plan that addresses how stakeholders will be effectively engaged on the project. (PMI, 2017)

Note: Own work.

4 RESULTS

4.1. Project Charter

The Green Estate Bungalow Project Charter authorizes the project and the authority of the Project Manager. It is presented in Chart 6 and developed from interviews with the Client, Company Director and Project Team.

Chart 6

Green Estate Bungalow Project Charter

<table>
<tr><th colspan="2">PROJECT CHARTER</th></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Date:</td><td>Project Name:</td></tr>
<tr><td>August 1, 2022</td><td>Green Estate Bungalow</td></tr>
<tr><td>Knowledge Areas / PM Processes:</td><td>Application Area (Sector / Activity):</td></tr>
<tr><td>Knowledge Areas:
Scope Management, Schedule Management, Cost Management, Quality Management, Resource Management, Communication Management, Risk Management, Procurement Management, Stakeholder Management</td><td rowspan="2">Residential Construction, Planning</td></tr>
<tr><td>PM Processes:
Initiating, Planning</td></tr>
<tr><td>Project Start Date:</td><td>Project Finish date:</td></tr>
<tr><td>August 1, 2022</td><td>February 1, 2023</td></tr>
<tr><td colspan="2">Project Objectives (General and Specific):</td></tr>
<tr><td colspan="2">General Objective:
To construct a new bungalow residence for the occupancy of Ms. Taheerah Usher at Parcel 3972 Green Estate, Lord's Bank, Belize
Specific Objectives:
1. To build a single-family residence by February 1, 2023, to allow immediate occupancy
2. To build a high quality, custom home of 1,943 square feet, 3-bedroom, 2 bathroom, one-car garage to meet the homeowner's design requirements
3. To manage construction costs to not exceed the allocated BZE$250,000 budget
4. To use environmentally friendly and regenerative construction methodologies and processes to minimize the project's environmental footprint and energy consumption
5. To meet all local building and labor regulations to comply with the law of the country
6. To furnish the residence by February 1, 2023, to allow immediate occupancy</td></tr>
<tr><td colspan="2">Project purpose or justification (merit and expected results):</td></tr>
</table>

The purpose of this project is to establish a new residence for Ms. Taheerah Usher. As a first-time property owner and long-time tenant, Ms. Taheerah Usher has decided to build her primary residence at Parcel 3972 at Green Estate residential development site in Lord's Bank, Belize. Ms. Usher has completed the engineering design process for her proposed home and has established a credit facility of BZ$250,000 at her primary banking institution for the construction of her dream home.

The new residence will be a reinforced concrete bungalow style home with three bedrooms, two bathrooms, spacious living, dining and kitchen areas with an enclosed one car garage, walk-in pantry and laundry area. The project is expected to satisfy the client's requirements for an aesthetically pleasing, comfortable and functional living space. It is expected that contracting a competent construction company, The Energy Optimizer (T.E.O.) Company Limited, for the construction of the home will allow the client to maintain construction costs, reduce construction duration and ensure the provision of a structurally sound building for permanent residency.

Description of Product or Service to be generated by the Project – Project final deliverables:

A 1,943 square feet finished and furnished bungalow house
Project Management Plan
Certificate of Completion

Assumptions:

1. It is assumed that there will be favorable weather conditions.
2. It is assumed that the client will issue timely disbursements.
3. It is assumed that six months is sufficient to complete the project.
4. It is assumed that competent subcontractors and skilled laborers will be available.
5. It is assumed that the building authority will conduct timely inspections as per the project schedule.
6. It is assumed that there will be no significant change requests by the client.
7. It is assumed that site work can occur on weekends.

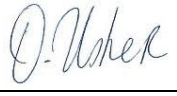
Constraints:

1. The budget is fixed at BZD$250,000.00.
2. The site is located in a rural community.
3. The Covid-19 restrictions for the country is fluctuating and limiting construction activity.
4. The availability and cost of construction materials are being affected by the Covid-19 pandemic.
5. Site work is limited from 6:00 A.M. to 6:00 P.M..

Preliminary Risks:

1. If the country is placed on lock-down due to Covid-19 pandemic, construction might be halted, impacting the project cost and schedule.
2. If there is a hurricane or extreme natural disaster, the site and building might be damaged, impacting the project cost, duration and progress of works.
3. If there is a Covid-19 outbreak on site, construction might be halted, impacting the project cost and schedule.
4. If there are delays in shipment, materials might not be available, impacting the project schedule and costs.

Budget:

The project budget is BZD$250,000.00.		
Milestones and dates:		
Milestone	**Start date**	**End date**
Project Start	August 1, 2022	August 1, 2022
Substructure Completed	August 17, 2022	September 16, 2023
Superstructure Completed	September 19, 2022	November 23, 2022
Finishes Completed	November 24, 2022	December 16, 2022
Furniture Installed	December 19, 2022	December 20, 2022
Final Inspection passed	January 6, 2023	January 6, 2023
Occupancy Permit Received	January 10, 2023	January 10, 2023
Handover Completed	January 11, 2023	January 11, 2023
Relevant historical information:		
The Energy Optimizer (T.E.O.) Company Limited has been shortlisted for the construction of the new bungalow residence to be located at Parcel 3972 at Green Estate, Lord's Bank, Belize. The company was established in September 2013 and has managed small to medium scale electrical design and installation projects. Around 2016, the company expanded to include civil engineering design, construction, and project management.		
Stakeholders:		
Direct stakeholders: Taheerah Usher The Energy Optimizer (T.E.O.) Company Limited Heritage Bank Belize Ltd. Subcontractors **Indirect stakeholders:** Construction Suppliers Central Building Authority Green Estate Community (Residents) Belize Water Services Belize Electricity Limited Belize Telemedia Limited Central TV & Internet Public Utilities Commission Green Estate Development Owner		
Approval:		
Project Manager: Orchel Usher	Signature: 	
Authorized by: Taheerah Usher	Signature:	

Note: Own work.

4.2. Scope Management Plan

4.2.1 Purpose of the Scope Management Plan

The Scope Management Plan provides the scope framework for the Green Estate Bungalow. It has the following purposes:

- To describe the scope of the project.
- To identify factors that will tend to expand the scope.
- To describe procedures that will be used to identify scope changes.
- To describe the project scope change mechanisms and responsibilities.

4.2.2 Scope Management Approach

For the Green Estate Bungalow Project, scope management will be the responsibility of the Project Manager. The Project Manager, Project Team and Client will establish and approve documentation for measuring project scope which includes deliverable quality checklists and work performance measurements. Proposed scope changes may be initiated by the Project Manager, Client or any member of the Project Team. All change requests will be identified, evaluated and actioned as set forth in this plan.

Chart 10 and 11 provides the Stakeholder Requirements list and detailed Requirements Traceability Matrix that serve as inputs to the scope definition.

4.2.3 Roles and Responsibilities

Ultimately, the Client is responsible for the acceptance of the final project deliverables and project scope. The Project Manager, Client and Project Team will all play key roles in managing the scope of the project. As such, the roles and responsibilities for the scope management are outlined in Chart 7 to ensure that work performed on the project is within the established scope throughout the entire duration of the Green Estate Bungalow project.

Chart 7

Scope Management Roles and Responsibilities

Role	Description
Client	Provides executive team approval and sponsorship for the project. Has budget ownership for the project and is the major stakeholder and recipient for the project deliverables. Identifies, approves and/or denies scope change requests.
Company Director	Provides executive team approval for the project. Aids in resolving issues that arise beyond the Project Manager's jurisdiction. Monitors project progress and provides necessary tools and support when milestones are in jeopardy.
Project Manager	Provides overall management to the project. Accountable for establishing the Project Charter, developing and managing the work plan, securing appropriate resources and delegating the work and ensuring successful completion of the project. All project team members report to the Project Manager. Handles all project administrative duties, interfaces with Client and has overall accountability for the project. Identifies, defines, evaluates, verifies, executes and communicates scope change requests.
Team Member	Working project team member. Participate in identifying, defining, evaluating, verifying, communicating and executing scope changes as directed by the Project Manager.

Note: Own work.

4.2.4 Project Scope Baseline

4.2.4.1 Scope Statement

Scope Description

The scope of the project includes the construction of a 1,943 square feet bungalow house to be built and furnished according to the Client's approved plan # CBA-044-21L Bk and signed contract agreement.

Project Exclusions

The scope of the project does not include:

- The design of the bungalow house
- The application or procurement of the "No Objection to Proposed Development" building permit
- Air conditioning
- Landscaping
- Maintenance of building after handover

Project Deliverables

The project deliverables include:

- 1,943 square feet finished and furnished bungalow house
- Project management plan
- Certificate of Completion

Project Acceptance Criteria

Chart 8 outlines the acceptance criteria for the project.

Chart 8

Project Acceptance Criteria

Deliverable	Project Acceptance Criteria
1,943 square feet finished and furnished bungalow house	1. The roof is metal-framed. 2. The exterior and interior walls are made from concrete bricks. 3. The house is watertight. 4. There is no significant unapproved deviation from the Client's approved design. 5. All utilities are connected and running. 6. The entire house has been completely furnished as agreed upon by the Client. 7. All kitchen appliances are black and electric. 8. All kitchen cabinets are painted white with black hardware. 9. All kitchen cabinets are made from mahogany.

	10. The kitchen island countertop is made from white granite. 11. The regular bathroom has a tub. 12. The master bathroom has a standing shower and free-standing tub. 13. The living room has a white bi-fold door with automatic security shutter. 14. The living room is sunken. 15. The garage has an automatic door that is correctly installed.
Project Management Plan	16. All project management plans have been approved and signed by the Client and Company Director. 17. The project has been completed within the $250,000 budget. 18. The project has been completed within the 6-month duration.
Certificate of Completion	19. All snag list items have been completed to the satisfaction of the client. 20. The Approved Occupancy Permit from the Central Building Authority has been received and delivered to the Client. 21. All project invoices have been delivered to the Client.

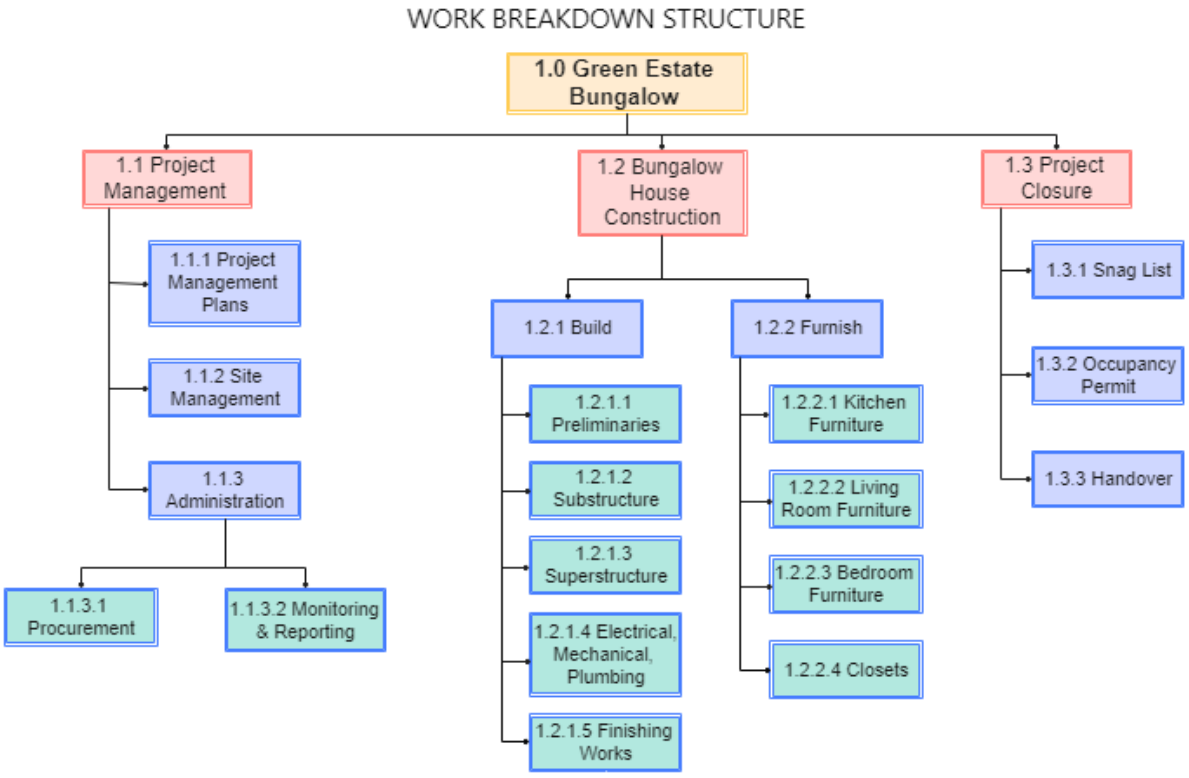
Note: Own work.

4.2.5 Project Work Breakdown Structure

For more effective management, the work required to complete the Green Estate Bungalow project will be subdivided into phases. This approach will allow the Project Manager to manage the project's scope more effectively as the project team works on the tasks necessary for project completion. The project phases are the project management phase, the construction phase and the project closure phase. Each of these phases is subdivided further down to deliverables and work packages that are estimated to require no more than 40 hours of work.

Figure 10

Work Breakdown Structure



Note: Own work.

4.2.6 Project WBS Dictionary

Chart 9

WBS Dictionary

GREEN ESTATE BUNGALOW WBS DICTIONARY									
WBS Code	**Element Name**	**Description of Work**	**Assumptions & Constraints**	**Owner Assigned**	**Resources Required**	**Cost Estimate**	**Acceptance Criteria**	**Technical References**	**Agreement Information**
1.1.1	Project Management Plans	This includes the development of the project management plan.	It is assumed that the project team knows how to create the subsidiary plans and utilize relevant software.	Project Manager	Project Team, computer, planning software, printer, office supplies	$3000	The project management plan is complete as assessed by the Project Manager.	Contract agreement, Construction drawings, Supplier specifications and price lists	Contract Agreement
1.1.2	Site Management	This includes all activities for the proper management of daily site activities.	It is assumed that a Site Engineer will be assigned to the site.	Site Engineer	Site Team, construction equipment		The house is completed as assessed by Project Manager.	Contract agreement, Construction drawings, CBA regulations	Contract Agreement
1.1.3	Administration	This includes all administrative tasks associated with the project including procurement, monitoring and reporting.	The company's administrative assistant will be multi-tasking with all the company's projects.	Administrative Assistant	computer, planning software, printer, office supplies		All administrative duties are completed as determined by the Project Manager.	Contract agreement, Company policies	Contract Agreement

1.2.1.1	Preliminaries	This includes the preparation of site for commencement of works, security, utilities, quality assurance and demobilisation.	It assumed that there will be no delays with installation of temporary utilities.	Site Engineer	building materials, equipment and hand tools, vehicle	$218,742.26	All pre-construction works are completed as checked by the Site Engineer	Contract agreement, Construction drawings, Supplier specifications, CBA regulations	Contract Agreement
1.2.1.2	Substructure	This includes the construction of the foundation that includes excavation, strip footing, cobwall and backfill.	It is assumed that all subcontracted laborers will be available as scheduled. It is assumed that all materials will be available and delivered on time.	Site Engineer	building materials, heavy equipment, hand tools, vehicle		The foundation is poured and curing as verified by the Site Engineer in compliance with approved drawings.	Contract agreement, Construction drawings, Supplier specifications, CBA regulations	Contract Agreement
1.2.1.3	Superstructure	This includes the construction of the building envelope, floor slab, roof, steps and verandah.	It is assumed that all subcontracted laborers will be available as scheduled. It is assumed that all materials will be available and delivered on time.	Site Engineer	building materials, heavy equipment, hand tools, vehicle		The building is completed from slab to roof as verified by the Site Engineer in compliance with the approved drawings.	Contract agreement, Construction drawings, Supplier specifications, CBA regulations	Contract Agreement
1.2.1.5	Finishes	This includes the finishing works and carpentry.	It is assumed that all subcontracted laborers will be available as scheduled. It is assumed that all materials will be	Site Engineer	building materials, equipment, hand tools, vehicle		All finishes are completed as verified by the Site Engineer in compliance	Contract agreement, Construction drawings, Supplier specifications,	Contract Agreement

			available and delivered on time.				with the approved drawings.	CBA regulations	
1.2.1.4	Electrical, Mechanical & Plumbing	This includes all electrical, plumbing and mechanical installations.	It is assumed that all subcontracted laborers will be available as scheduled. It is assumed that all materials will be available and delivered on time.	Site Engineer	building materials, equipment, hand tools, vehicle		The house has running water, electricity and septic/soaka way system as verified by the Site Engineer in compliance with the approved drawings.	Contract agreement, Construction drawings, Supplier specifications, CBA regulations, PUC regulations, BEL and BWS requirements	Contract Agreement
1.2.2	Furniture	This includes the placement of all furniture.	It is assumed that all furniture will be delivered on time, available and remain within budget.	Site Engineer	furniture, hand tools, vehicle		All furniture meets the Client's satisfaction.	Contract agreement, Construction drawings, Supplier specifications,	Contract Agreement
1.3.1	Snag List	This includes the final inspection and completion of snag list items to the client's satisfaction.	It is assumed that all work will be completed to the Client's satisfaction.	Site Engineer	hand tools	$200	Final inspection snag list items are completed to satisfaction of Client.	Contractor agreement, construction drawings	Contract Agreement
1.3.2	Occupancy Permit	This includes the application and receipt of the Certificate	The approval process by Central Building	Project Manager	computer, office supplies		Certificate of Occupancy is received	CBA regulations	Contract Agreement

		of Occupancy from the Central Building Authority.	Authority can be lengthy.				from Central Building Authority.		
1.3.3	Handover	This includes the handover of keys, final accounts and manufacturer's warranties to client.	The final payment for work is made.	Project Manager	computer, office supplies, accounting receipts, manufacturer's warranties and manuals		All documents are transferred to client to the client's satisfaction.	Contractor agreement	Contract Agreement

Note: Own work.

4.2.7 Scope Verification

As the Green Estate Bungalow project progresses, the Project Manager will verify the interim project deliverables against the original scope as defined in the scope statement, WBS and WBS Dictionary. Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager and Client will meet for formal acceptance of the deliverables. This meeting will be accompanied with a site inspection. The Client will accept the deliverable by signing a Project Deliverable Acceptance Document (see Chart 12). This will ensure that project work remains within the scope of the project on a consistent basis throughout the life of the project.

4.2.8 Scope Control

The Project Manager and the Project Team will work together to control the scope of the Green Estate Bungalow project. The Project Team will leverage the WBS Dictionary by using it as a statement of work for each WBS element. The Project Team will ensure that they perform only the work described in the WBS dictionary and generate the defined deliverables for each WBS element. The Project Manager will oversee the Project Team and the progression of the project to ensure that this scope control process is followed, and progress is reported through the Project Scope measurement tools.

4.2.9 Scope Changes

4.2.9.1 Scope Change Factors

The following are the factors in this project that could lead to changes of scope:

- The client requests changes after contract agreement.
- The selected and pre-approved materials or items are not available locally or cannot be special ordered in a timely manner; and
- Design flaws in the approved construction drawings.

4.2.9.2 Identifying Scope Changes

The following are the means by which scope changes will be identified during the execution of the project:

- Refine the scope to a greater level of detail (as supported by the Client);
- Implement a formal scope change request mechanism (described below);

- Review all results of project meetings or review sessions with the Client to determine if a scope change happens;
- Include a roundtable to identify scope changes at all project team meetings;
- Assess the results of all deliverable review and approval cycles to determine if a scope change has been added;
- Sensitize the team to the project scope and request that team members be alert to changes of scope; or
- Sensitize the Client to the project scope and the scope change procedures.

4.2.9.3 Scope Change Procedures

There are two procedures for managing scope changes: one for scope change requests that are initiated by the Client and one for requests that are not explicitly identified as such.

Client-Initiated Scope Change

- When the Client identifies a change of scope, a "Integrated Change Request Form" will be completed and delivered to the Project Manager.
- The Project Manager will assign someone from the team to estimate the cost of the change and its impact on the project schedule.
- The Project Manager will provide the estimate to the Client along with a date by which a Client decision is required.
- If the Client does not approve the change, the change request will be filed, and no further work done on it.

Other Scope Changes

- When the Project Manager identifies a requirement or a request that, in his or her opinion, constitutes a change of scope, the Client will be contacted by phone or appointment to discuss the change.
- If the Client agrees that the request is a change of scope and is desirable, the procedure under "Client-Initiated Scope Change" will be followed.

- If the Client states that the request is not necessary, the Project Manager will notify the source of the request and ask that it be dropped.
- If the Client disagrees that the request is a change of scope and states that it is desirable, the Project Manager will review the project scope statement with the Client in an attempt to reach agreement.
- If there is no agreement, the Project Manager will refer the issue to management for resolution. Changes that are accepted into the project will be reflected in revisions to the project plan.

Acceptance

Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

ANNEX A: Requirements Traceability Matrix

Requirements

Based on interviews and client documents, the requirements for the Green Estate Bungalow project are outlined and classified as follows:

Chart 10

Stakeholder Requirements

Stakeholder Requirements	Contractor • Client disbursements must follow the disbursement schedule. • Contractor must be given full access to project site for duration of project. Client • The kitchen cabinets must be all-white and made from mahogany. • The kitchen countertop must be granite, white. • The kitchen appliances must be smart appliances with black finishes • The Client must pre-approve all furniture. • The project must be completed by February 1, 2023. • There must be adequate security on location. • There must be a safe working environment. Authorities • House must be built according to approved plan. • Any deviation to structural design must be reported to CBA. • Contractor must keep approved copy of plans and permit on site.
Project Requirements	• Project cost must not exceed $250,000 budget.

	• The bungalow house must be move-in ready by February 1, 2023.
Quality Requirements	• All materials must meet minimum specified standards as per approved design.

Note: Own work.

Requirements Traceability Matrix

Chart 11

Requirements Traceability Matrix

ID	WBS ID	WBS Deliverable	Requirements Description	Business Needs, Opportunities, Goals, Objectives	Stakeholder
01	1.1.3	Administration	Client disbursements must follow the disbursement schedule.	To provide stable cash flow for timely completion of project deliverables	Client
02	1.1.2	Site Management	Contractor must be given full access to project site for duration of project. Client	For successful completion of project deliverables	Client
03	1.2.1.5	Finishing Works	The kitchen cabinets must be all-white and made from mahogany.	To meet client requirements	Contractor
04	1.2.1.5	Finishing Works	The kitchen countertop must be granite, white.	To meet client requirements	Contractor
05	1.2.2.1	Kitchen Furniture	The kitchen appliances must be smart appliances with black finishes	To meet client requirements	Contractor
06	1.2.2	Furnish	The Client must pre-approve all furniture.	To meet client requirements	Contractor

07	1.1	Project Management	The project must be completed by February 1, 2023.	For successful completion of project deliverables. To meet client requirements. To ensure maximum profit	Contractor
08	1.1.2	Site Management	There must be adequate security on location.	To ensure health and safety of Project Team, Subcontractors, Client and all visitors to site. Protection from theft of materials and/or equipment.	Contractor
09	1.1.2	Site Management	There must be a safe working environment.	To ensure health and safety of Project Team, Subcontractors, Client and all visitors to site.	Contractor
10	1.2	Bungalow House Construction	House must be built according to approved plan.	To meet building approval requirements and client requirements.	Contractor
11	1.1.2	Site Management	Any deviation to structural design must be reported to CBA.	To adhere to building regulations.	Contractor
12	1.1.2	Site Management	Contractor must keep approved copy of plans and permit on site.	To adhere to building regulations.	Contractor
13	1.1	Project Management	Project cost must not exceed $250,000 budget.	To meet client's budget/requirement. To ensure a profit.	Contractor
14	1.1	Project Management	The bungalow house must be move-in ready by November 2, 2022.	To meet client's requirement. To ensure a profit.	Contractor
15	1.1	Project Management	All materials must meet minimum	To meet client's requirement, building regulations	Contractor

			specified standards as per approved design.	and ensure a sound and safe structure.	
16	1.3.3	Handover	All invoices must be kept.	To document project costs.	Contractor
17	1.3.2	Occupancy Permit	The Contractor must apply for and obtain the Occupancy Permit from the Central Building Authority	To comply with building regulations and meet Client's requirements.	Contractor

Note: Own work.

ANNEX B: Project Deliverable Acceptance Document

Chart 12

Deliverable Acceptance Document

T.E.O. COMPANY LTD.
1252 SUNRAY AVENUE, APT. 2
BELIZE CITY, BELIZE C.A.

DELIVERABLE ACCEPTANCE DOCUMENT

Purpose: This document is to ensure that the requirements and expectations of the deliverable are met, approved, and accepted. This document may be used at the end of the project or during each phase as deliverables are submitted to the requesting organization and/or client.

Project Name	Project Manager
Green Estate Bungalow	
Deliverable Name	**Date**
Name of Deliverable	Date of Document

Acceptance of: Task ☐ **Deliverable** ☑ Project Phase ☐ **Project** ☐

Task/Deliverable/Milestone/Phase	Completion Date		Lead/Lag (Days)
	Planned	Actual	
Insert description			
Insert description			
☐ **APPROVAL** Comments (if any):	☐ **REJECT /REVISE & RESUBMIT** Comments (if any): Estimated date:		

Prepared & Reviewed By			
Name	Role in Project / Title	Date	Signature
	Site Engineer		
Accepted By			

	Project Manager		
Approved By			
	Project Manager		
	Company Director		
	Client		

Signature indicates that the named deliverable (s) in the opinion of the signer (i) meets the specifications; (ii) has no significant unresolved issues; and (iii) meets the acceptance criteria.

Note: Adapted from *Deliverable Acceptance Document* in *ProjectManagement.com*, March 3, 2022, from https://www.projectmanagement.com/deliverables/582006/deliverable-acceptance-document . Copyright 2022 by ProjectManagement.com.

4.3. Schedule Management Plan

4.3.1 Purpose of the Schedule Management Plan

The Schedule Management Plan has the following purposes:

- To present the schedule of the project.
- To identify factors that can delay the schedule.
- To describe procedures that will be used to deal with schedule impacts.
- To describe reporting requirements and tools for schedule monitoring, management and performance.

4.3.2 Schedule Management Approach

The project schedule will be created using Microsoft Project software tool based on the detailed activity list shown in Chart 15. The Project Manager will complete the development of the project schedule using activity sequencing, activity duration estimating and resource allocation. Once the project schedule is verified by the Team and approved by the Client, it will be baselined. Chart 13 presents the project milestones.

Chart 13

Project Milestones

Milestones	Date
Project Start	August 1, 2022
Substructure completed	September 16, 2022
Superstructure completed	November 23, 2022
Finishes completed	December 16, 2022
Furniture installed	December 20, 2022
Final Inspection passed	January 6, 2023
Occupancy Permit received	January 10, 2023
Handover completed	January 11, 2023

Note: Own work.

4.3.3 Roles and Responsibilities

Chart 14

Schedule Management Roles and Responsibilities

Role	Description
Client	Provides executive team approval and sponsorship for the project. Provides schedule approval to baseline the schedule. Participates in reviews of the schedule, identifying and approving schedule changes and assist with schedule validation.
Company Director	Provides executive team approval for the project. Provides schedule approval to baseline the schedule. Participates in schedule validation. Tracks progress of key milestones.
Project Manager	Provides overall management to the project. Responsible for facilitating activity definition, sequencing, and estimating duration and resources with the Project Team. Creates the project schedule using MS Projects. Validates the schedule with the Project Team, Company Director and Client. Obtain schedule approval from the Company Director and Client to baseline the schedule. Review and update the schedule for the duration of the project. Participate in identifying, defining, evaluating, verifying, communicating, and executing schedule changes.
Team Member	Working project team member. Participate in the activity definition, sequencing, duration, and resource estimating required for the development of the schedule. Participate in its review and validation. Participate in identifying, defining, evaluating, verifying, communicating, and executing schedule changes as directed by the Project Manager. Performs project activities as approved.

Note: Own work

4.3.4 Project Schedule

4.3.4.1 Activity List

Chart 15 presents the Green Estate Bungalow activity list generated from the decomposition of the WBS deliverables and work packages. The activity list will serve as the basis for the initial project schedule which must be updated by the Project Team as needed.

Chart 15

Green Estate Bungalow Activity List

WBS ID	WORK PACKAGE	TASK NO.	ACTIVITY NAME	DESCRIPTION
1.1	**Project Management**			
1.1.1	**Project Management Plan**	1.1.1.1	Conduct client meeting	This activity includes a meeting with the Client, Company Director and Project Manager to determine all requirements and information for the development of the project charter and subsequent management plans.
		1.1.1.2	Develop project charter	This activity includes the development of the project charter
		1.1.1.3	Develop scope management plan	This activity includes the development of the scope management plan
		1.1.1.4	Develop schedule management plan	This activity includes the development of the schedule management plan
		1.1.1.5	Develop cost management plan	This activity includes the development of the cost management plan
		1.1.1.6	Develop quality management plan	This activity includes the development of the quality management plan
		1.1.1.7	Develop resource management plan	This activity includes the development of the resource management plan
		1.1.1.8	Develop communication management plan	This activity includes the development of the communication management plan
		1.1.1.9	Develop risk management plan	This activity includes the development of the risk management plan
		1.1.1.10	Develop procurement management plan	This activity includes the development of the procurement management plan
		1.1.1.11	Develop stakeholder management plan	This activity includes the development of the stakeholder management plan
		1.1.1.12	Compile the integrated project management plan	This activity includes the compilation of the subsidiary plans to form the integrated project management plan and the acquisition of approval and signatures of the Client and Company Director.
1.1.2	**Site Management**	1.1.2.1	Conduct Site Management	This activity includes the daily site supervision of the construction activities for the project

1.1.3	**Administration**			
1.1.3.1	**Procurement**	1.1.3.1.1	Procure project resources	This activity includes the timely procurement of goods, works and services required for the execution of the project.
1.1.3.2	**Monitoring & Reporting**	1.1.3.2.1	Perform project monitoring & reporting	This activity includes the progress monitoring and reporting activities for the duration of the project
1.2	**Bungalow House Construction**			
1.2.1	**Build**			
1.2.1.1	**Preliminaries**	1.2.1.1.1	Clear project site	This activity includes all site clearance, site preparation and removal of spoils and debris.
		1.2.1.1.2	Setting out, levelling and compacting site	This activity includes the setting out of works including the erection and maintenance of profile boards, levelling and perimeter markers.
		1.2.1.1.3	Install temporary service connections	This activity includes the installation, maintenance and decommissioning of temporary utility connections (electricity, water) for the project duration
		1.2.1.1.4	Transport resources	This activity includes the transportation of project resources to and from the project site
		1.2.1.1.5	Erect site office and storage room	This activity includes the erection of a temporary site office and storage shed, including restroom facility
		1.2.1.1.6	Provide site security	This activity includes the provision of site security for the duration of the project
		1.2.1.1.7	Demobilize site resources	This activity includes the demobilization of all resources from project site after completion of works. It includes cleaning of site.
		1.2.1.1.8	Test materials	This activity includes the testing of material strength for in-situ concrete and blocks including the preparation and selection of samples, transportation and collection to and from testing facility
1.2.1.2	**Substructure**	1.2.1.2.1	Remove topsoil and excavate foundation trenches	This activity includes the removal of topsoil and excavation of foundation trenches
		1.2.1.2.2	Backfill and compact foundation soil	This activity includes the backfilling and compaction of approved foundation fill material
		1.2.1.2.3	Blind foundation surface	This activity includes the blinding of the surface for the foundation
		1.2.1.2.4	Place reinforcement	This activity includes the steel cutting, tying, placement of cement spacers for the strip foundation and placement of starter bars for cob wall reinforcement

		1.2.1.2.5	Pour concrete	This activity includes pouring, vibrating and floating of concrete for the strip foundation
		1.2.1.2.6	Prepare concrete sample	This activity includes the preparation of concrete cylinders for testing
		1.2.1.2.7	Place concrete blocks for Cobwall	This activity includes the placement of concrete blocks with steel and core fill for the foundation cob wall
		1.2.1.2.8	Backfill and compact Cobwall	This activity includes the placement and compaction of approved backfill to the foundation cob wall
1.2.1.3	**Superstructure**	1.2.1.3.1	Place damp proof membrane	This activity includes the placement of the damp proof membrane (polythene sheeting)
		1.2.1.3.2	Place formwork (slab)	This activity includes the placement of formwork to the ground floor slab, verandahs and stairs
		1.2.1.3.3	Place reinforcement (slab)	This activity includes the steel cutting, tying, placement of cement spacers, reinforcement to the ground floor slab, verandahs and stairs
		1.2.1.3.4	Pour concrete (slab)	This activity includes pouring, vibrating and floating of concrete for the ground floor slab, verandahs and stairs
		1.2.1.3.5	Strip formwork (slab)	This activity includes the removal of formwork
		1.2.1.3.6	Cure concrete slab	This activity includes the curing of concrete slabs
		1.2.1.3.7	Place concrete blocks for exterior walls	This activity includes the placement of concrete blocks with steel and core fill for the exterior walls
		1.2.1.3.8	Place concrete blocks for interior walls	This activity includes the placement of concrete blocks with steel and core fill for the interior walls
		1.2.1.3.9	Prepare and pour lintels and sills	This activity includes the placement of formwork, reinforcement and concrete for window/door lintels and window sills
		1.2.1.3.10	Place formwork (belt beam)	This activity includes the placement of formwork for the concrete belt beams
		1.2.1.3.11	Place reinforcement cage (belt beam)	This activity includes the steel cutting, tying, placement of reinforcement cage for the belt beams
		1.2.1.3.12	Pour concrete (belt beam)	This activity includes pouring and vibrating of concrete for the belt beams
		1.2.1.3.13	Strip formwork (belt beam)	This activity includes the removal of formwork
		1.2.1.3.14	Install treated pine roof frame and ceiling	This activity includes the installation of the complete roofing system and ceiling
1.2.1.4		1.2.1.4.1	Rough-in plumbing	This activity includes laying of PVC pipe and fittings sub-slab
		1.2.1.4.2	Set plumbing fixtures and trim	This activity includes fitting all plumbing fixtures

	Electrical, Mechanical and Plumbing	1.2.1.4.3	Connect fixtures	This activity includes the connection of fixtures to supply and waste system
		1.2.1.4.4	Flush, test, and clean piping and fixtures	This activity includes the testing of all fixtures
		1.2.1.4.5	Rough-in electrical	This activity includes laying of electrical conduit in walls to accommodating electrical wires
		1.2.1.4.6	Install electrical service panel	This activity includes the installation of service panel
		1.2.1.4.7	Install rough wire	This activity includes running electrical wires through electrical conduits
		1.2.1.4.8	Install electrical fixtures	This activity includes the installation of all electrical fixtures
		1.2.1.4.9	Connect fixtures	This activity includes the connection of all fixtures to the electrical supply
		1.2.1.4.10	Test and clean fixtures	This activity includes the testing and cleanup of all fixtures
		1.2.1.4.11	Install septic tank and soakaway system	This activity includes the excavation, backfill, compaction and construction of the soakaway and septic tank system
		1.2.1.4.12	Install PVC gutter, downspout and splashpads	This activity includes the installation of the pvc gutter, downspout and splash pads
1.2.1.5	**Finishing Works**	1.2.1.5.1	Render and plaster concrete surfaces	This activity includes the rendering and plastering of all concrete surfaces
		1.2.1.5.2	Place floor screed to floor slabs	This activity includes the leveling and placement of floor screed on all floor slabs for tiling
		1.2.1.5.3	Install windows	This activity includes the installation of all windows
		1.2.1.5.4	Install doors	This activity includes the installation of all doors
		1.2.1.5.5	Prime and paint concrete surfaces	This activity includes the preparation, priming and painting of all concrete surfaces
		1.2.1.5.6	Install floor tiles	This activity includes the installation of floor tiles
		1.2.1.5.7	Install wall tiles	This activity includes the installation of wall tiles
		1.2.1.5.8	Install kitchen, pantry and bathroom cabinets	This activity includes the installation of kitchen, pantry and bathroom cabinets and trimming
		1.2.1.5.9	Install appliances	This activity includes the installation of all household appliances.
		1.2.1.5.10	Install railings	This activity includes the installation of railings
1.2.2	**Furnish**			
1.2.2.1	**Kitchen Furniture**	1.2.2.1	Install kitchen furniture	This activity includes the installation of all kitchen furniture and appliances

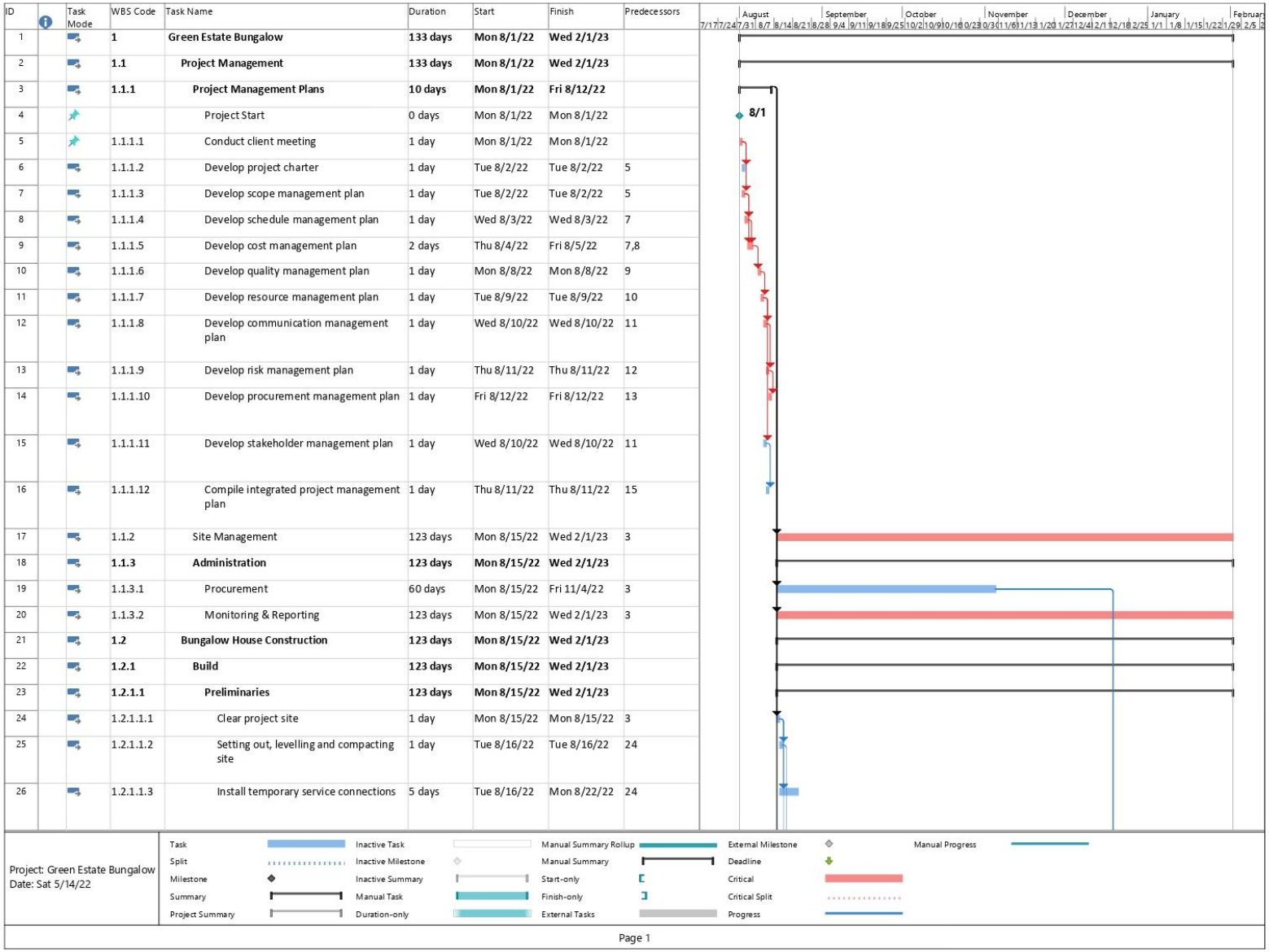
1.2.2.2	**Living Room Furniture**	1.2.2.2	Install living room furniture	This activity includes the installation of all living room furniture
1.2.2.3	**Bedroom Furniture**	1.2.2.3	Install bedroom furniture	This activity includes the installation of all bedroom furniture
1.2.2.4	**Closets**	1.2.2.4	Install closets	This activity includes the installation of bedroom closets
1.3	**Project Closure**			
1.3.1	**Snag List**	1.3.1.1	Conduct walk-through inspection	This activity includes a walk-through inspection meeting with the Client to develop and agree upon any snag list items for remedy
		1.3.1.2	Correct any snag list items	This activity includes the correction of any identified defects on the snag list
		1.3.1.3	Conduct final inspection	This activity includes a final inspection for final acceptance of the building and works
1.3.2	**Occupancy Permit**	1.3.2.1	Apply for occupancy permit	This activity includes the application for occupancy permit from the Central Building Authority
		1.3.2.2	Receive occupancy permit	This activity includes the acquisition of the approved occupancy permit from the Central Building Authority
1.3.3	**Handover**	1.3.3.1	Conduct handover meeting	This activity includes a final handing over meeting where the Client receives final statement of accounts, hardcopy invoices, receipts and warranties, and keys to the home.

Note: Own work.

4.3.4.2 Project Schedule

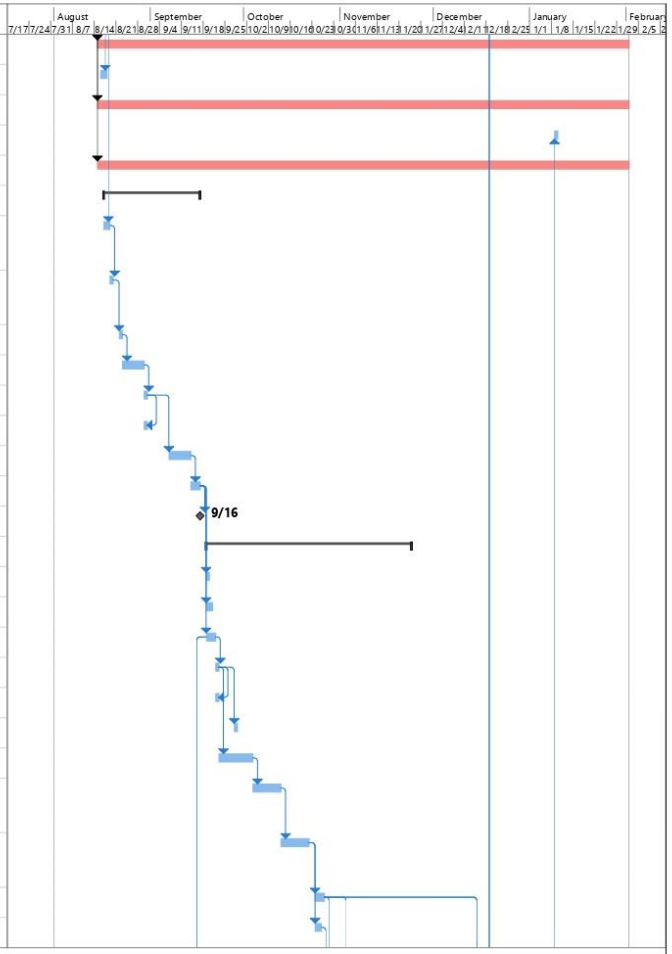
Figure 11

Project Schedule



ID	Task Mode	WBS Code	Task Name	Duration	Start	Finish	Predecessors
1		1	**Green Estate Bungalow**	**133 days**	**Mon 8/1/22**	**Wed 2/1/23**	
2		1.1	**Project Management**	**133 days**	**Mon 8/1/22**	**Wed 2/1/23**	
3		1.1.1	**Project Management Plans**	**10 days**	**Mon 8/1/22**	**Fri 8/12/22**	
4			Project Start	0 days	Mon 8/1/22	Mon 8/1/22	
5		1.1.1.1	Conduct client meeting	1 day	Mon 8/1/22	Mon 8/1/22	
6		1.1.1.2	Develop project charter	1 day	Tue 8/2/22	Tue 8/2/22	5
7		1.1.1.3	Develop scope management plan	1 day	Tue 8/2/22	Tue 8/2/22	5
8		1.1.1.4	Develop schedule management plan	1 day	Wed 8/3/22	Wed 8/3/22	7
9		1.1.1.5	Develop cost management plan	2 days	Thu 8/4/22	Fri 8/5/22	7,8
10		1.1.1.6	Develop quality management plan	1 day	Mon 8/8/22	Mon 8/8/22	9
11		1.1.1.7	Develop resource management plan	1 day	Tue 8/9/22	Tue 8/9/22	10
12		1.1.1.8	Develop communication management plan	1 day	Wed 8/10/22	Wed 8/10/22	11
13		1.1.1.9	Develop risk management plan	1 day	Thu 8/11/22	Thu 8/11/22	12
14		1.1.1.10	Develop procurement management plan	1 day	Fri 8/12/22	Fri 8/12/22	13
15		1.1.1.11	Develop stakeholder management plan	1 day	Wed 8/10/22	Wed 8/10/22	11
16		1.1.1.12	Compile integrated project management plan	1 day	Thu 8/11/22	Thu 8/11/22	15
17		1.1.2	Site Management	123 days	Mon 8/15/22	Wed 2/1/23	3
18		1.1.3	**Administration**	**123 days**	**Mon 8/15/22**	**Wed 2/1/23**	
19		1.1.3.1	Procurement	60 days	Mon 8/15/22	Fri 11/4/22	3
20		1.1.3.2	Monitoring & Reporting	123 days	Mon 8/15/22	Wed 2/1/23	3
21		1.2	**Bungalow House Construction**	**123 days**	**Mon 8/15/22**	**Wed 2/1/23**	
22		1.2.1	**Build**	**123 days**	**Mon 8/15/22**	**Wed 2/1/23**	
23		1.2.1.1	**Preliminaries**	**123 days**	**Mon 8/15/22**	**Wed 2/1/23**	
24		1.2.1.1.1	Clear project site	1 day	Mon 8/15/22	Mon 8/15/22	3
25		1.2.1.1.2	Setting out, levelling and compacting site	1 day	Tue 8/16/22	Tue 8/16/22	24
26		1.2.1.1.3	Install temporary service connections	5 days	Tue 8/16/22	Mon 8/22/22	24

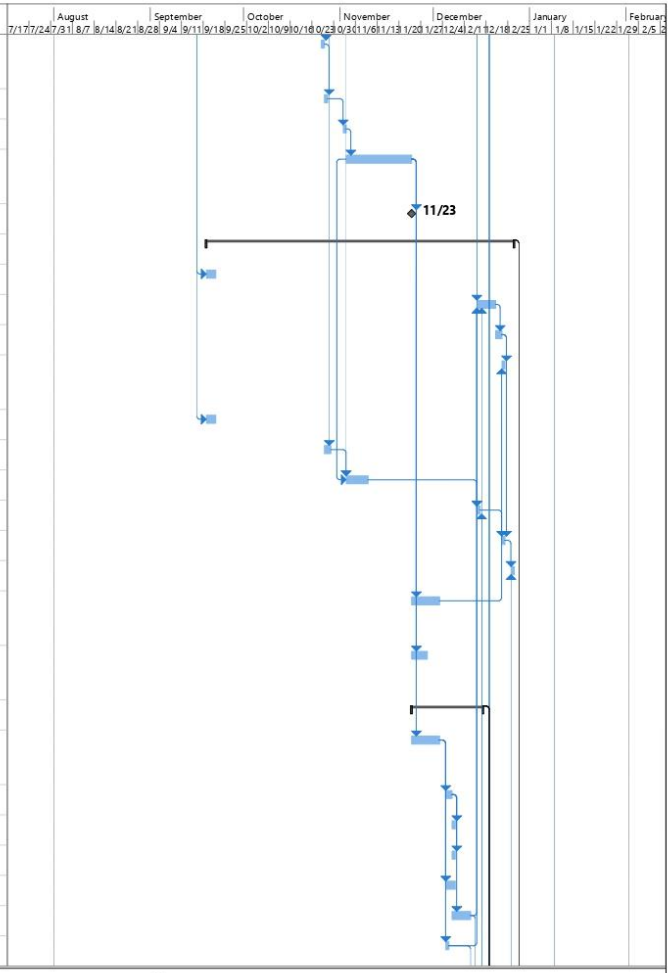
ID	Task Mode	WBS Code	Task Name	Duration	Start	Finish	Predecessors
27		1.2.1.1.4	Transport resources	123 days	Mon 8/15/22	Wed 2/1/23	3
28		1.2.1.1.5	Erect site office and storage room	2 days	Tue 8/16/22	Wed 8/17/22	24
29		1.2.1.1.6	Provide site security	123 days	Mon 8/15/22	Wed 2/1/23	3
30		1.2.1.1.7	Demobilize site resources	1 day	Mon 1/9/23	Mon 1/9/23	98
31		1.2.1.1.8	Test materials	123 days	Mon 8/15/22	Wed 2/1/23	3
32		**1.2.1.2**	**Substructure**	**23 days**	**Wed 8/17/22**	**Fri 9/16/22**	
33		1.2.1.2.1	Remove topsoil and excavate foundation trenches	2 days	Wed 8/17/22	Thu 8/18/22	25
34		1.2.1.2.2	Backfill and compact foundation soil	1 day	Fri 8/19/22	Fri 8/19/22	33
35		1.2.1.2.3	Blind surface	1 day	Mon 8/22/22	Mon 8/22/22	34
36		1.2.1.2.4	Place reinforcement	5 days	Tue 8/23/22	Mon 8/29/22	35
37		1.2.1.2.5	Pour concrete	1 day	Tue 8/30/22	Tue 8/30/22	36
38		1.2.1.2.6	Prepare concrete samples	1 day	Tue 8/30/22	Tue 8/30/22	37FF
39		1.2.1.2.7	Place concrete blocks for cobwall	5 days	Wed 9/7/22	Tue 9/13/22	37FS+5 days
40		1.2.1.2.8	Backfill and compact cobwall	3 days	Wed 9/14/22	Fri 9/16/22	39
41			Substructure Completed	0 days	Fri 9/16/22	Fri 9/16/22	40
42		**1.2.1.3**	**Superstructure**	**48 days**	**Mon 9/19/22**	**Wed 11/23/22**	
43		1.2.1.3.1	Place damp proof membrane	1 day	Mon 9/19/22	Mon 9/19/22	40
44		1.2.1.3.2	Place formwork (slab)	2 days	Mon 9/19/22	Tue 9/20/22	40
45		1.2.1.3.3	Place reinforcement (slab)	3 days	Mon 9/19/22	Wed 9/21/22	40
46		1.2.1.3.4	Pour concrete (slab)	1 day	Thu 9/22/22	Thu 9/22/22	45
47		1.2.1.3.5	Prepare concrete samples	1 day	Thu 9/22/22	Thu 9/22/22	46FF
48		1.2.1.3.6	Strip formwork (slab)	1 day	Wed 9/28/22	Wed 9/28/22	46FS+3 days
49		1.2.1.3.7	Cure concrete slab	7 days	Fri 9/23/22	Mon 10/3/22	46
50		1.2.1.3.8	Place concrete blocks for exterior walls	7 days	Tue 10/4/22	Wed 10/12/22	49
51		1.2.1.3.9	Place concrete blocks for interior walls	7 days	Thu 10/13/22	Fri 10/21/22	50
52		1.2.1.3.10	Prepare and pour lintels and sills	3 days	Mon 10/24/22	Wed 10/26/22	51
53		1.2.1.3.11	Place formwork (belt beam)	2 days	Mon 10/24/22	Tue 10/25/22	51



Project: Green Estate Bungalow
Date: Sat 5/14/22

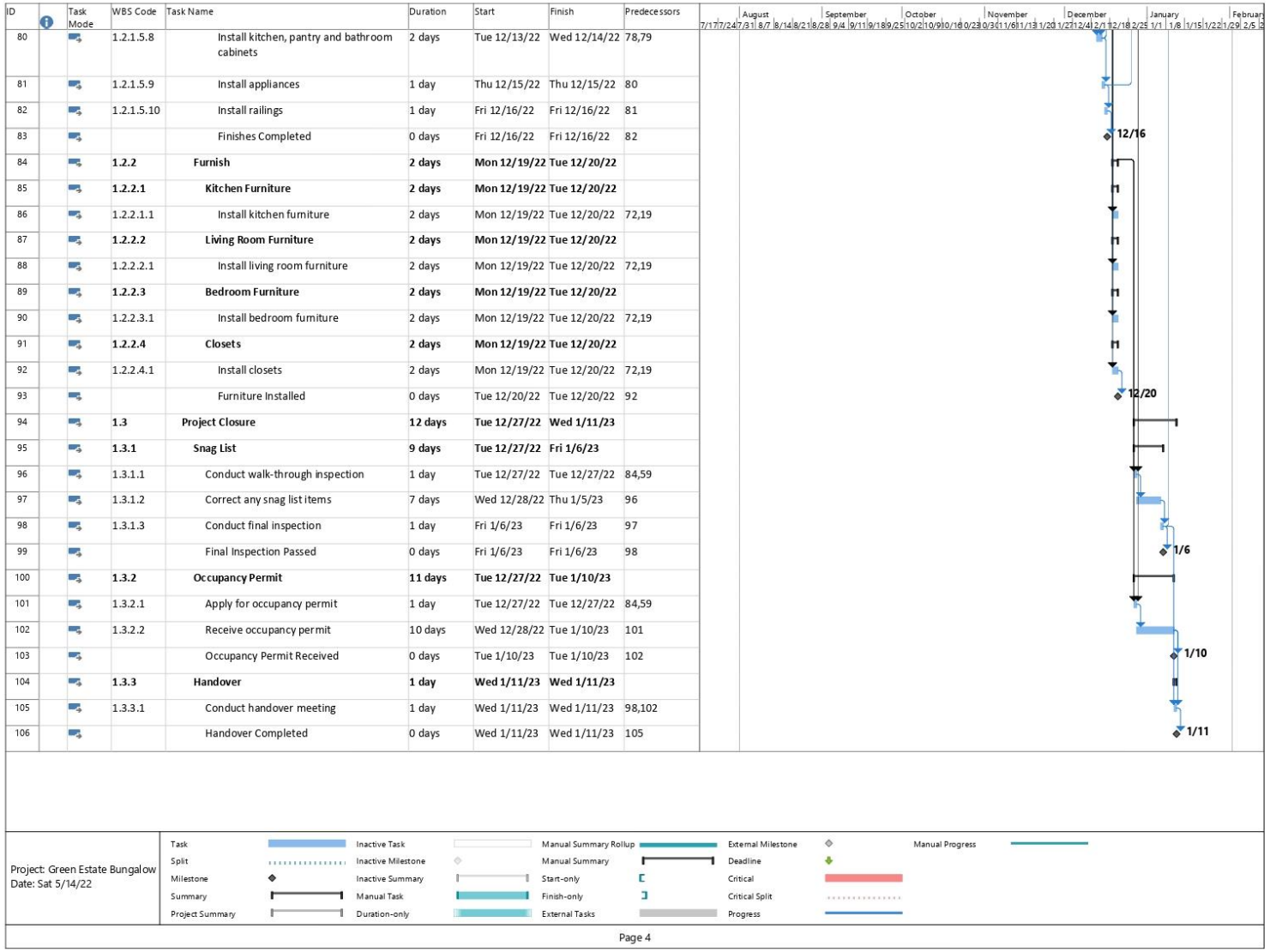
Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Critical
Critical Split
Progress
Manual Progress

ID	Task Mode	WBS Code	Task Name	Duration	Start	Finish	Predecessors
54		1.2.1.3.12	Place reinforcement cage (belt beam)	1 day	Wed 10/26/22	Wed 10/26/22	53
55		1.2.1.3.13	Pour concrete (belt beam)	1 day	Thu 10/27/22	Thu 10/27/22	54
56		1.2.1.3.14	Strip formwork (belt beam)	1 day	Wed 11/2/22	Wed 11/2/22	55FS+3 days
57		1.2.1.3.15	Install treated pine roof frame and ceiling	15 days	Thu 11/3/22	Wed 11/23/22	56
58			Superstructure Completed	0 days	Wed 11/23/22	Wed 11/23/22	57
59		**1.2.1.4**	**Electrical, Mechanical, Plumbing**	**71 days**	**Mon 9/19/22**	**Mon 12/26/22**	
60		1.2.1.4.1	Rough-in plumbing	3 days	Mon 9/19/22	Wed 9/21/22	45SS
61		1.2.1.4.2	Set plumbing fixtures and trim	4 days	Thu 12/15/22	Tue 12/20/22	52,78,79,80
62		1.2.1.4.3	Connect Fixtures	2 days	Wed 12/21/22	Thu 12/22/22	61
63		1.2.1.4.4	Flush, test, and clean piping and fixtures	1 day	Fri 12/23/22	Fri 12/23/22	62,70
64		1.2.1.4.5	Rough-in electrical	3 days	Mon 9/19/22	Wed 9/21/22	45SS
65		1.2.1.4.6	Install electrical service panel	2 days	Thu 10/27/22	Fri 10/28/22	52
66		1.2.1.4.7	Install rough wire	5 days	Thu 11/3/22	Wed 11/9/22	65,52,57SS
67		1.2.1.4.8	Install electrical fixtures	1 day	Thu 12/15/22	Thu 12/15/22	66,52,80
68		1.2.1.4.9	Connect fixtures	1 day	Fri 12/23/22	Fri 12/23/22	67,62
69		1.2.1.4.10	Test and clean fixtures	1 day	Mon 12/26/22	Mon 12/26/22	68,81
70		1.2.1.4.11	Install septic tank and soakaway system	7 days	Thu 11/24/22	Fri 12/2/22	57
71		1.2.1.4.12	Install PVC gutter, downspout and splashpads	3 days	Thu 11/24/22	Mon 11/28/22	57
72		**1.2.1.5**	**Finishing Works**	**17 days**	**Thu 11/24/22**	**Fri 12/16/22**	
73		1.2.1.5.1	Render and plaster concrete surfaces	7 days	Thu 11/24/22	Fri 12/2/22	57
74		1.2.1.5.2	Place floor screed to floor slabs	2 days	Mon 12/5/22	Tue 12/6/22	73
75		1.2.1.5.3	Install windows	1 day	Wed 12/7/22	Wed 12/7/22	74
76		1.2.1.5.4	Install doors	1 day	Wed 12/7/22	Wed 12/7/22	74
77		1.2.1.5.5	Prime and paint concrete surfaces	3 days	Mon 12/5/22	Wed 12/7/22	73
78		1.2.1.5.6	Install floor tiles	4 days	Wed 12/7/22	Mon 12/12/22	74
79		1.2.1.5.7	Install wall tiles	1 day	Mon 12/5/22	Mon 12/5/22	73



Project: Green Estate Bungalow
Date: Sat 5/14/22

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Critical
Critical Split
Progress
Manual Progress



ID	Task Mode	WBS Code	Task Name	Duration	Start	Finish	Predecessors
80		1.2.1.5.8	Install kitchen, pantry and bathroom cabinets	2 days	Tue 12/13/22	Wed 12/14/22	78,79
81		1.2.1.5.9	Install appliances	1 day	Thu 12/15/22	Thu 12/15/22	80
82		1.2.1.5.10	Install railings	1 day	Fri 12/16/22	Fri 12/16/22	81
83			Finishes Completed	0 days	Fri 12/16/22	Fri 12/16/22	82
84		**1.2.2**	**Furnish**	**2 days**	**Mon 12/19/22**	**Tue 12/20/22**	
85		**1.2.2.1**	**Kitchen Furniture**	**2 days**	**Mon 12/19/22**	**Tue 12/20/22**	
86		1.2.2.1.1	Install kitchen furniture	2 days	Mon 12/19/22	Tue 12/20/22	72,19
87		**1.2.2.2**	**Living Room Furniture**	**2 days**	**Mon 12/19/22**	**Tue 12/20/22**	
88		1.2.2.2.1	Install living room furniture	2 days	Mon 12/19/22	Tue 12/20/22	72,19
89		**1.2.2.3**	**Bedroom Furniture**	**2 days**	**Mon 12/19/22**	**Tue 12/20/22**	
90		1.2.2.3.1	Install bedroom furniture	2 days	Mon 12/19/22	Tue 12/20/22	72,19
91		**1.2.2.4**	**Closets**	**2 days**	**Mon 12/19/22**	**Tue 12/20/22**	
92		1.2.2.4.1	Install closets	2 days	Mon 12/19/22	Tue 12/20/22	72,19
93			Furniture Installed	0 days	Tue 12/20/22	Tue 12/20/22	92
94		**1.3**	**Project Closure**	**12 days**	**Tue 12/27/22**	**Wed 1/11/23**	
95		**1.3.1**	**Snag List**	**9 days**	**Tue 12/27/22**	**Fri 1/6/23**	
96		1.3.1.1	Conduct walk-through inspection	1 day	Tue 12/27/22	Tue 12/27/22	84,59
97		1.3.1.2	Correct any snag list items	7 days	Wed 12/28/22	Thu 1/5/23	96
98		1.3.1.3	Conduct final inspection	1 day	Fri 1/6/23	Fri 1/6/23	97
99			Final Inspection Passed	0 days	Fri 1/6/23	Fri 1/6/23	98
100		**1.3.2**	**Occupancy Permit**	**11 days**	**Tue 12/27/22**	**Tue 1/10/23**	
101		1.3.2.1	Apply for occupancy permit	1 day	Tue 12/27/22	Tue 12/27/22	84,59
102		1.3.2.2	Receive occupancy permit	10 days	Wed 12/28/22	Tue 1/10/23	101
103			Occupancy Permit Received	0 days	Tue 1/10/23	Tue 1/10/23	102
104		**1.3.3**	**Handover**	**1 day**	**Wed 1/11/23**	**Wed 1/11/23**	
105		1.3.3.1	Conduct handover meeting	1 day	Wed 1/11/23	Wed 1/11/23	98,102
106			Handover Completed	0 days	Wed 1/11/23	Wed 1/11/23	105

Note: Own work.

4.3.5 Schedule Control

4.3.5.1 Schedule Change Control

Potential Causes of Schedule Slippages

The following list outlines factors that could lead to slippage in the project schedule:

- Project activities require more effort than planned
- Project staff require additional training or experience to meet the estimates
- Additional activities beyond those planned are required
- Specific technical skills were assumed in the plan that are not available
- Client decisions are not made in a timely manner
- The review and approval of deliverables takes longer than planned
- Project disbursements are delayed.

Identification of Schedule Problems

- Weekly (or other) review of activity status and estimates to complete work packages.
- Weekly (or other) review of unplanned requirements such as equipment, staff, or consulting resources.
- The adequacy of current resources, human and equipment, will be reviewed. A potential schedule slippage occurs when the need for additional resources is identified.
- Weekly (or other) review of Client activities and performance. The response of the Client will be monitored and reviewed, particularly for current activities. A potential slippage occurs when there are delays in responsiveness or Client decisions.
- Weekly (or other) review of risks and changes to risks. The status of risks will be reviewed as described in the Risk Management Plan. A potential slippage occurs when existing risks have become riskier or when new risks have been identified.
- Weekly (or other) review of changes to scope, approved or otherwise. The status of scope compliance will be reviewed as described in the Scope Management Plan. A potential slippage occurs when unapproved scope changes are being carried out.

Resolution of Schedule Problems

- Accept the slippage. The Client will accept the schedule slippage.

- Resolve the slippage. The schedule slippage will be resolved by adding resources, authorizing overtime, or engaging consultants. The effect of this approach will be to increase costs, so there may be a budget impact. As such, all necessary steps as outlined in the Change Control process must be adhered to.
- Reduce the scope. The Company Director will consult with the Client to determine if the scope can be reduced and, if so, what items of functionality can be eliminated or deferred.

4.3.6 Schedule Measurement & Reporting

The integrated Project Status Report will provide a monthly update of the project schedule. However, weekly meetings will be led by the Project Manager to review and update the project schedule. Monday morning sessions with the Site Management Team will be held to start the week's activities, keep on track, and provide necessary feedback for reporting. Site Management Team is responsible for keeping daily activity logs on site.

The Microsoft Project's Gantt Chart and scheduling features will be used to track and measure progress, including percentage complete and hours complete. As schedule conflicts or slippage arises, techniques such as crashing, or fast-tracking will be evaluated to get back on schedule.

Schedule variance analysis will be conducted in conjunction with the EVA methodologies indicated in the Cost Management Plan.

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.4. Cost Management Plan

4.4.1 Purpose of the Cost Management Plan

The Cost Management Plan provides the cost framework for the Green Estate Bungalow. It has the following purposes:

- To detail the cost of the project.
- To identify factors that will tend to adjust the cost.
- To describe procedures that will be used to identify cost changes.
- To describe the project cost change mechanisms and responsibilities.
- To describe the reporting requirements and tools for cost performance measurement, such as metrics, cost variance considerations etc.

4.4.2 Cost Management Approach

The Cost Management Plan approach for the Green Estate Bungalow project requires that the project resources assist in establishing and managing the total cost of ownership of the project. This includes establishing the estimated project budget and measuring actual spending against the planned budget for the following items:

- The Energy Optimizer (T.E.O.) Company Ltd project team and all of their associated costs
- Subcontractors and all of their associated costs
- Materials and equipment
- Utilities
- Furnitures and appliances

All costs will be managed at the third level of the WBS. Actual costs and cost variances will be reported regularly to the Company Director. The Project Manager and required team members will establish the resource and staffing requirements for the project. Using a ‘bottom-up’ approach, company historical information and current market rates, the Project Manager will estimate the project costs and establish the project cost baseline. The basis for the estimate will be documented to allow for seamless adjustment of the cost estimate as better information becomes available.

The Project Manager will review and compare the totaled budget with the allotted project budget. Once verified, the Company Director will review and approve the project budget which will then be baselined. The project budget baseline (or cost baseline) may only be changed with authorization by the Client.

4.4.3 Roles and Responsibilities

The Company Director will work with the Client to define the various roles and expectations for the resources involved in managing the overall project cost. Role definition pertains to the ownership for review and approval of all project expenses, project cost establishment, review of budget tracking system details, and daily cost management. Best practices in project management will help to ensure that the project is delivered on time and within budget.

Ultimately, the Client has the authority to make changes to the project to bring it back within budget. The Company Director, Project Manager, Client and Project Team will all play key roles in managing the cost of the project. As such, the roles and responsibilities for the cost management are outlined in Chart 16.

Chart 16

Cost Management Roles and Responsibilities

Role	Description
Client	Provides sponsorship for the project. Has budget ownership for the project. Identifies, approves and/or denies cost change requests.
Company Director	Approves the project cost baseline. Sets expectations for cost management. Monitors the project cost performance at a higher level. Authorized to adjust project cost baseline based on Client authorization. Responsible for accounting for cost deviations and presentation of such changes to Client with options for resolving shortages and overages.

Project Manager	Provides daily cost management to the approved baseline. Responsible for preparing the cost management plan, monitoring and tracking project costs, preparing the cost status reports, ensuring cost transactions are adequately documented. Identifies, defines, evaluates, verifies, executes and communicates cost change requests.
Team Member	Working project team member. Participates in the day-to-day accounting, reporting and administrative duties pertaining to project cost tracking, monitoring and control. Responsible to the Project Manager.

Note: Own work.

4.4.4 Project Budget

4.4.4.1 Project Cost Baseline

Project Cost Estimate

Chart 17 details the monetary resources required for the execution of the Green Estate Bungalow project.

Chart 17

Project Cost Estimate

1.0 GREEN ESTATE BUNGALOW						
WBS Code	**Control Account**	**Description**	**Qty**	**Unit**	**Rate**	**Total**
1.1	**110000**	**Project Management**	**1**	**LS**	**$3,200.00**	**$3,200.00**
					TOTAL PROJECT MANAGEMENT	**$3,200.00**
1.2	**120000**	**Bungalow House Construction**				
1.2.1	**120001**	**Build**				
1.2.1.1		**Preliminaries**				
1.2.1.1.1		**Site Clearance**				

		Allow for site clearance and preparation. Spoils and debris should be removed from site after completion of task	1	LS	$300.00	$300.00
1.2.1.1.2		**Setting Out of Works**				
		Setting out of Works inclusive of profile board maintained in good condition through the project duration	1	LS	$600.00	$600.00
1.2.1.1.3		**Temporary Services**				
		Allow for the provision of services throughout the project duration, including water and electrical supply	1	LS	$850.00	$850.00
1.2.1.1.4		**Transportation**				
		Allow for transportation of materials to project site for the project duration	1	LS	$1,500.00	$1,500.00
1.2.1.1.5		**Site Office/Storage Room**				
		Allow for the erection of temporary site office and storage shed, including adequate restroom facility.	1	LS	$4,500.00	$4,500.00
1.2.1.1.6		**Security**				
		Allow for the provision of site security during the project duration	1	LS	$2,000.00	$2,000.00
1.2.1.1.7		**Demobilisation**				
		Allow for demobilization on the completion of works, including the removal of all temporary structures and works, cleaning of building and site.	1	LS	$1,500.00	$1,500.00
1.2.1.1.8		**Quality Assurance**				
		Allow for the crushing of in-situ concrete samples and concrete block samples	1	LS	$700.00	$700.00
					SUBTOTAL PRELIMINARIES	**$11,950.00**
1.2.1.2		**Substructure**				
1.2.1.2.1		**Strip Footing Foundation**				
		Provide and place reinforced concrete strip footing foundation as per approved design				

		Materials				
		1/2" diameter bars (Gr60)	45	LENGTHS	$38.00	$1,710.00
		3/8" diameter bars (Gr60)	55	LENGTHS	$21.00	$1,155.00
		black tying wire	25	LBS	$2.50	$62.50
		concrete mix (3,500 psi - 1:2:4 mix properly vibrated with poker vibrator)	40	CY	$175.00	$7,000.00
		rental of concrete pump	1	LS	$400.00	$400.00
		Labor				$0.00
		Cutting and fabrication of steel bars	3000	LBS	$0.30	$900.00
		Placement of concrete (3,500 psi)	40	CY	$30.00	$1,200.00
		Removal of 6" topsoil, excavation to 15", backfilling and compaction	42	CY	$30.00	$1,260.00
1.2.1.2.2		**Cobwall**				
		Provide and place 6" thick hollow core concrete blocks reinforced with #3 bars and core filled as per approved design				
		Materials				
		6" thk hollow concrete blocks	1600	NR	$1.74	$2,784.00
		cement	35	SACKS	$16.50	$577.50
		washed sand and gravel with 3/8" diameter minimum aggregates	7	CY	$40.00	$280.00
		building sand	1	LOADS	$350.00	$350.00
		rental of cement mixer	1	LS	$250.00	$250.00
		Labor				
		Installation of concrete blocks in flemish bond inclusive of cavity fill	1600	NR	$1.05	$1,680.00
					SUBTOTAL SUBSTRUCTURE	**$19,609.00**
1.2.1.3		**Superstructure**				
1.2.1.3.1		**Ground Floor Slab, Steps and Verandah**				
		Provide and place reinforced concrete floor slab, steps and verandah as per approved design				

		Materials				
		3/8" diameter bars	129	LENGTHS	$21.00	$2,709.00
		Formwork 1" x 8 "x 14' 15pcs	180	BF	$3.00	$540.00
		Black tying wire	20	LBS	$2.50	$50.00
		Formwork 1" x 12" x 12’ 4 pcs	48	BF	$3.00	$144.00
		Formwork 1" x 4" x 12’ 15 pcs	60	BF	$3.00	$180.00
		Galvanize nails 3"	10	LBS	$4.00	$40.00
		Bush sticks	50	NR	$3.00	$150.00
		Concrete mix (3,500 psi)	41	CY	$175.00	$7,175.00
		1/2" diameter bars	4	LENGTHS	$37.00	$148.00
		Rental of concrete pump and pumping of concrete	1	LS	$400.00	$400.00
		Spacers	1	LS	$100.00	$100.00
		Backfill (selected sand fill to be compacted in 4 to 6" layers)	9	LOADS	$160.00	$1,440.00
		Polythene sheeting .004mm thick (one layer with 12" laps along all edges)	1	LS	$100.00	$100.00
		Labor				
		Placement of ground floor slab, verandah and steps (allow for stripping of forms)	41	SY	$20.00	$820.00
		Compaction of backfill in 4" to 6" layers	135	CY	$6.00	$810.00
		Cutting and fabrication of steel bars	1500	LBS	$0.60	$900.00
		Installation of polythene sheeting	160	YDS	$0.35	$56.00
		Placement of 3,500psi concrete	41	CY	$30.00	$1,230.00
					SUBTOTAL GF SLAB, STEPS & VERANDAH	**$16,992.00**
1.2.1.3.2		**External Walls**				
		Provide and place 6" thick hollow core concrete blocks reinforced with #3 bars and core filled as per approved design				
		Materials				
		6" thk hollow concrete blocks	2000	NR	$1.74	$3,480.00
		cement	55	SACKS	$16.50	$907.50
		3/8" diameter bars	25	LENGTHS	$21.00	$525.00

		washed sand and gravel with 3/8" diameter minimum aggregates	7	CY	$40.00	$280.00
		Labor				
		Installation of concrete blocks in flemish bond inclusive of cavity fill	2000	NR	$1.10	$2,200.00
					SUBTOTAL EXTERNAL WALLS	**$7,392.50**
1.2.1.3.3		**Internal Walls**				
		Provide and place 6" thick hollow core concrete blocks reinforced with #3 bars and core filled as per approved design				
		Materials				
		6" thk hollow concrete blocks	1400	NR	$1.74	$2,436.00
		cement	35	SACKS	$16.50	$577.50
		3/8" diameter bars	13	LENGTHS	$21.00	$273.00
		washed sand and gravel with 3/8" diameter minimum aggregates	6	CY	$40.00	$240.00
		Labor				
		Installation of concrete blocks in flemish bond inclusive of cavity fill	1400	NR	$1.10	$1,540.00
					SUBTOTAL INTERNAL WALLS	**$5,066.50**
1.2.1.3.4		**Lintels**				
		Provide and place reinforced concrete lintels as per approved design				
		Materials				
		Formwork 1" x 8 " x 10’ 10 pcs	67	BF	$3.00	$201.00
		Formwork 1" x 12" x 12’ 10 pcs	120	BF	$3.00	$360.00
		Galvanize nails 2"	5	LBS	$4.00	$20.00
		Black tying wire	5	LBS	$2.50	$12.50
		Wash sand & gravel 3/8" diameter minimum aggregates	4	CY	$40.00	$160.00
		Cement	14	SACKS	$16.50	$231.00
		3/8"diameter bars nr 60 grade	8	LENGTHS	$21.00	$168.00

		1/2" diameter bars	10	LENGTHS	$37.00	$370.00
		Cement nails	6	LBS	$3.90	$23.40
		Bush sticks	10	NR	$3.00	$30.00
		Labor				
		Installation of formwork, fabrication and installation of steel bars, placement and compaction of concrete	24	NR	$60.00	$1,440.00
					SUBTOTAL LINTELS	**$3,015.90**
1.2.1.3.5		**Belt Beam**				
		Provide and place reinforced concrete belt beam as per approved design				
		Materials				
		Formwork 1" x 6 " x 12' 35 pcs	210	BF	$2.10	$441.00
		Formwork 1" x 12" x 12' 35 pcs	600	BF	$2.10	$1,260.00
		Galvanize nails 3"	5	LBS	$4.00	$20.00
		Black tying wire	8	LBS	$2.50	$20.00
		Wash sand & gravel 3/8" diameter minimum	12	CY	$40.00	$480.00
		Cement	40	SACKS	$16.50	$660.00
		3/8"diameter bars nr 60 grade	30	LENGTHS	$21.00	$630.00
		1/2" diameter bars nr 60 grade	30	LENGTHS	$37.00	$1,110.00
		Cement nails	5	LBS	$3.90	$19.50
		Bush sticks	100	NR	$3.00	$300.00
		2" x12" x 1/4" heel straps with 3/8" dia.6" bolts, nuts, washers	50	NR	$7.00	$350.00
		Labor				
		Fabricating and installation of belt beam forms (allow for stripping of forms)	30	SY	$30.00	$900.00
		Cutting and fabrication of steel bars	800	LBS	$0.60	$480.00
		Placement of concrete (3,500 psi)	12	CY	$110.00	$1,320.00
					SUBTOTAL BELT BEAM	**$7,990.50**
1.2.1.3.6		**Roof System**				
		Provide and place timber framed roofing system as per approved design.				

		Materials				
		Procure all roofing materials including 2"x6" rafters, 2"x3" purlins, 1"x8" ridging, 1"x108" fascia board, 26 galvalum roof sheathing, 26-gauge ridging bade trim sheathing, 1"x8" ridging, 26-gauge 4" badge trim, interior and exterior foam enclosure, tacky tape, metal screws, 4 Nr (2'0" x3'0" vinyl vents), heel straps and all other associated materials	2300	SF	$7.00	$16,100.00
		Labor				
		Installation of roof system and soffit as per approved design	2300	SF	$4.00	$9,200.00
					SUBTOTAL ROOF SYSTEM	**$25,300.00**
1.2.1.3.7		**Ceiling**				
		Provide and place sheetrock ceiling as per approved design				
		Materials				
		1" X 4'‘X 12' treated pine pcs 50 pcs	450	BF	$2.10	$945.00
		Sheet rock	50	SHEETS	$25.00	$1,250.00
		Sheet rock screws	2	BOXES	$30.00	$60.00
		Compound - 5 gallon	3	BUCKETS	$55.00	$165.00
		Tape fiber glass	6	ROLLS	$16.56	$99.36
		Assorted nails	10	LBS	$4.00	$40.00
		1" x 6" hardwood tong and groove ceiling board	300	BF	$4.00	$1,200.00
		Labor				
		Installation of sheet rock to ceiling as per approved design	1980	SF	$2.00	$3,960.00
					SUBTOTAL CEILING	**$7,719.36**
					SUBTOTAL SUPERSTRUCTURE	**$73,476.76**
1.2.1.4		**Electrical, Mechanical and Plumbing**				
1.2.1.4.1		**Plumbing**				
		Allow for the provision and placement of all required plumbing fixtures and fittings from building to septic tank				

		system as per the approved design				
		Materials				
		Water Closet S-Trap	2	NR	$350.00	$700.00
		Wash hand basins	3	NR	$200.00	$600.00
		Double kitchen sink with drain board	1	NR	$400.00	$400.00
		Shower stall and bathtub and accessories	2	NR	$1,000.00	$2,000.00
		Pipes, fittings and hot water tankless heaters(2nr)	1	LS	$3,500.00	$3,500.00
		Labor				
		Installation of fixtures, piping, vents, and all associated works	1	LS	$4,500.00	$4,500.00
					SUBTOTAL PLUMBING	**$11,700.00**
1.2.1.4.2		**Electrical**				
		Allow for the provision and installation of all electrical fixtures as per approved electrical design. Including conduit, wiring, junction box etc. All wiring shall confirm with N.E.C. codes. Main electrical supply system to include breaker panel complete with breakers, lights, switches, outlets, exterior lighting, electrical lines and service entrance.	1	LS	$9,000.00	$9,000.00
					SUBTOTAL ELECTRICAL	**$9,000.00**
1.2.1.4.3		**Guttering**				
		Materials				
		Provision of all materials for PVC Colonial Type guttering including down pipes and splashpad as per approved design	1	LS	$1,250.00	$1,250.00
		Labor				
		Installation of guttering, downpipes and splash pads	1	LS	$800.00	$800.00
					SUBTOTAL GUTTERING	**$2,050.00**
1.2.1.4.4		**Septic Tank & Soakaway**				

		Provision and placement of septic tank and soakaway completed as per approved design	1	LS	$4,000.00	$4,000.00
					SUBTOTAL SEPTIC TANK & SOAKAWAY	**$4,000.00**
					SUBTOTAL ELECTRICAL, MECHANICAL, PLUMBING	**$26,750.00**
1.2.1.5		**Finishing Works**				
1.2.1.5.1		**Rendering and plastering**				
		Allow for the rendering and plastering of all concrete surfaces including beams, doors and windows edges, and wall surfaces. With 1/2" thk 1:5 cement and sand mortar mix				
		Materials				
		Building Sand	35	CY	$40.00	$1,400.00
		Cement	95	SACKS	$16.50	$1,567.50
		Labor				
		Preparation and plastering of all concrete surfaces	1000	SY	$5.00	$5,000.00
					SUBTOTAL RENDERING & PLASTERING	**$7,967.50**
1.2.1.5.2		**Floor Screed (Slab, steps and verandah)**				
		Allow for preparation and placement of floor screed for ground floor slab, steps and verandah with 1/2" thk 1:4 cement and sand mortar mix				
		Materials				
		Building Sand	6	CY	$50.00	$300.00
		Cement	20	SACKS	$19.00	$380.00
		Labor				
		Preparation and screeding of all concrete surfaces (slab, verandah and steps)	180	SY	$6.00	$1,080.00
					SUBTOTAL FLOOR SCREED	**$1,760.00**
1.2.1.5.3		**Windows**				
		Allow for the provision and placement of all windows as per window schedule in the approved drawings				
		Materials				

		Window with specifications as per W1 on window schedule	1	NR	$750.00	$750.00
		Window with specifications as per W2 on window schedule	4	NR	$500.00	$2,000.00
		Window with specifications as per W3 on window schedule	1	NR	$350.00	$350.00
		Window with specifications as per W4 on window schedule	3	NR	$275.00	$825.00
		Window with specifications as per W5 on window schedule	2	NR	$150.00	$300.00
		Screws and shields	1	LS	$30.00	$30.00
		Sealant	16	TUBES	$7.50	$120.00
		Labor				
		Window installation and perimeter sealing	12	NR	$70.00	$840.00
					SUBTOTAL WINDOWS	**$5,215.00**
1.2.1.5.4		**Doors**				
		Allow for the provision and placement of all internal and external doors as per door schedule in the approved drawings. including all hardware, trimmings and associated works.				
		Materials				
		Door with specifications as per D1 on door schedule	3	NR	$650.00	$1,950.00
		Door with specifications as per D2 on door schedule	4	NR	$300.00	$1,200.00
		Door with specifications as per D3 on door schedule	1	NR	$300.00	$300.00
		Door with specifications as per D4 on door schedule and motorized shutter	1	NR	$7,000.00	$7,000.00
		Door with specifications as per D5 on door schedule	1	NR	$150.00	$150.00
		Door with specifications as per D6 on door schedule	1	NR	$1,400.00	$1,400.00
		3 1/2" x 3 1/2"brass hinges	33	NR	$6.00	$198.00
		Screws 1 1/2"	100	NR	$1.00	$100.00
		Door frames	12	NR	$150.00	$1,800.00
		Rubber	1	LS	$75.00	$75.00
		Door mouldings	1	LS	$650.00	$650.00
		3/8" x 4' bolts with shield	66	NR	$2.50	$165.00
		Door filler	1	LS	$80.00	$80.00

		Deadbolt lock with keys and knob	3	NR	$150.00	$450.00
		Internal doors knob type with keys	5	NR	$75.00	$375.00
		Labor				
		Installation of external and internal doors	12	NR	$125.00	$1,500.00
		Installation of garage door and motor system	1	LS	$800.00	$800.00
					SUBTOTAL DOORS	**$18,193.00**
1.2.1.5.5		**Painting**				
		Provide for preparation, priming and painting of all internal and external concrete and timber surfaces as per the approved design				
		Materials				
		Acrylic exterior emulsion paint	4	BUCKETS	$350.00	$1,400.00
		Egg shell	7	BUCKETS	$250.00	$1,750.00
		Varnish	2	GAL	$75.00	$150.00
		Oil paint	4	GAL	$65.00	$260.00
		Assorted Sandpaper	1	LS	$25.00	$25.00
		Sanding sealer	1	LS	$50.00	$50.00
		Labor				
		Application of paint and associated works	1	ls	$2,000.00	$2,000.00
					SUBTOTAL PAINTING	**$5,635.00**
1.2.1.5.6		**Rails and Decking**				
		Provide and place hardwood decking and concrete baluster rails for verandah and steps				
		Materials				
		Concrete balusters	1	LS	$800.00	$800.00
		hardwood decking	1	LS	$1,450.00	$1,450.00
		Labor				
		Installation of verandah, railings and decking	1	LS	$1,250.00	$1,250.00
					SUBTOTAL RAILS & DECKING	**$3,500.00**
1.2.1.5.7		**Floor Tiles**				
		Allow for the placement of all floor tiles				

		Materials				
		12" X 12" ceramic tiles	2500	NR	$3.00	$7,500.00
		Thin set	60	BAGS	$16.00	$960.00
		Grout (sanded)	20	BAGS	$40.00	$800.00
		Labor				
		Installation of tiles complete with all associated works	2500	NR	$1.50	$3,750.00
					SUBTOTAL FLOOR TILES	**$13,010.00**
1.2.1.5.8		**Wall Tiles**				
		Allow for the placement of all wall tiles				
		Materials				
		8" x 12" wall tiles	890	NR	$1.60	$1,424.00
		Thin set	12	BAGS	$16.00	$192.00
		Grout (unsanded)	7	BAGS	$40.00	$280.00
		Labor				
		Installation of tiles complete with all associated works	890	NR	$2.00	$1,780.00
					SUBTOTAL WALL TILES	**$3,676.00**
1.2.1.5.9		**Carpentry**				
		Allow for the provision and placement of mahogany cabinets, closets and bathroom vanities with granite countertop as per approved design	1	LS	$18,000.00	$18,000.00
					SUBTOTAL CARPENTRY	**$18,000.00**
					SUBTOTAL FINISHES	**$76,956.50**
1.2.2	**120002**	**Furnish**				
		Provision and placement of all indoor and outdoor furnishing approved by client	1	LS	$10,000.00	$10,000.00
					SUBTOTAL FURNITURE	**$10,000.00**
					TOTAL CONSTRUCTION	**$218,742.26**
1.3	**130000**	**Project Closure**	**1**	**LS**	**$200.00**	**$200.00**
					TOTAL PROJECT CLOSURE	**$200.00**
					SUMMARY OF COSTS	
					TOTAL PROJECT MANAGEMENT	**$3,200.00**
					TOTAL BUNGALOW HOUSE CONSTRUCTION	**$218,742.26**

TOTAL PROJECT CLOSURE	**$200.00**
GRAND TOTAL	**$222,142.26**

Contingency Reserves

Based on historical company data and industry standards, contingency reserves usually range between 5-10% for construction projects. Given the current challenges due to the Covid-19 pandemic and its impact on the construction activity, The Energy Optimizer (T.E.O.) Company Ltd reserves 8% of the total project cost as a Contingency Reserve.

4.4.4.2 Management Reserves

Based on the available funding, an estimated 4.5% is earmarked for management reserves.

4.4.4.3 Project Budget

Chart 18

Project Budget

Green Estate Bungalow Project Budget		
Cost Baseline	**Project Cost Estimate**	**$222,142.26**
	Contingency Reserve (8%)	**$17,771.38**
Management Reserve (4.5%)		**$9,996.40**
	Total Budget:	**$249,910.04**

Note: Own work.

4.4.4.4 Funding Requirements

The Client will issue disbursements as scheduled in Chart 19 due to the agreement and conditions of her mortgage. The Heritage Bank lending institution requires a phased disbursement based on the progress of works completed on the project.

Chart 19

Green Estate Bungalow Disbursement Matrix

				Disbursement Matrix		
WBS Code	**Control Account**	**Description**	**Budget**	**Disbursement 1**	**Disbursement 2**	**Disbursement 3**
1.1	**110000**	**Project Management**	**$ 3,200.00**	$ 3,200.00		
1.2.1	**120001**	**Build**	**$208,742.46**	$ 31,559.00	$ 128,313.71	$ 53,869.55
1.2.2	**120002**	**Furnish**	**$ 10,000.00**		$ 5,000.00	$ 5,000.00
1.3	**130000**	**Project Closure**	**$ 200.00**			$ 200.00
			Total	**$ 34,759.00**	**$ 133,313.71**	**$ 59,069.55**
				*Eligible upon signature of contract for mobilization	*Eligible upon completion of full mobilization and substructure erection	*Eligible upon completion of superstructure, 30% electrical, mechanical and plumbing works, 30% finishing works and pre-order of selected furniture

Note: Own work.

Based on these funding requirements and project schedule, Chart 30 establishes a time-phased baseline budget for the completion of the project.

Chart 20

Projected Monthly Expenditures

			Projected Expenditures					
WBS Code	**Control Account**	**Description**	**Aug '22**	**Sep '22**	**Oct '22**	**Nov '22**	**Dec '22**	**Jan '23**
1.1	**110000**	**Project Management**	$3,200.00					
1.2.1	**120001**	**Build**	$26,280.00	$52,832.06	$61,242.28	$44,530.63	$21,462.30	$2,395.00
1.2.2	**120002**	**Furnish**		$5,000.00		$5,000.00		
1.3	**130000**	**Project Closure**						$200.00
		Total	**$29,480.00**	**$57,832.06**	**$61,242.28**	**$49,530.63**	**$21,462.30**	**$2,595.00**

Note: Own work.

4.4.5 Cost Control

The key to effective cost control lies within the management of the approved cost baseline. As such, the Project Manager will ensure the following:

- That there is timely management of all change requests
- That cost expenditures do not exceed the approved funding
- That cost performance monitoring is continuously performed to isolate and understand cost variances from the approved cost baseline
- That work performance monitoring against expenditures is continuously performed
- That unapproved changes are not included in reported cost or resource usage
- That all approved changes and associated costs are communicated in a timely manner
- That expected cost overruns are managed within the acceptable limits.

4.4.5.1 Cost Performance Measurement

Project costs for the Green Estate Bungalow Project will be measured at two levels:

- Overall – this constitutes the overall total cost of ownership to track and budget spending of all project costs.
- Detailed – this constitutes the measurement and control of costs at the detailed work level

The Earned Value Management (EVM) approach will be used to measure and control the project costs. The following earned value measurements will be reviewed:

- Schedule Variance
- Cost Variance
- Schedule Performance Index
- Cost Performance Index
- To Complete Cost Performance Index
- Estimated Actual Cost at Completion

An Earned Value Analysis Management tool will be used to automate these measurement calculations as shown in Figure 12 and 13.

Figure 12

EVA Management Tool Excel Sheet 1

Project Earned Value Analysis
Green Estate Bungalow House

	1.2	2	5	7	12	17	19	22	23	24
Budget at Completion (BAC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Earned Value (EV)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual Cost (AC)	$ 12,210.00	$ 24,420.00	$ 48,840.00	$ 73,260.00	$ 122,100.00	$ 170,940.00	$ 195,360.00	$ 219,780.00	$ 231,990.00	$ 244,200.00
Planned Value (PV)	$ 12,500.00	$ 25,000.00	$ 50,000.00	$ 75,000.00	$ 125,000.00	$ 175,000.00	$ 200,000.00	$ 225,000.00	$ 237,500.00	$ 250,000.00
Cost Variance (CV)	$ (12,210.00)	$ (24,420.00)	$ (48,840.00)	$ (73,260.00)	$(122,100.00)	$(170,940.00)	$(195,360.00)	$(219,780.00)	$(231,990.00)	$(244,200.00)
Schedule Variance (SV)	$ (12,500.00)	$ (25,000.00)	$ (50,000.00)	$ (75,000.00)	$(125,000.00)	$(175,000.00)	$(200,000.00)	$(225,000.00)	$(237,500.00)	$(250,000.00)
Cost Performance Index (CPI)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Schedule Performance Index (SPI)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate to Completion (ETC)										
Estimate at Completion (EAC)										
Variance at Completion (VAC)										
Status based on Average Performance Index	BLACK		BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
Comments					New baseline set					

Note: Own work.

Figure 13

EVA Management Tool Excel Sheet 2

Project Earned Value Analysis

Project Earned Value Analysis measures the health of a project by looking at cost information and schedule information concurrently. It tells you whether the project is on schedule and on budget, as well as whether the project is on budget for the amount of work done so far.

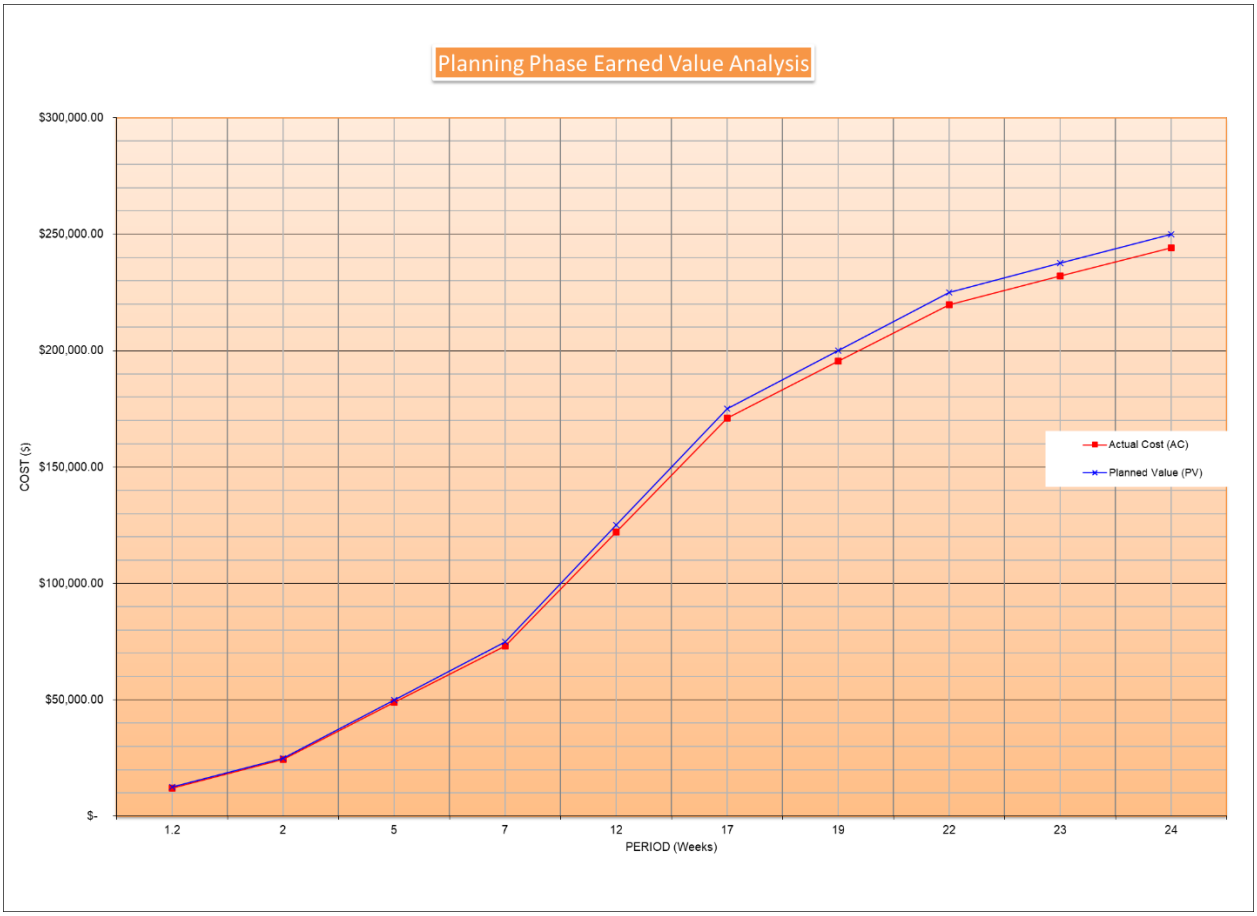
Metric	Abbrev.	Description	Formula/Value
Budget at Completion	BAC	Baseline cost for 100% of project.	N/A
Actual Cost	AC	Total costs actually incurred so far.	N/A
Earned Value	EV	Amount of budget earned so far based on physical work accomplished, without reference to actual costs.	N/A
Planned Value	PV	The budget for the physical work scheduled to be completed by the end of the time period.	N/A
Cost Variance	CV	Measure of cost overrun. The difference between the budget for the work actually done so far and the actual costs so far.	Earned Value–Actual Cost EV–AC
Cost Performance Index	CPI	Cost efficiency ratio. A CPI of 1.00 means that the costs so far are exactly the same as the budget for work actually done so far.	Earned Value/ Actual Cost EV/AC
Schedule Variance	SV	Measure of schedule slippage. The difference between the budget for the work actually done so far and the budgeted cost of work scheduled.	Earned Value–Planned Value EV–PV
Schedule Performance Index	SPI	The schedule efficiency ratio. An SPI of 1.0 means that the project is exactly on schedule.	Earned Value/Planned Value EV/PV
Estimate to Completion	ETC	The expected additional cost to complete.	Estimate at Completion–Actual Cost EAC–AC
Estimate at Completion	EAC	Expected total cost based on the current cost efficiency ratio.	Budget at Completion/Cost Performance Index BAC/CPI
Variance at Completion	VAC	Estimated cost overrun at the end of project.	Budget at Completion–Estimate at Completion BAC–EAC
Status		Average of CPI & SPI.	(Cost Performance Index+Schedule Performance Index)/2 (CPI+SPI)/2
		GREEN = On track	>1.0
		YELLOW = Slightly behind schedule or budget	>0.85
		RED = Needs immediate attention	>0.65
		BLACK = Killed or Restore	<0.65

Note: Own work.

Trend analysis will be performed and graphically represented using S-curve as shown in Figure 14.

Figure 14

S-Curve Sample



Note: Own work.

4.4.5.2 Cost Variance Response Process

Cost management measures will be reported in the monthly Green Estate Bungalow Status Report. All cost variances outside of the thresholds identified in this Cost Management Plan will be identified, along with any planned corrective actions. Change requests triggered by project cost overruns will be identified and tracked in the monthly status report.

<u>Control Thresholds Established for the Green Estate Bungalow Project:</u>

If the project reaches one of the control thresholds of CPI, SPI or TCPI between 0.9 and 1.0, or if the SPI, CPI or TCPI has a variance of +/- 0.1 since the prior reporting period, the Company Director must report to the Client the reason for the exception.

If the project reaches ones of the control thresholds of CPI, SPI or TCPI less than 0.8 or greater than 1.2, or if the SPI, CPI or TCPI has a variance of greater than 0.2, the Company Director will report the reason for the exception and provide executive management with a Cost Variance Corrective Action Plan to bring the projects performance back to acceptable levels.

Cost Variance Corrective Action Plan:

The Company Director will present the Client with options for corrective actions within five business days from when the cost variance is first reported. Within three business days from when the Client selects a corrective action option, the Company Director will present the Client with a formal Cost Variance Corrective Action Plan.

The Cost Variance Corrective Action Plan will detail the actions necessary to bring the project back within budget and the means by which the effectiveness of the actions in the plan will be measured. If the corrective actions to be taken results in a change, the project's overall Change Control Process must be followed as well. Upon acceptance, the Cost Variance Corrective Action Plan will become a part of the Project Schedule and the project will be updated to reflect the corrective actions.

4.4.5.3 Cost Change Control Process

Any adjustments to the baselined budget can only occur through the integrated Change Control Process.

Cost Change Factors

The following are the factors in this project that could lead to changes of cost:

- Client-requested changes after contract agreement.
- Inflation in the cost of materials locally and/or globally.
- Any approved scope change that has an associated cost variance.

- Any workmanship errors.

Cost Change Procedures

1. When the Client or Contractor identifies a change, typically through a cost variance analysis or corrective action report, the Project Manager will assess the change.
2. A Change Request Form will be completed and submitted, along with required supporting documentation, to the Company Director.
3. The change request will be reviewed by the Company Director, then reviewed with the Project Manager and the Client.
4. Using the Change Request Form, the Project Manager will mark the change as:
    a. Approved – in which case the approvers will sign off on the change request and adjust other project planning factors as necessary.
    b. Approved, pending additional supporting documentation – in which case the approvers will mark the change as approved/pending in the change control system and sign off on the change request. The Project Manager will specify, and coordinate gathering of the required documentation, incorporate the change and adjust other project planning factors as necessary.
    c. Denied – in which case the Company Director will mark the changes as denied in the change control and the approvers will sign off on the change request. The Project Manager will notify the requestor of the status and reason for denial.
5. All relevant project documents will be updated as necessary, if impacted. If there is a change to the total cost of ownership of the project, or in how the estimated costs will be incurred over the remaining life of the project, a new project budge baseline, and time-phased budget baseline should be set and approved by the Client.

If the Client disagrees that the request change of cost and states that it is desirable, the Company Director and Project Manager will review the Contract Agreement with the Client in an attempt to reach agreement. If there is no agreement, the contract clauses pertaining to contract resolution will be applied.

4.4.6 Cost Reporting

The integrated Project Status Report will provide a monthly update of the project finances. Bi-weekly meetings will be led by the Project Manager to update and review current expenditures and forecasts with the Company Director.

Acceptance

Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.5. Quality Management Plan

4.5.1 Purpose of the Quality Management Plan

The Quality Management Plan documents the necessary information required to effectively manage the project quality from planning to delivery. It has the following purposes:

- To define the quality policies, procedures, acceptable standards, and criteria for the project.
- To identify the roles and responsibilities for quality management activities.
- To define the quality baseline and quality assurance and control activities.
- To describe reporting requirements and tools for schedule monitoring, management, and performance.

4.5.2 Quality Policy

The Energy Optimizer (T.E.O.) Company Ltd bases its quality management on the fundamental concept that quality control is a team obligation. As such, the Project Team will plan properly to provide quality products and services to complete the Green Estate Bungalow project. To achieve its objectives, the project will define its quality standards, measure its quality, and work to continuously improve. Specific processes and metrics will be established to assess the project's quality.

The Project Team will have clearly defined roles and responsibilities as it pertains to quality control and assurance activities. Construction activities will adhere to the design standards and regulations set forth in the approved building plans, as certified by the Central Building Authority and Public Utilities Commission. The Project Team, Subcontractors and Suppliers will be expected to provide quality work for every work performed for the project. Appropriate tools will be employed by the Project Team to facilitate the planning, reviewing, checking, inspecting, and measuring of project quality.

The Project Team will adopt an attitude of prevention over inspection as the first line of action to ensure compliance with this Quality Management Plan.

4.5.3 Roles and Responsibilities

The Project Team, including Subcontractors and Suppliers will have the responsibility and required level of authority to contribute to the achievement of the project's quality objectives. All contributors share the responsibilities that include:

- Initiating action to prevent the occurrence of non-conforming work
- Identifying, evaluating, and documenting quality problems
- Recommending or initiating quality improvement solutions
- Stopping the work when non-conforming work is identified, until deficiency is corrected

Chart 21 further defines the quality management roles and responsibilities of key members of the Project Team and such relevant stakeholders.

Chart 21

Quality Management Roles and Responsibilities

Role	Quality Responsibility
Client	Provides executive team approval and sponsorship for the project. Responsible for approving all quality standards for the project. Participates in quality inspections. Assists in resolution of escalated quality issues. Accepts final deliverables.
Company Director	Provides executive team approval for the project. Participates in quality inspections. Provides final decision on the resolution of escalated quality issues. Monitors and reviews project quality performance for conformance to the quality management plan. Provides resources for any training that becomes necessary to ensure compliance to quality standards.
Project Manager	Provides overall management to the project. Responsible for the overall management and implementation of the quality management plan including: • Ensuring team compliance with the quality management processes • Securing resources for the performance of quality management • Conducting quality management reviews as required • Providing oversight to corrective actions arising from quality issues • Approving payments based on accepted quality work performance • Maintaining and updating the quality documents for the project • Providing resolution of escalated quality issues, or escalate further as needed

Team Member	Working project team member. Participate in the compliance and execution of quality activities that include: Project Engineer • Provides leadership of the quality management activities including inspections and testing • Manages quality reviews and oversees execution of corrective actions • Identifies and assesses quality change requests and escalate as needed • Oversees quality testing and inspection Site Foreman • Performs quality activities in compliance with quality management plan • Performs corrective actions • Participates in quality reviews Administrative Assistant • Assists Project Manager and Project Engineer in organizing and maintaining records and documents of quality activities Accountant • Performs payments as approved by Project Manager • Assists in the maintenance of records
Work Crews, Subcontractors	Working project team member. Provides quality workmanship and complies with quality management plan. Identifies and escalates quality issues encountered or foreseen on site. Testing Technician shall prepare and perform tests as required and provide results in a timely manner.
Suppliers	Provides quality materials.
Central Building Authority & Public Utilities Commission Inspectors	Conducts routine inspections for compliance to the approved building and electrical designs. Has the authority to stop works that are in non-conformance.

Note: Own work.

4.5.4 Quality Metrics and Baseline

Chart 22 and 23 presents the project's quality baseline and definition of quality metrics. These metrics will allow the Project Manager to effectively measure and assess the progress, efficiency, and performance of the Green Estate Bungalow project. Based on the stakeholder requirements, the metrics and activities identified in Chart 22 and 23 have been established, reviewed and approved by the Company and the Client.

Chart 22

Quality metrics and baseline

Quality Objectives	Metric	Metric Definition	Expected Outcome/Result	Measurement Frequency	Responsible
To construct a structurally sound bungalow residence	# of passed concrete strength tests	Material testing results for structural elements	Structural elements meet the specified strength requirements as per CBA approved design	As indicated in project schedule	Project Manager
To meet Client's requirements and achieve full customer satisfaction	# of client complaints	Client complaints on project's progress or workmanship	Minimal to no complaints	Weekly	Project Manager
	# of stops to project	Client halts or stops the construction activities due to dissatisfaction	Minimal to no stoppage	Monthly	Project Manager
	% of tasks completed on time	Percentage of scheduled works completed at a given time	Minimum of 80% of scheduled work is completed at a given time	Monthly	Project Manager
	# of complaints from neighbors	Complaints from neighbors about	Minimal to no complaints	Weekly	Project Manager

To ensure minimal disturbance to environment		noise, environmental issues or other construction activities			
	# of stops from building authorities or DOE	Building authorities halt or stop the construction activities due to non-compliance	No stoppage	Monthly	Project Manager
To provide a safe working environment	# of accidents/injuries on site	Accidents or injuries on site	<2 per month	Weekly	Project Manager

Note: Own work.

4.5.5 Quality Activities Matrix

Chart 23

Quality Activities Matrix

Deliverable	Requirement	Manage and Control Activities	Frequency	Responsible
1,943 square feet finished and furnished bungalow house	Compliance to approved construction design	Manage: Site inspections, Material/Supply Verification Checklists	Daily	Project Engineer
		Control: Verify compliance with approved design.	Weekly	Project Manager
	Good workmanship from subcontractors	Manage: Site inspections, checklists, progress monitoring	Daily	Project Engineer
		Control: Verify quality of works and services conducted	Weekly	Project Manager
	Safe working environment	Manage: Inspections, PPE Monitoring, Covid-19 protocol checklists, Safety checklists	Daily	Project Engineer
		Control: Verify Covid-19 log, accidents/ incidents reports.	Weekly	Project Manager
Project Management		Manage: Tracking and reporting project costs	Weekly	Project Engineer

	Project completed within budget and schedule	and schedule progress using monthly reports, inspections	Monthly	Project Manager
		Control: Verify cost and schedule performance of project.	Weekly, at Monday Kick-off meetings Monthly, at monthly progress report meetings	Project Manager
Project Closure	Snag list items completed to satisfaction of Client	Manage: Conduct Walk-through inspection using a Snag List Form to record and agree upon items to be corrected.	Once, at Walk-through inspection visit	Project Manager, Project Engineer
		Control: Verify completion of snag list items.	Once, at final inspection visit	Project Manager

Note: Own work.

4.5.6 Quality Documents

The project will organize and maintain both physical and electronic copies of all information obtained that is necessary to document acceptable performance of work on the project. Chart 24 presents the documentation that will be collected.

Chart 24

Quality Documents

Category	**Associated Quality Documents and/or Standards**

Quality standards	• Approved Construction Drawings
	  ○ ASTM Standards
	  ○ ACI 318 & 347
	• Approved PUC Electrical Design
	  ○ National Electric Code (N.E.C.)

Material Specifications	• Shop drawings • Product data sheets • Rebar mill certificates • Cut sheets for admixtures or additives • Warranties
Concrete Preparation or Testing	• Concrete mix designs and verification test data • Concrete Strength Testing report • Sieve analysis report for aggregates
Reporting	• Daily Site Logs • Material Testing Logs
Inspections	• Request for Approval of Materials (RAM) Form • Manufacturer's Certificate of Compliance • Daily Manpower and Equipment Records • Pre-Concrete Pour Inspection Request Form • Approval of Works Form
Health & Safety	• National Labor Laws • National Environmental Laws • OSHA

Notes: Own work

4.5.7 Quality Continuous Improvement Plan

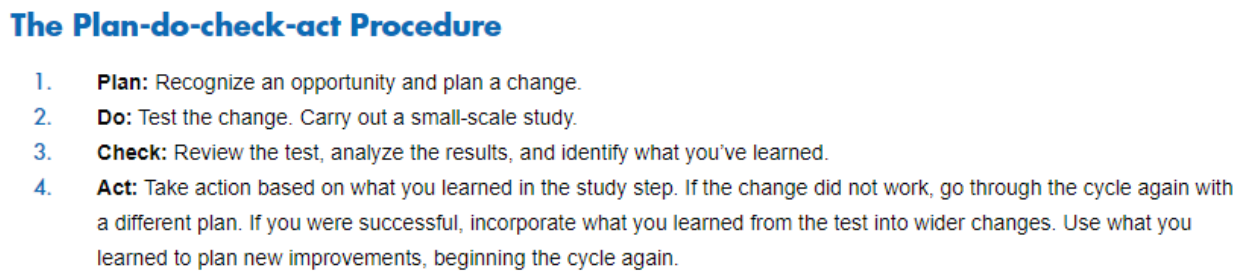
The Energy Optimizer (T.E.O.) Company Ltd believes in the enhancement of organizational competence. As such, it is committed to ensuring quality that extends beyond the minimum

satisfaction requirements of its Client. Three specific actions are central to continuous improvement: communication, corrective action and identifying and acting on opportunities.

The Plan-Do-Check-Act approach will be enforced and embraced by the Project Team and key stakeholders to continually improve processes, products or services, and resolving problems. This cycle provides an effective way to solve problems and manage change. Figure 15 summarizes the Plan-Do-Check-Act cycle.

Figure 15

Plan-Do-Check-Act Cycle



Note: Reprinted from *What is the Plan-Do-Check-Act (PDCA) Cycle?* In *ASQ*, May 19, 2022, from https://asq.org/quality-resources/pdca-cycle . Copyright 2022 by American Society for Quality.

4.5.8 Quality Change Control

Potential Causes of Quality Problems

The following list outlines factors that could lead to problems regarding quality:

- Project staff require more training or experience to meet the quality standards
- Additional activities beyond those planned are required
- Specific technical skills were assumed in the planning that are not available
- Client decisions require a change in quality
- Errors are found in the approved design based on site verification
- Defects or faulty materials, equipment or sub-contracted services are identified
- Compliant materials become unavailable

Resolution of Quality Problems

Any member of the project team or stakeholder can identify and alert the project team when a quality issue or problem is identified or foreseen. Quality review meetings will be held to determine immediate corrective action. The Integrated Change Request Form must be completed should any corrective action affect any of the project baselines. Otherwise, immediate action should be taken to correct or resolve any identified issues.

4.5.9 Quality Monitoring & Reporting

The integrated Project Status Report will provide a monthly quality report, focusing on quality management issues, recommendations for process, project and product improvements, corrective actions and any relevant findings.

Site logs will be kept along with supporting quality inspection checklists to report on the daily quality monitoring and control activities. Any issues must be escalated immediately for quick corrective action. Quality review meetings will be held routinely as determined by the Project Manager.

Acceptance

Approved by:

_____ Date: _____

Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____

Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____

<Approvers Name>
Green Estate Bungalow - Project Manager

4.6. Resource Management Plan

4.6.1 Purpose of the Resource Management Plan

The Resource Management Plan provides the framework to ensure that appropriate project resources are allocated for successful completion of the project. It has the following purposes:

- To identify the physical and team resources needed to complete the project successfully.
- To define the roles and responsibilities of team members.
- To identify training requirements and performance measurements.
- To identify strategies and methods for team development.
- To describe how resources will be acquired and optimized.

4.6.2 Resource Management Approach

The Energy Optimizer (T.E.O.) Company Ltd will ensure that the right resources will be available at the right time. With this ground rule, the Project Team will work collectively to optimize the resources available for the project. Team empowerment and continued capacity building are key factors to the successful management of project resources. The Energy Optimizer (T.E.O.) Company Ltd seeks to employ the following as a foundation to its resource management:

1. Be realistic with deadlines.
2. Set start and end dates.
3. Know the skills of your employees.
4. Prioritize work.
5. Help your team increase its utilization rate.
6. Adjust on the fly to be more effective.
7. Keep some schedules flexible.
8. Choose the resource management style that best suits your team.
9. Communicate with your team.
10. Get the right tool for managing work.

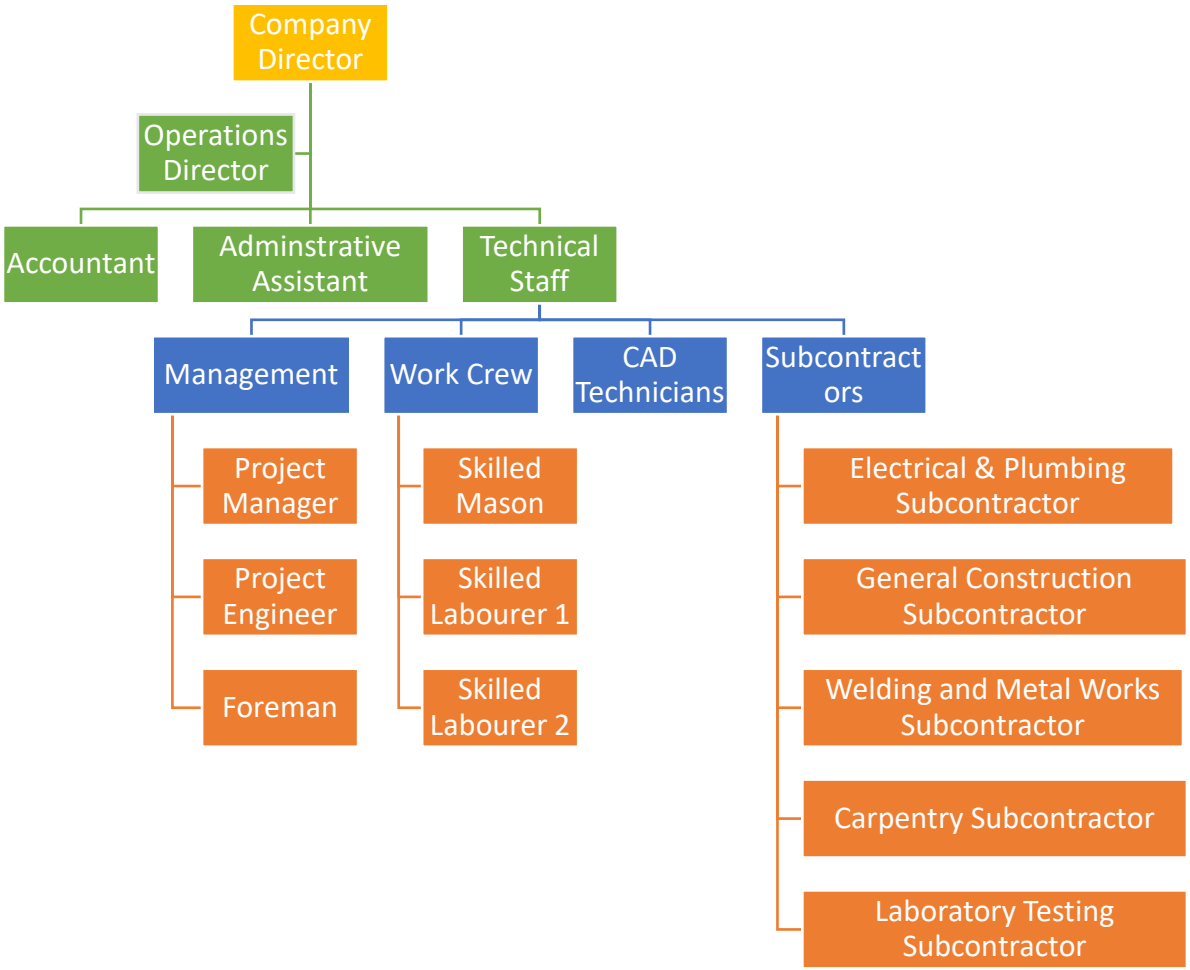
4.6.3 Roles and Responsibilities

The Energy Optimizer (T.E.O.) Company Ltd is committed to providing the right resources for the execution of its projects. As such, the Project Team is established with team members that can optimize on project resources to get the job done. Figure 16 presents the organizational structure of The Energy Optimizer (T.E.O.) Company Ltd. Each teach member has clearly defined roles and

responsibilities as detailed in Chart 25.

Figure 16

Green Estate Bungalow Project Organizational Structure



Note: Own work.

Chart 25

Roles and Responsibility

Role	Resource Management Responsibility
Client	Provides executive team approval and sponsorship for the project. Responsible for providing financial resources in a timely manner.
Company Director	Provides executive team approval for the project. Overall responsibility for the selection of staff, and subcontractors, suppliers. Overall accountability for the management of all company resources. Ensures that physical and human resources are available. Provides opportunities for capacity and team building. Responsible for team formation and development. Provides the vision, direction, and policy leadership for the project. Assists in removing barriers and providing conflict resolution.
Project Manager	Provides overall management to the project. Overall responsibility and accountability for the management of assigned project resources. Manages daily activities of technical staff, in coordination with administrative staff. Provides strong leadership and support to technical staff. Responsible for team formation and development. Proactively develops team skills and competencies and improves team satisfaction and motivation. Reviews team performance. Responsible for the planning, management, control and continued optimization of both physical and human resources.
Team Member	Working project team member. Collectively responsible for assigned roles, team collaboration, proper use, care and optimization of project resources. Participate in the compliance and execution of resource management activities that include: Project Engineer • Supports leadership role of Project Manager by also providing positive team leadership • Assist Project Manager with the identification and optimization of physical resources • Responsible for daily supervision and management of project resources • Resolves conflicts with both physical and team resources daily; escalates issues as needed • Identifies and builds technical capacity of team members Site Foreman

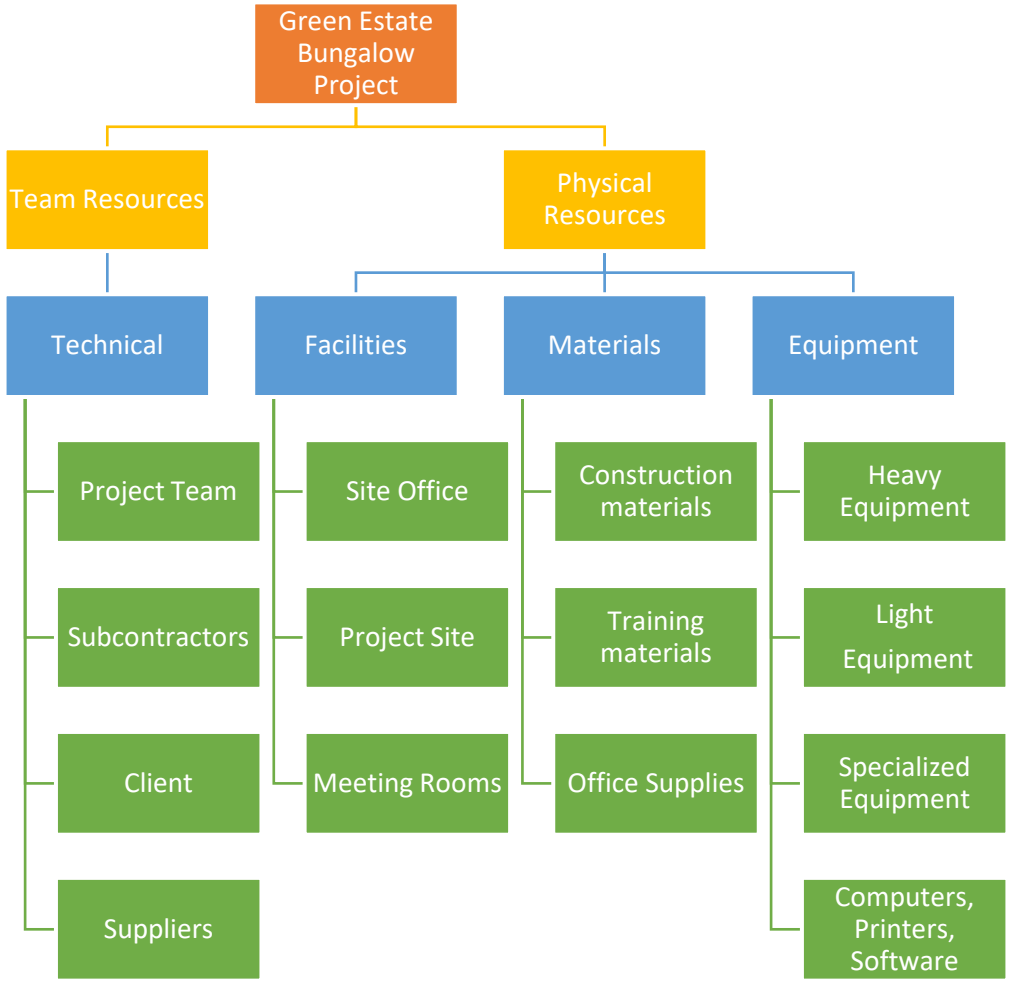
	• Supervises work crew and promotes positive team collaboration and leadership • Aids in the identification and development of technical capacity of team members • Responsible for proper use, care and maintenance of equipment and materials under his/her care • Assists with conflict resolutions on site • Assist Project Engineer with the identification and optimization of resources Administrative Assistant • Assists Project Manager and Project Engineer in acquisition of project resources, procurement and logistics Accountant • Performs payments as approved by Project Manager for the acquisition of project resources
Work Crews, Subcontractors	Working project team member. Shares overall responsibilities for their assigned roles, team collaboration, proper use, care and optimization of project resources. Responsible for promoting positive working environment, team development, and sharing and building capacities. Assist with identification and optimization of resources.

Note: Own work.

The Resource Breakdown Structure (RBS) and RACI Matrix are presented in Figure 17 and Chart 26 respectively. These structures provide additional information regarding the available resources and the assignment of roles and responsibilities of the Project Team and key stakeholders.

Figure 17

Resource Breakdown Structure



Note: Own work.

Chart 25

RACI Matrix

Project Tasks	Client	Company Director	Project Manager	Project Team	Subcontractors	Suppliers	Central Building Authority
Project Management							
Create Project Management Plan	I	C	R,A	C	C	C	
Approve Project Management Plan	R					A	
Conduct Project Management	I	R,C	R,A	C	C	C	
Conduct Site Management			R	R,A	C	C	
Conduct Project Administration		C	R, C	A	C	C	
Bungalow House Construction							
Build bungalow house	I	I	R,C	A	A,C	A,C	I
Furnish bungalow house	I	I	R,C	A	A,C	A,C	
Project Closure							
Complete Snag List	I	I	R,C	A	A	A,C	
Obtain Occupancy Permit	I	R	A			A	C
Create Handover Report	R					A	

Responsible (R) | Consulted (C)

Accountable (A) | Informed (I)

Note: Adapted from *How to Make a RACI Chart for a Project (with Example)* In *ProjectManager*, May 20, 2022, from https://www.projectmanager.com/blog/how-to-make-a-raci-chart-for-a-project-with-example . Copyright 2022 by ProjectManager.com, Inc.

4.6.4 Resource Acquisition

Project resources will either be hired, purchased, or already owned by the Company as outlined in Chart 27 and 28. For the project team, all contracted work or positions must be filled prior to project commencement. The Project Manager must be hired before signing of contract with the Client. Physical resources must be acquired in advance of the intended construction activities. Office supplies and recurring items will be procured routinely by the Administrative Staff. Proper planning and estimation will need to be conducted by the Project Manager and supporting staff to ensure that construction materials, services and equipment are procured with sufficient lead time.

Chart 27

Team Acquisition

Role	Type of Acquisition	Method of Acquisition
Project Manager	Contract	Interview, CV
Project Engineer	Contract	Interview, CV
Site Foreman	Contract	Interview, CV
Work Crew	Permanent Staff	Referrals, CV
CAD Technician	Permanent Staff	Interview, CV
Subcontractors	Contract	Referrals, Company Experience
Accountant	Permanent Staff	Interview, CV
Administrative Assistant	Permanent Staff	Interview, CV

Note: Own work.

Chart 28

Physical Resource Acquisition

Resource	Method of Acquisition
Site Office (mobile)	Purchase
Construction Materials	Purchase
Training Materials	Purchase
Office Supplies	Purchase
Heavy Equipment	Purchase, Hire
Light Equipment	Owned
Specialized Equipment	Hire
Computers, Printers, Software	Owned

Note: Own work.

4.6.5 Training

All Project Team members and Subcontractors must receive standard Occupational Health and Safety training. Routine toolbox meetings will also be held as refreshers to promote the Company's commitment to health and safety.

Software training will be made available for staff, as needed. These can include MS Projects, Excel, QuickBooks, AutoCAD/BIM training depending on the specific team member's needs.

Technical training will be provided for permanent technical staff as needed. However, specific trainings can be offered to contracted staff as directed by the Company Director.

4.6.6. Team Development

The Energy Optimizer (T.E.O.) Company Ltd is committed to the development of its team, staff and subcontractors. As such, the Company invests in continued team development activities geared towards improving competencies, team member interaction and the overall team environment. The team development activities include:

- Open and effective communication
- Monthly Staff/Team meetings
- Weekly Team meetings (Mondays)
- Quarterly Team Performance Assessments
- Open feedback loops
- On-the-job training/shadowing for new employees
- Occasional team lunches
- Yearly Team building retreat
- Birthday recognitions
- Christmas parties

To complement its team building strategies, supervisory staff of the Company will work:

- With transparency
- To acknowledge work and efforts of the team
- Delegate and not micromanage
- Manage conflict

4.6.7 Resource Control

Once project resources have been acquired, they must be properly assigned and controlled. The following tools will be used to control project resources:

- Inventory list
- Performance reviews
- Problems/Issues resolution

Work performance information will be included in the monthly progress reports by the Project Manager. A section pertaining to resource management will provide details of issues identified and resolved, update on inventory, requests for additional resources and any updates to resource assignment.

4.6.8 Recognition Plan

The Company Director will work along with the Project Manager to identify opportunities for creative recognition and awards. Chart 29 presents the recurring rewards and recognitions for the project team.

Chart 29

Recognition and Awards

Reward/Recognition	Type	Description
Early Completion	Monetary	10% Bonus is awarded for early project completion.
Birthday Gift Basket	Token	Each team member will be congratulated with a birthday basket on their birthday.
Project Completion	Celebratory	A small gathering will be sponsored to held at the company office to celebrate a successful project completion.

Note: Own work.

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.7. Communication Management Plan

4.7.1 Purpose of the Communication Management Plan

The Communication Management Plan provides the communication framework for the Green Estate Bungalow project. It has the following purposes:

- To identify the communication channels to be used;
- To assess and prioritize the communication needs and expectations of each stakeholder;
- To describe how information will be distributed to and from stakeholders;
- To provide strategies for effective and proactive communication with stakeholders.

4.7.2 Communications Management Approach

The primary approach towards communication management for the project is to ensure that all project stakeholders have the information that they need to perform their roles. This management plan provides the foundation for the Project Manager and Project Team to ensure that all communications are adequate, specific, sufficient, concise, and timely. As an important aspect of stakeholder engagement, The Energy Optimizer (T.E.O.) Company Ltd seeks to ensure two-way communication is sustained between the Project Team and stakeholders.

4.7.3 Roles and Responsibilities

Communication is a shared responsibility for all stakeholders. The Project Manager and Company Director have critical leadership roles in encouraging, establishing, and maintaining open and smooth communication channels throughout the project. The project's communication matrix Chart 30 will serve as the critical tool for the Project Team members to effectively communicate with project stakeholders.

In addition, the following guidelines shall assist in improving team efficiency and productivity in communications:

1. All messages will be tailored to the intended audience and what they need to know.
2. Every key message will be communicated formally and through an appropriate channel.
3. The team is expected to communicate what stakeholders need to know in a timely manner.
4. Project-wide meetings will be held at critical milestones.
5. The Project Team will listen and act on feedback.

4.7.4 Communication Matrix

Chart 30

Green Estate Stakeholder Communication Matrix

Communication Deliverable	Audience	Description/Purpose	Frequency	Media of Communication	Responsible Person
Briefing Meeting	Client; Project Team	Gather information for project	once at the start of the project	In-person or virtual Meeting; Meeting Minutes	Project Manager
Project Initiation Meeting	Client; Project Team	Distribute approved project management plan	once at the start of the project	In-person or virtual Meeting; Meeting Minutes	Project Manager
Monthly Status Meetings	Client; Project Team	Update the Client on the progress of the project	monthly	In-person or virtual Meeting; Meeting Minutes	Project Manager
Team Meetings	Project Team	To review, analyze and update detailed plans and project status	bi-weekly	In-person Meeting; Meeting Minutes	Project Manager
Site Meetings	Project Team; Subcontractors	To review and plan construction activities for the week	weekly at the start of the week	In-person Meeting	Site Engineer
Monthly Project Status Report	Client; Project Team	To report the status of the project including activities, progress, costs, schedule, changes and issues.	monthly	Email; Meeting	Project Manager

Note: Own work.

4.7.5 Monitoring & Reporting

Monthly status reports will include updates on the status of communication management. As a live document, the communication management plan must be reviewed and updated as the project progresses and in complement to the Stakeholder Engagement Plan. All updates will be distributed to relevant stakeholders with the most effective medium.

As communication constraints or issues arise, a standard escalation process will be triggered to resolve such issues. Chart 31 presents the communication escalation process.

Chart 31

Green Estate Communication Escalation Matrix

Priority	Definition	Decision Authority	Timeframe for Resolution	Triggers
Priority 1	Major impact to the project. If not resolved quickly, there will be significant adverse impact to the project	Client	within 4 hours	• Natural disaster • Material shortages • Covid-19 spread or state-of-emergency • Damage to works • Serious injuries, accidents
Priority 2	Medium impact to the project. If not resolved, there will be some adverse impact on the project	Company Director	within 1-2 days	• Heavy rainfall • Major delays in material deliveries • Minor injuries, accidents
Priority 3	Minor impact to the project. If not resolved, there will be minor adverse impact on the project.	Project Manager	within 2-3 days	• Minor delays in material deliveries • Sickness, injuries
Priority 4	Insignificant impact to the project. There may be little to no impact, however better solutions may arise.	Project Manager	as needed	• Small schedule delays • Poor weather

Note: Own work

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.8 Risk Management Plan

4.8.1 Purpose of the Risk Management Plan

The Risk Management Plan establishes the framework in which project risks will be identified and mitigated. It has the following purposes:

- To list the risks that have been defined as extreme or high.
- To identify the signs that indicate that a risk is about to materialize.
- To develop procedures to mitigate these risks.
- To define procedures within the project to identify new risks and to re-evaluate existing ones.

4.8.2 Risk Management Approach

The Green Estate Bungalow Project will adopt the four-step method to identify, assess, respond, and monitor risks throughout the project lifecycle. This approach is a continuous process aimed at identifying risks as soon as possible so that the necessary steps can be taken before issues become extreme or critical.

4.8.3 Roles and Responsibilities

Chart 31 provides an overview of the roles and responsibilities for the project's risk management activities.

Chart 32

Risk Management Roles and Responsibilities

Role	Risk Management Responsibility
Client	Provides executive team approval and sponsorship for the project. Responsible for alerting the Contractor of any foreseen financial or other risks that can impact project completion.
Company Director	Provides executive team approval for the project. Responsible for the overall coordination of the risk management program. Provides updates to the Client including new risks identified or mitigation actions taken.

Project Manager	Provides overall management to the project. Responsible for maintaining the risk management plan, including its updates, and communicating updates. Identifies, assesses, prioritizes, and decides on mitigation actions for risks throughout the project lifecycle. Escalates issues and problems to Company Director as needed.
Project Team	Working project team member. Assist the Project Manager with the identification of project risks. Can review and present recommendations. Actively engage in executing risk mitigation measures as well as reporting on the status and completion of these actions. Escalates issues to the Project Manager that can significantly impact the project and where strategy is not effective or productive.

Note: Own work.

4.8.4 Risk Identification, Re-evaluation and Notification

Project risk identification will occur throughout the project lifecycle. This process will involve the entire Project Team, and appropriate stakeholders. Chart 33 presents the categorization of project risks that can affect the Green Estate Bungalow Project.

Chart 33

Green Estate Bungalow Project Risk Breakdown Structure

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3
0. All Sources of Project Risks	1 External	1.1 Environmental	1.1.1 Pollution
			1.1.2 Transportation
			1.1.3 Weather Conditions
			1.1.4 Covid-19 Pandemic
		1.2 Social	1.2.1 Community Support
			1.2.2 Health and Safety
		1.3 Legal	1.3.1 Building Regulations
			1.3.2 Labor Laws
			1.3.3 Contractual Conditions
		1.4 Economic	1.4.1 Client Funding
	2 Management	2.1 Project Management	2.1.1 Resources
			2.1.2 Planning
		2.2 Organization	2.2.1 Organizational Culture
	3 Technical	3.1 Scope	3.1.1 Requirements
	4 Industry	4.1 Market	4.1.1 Fluctuation in prices

Notes: Own work.

Further analysis of potential project risks is presented in the Risk Register found in Chart 34. The Risk Register must be updated as new risks are identified, past risks are eliminated or the severity of risks change.

Chart 34

Green Estate Bungalow Project Risk Register

No.	Cause	Risk	Consequence	Probability	Impact	PxI	Strategy
1.1.1	Improper usage or disposal of hazardous materials; Poor waste disposal practices	The contamination of the environment by hazardous materials or waste	Decrease in health and safety of workers, site visitors, and neighbors in the immediate and surrounding areas.	2	5	10	Mitigate: Ensure strict compliance to health and safety best practices including proper PPE, proper usage and treatment of hazardous materials.
1.1.1	Noise and vibration from machinery and equipment	Noise pollution	Unhappy residents; decrease in focus of workers	4	4	16	Mitigate: Use quiet work power tools and equipment. Schedule work during sociable hours. Ensure employees wear correct PPE to reduce risk of hearing loss.
1.1.1	Burning of waste; Loose material that contains dust particles; Construction activities such as grading, filling, removals etc.	Air pollution	Decrease in air quality in the immediate and surrounding areas; decrease in health and safety of workers, site visitors, and neighbors in the immediate and surrounding areas.	4	4	16	Mitigate: Ensure there is no burning of waste on site. Wet sand to prevent dust in the air.

1.1.2	Unexpected traffic delays en route to project site; traffic accidents; late delivery by suppliers; Extreme weather conditions	Delays in transportation of project resources	Delays in project schedule	4	4	12	Accept: Adjust project schedule and activities as soon as delay occurs.
1.1.3	Tropical storm or hurricane	Project site is destroyed	Serious damage and loss to property, stored materials, workers and works; serious delays in project schedule; Drastic Increase in project costs	3	5	15	Mitigate: Secure property and materials. Ensure compliance with emergency protocols. Transfer: Ensure works, material and personnel are insured.
1.1.3	Heavy rainfall during construction	Project site is flooded	Damage to materials, equipment, machinery or works; delays in project schedule; increase project costs; Safety hazards	3	4	12	Mitigate: Secure property and materials. Ensure compliance with emergency protocols. Transfer: Ensure works, material and personnel are insured.
1.1.4	Covid-19 outbreak amongst workers	Closure of construction activities	Delays in project schedule; loss of workers; increase in project costs; decrease in health and safety of workers; death	5	5	25	Mitigate: Strict enforcement of Covid-19 safety protocols such as wearing masks, handwashing and sanitizing, social distancing as practicably possible, check temperatures/symptoms at start of day

							Accept: Covid-19 pandemic is unpredictable. Must adhere to government regulations.
1.2.1	Loud construction, unsanitary project site, unruly workers; street blockage	Opposition from residents or property developer	Project can be halted; delays in project schedule	1	3	3	Escalate: Project Engineer informs Project Manager and/or Company Director for intervention and amicable solution.
1.2.2	Lack of PPE; poor usage and handling of materials, equipment and machinery; unkept work site	Accident, injuries or death on project site	Decrease in health and safety of workers; potential lawsuit/claim;	2	5	10	Mitigate: Ensure strict compliance with health and safety measures. Transfer: Obtain insurance for workers and third-party.
1.3.1	Failed building inspection; Non-compliance with building regulations or approved design requirements	Occupancy permit denied	Delay in project handover; client dissatisfaction	1	5	5	Mitigate: Ensure construction is compliant with building regulations and approvals. Inform Central Building Authority of any significant structural modifications to obtain clearance.

1.3.1	Faulty electrical work	Electrical Fire or Shock	Decrease in health and safety on site; accident, injury or death; Increase in project cost due to rework or damages	1	5	5	Avoid: Contract a reputable and PUC registered Electrician to conduct the works. Mitigate: Ensure strict compliance to electrical codes and health and safety.
1.3.2	Unfair conditions or treatment of workers	Labor or social security penalties	Project can be halted; increased cost due to financial penalties; loss of workers; delays in project schedule	1	3	3	Avoid: Contract a reputable and PUC registered Electrician to conduct the works. Mitigate: Ensure strict compliance to electrical codes and health and safety.
1.3.3	Breach of contract conditions from either Contractor, Subcontractors, Client	Lawsuit is actioned	Project can be halted or closed; increase in costs for all parties; loss of income and job security for workers and subcontractors	1	4	4	Escalate: Project Manager informs the Company Director of any breaches in contract to decide upon legal recourse.
1.4.1	Delayed disbursement by Client	Shortage of funds	Project can be halted; delays in project schedule	2	5	10	Avoid: Proper planning and inclusion of disbursement schedule in contract.
2.1.1	Importation delays due to Covid-19 pandemic causing material shortages	Unavailability of materials	Project can be halted; delays in project schedule	4	5	20	Mitigate: Place orders from onset of project to allow time for change in Supplier.

2.1.1	Resignation of staff or discontinuation of services from subcontractors due to covid-19, issues/disputes, or dissatisfaction	Turnover of staff or subcontractors	Serious delays to project schedule; increased project costs	2	4	8	Mitigate: Ensure healthy and productive working environment. Hire quality employees and subcontractors. Ensure adherence to contract terms.
2.1.2	Inexperienced Project Manager	Poorly project planning	Serious delays and cost increase to the project	1	4	4	Mitigate: Hire competent Project Manager.
2.2.1	Poor working conditions and treatment	Turnover of staff or subcontractors	Loss of staff or subcontractors; delays and cost increase to project	2	4	8	Mitigate: Ensure healthy and productive working environment. Hire quality employees and subcontractors.
3.1.1	Client is allowed to make numerous changes during construction	Scope Creep	Delays project schedule; increase in project costs	2	5	10	Mitigate: Proper planning and project definition. Ensure strict compliance with Integrated Change Control process and approvals.
4.1.1	Disputes/issues with Subcontractors, Suppliers or Contractors; Changes in prices; Changes in scope	Changes in price for services	Delays project schedule; increase in project costs	3	4	12	Escalate: Project Manager informs the Company Director of cost implications for decision on contingency or management reserve use or contractual conditions that may apply in favor of Contractor.

4.1.1	Unavailability of goods and materials; Impact of Covid-19 on the economy	Changes in market price for goods or materials	Delays project schedule; increase in project costs	5	5	25	Escalate: Project Manager informs the Company Director of cost implications for decision on contingency or management reserve use.

Note: Own work.

4.8.4.1 Risk Identification Procedures

New risks will be identified as follows:

1. Each project team meeting will include an agenda item for risks.
2. All meeting participants will be given the opportunity to identify factors which could adversely affect the project.
3. Factors that have not materialized will be identified as risks. Their probability and impact will be assessed. Those evaluated as extreme or high will be documented in the Risk Management Form.
4. New risks that are evaluated as extreme or high will be documented on the next status report. The Client will be informed by memo and follow up call.

4.8.4.2 Risk Notification Procedures

The Client will be informed of important changes to the risk status as follows:

1. The status of all risks that are extreme or high will be reported on the project status report.
2. Any risks that change categorization, either reducing or increasing in severity, will be noted on the status report.

3. Any new risks that are identified or risks that increase in severity to high or extreme will trigger formal communications to the Client with follow-up to ensure action.

4.8.4.3 Risk Re-evaluation Procedures

Risks will be re-evaluated as follows:

1. Each project team meeting will include an agenda item for risks.
2. During the meeting, each risk identified as medium or severe will be reviewed and team members asked to comment on its probability and impact.
3. If a risk is downgraded from extreme or high to medium or lower, the cause of the change of status will be noted on the Risk Management Form.
4. If a risk is upgraded to high, a Risk Management Form will be prepared, and mitigation procedures defined and initiated.
5. If a risk is upgraded to extreme, the Client will be informed by memo and follow-up call.

4.8.4 Risk Prioritization

A probability and impact factor has been assigned to each project risk as seen in Chart 33. This allows the Project Manager and Project Team to prioritize risks based on the potential impact to the project. Risk mitigation and avoidance planning measures are then provided for each risk according to prioritization.

Chart 35 and 36 outlines the probability and impact scales used to complete the risk register. The probability and impact scales are used to determine the severity of the risk which will guide the Project Manager on the necessary mitigation or avoidance action or strategy. Chart 37 presents the Probability and Impact Matrix used for the project.

Chart 35

Probability Scale

Probability Scale	
Rating	**Interpretation**
1	An event expected to occur once during the project life cycle
2	An event expected to occur not more than 2 times during the project life cycle
3	An event expected to occur 3 times during the project life cycle
4	An event expected to occur 4 times during the project life cycle
5	An event expected to occur more than 4 times during the project life cycle

Note: Own work.

Chart 35

Impact Scale

Level	Scale	Cost Increase	Schedule Increase
1	Insignificant	Less than 5%	Delay in delivery < 2 weeks
2	Minor	5% - 9.9%	Delay in delivery 2 - 3 weeks
3	Moderate	10%- 19.9%	Delay in delivery 3 - 4 weeks

4	Major	20%- 29.9%	Delay in delivery 4 - 6 weeks
5	Catastrophic	More than 30%	Delay in delivery > 6 weeks

Note: Own work.

Chart 37

Probability and Impact Matrix

Probability										
	5	10	15	20	25	25	20	15	10	5
	4	8	12	16	20	20	16	12	8	4
	3	6	9	12	15	15	12	9	6	3
	2	4	6	8	10	10	8	6	4	2
	1	2	3	4	5	5	4	3	2	1
	Threats (Negative)					Opportunities (Positive)				
	Impact									

	High	Risk that has the potential to greatly impact project
	Medium	Risk that has the potential to slightly impact project
	Low	Risk that has relatively low impact on project

Note: Own work.

4.8.5 Risk Response Planning

The project Risk Register outlines specific risk responses. These responses are prepared at the start of the project but must be updated as it progresses. For each project risk, one of the following approaches can be selected:

- Avoid – Eliminate the threat or condition or avoid impact to the project objectives by eliminating the cause.
- Mitigate – Identify ways to reduce the probability or the impact of the risk.
- Accept – Accept that the risk exists and make no change to the project plan to address the risk. No response strategy is identified.

- Transfer – Shift the consequence and ownership of a risk by making another party responsible
- Escalate - when the threat or opportunity exceeds either or both the project scope and the project manager's authority; the appropriate owner (Company Director or Client) manages the threat or opportunity

4.8.6 Monitoring and Reporting

The risk register will serve as the important log of all identified project risks. This tool will be presented in monthly status reports. However, project risks will be discussed on a weekly basis at project team meetings and site huddles.

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.9 Procurement Management Plan

4.9.1 Purpose of the Procurement Management Plan

The Procurement Management Plan establishes the framework in which project procurement will occur. It has the following purposes:

- To identify the goods, works and/or services to be procured.
- To identify and define the processes, documentation, and decision criteria to be used for all procurement.
- To identify and analyze procurement risks and procurement risk management strategies.

4.9.2 Procurement Management Approach

The Green Estate Bungalow Project Team will act in an expeditious manner when it pertains to the procurement of project resources. As outlined in the resource management plan, a critical component for project success is to have the right resources available at the right time. As such, the project will approach its procurement processes with this guiding principle. Proper planning and execution of procurement is then critical.

Inherent to the Company's philosophy is the need for complete transparency and fairness in the selection method for procurement. As such, the Project Manager will provide oversight and management of procurement activities in concert with the Project Engineer and supported by the Administrative Assistant and Accountant. The entire Project Team will be consulted for the identification of all procurement items that may be required for successful completion of the project.

4.9.3 Procurement Definition, Process, Criteria

Chart 38 outlines the list of procurement items and services deemed essential for the completion of the Green Estate Bungalow Project.

Chart 38

Green Estate Bungalow Project Procurement Definition List

Item or Service	**Type**	**Procurement Method**	**Needed By**
Construction Materials	Physical	Direct Purchasing	Start of construction activity
Construction Equipment	Physical	Direct Purchasing, Rental	Start of construction activity
Services	Team	Contract	Start of project
Project Team Members	Team	Contract	At least two months prior to project commencement
Office Supplies	Physical	Direct Purchasing	Throughout project lifecycle

Note: Own work.

All contracted items or services can be approved by the Company Director or Project Manager. Direct Purchase can be initiated by the Project Engineer and approved by either Project Manager or Company Director.

All contracted services will be solicited under fixed price contracts, subject to modification upon approved scope changes. Unit rates for additional scope of works will be agreed upon prior to start of services. The Energy Optimizer (T.E.O.) Company Ltd has a pool of subcontractors already established from previous works. These subcontractors will be used for the Green Estate Bungalow Project. As well, the Company has established discounts and relationships with key Suppliers that will be selected for the project. The standard three quotations process will be used for direct purchasing. This involves the acquisition of three quotations for comparison, analysis, and selection of Supplier with the most advantageous quotation. The selection of subcontractors will be based on work experience and quality of workmanship. The selection of project team members will be based on the vetting of their CVs and interviews, where necessary. Referrals will be critical for the identification of potential team members.

Ultimately, the Company will consider the following criteria in the selection of suppliers and/or contractors:

- Mandatory requirements
- General qualifications and experience

- Past performance and technical qualifications
- Quality
- Delivery time
- Warranties or guarantees offered
- Cost
- Proximity to project site

4.9.4 Procurement Management and Documentation

Chart 39 presents the Procurement Plan template for the project which will serve as a key management tool for project procurement. This document is expected to be updated throughout the project lifecycle.

Other procurement documentation include:

- Vendor List
- Inventory List
- Purchase Orders
- Invoices
- Fixed price contract

Chart 39

Green Estate Bungalow Project Procurement Plan Template

#	Description of item or service	Date of request	Requested by	Approved By	Procurement Method	Action Date	Delivery Date	Status

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4.9.5 Procurement Constraints and Risk Management

Project risks will be managed in accordance with the project's risk management plan. However, it is critical for the Project Team to make additional considerations for procurement related project risks. The Company Director will act to maintain positive and collaborative relationships with vendors, suppliers, and contractors.

The main procurement constraints that may impact the procurement activities include:

- Scheduling – all procurement activities must be properly scheduled and executed in a timely manner by the Project Team

- Scope changes – all procurement activities must support approved project scope plan and defer from activities that will be considered out of scope.
- Market Variability – fluctuation in price and availability of materials must be monitored closely as the construction industry continues to face inflation and shipment delays due to the pandemic. As such, the availability of all key personnel, whether staff or contracted, is also subject to change due to the pandemic.
- Relationship with vendors, contractors, suppliers – any conflicts with vendors, suppliers, staff, or contractors can negatively impact procurement or goods or services.

4.9.6 Reporting

A status of procurement activities will be incorporated in the monthly progress report. However, daily monitoring and updating of procurement needs will be expected and reported to the Project Manager. Chart 40 presents a Procurement Activity Performance Metrics that will be used to ensure the project remains on schedule with its procurement activities. It will also serve provide performance data to assist the Project Manager with future procurement selections. Each metric is rated on a 1-3 scale as indicated.

Chart 40

Green Estate Bungalow Procurement Performance Metrics

Vendor	Product Quality	On Time Delivery	Documentation Quality	Development Costs	Development Time	Cost per Unit	Transactional Efficiency
Vendor #1							
Vendor #2							

1 – Unsatisfactory 2 – Acceptable 3 - Exceptional

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Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

4.10. Stakeholder Management Plan

4.10.1 Purpose of the Stakeholder Management Plan

The Stakeholder Engagement Plan has the following purposes:

- To identify the key project stakeholders.
- To assess levels of impact, influence, power, and influence for the project.
- To analyze stakeholders' roles and expectations.
- To provide a framework for the effective stakeholder engagement and management strategies.

4.10.2 Stakeholder Engagement Approach

The primary engagement approach for the Green Estate Bungalow Project will be based on consistent and open communication flows. As the needs, expectations and affectation of different project stakeholders change throughout the project, the Project Team will carry the responsibility for meeting these needs. As such, all available forms of communication will be used and tailored to individual stakeholders to increase effectiveness and reduce miscommunications. It is the objective of The Energy Optimizer (T.E.O.) Company Ltd to ensure understanding, actively engage stakeholders, build relationships, effectively manage expectations, and ensure compliance.

4.10.3 Roles and Responsibilities

The Project Manager will be critical to the execution of the stakeholder engagement plan. Chart 41 provides a breakdown of the key roles and responsibilities for the stakeholder engagement.

Chart 41

Stakeholder Engagement Roles and Responsibilities

Role	Description
Client	Provides executive team approval and sponsorship for the project. Communicates needs, expectations, likes/dislikes to Contractor. Actively responds to communications and requests for approvals from the Contractor.

Company Director	Provides executive team approval for the project. Communicates expectations to the Client and Project Team. Maintains good relationships with internal and external stakeholders. Resolves high level stakeholder issues.
Project Manager	Provides overall management for the project. Acts as the focal point for the project. Proactively engages and manages relationships with all project stakeholders. Manages stakeholder information and ensures compliance with the stakeholder engagement plan. Resolves daily stakeholder issues
Team Member	Working project team member. Actively implements the stakeholder engagement plan. Provides support to the Project Manager in the engagement and management of stakeholders. Identifies, analyzes and act to resolve stakeholder issues as guided by the Project Manager.

Note: Own work.

4.10.4 Stakeholder Identification & Analysis

4.10.4.1 Stakeholder Register

Central to the execution of the stakeholder engagement plan is the identification and analysis of key project stakeholders. Chart 42 outlines the project stakeholders that may either be affected or can impact the project's success. It is noted that the interests, impacts, influence, and power levels for different stakeholders can change as the project is being executed. As such, the stakeholder register must be updated to accommodate such changes or requirements to remain effective.

Chart 42

Green Estate Stakeholder Register

Green Estate Bungalow Stakeholder Register							
ID	**Stakeholder**	**Role**	**Role in Project**	**Type of Stakeholder**	**Type of Communication**	**Expectations**	**Influence/ Impact**
01	Taheerah Usher (TU)	Client	Project Sponsor	Direct/ Internal	meetings, emails, calls, instant messaging, reports	House is constructed as per client's design, compliant to building standards, good quality, within budget and schedule	H/H
02	The Energy Optimizer Company Limited (TEO)	Company	Main Contractor	Direct/ Internal	meetings, emails, calls, instant messaging, reports	Delivery of compliant, safe, and structurally sound house as per client's design and approved changes, on time and within budget	H/H
03	Heritage Bank Belize Ltd. (HBL)	Client's Bank	Project Financing	Direct/ External	meetings, emails, calls	House is completed as per client's approved design, on schedule and	H/H

						compliant to building standards	
04	Carlos Construction Ltd. (CCL)	Subcontractor	Labor - General Construction Services	Direct/ External	meetings, emails, calls, instant messaging	Timely provision of materials and payments for labor; safe working environment	M/L
05	Nell's Welding Services (NWS)	Subcontractor	Labor - Welding & Metal Works	Direct/ External	meetings, emails, calls, instant messaging	Timely provision of materials and payments for labor; safe working environment	M/L
06	Tillett's Electrical & Plumbing Services (TEPS)	Subcontractor	Labor - Electrical & Plumbing Installations	Direct/ External	meetings, emails, calls, instant messaging	Timely provision of materials and payments for labor; safe working environment	M/L
07	Hadrian's Woodwork (HWW)	Subcontractor	Labor - Cabinetry & Woodworks	Direct/ External	meetings, emails, calls, instant messaging	Timely provision of materials and payments for labor; safe working environment	M/L

08	Benny's Superstore (BS)	Supplier	Construction & Building Materials	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
09	Creative Tiles (CT)	Supplier	Tiles	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
10	Rodla Construction (RC)	Supplier	Blocks, Ready-mix Concrete	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
11	Joseph & Taylor Ltd (JTL)	Supplier	Steel	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
12	Brother's Habet Ltd (BHL)	Supplier	Construction & Building Materials	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
13	Habet & Habet (HH)	Supplier	Construction & Building Materials	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
14	Peter's Glass Shop (PGS)	Supplier	Glass Windows, Doors	Indirect/ External	meetings, emails, calls, instant messaging	Timely procurement and payment of orders	H/H
15	Central Building Authority (CBA)	Regulator	Building Authority Regulator	Indirect/ External	emails, calls, site visits	Compliance to building approvals and local building act stipulations	H/H

16	Green Estate Community (Residents) (GEC)	Neighbors	Neighboring residents	Indirect/ External	calls, instant messaging, emails	Least disruption to neighborhood (noise, aesthetics, accidents); safe work	L/L
17	Belize Water Services (BWS)	Service Provider	Water services	Indirect/ External	emails, calls, site visits, instant messaging	Timely procurement and payment of orders; safe working environment	H/H
18	Belize Electricity Limited (BEL)	Service Provider	Electrical services	Indirect/ External	emails, calls, site visits, instant messaging	Timely procurement and payment of orders; safe working environment	H/H
19	Belize Telemedia Limited (BTL)	Service Provider	Telecommunications services	Indirect/ External	emails, calls, site visits, instant messaging	Timely procurement and payment of orders; safe working environment	M/L
20	Central TV & Internet (CTV)	Service Provider	Cable services	Indirect/ External	emails, calls, site visits, instant messaging	Timely procurement and payment of orders; safe working environment	L/L
21	Public Utilities Commission (PUC)	Regulator	Electrical Regulatory Body	Indirect/ External	emails, calls, site visits	Compliance to electrical approvals and	H/H

						national electric code stipulations	
22	Green Estate Development Owner (GED)	Estate Developer	Property Developer	Indirect/ External	emails, calls, instant messaging	Least disturbance to residents and compliance with Estate Covenant	M/M

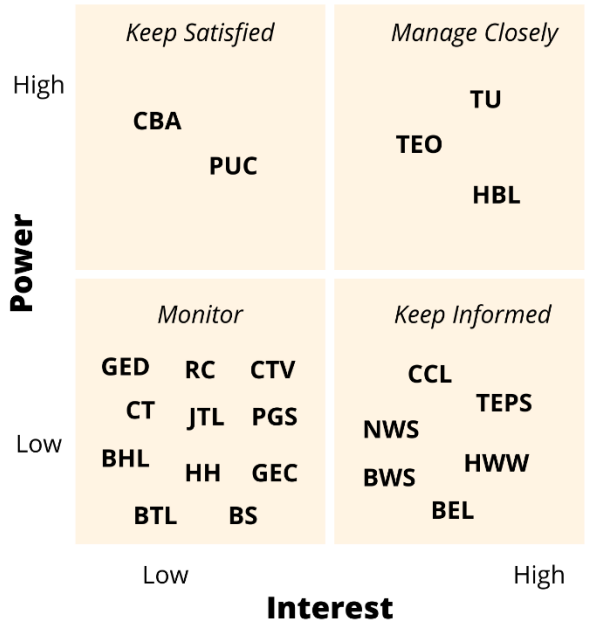
Note: Own work.

4.10.4.2 Stakeholder Matrices

Figure 18 categorizes the project stakeholders based on their perceived power and interest in the project. In this case, "power" is defined as the stakeholder's level of authority on the project, and interest" is defined as the level of concern about the project's outcomes. The matrix groups stakeholders based on mitigation strategies recommended given their power-interest classifications. Appropriate communication channels will be employed by the Project Team to address the engagement needs of each group of stakeholders.

Figure 18

Stakeholder Power-Interest Grid



Note: Own work.

4.10.4.3 Stakeholder Engagement Assessment Matrix

Chart 43 presents the stakeholder engagement assessment matrix that provides the current (C) and desired (D) engagement levels of each stakeholder. This assessment will aid the Project Manager and Project Team in determining the level of communication that will be necessary to engage each stakeholder and can be used as monitoring tool. Throughout project execution, the matrix must be updated as the needs and expectations of stakeholders change.

Chart 43

Green Estate Bungalow Stakeholder Engagement Assessment Matrix (source)

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Taheerah Usher					C, D
The Energy Optimizer Company Limited					C, D

Heritage Bank Belize Ltd.				C, D	
Carlos Construction Ltd.				C	D
Nell's Welding Services				C	D
Tillett's Electrical & Plumbing Services				C	D
Hadrian's Woodwork				C	D
Benny's Superstore	C				D
Creative Tiles	C				D
Rodla Construction	C				D
Joseph & Taylor Ltd	C				D
Brother's Habet Ltd	C				D
Habet & Habet	C				D
Peter's Glass Shop	C				D
Central Building Authority				C, D	
Green Estate Community (Residents)	C			D	
Belize Water Services	C				D
Belize Electricity Limited	C				D
Belize Telemedia Limited	C				D
Central TV & Internet	C				D
Public Utilities Commission				C, D	
Green Estate Development Owner				C, D	

Key:

Unaware – Unaware of the project and potential impacts.
Resistant – Aware of the project and potential impacts but resistant to any changes that may occur because of the project. Will be unsupportive.
Neutral – Aware of the project, but neither supportive nor unsupportive.
Supportive – Aware of the project and potential impacts and supportive of the work and its outcomes.
Leading – Aware of the project and potential impact and actively engaged in ensuring that the project is a success
C – represents the current engagement level of each stakeholder
D – represents the desired engagement level that the Project Team has assessed as essential for project success

Note: Own work.

4.10.5 Monitoring & Reporting

Monthly status reports will include updates on the status of stakeholder engagement, including a comparison of the level of current project support and desired levels of engagement.

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

5 CONCLUSIONS

1. The Green Estate Bungalow Project Management Plan was developed in fulfillment of the requirements for the Final Graduation Project for the MPM Course. This project management plan includes the development of the project charter and subsidiary plans that provide a robust framework for effective project definition, planning, execution, monitoring, and closure by The Energy Optimizer (T.E.O.) Company Ltd.

2. The project management plan was developed specifically for the construction of a bungalow house project for Ms. Taheerah Usher. However, it was prepared in a manner by which it can be scaled and standardized by the Company for future construction projects.

3. The project charter was developed to formally authorize the existence of the project. It establishes and defines the project manager's authority to apply organizational resources to project activities. This deliverable presents high-level project information that defines the roles and responsibilities of stakeholders and outlines the objectives and goals of the project.

4. The scope management plan was developed to provide a framework for the definition, development, monitoring, control and validated of the project. It includes the development of the project's WBS, WBS Dictionary, requirements traceability matrix, scope statement, and scope baseline. It essentially defines the work that must be completed to ensure the achievement of project deliverables.

5. The schedule management plan was developed to provide a framework for the development, monitoring, and control of the project schedule. It presents the project milestones and details the project's activity list and schedule. It essentially tells how and when the project will deliver its expected deliverables and provides a basis for performance reporting.

6. The cost management plan was developed to provide a framework for the planning, structuring and control of the project costs. It presents the cost baseline, including the detail cost estimate and contingency reserve. The project budget is established with the cost baseline and contingency reserves. Company historical data and current market rates were used to inform the project budget.

7. The quality management plan was developed to provide a framework for the achievement of the Company's quality objectives. It described the policies, procedures, guidelines, and activities necessary for compliance with this plan. Quality management and quality assurance activities are critical.

8. The resource management plan was developed to provide a framework for the categorization, allocation, management, and release of project resources. It defines both physical and team resources required for the execution of the project. Key tools presented include the project's organizational structure, resource breakdown structure, RACI Matrix, team and physical resource acquisitions lists, training, team development and recognition activities. This plan ensures that Project Team secures the right resources at the right time for successful project completion.

9. The communication management plan was developed to provide a framework for the planning, structuring, implementation, and monitoring of project communications. As a critical proponent of project success, the communication plan includes the necessary guidelines, templates, and strategies for effective communication with and between key project stakeholders. This plan presents the communication matrix and escalation matrix for the project.

10. The risk management plan was developed to provide a framework for the identification and risk management approach for project risks. The plan presents the project's risk breakdown structure and risk register that further prioritizes each project risk and associated risk response actions. Risk identification is a continuous process in the project lifecycle.

11. The procurement management plan was developed to provide a framework for the procurement of project resources. This plan defines the methods and processes that can be employed for acquisitions. It presents procurement decision criteria, procurement risks, corresponding risk management strategies and procurement documentation. A critical tool is the project's procurement plan that is included.

12. The stakeholder engagement plan was developed to provide a framework for identification and classification of project stakeholders. This plan presents the project's stakeholder register, power-interest matrix, and engagement assessment matrix. It further defines the strategies and actions required for the effective engagement of stakeholders.

6 RECOMMENDATIONS

1. The Energy Optimizer (T.E.O.) Company Ltd should implement project management best practices as guided by the PMI.
2. The Energy Optimizer (T.E.O.) Company Ltd should prioritize the establishment of a robust and competent Project Team that understands and embraces the importance of proper planning and execution techniques.
3. The Project Manager should create the project charter as the first task to authorize the Green Estate Bungalow project. They should conduct a thorough stakeholder requirements gathering process to best inform the charter.
4. The Project Manager should develop the scope management plan through the plan scope management, collect requirements, define scope, create WBS, validate scope and control scope processes as guided by the PMI. They should act to minimize scope modifications to avoid scope creep that can significantly impact the project.
5. The Project Manager should develop the schedule management plan with a realistic project schedule. They should implement the plan schedule management, define activities, sequence activities, estimate activity durations processes to develop the project schedule using MS Project. They should conduct daily briefings with the Project Team to be able to update the project schedule in real-time for the most accurate status of works.
6. The Project Manager should develop the cost management plan with current market rates. They should perform the plan cost management, estimate costs, and determine budget processes to develop the project budget and control mechanisms. They should proactively enforce protocols for good financial execution and management by supporting Project Team members. They should act to manage project cost modifications.
7. The Project Manager should develop the quality management plan in alignment with the Company's quality policy and objectives. They should perform the plan quality management and manage quality processes. They should strictly enforce compliance to quality standards, avoiding any deviations from the expected quality requirements.
8. The Company Director and Project Manager should ensure the availability of necessary project resources at the right time for effective project execution. Effective

leadership strategies should be employed by the Project Manager for the management of team resources, with emphasis on communication and collaboration. They should tailor communication methods to each stakeholder.

9. The Project Team should share responsibility in the continued identification of project risks. The Project Manager should develop the risk management plan and strategies with the Project Team. They should inquire about project risks at regular meetings to be able to respond expeditiously.
10. The Project Manager should ensure that the right resources are available at the right time. They should develop the procurement management plan to ensure that this is done. They should prioritize long lead items and monitor the depletion of resources.
11. The Project Manager should actively engage stakeholders throughout the project lifecycle. They should develop a stakeholder engagement plan.
12. The Project Team must consult the subsidiary management plans for effective project execution.
13. The Project Manager should implement agile and sustainable methodologies in the project execution. It is recommended to integrate agile principles such as face-to-face conversation (via weekly stand-up meetings), working software (via the introduction of accounting, scheduling and a central information system), reflect and adjust (via continued reporting and review meetings), and embracing change (via a collective mindset towards change management, trusting and supporting team members, self-organizing teams and working together). It is further recommended for the Company to incorporate regenerative practices such as using lean tools, starting construction with effective mobilization and site planning, and the prioritization of site waste management.
14. The Project Manager should, along with the Project Team, review and update management plans and respective monitoring and control tools on an as needs basis.

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APPENDICES

Appendix 1: FGP Charter

PROJECT CHARTER	
Date:	**Project Name:**
November 8, 2021	Project Management Plan for the Construction of a New Bungalow Residence at Parcel 3972 Green Estate, Lord's Bank, Belize
Knowledge Areas / Processes:	**Application Area (Sector / Activity):**
Knowledge areas: Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management, Project Stakeholder Management **Process groups:** Initiating, Planning	Construction, Planning
Start date:	**Finish date:**
November 8, 2021	May 13, 2022

Project Objectives (general and specific):

General objective: To create an integrated project management plan, framed within the standards of the Project Management Institute, to effectively manage the construction of a new bungalow residence at Parcel 3972 Green Estate, Lord's Bank, Belize.

Specific objectives:

1. To create a project charter to formally authorize the project and provide the project manager with the authority to utilize resources for project completion (PMI, 2017)
2. To create the scope management plan to describe how the scope for the residential construction will be defined, developed, monitored, controlled and validated to meet the client's requirements (PMI,2017).
3. To create a schedule management plan to establish how the project schedule will be developed, monitored, and controlled for the residential construction within an approved, reasonable and realistic timeframe (PMI,2017).
4. To create a cost management plan to describe how the costs for the residential construction will be planned, structured, and controlled to complete the project within the contract sum (PMI,2017).
5. To create a quality management plan to establish the policies, procedures and guidelines to be implemented to achieve quality objectives of the company (PMI,2017).
6. To create a resource management plan to establish how project resources will be categorized, allocated, managed, and released to complete the project (PMI,2017).
7. To create a communications management plan to establish how project communications will be planned, structured, implemented, and monitored (PMI,2017).
8. To create a risk management plan to establish how risk management activities will be structured and performed (PMI,2017).
9. To create a procurement management plan to establish how goods and services will be acquired in the procurement process (PMI,2017).
10. To create a stakeholder management plan to establish the strategies and actions for productive stakeholder involvement in decision making and execution of the project (PMI,2017).

Project purpose or justification (merit and expected results):

As a growing engineering firm, T.E.O (The Energy Optimizer) Company Limited seeks continual improvement for the management of its construction projects. Over the years, the company has expanded its services from primarily electrical engineering designs and installations to residential and commercial building construction. With this expansion and the influx of more construction projects, T.E.O. has identified the need for a more structured approach to its construction management.

The company seeks to develop a comprehensive project management plan that can be adapted or scaled for all its construction projects. It is expected that proper organizational structure and management methodologies will improve the company's success rates, thus increasing its competitiveness in the construction industry.

T.E.O. has been shortlisted for the construction of a bungalow ferro-concrete residence to be located at Parcel 3972 at Green Estate, Lord's Bank, Belize. The client has provided an approved construction design for a three bedroom, two bathroom open concept home with an enclosed garage and large outdoor deck. It is expected that the development of a comprehensive project management plan for the new bungalow residence will provide the necessary organizational structure and management methodologies to guide a successful project completion.

Description of Product or Service to be generated by the Project – Project final deliverables:

An integrated project management plan for the construction of a new bungalow residence at Parcel 3972 Green Estate, Lord's Bank, Belize. It will include the development of a project charter and the following subsidiary plans, based on each knowledge area:

1. Scope Management Plan
2. Schedule Management Plan
3. Cost Management Plan
4. Quality Management Plan
5. Resource Management Plan
6. Communications Management Plan
7. Risk Management Plan
8. Procurement Management Plan
9. Stakeholder Management Plan

Assumptions:

The following assumptions are made:

1. It is assumed that the required information is available and accessible for the selected project.
2. It is assumed that the allocated timeframe for the FGP development is sufficient to complete all deliverables.
3. It is assumed that the assigned tutor will provide effective and timely feedback during tutorship.
4. It is assumed that the student has access to MS Projects and other required software/tools for the FGP development.
5. It is assumed that the development of the FGP is not costly.
6. It is assumed that the student passess the FGP seminar and meets all prerequisites to conduct the FGP.
7. It is assumed that the Sponsor commits to the student for the entire duration of the FGP development.

Constraints:

The following constraints are considered:

1. The FGP must be completed within four (4) months.
2. Insufficient time to change topic in extreme circumstance (such as withdrawal of sponsor).
3. Communication gap between tutor and student (due to language).
4. Small pool of philologists in Belize.

Preliminary Risks:

The main risks are as follows:

1. If the student contracts Covid-19, it might significantly delay her performance, impacting the timely submission and/or quality of the FGP deliverables.
2. If the student does not understand or interpret the tutor's instructions correctly, it might delay completion and corrections, impacting the time and quality of FGP deliverables.
3. If the student misses a deadline, it might delay her subsequent submissions, impacting the timely completion of the FGP.

4. If the tutor does not provide feedback in a timely manner, it might delay corrections, impacting time and quality of FGP deliverables.
5. If a hurricane or extreme weather event occurs, it might delay student's ability to work, impacting time and quality of FGP deliverables.

Budget:

The budget is estimated for the printing, binding, shipping to Costa Rica and philologist review of the final document. Estimations will be made at a later date due to fluctuation prices as shipping and reviews will depend on final size of the documents.

Milestones and dates:

Milestone	Start date	End date
Deliverable 1 (FGP Charter & WBS)	November 8, 2021	November 14, 2021
Deliverable 2 (Introduction & FGP Schedule)	November 15, 2021	November 21, 2021
Deliverable 3 (Theoretical Framework)	November 22, 2021	November 28, 2021
Deliverable 4 (Methodological Framework)	November 29, 2021	December 5, 2021
Deliverable 5 (Abstract, Executive Summary, Bibliography)	December 6, 2021	December 12, 2021
Tutoring Process	December 20, 2021	March 18, 2022
Reading by Reviewers	March 21, 2022	April 8, 2022
Adjustments	April 11, 2022	May 6, 2022
Presentation to Board of Examiners	May 9, 2022	May 13, 2022

Relevant historical information:

T.E.O. (The Energy Optimizer) Company Limited was established in September 2013 by a father-daughter duo of a civil and an electrical engineer. T.E.O. originated as a small engineering firm providing technical and professional services in telecommunications and electrical engineering. As principal engineer, Mr. Mark Usher registered T.E.O. as a formal company for the execution of a large engineering consultancy for all the electrical design and installation for the Harvest Caye Island, awarded in 2013. Since then, the company has been awarded multiple small-to-medium sized electrical system design and installation contracts. Additional staff were hired as needed. Around 2016, the company expanded to a multi-disciplinary firm, adding professional services in civil/structural engineering, construction and project management to its portfolio with the construction of a law firm and several residential homes. Like most small firms, construction management is generally initiated in a more informal way. Hence, as the company continues to build its profile, the integration of a structured project management approach to its projects has become warranted. This need has given way to the sponsorship of the FGP for the student for the selected topic of a project managemet plan for one of the company's residential project.

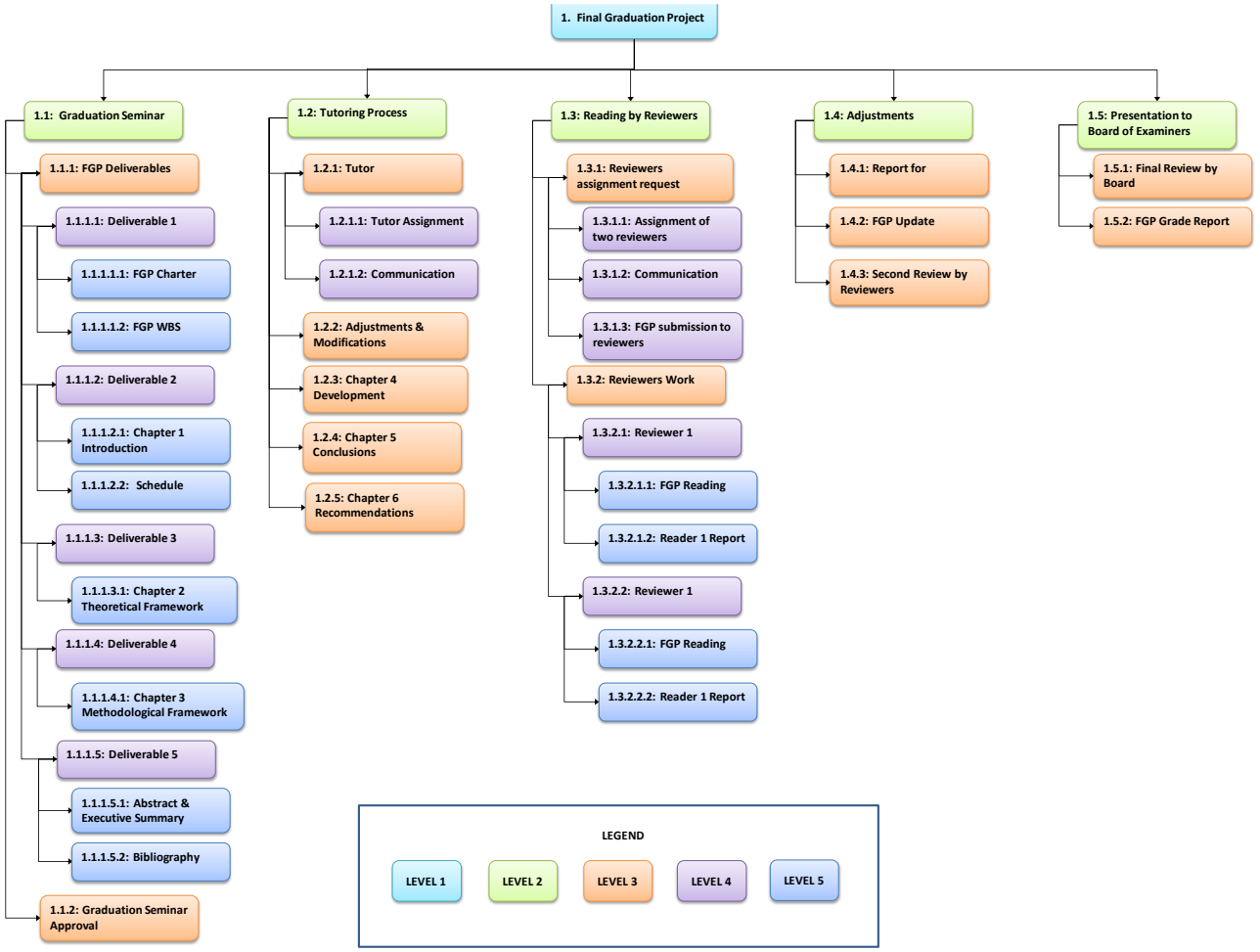
Stakeholders:

Direct stakeholders: Sponsor – T.E.O. Company Limited, Client – Taheerah Usher
Indirect stakeholders: Subcontractors, Suppliers

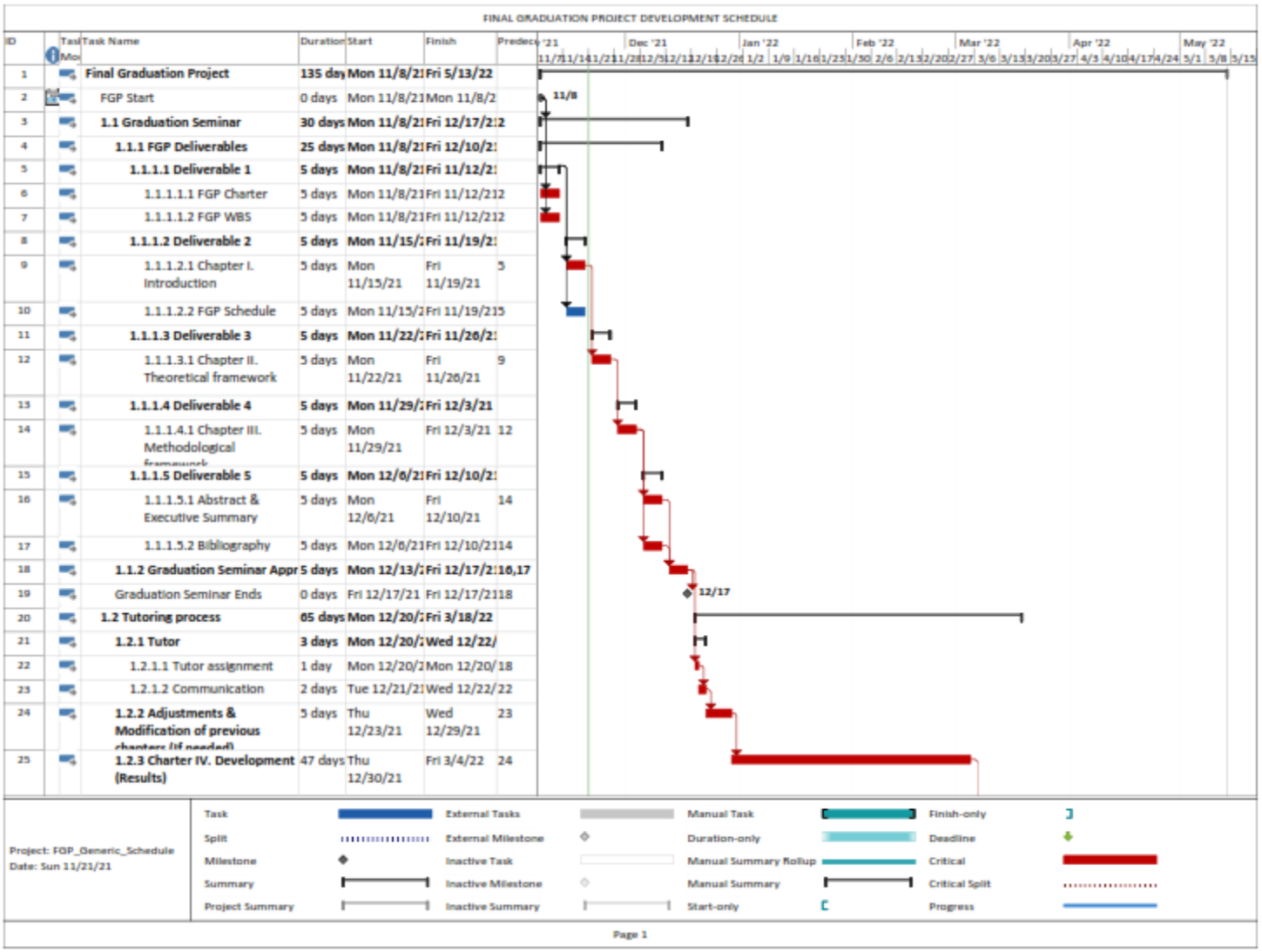
Approval:

Project Manager: Orchel Usher	**Signature:** 
Authorized by:	**Signature:**

Appendix 2: FGP WBS

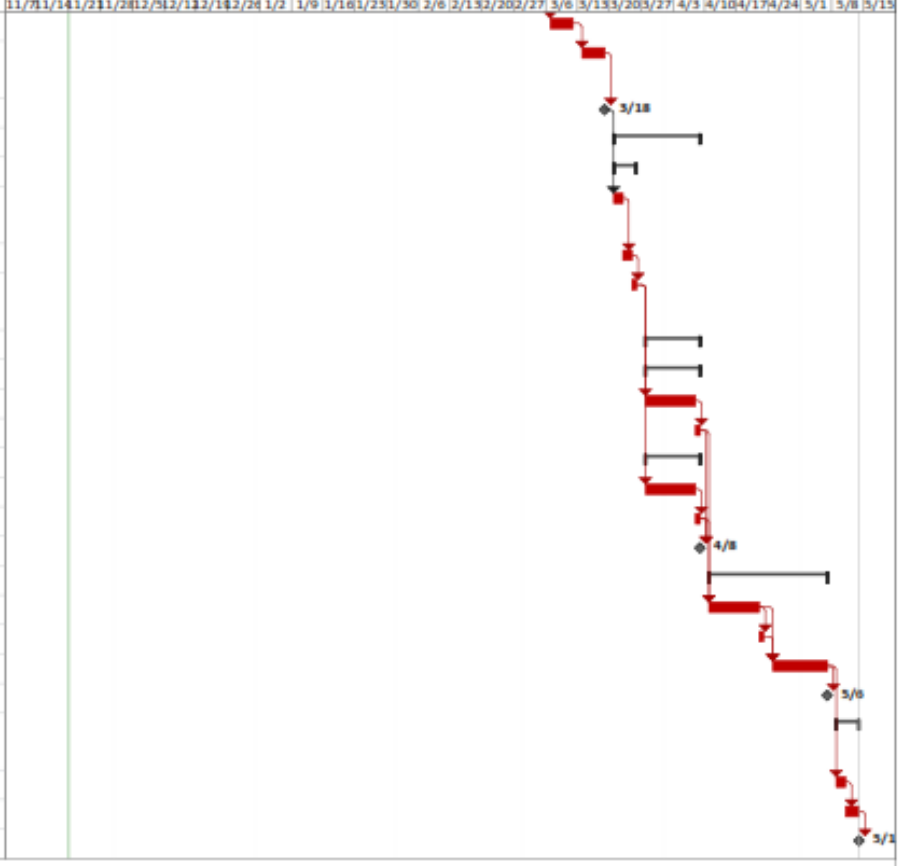


Appendix 3: FGP Schedule



FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE

ID	Task Mo	Task Name	Duration	Start	Finish	Predec
26		**1.2.4 Chapter V. Conclusions**	5 days	Mon 3/7/22	Fri 3/11/22	25
27		**1.2.5 Chapter VI. Recommendations**	5 days	Mon 3/14/22	Fri 3/18/22	26
28		Tutor approval	0 days	Fri 3/18/22	Fri 3/18/22	27
29		**1.3 Reading by Reviewers**	**15 days**	**Mon 3/21/22**	**Fri 4/8/22**	
30		**1.3.1 Reviewers assigment req**	**5 days**	**Mon 3/21/22**	**Fri 3/25/22**	
31		1.3.1.1 Assignment of two reviewers	2 days	Mon 3/21/22	Tue 3/22/22	28
32		1.3.1.2 Communication	2 days	Wed 3/23/22	Thu 3/24/22	31
33		1.3.1.3 FGP submission to reviewers	1 day	Fri 3/25/22	Fri 3/25/22	32
34		**1.3.2 Reviewers work**	**10 days**	**Mon 3/28/22**	**Fri 4/8/22**	
35		**1.3.2.1 Reviewer 1**	**10 days**	**Mon 3/28/22**	**Fri 4/8/22**	
36		1.3.2.1.1 FGP reading	9 days	Mon 3/28/22	Thu 4/7/22	33
37		1.3.2.1.2 Reader 1 report	1 day	Fri 4/8/22	Fri 4/8/22	36
38		**1.3.2.2 Reviewer 2**	**10 days**	**Mon 3/28/22**	**Fri 4/8/22**	
39		1.3.2.2.1 FGP reading	9 days	Mon 3/28/22	Thu 4/7/22	33
40		1.3.2.2.2 Reader 2 report	1 day	Fri 4/8/22	Fri 4/8/22	39
41		First Review completed	0 days	Fri 4/8/22	Fri 4/8/22	40,37
42		**1.4 Adjustments**	**20 days**	**Mon 4/11/22**	**Fri 5/6/22**	
43		1.4.1 Report for Reviewers	9 days	Mon 4/11/22	Thu 4/21/22	40,37
44		1.4.2 FGP update	1 day	Fri 4/22/22	Fri 4/22/22	43
45		1.4.3 Second review by reviewe	10 days	Mon 4/25/22	Fri 5/6/22	43,44
46		Second Review completed	0 days	Fri 5/6/22	Fri 5/6/22	45
47		**1.5 Presentation to Board of Examiners**	**5 days**	**Mon 5/9/22**	**Fri 5/13/22**	
48		1.5.1 Final review by board	2 days	Mon 5/9/22	Tue 5/10/22	45
49		1.5.2 FGP grade report	3 days	Wed 5/11/22	Fri 5/13/22	48
50		FGP End	0 days	Fri 5/13/22	Fri 5/13/22	49



Project: FGP_Generic_Schedule
Date: Sun 11/21/21

Task	External Tasks	Manual Task	Finish-only		
Split	External Milestone	Duration-only	Deadline		
Milestone	Inactive Task	Manual Summary Rollup	Critical		
Summary	Inactive Milestone	Manual Summary	Critical Split		
Project Summary	Inactive Summary	Start-only	Progress		

Appendix 4: Integrated Change Request Form

Change Request Form
Green Estate Bungalow Project

Change Request Form

Project Name: Green Estate Bungalow Project	**Request #:** *Number to be entered by Senior Project Director*
Date of Request: *Enter date of request*	**Requested By:** *Person requesting change*
Change Category (Check all that apply): □ Schedule □ Cost □ Scope □ Resources □ Testing/Quality □ Requirements/Deliverables	

Request Description:
Describe the change being requested. Be as specific as possible.

Reasons / Goals for Change:
Describe the reasons and purpose of request (what is the business or technical driver).

Recommendations:
This area should include recommendations by the team that is bringing the change request forward. There is a potential for multiple recommendations for solutions based on analysis.

Impacts (Cost, Scope, Schedule, and/or Quality):
For each recommendation, a narrative of the impacts of the change request should be provided along with any supporting justifications (calculations, impact-analysis, projections etc.).

Solution:

This area should define the most appropriate solution to attain the desired objective. This is determined by the approving authority.

Disposition:		
☐ Approve	☐ Reject	☐ Defer

Authorization/Sponsor Acceptance

The Senior Project Director will identify the appropriate approval body and forward for signatures. (Delete all instructions prior to finalizing document.)

_____ Date: _____

Ms. Taheerah Usher
Owner/Client

_____ Date: _____

Mr. Mark Usher
Company Director

_____ Date: _____

<Project Manager>
Project Manager

Note: Change Request Form template adapted from *Tennessee Business Solutions Methodology (TBSM)* in *TN Department of Finance & Administration*, April 24, 2022, from https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html . Copyright 2022 by TN.gov.

Appendix 5: Change Management Process

This document defines the change management process for the Green Estate Bungalow Project. Its purpose is to ensure that changes introduced to the project are properly defined, evaluated and approved. In compliment to the subsidiary management plans for the Green Estate Bungalow Project, all project changes must follow the following process:

- The submission and receipt of change requests
- The review and logging of change requests
- The determination of the feasibility of change requests
- The approval of change requests
- The implementation and closure of change requests.

Identify and Submit Change Request

This process provides the ability for any member of the project team to submit a request for a change to the project.

The Change Requester:

- Identifies a requirement for change to any aspect of the project (e.g., scope, deliverables, timescales and organization)
- Completes a Change Request form and distributes the form to the Project Manager.

Review Change Request

The Project Manager reviews the change request and determines whether or not additional information is required to assess the full impact of the change to the project time, scope and cost. The Project Manager will record the change request details in a Change Log to track the status of the change request.

Approve Change Request

The Project Manager will forward the Change Request Form and any supporting documentation to the Company Director for review and final approval. The CCB will determine the feasibility of this change along with the Client. After a formal review, the Company Director and Client may approve, reject or defer the change.

Acceptance
Approved by:

_____ Date: _____
Ms. Taheerah Usher
Green Estate Bungalow - Owner/Client

_____ Date: _____
Mr. Mark Usher
Green Estate Bungalow - Company Director

_____ Date: _____
<Approvers Name>
Green Estate Bungalow - Project Manager

Appendix 6: Philological Dictum

The University of New Mexico

has conferred upon

Virginia Louliere Hampton

the degree of

Doctor of Philosophy

English

with all the rights and privileges appertaining to that degree,
in testimony whereof the Regents of the University upon recommendation
of the Faculty have granted this diploma bearing the seal of the University
this twentieth day of December, two thousand three.

President of the Regents

Secretary of the Regents

THE UNIVERSITY OF NEW MEXICO · 1889 ·

President of the University

Provost of the University

Virginia L. Hampton, Ph.D.
920 Maren Lane SW
Albuquerque, NM 87105

1 June 2022

To Whom It May Concern:

This is to certify that I have reviewed The Final Graduation Project for master's degree candidate Orchel Usher, including but not limited to:

- Spelling, grammar, and usage appropriate for candidates at the master's level
- Sentence structure, syntax, and overall development appropriate to Standard American English
- Formatting in APA style

This candidate has completed her project in accordance with the standard for proficiency in written English for the Master's in Project Management (MPM) Degree offered by the Universidad Para la Cooperación Internaciónal.

Respectfully,

Virginia L. Hampton