UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CUL-DE-SAC BASIN (PHASE 1: CUL-DE-SAC BRIDGE), SAINT LUCIA (MANAGEMENT PLANS)

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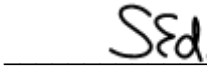

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DEDICATION

This Final Graduation Project is dedicated to my family who have been a constant source of support and encouragement.

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I would like to express my sincere gratitude to my tutor, Ms. Paula Villalta Olivares, for her guidance and dedicated supervision throughout this project. I would also like to acknowledge Mr. Carlos Brenes for the guidance provided during the preparation course.

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The completion of this project would not have been possible without their invaluable assistance.

ABSTRACT

The objective of this document is to develop a project management plan that considers all the necessary project management knowledge areas on how the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia, will be performed to ensure a successful project realization. The Cul-De-Sac Basin has had a long history of flooding, which has resulted in significant negative economic and social impacts. A new bridge with increased hydraulic capacity is necessary to reduce flood risks and ensure smooth traffic flow.

An analytic-synthetic method is used to conduct the research, which uses information collected from both primary and secondary sources. The final product of the Final Graduation Project consists of an effective project management plan for the redesign and reconstruction of the Cul-De-Sac Bridge. The project management plan includes all subsidiary plans for the management of the project's integration, scope, schedule, cost, quality, resources, communications, risks, procurement, and stakeholder engagement. The study also validates the project from the perspectives of regenerative and sustainable development.

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ABBREVIATIONS AND ACRONYMS

DIPE	Department of Infrastructure, Ports and Energy
ESIA	Environmental and Social Impact Assessment
FGP	Final Graduation Project
GHG	Greenhouse gases
GOSL	Government of Saint Lucia
JICA	Japan International Cooperation Agency
USD	United States Dollar
MIPEL	Ministry of Infrastructure, Ports, Energy and Labour
OAS	Organization of American States
PMBOK	Project Management Body of Knowledge
RBS	Risk breakdown structure
WBS	Work breakdown structure
XCD	Eastern Caribbean Dollars

EXECUTIVE SUMMARY

The Cul-De-Sac Basin in Saint Lucia has a long history of flooding. Bridges play a vital role in mitigating flood risks. There are three main bridges located in the Cul-De-Sac Basin: Ravine Poisson Bridge and Ferrand's Bridge and Cul-De-Sac Bridge, which form parts of critical links that connect the north, south, and west of the island. The Government of Saint Lucia (GOSL) through grant aid from the Government of Japan is embarking on a project, the Project for Reconstruction of Bridges in the Cul-De-Sac Basin, with the primary objective to promote the country's social and economic development by reconstructing the bridges which are in vulnerable areas to natural disaster risks in the Cul-De-Sac Basin. The project will be executed by the Ministry of Infrastructure, Ports, Energy and Labour (MIPEL) and undertaken in phases, commencing with the Cul-De-Sac Bridge.

A project management plan is required by the MIPEL to ensure that the project is delivered successfully and fulfils the intended outcomes. Given the significant external investment the Japanese Government and the critical role of the Cul-De-Sac bridge in reducing flood risks within the Cul-De-Sac basin and supporting the economy of the island, efforts should be made to ensure its successful completion. Reliance solely on the standard operating procedures of the MIPEL is insufficient to provide project management guidance.

An effective project management plan will serve as a blueprint to guide the execution of the project and increase the likelihood of success. The successful completion of the project will result in stakeholder satisfaction, particularly the donor. It will also facilitate project performance monitoring.

The general objective of the Final Graduation Project was to develop a project management plan that considered all the necessary project management knowledge areas on how the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia, will be performed to ensure a successful project realization. The specific objectives were to create a project charter to initiate the project and document high level project information to facilitate the development of the project management plan; to develop a scope management plan to guide how the project scope will be defined, validated, and controlled; to develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule; to develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled; to develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives; to develop a resource management plan to guide the categorization, allocation, management, and release of project resources; to develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project; to develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels; to develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services; to develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement and to validate the project from a

regenerative/sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.

An analytic-synthetic method was predominantly used for the research as existing information was collected, analyzed, evaluated, and combined to develop the project management plan. The main information sources used in the research included the PMBOK® Guide (2017 and 2021), MIPEL standards and procedures, and journal articles.

The research resulted in the successful development of a detailed project management plan for the Project for Reconstruction of the Bridges in the Cul-De-Sac Basin (Phase: 1), Saint Lucia, which utilized all ten project knowledge areas established by the Project Management Institute (2017). Additionally, an analysis validated the project as regenerative and sustainable.

It is recommended that all changes are initiated using the change control process and that a change management plan be developed to serve as the overarching plan for managing changes. The communications management plan, stakeholder register, and risk register should also be updated to reflect changes throughout the project. It is also recommended that DIPE should implement a grievance regress mechanism as an approach to engaging the public and the project-affected community. Investment in specialized risk software and the employment of a risk management specialist to undertake quantitative risk analyses for projects implemented by the DIPE are also recommended. Additionally, the DIPE should consider the engagement of a monitoring and evaluation specialist to contribute to the delivery of high-quality and successful projects.

1 INTRODUCTION

1.1. Background

The economy of Saint Lucia is heavily dependent on the tourism sector. Transport infrastructure, such as roads and bridges, play a key role in providing accessibility, which is critical for the tourism sector. Saint Lucia, due to its geographical location, is prone to hydrometeorological hazards including tropical storms, hurricanes, and flooding.

The Cul-De-Sac Basin in Saint Lucia has had a long history of flooding. There are three bridges along the primary road network within the Cul-De-Sac Basin: Cul-De-Sac Bridge, Ferrands Bridge, and Ravine Poisson Bridge. The Ferrands and Ravine Poisson bridges form part of a critical link that connects the Capital, Castries, and the South of the island. The Hewannora International Airport is in the south. The Cul-De-Sac Bridge also forms part of a vital link that connects Castries and the West of the island. Many tourist attractions, including a UNESCO World Heritage Site, are in the West of the island. Additionally, the Cul-De-Sac Bridge provides access to the sole power plant and the oil storage facilities of the two key suppliers of petroleum products in Saint Lucia.

The GOSL, through grant aid from the Government of Japan, is embarking on a project, the Project for Reconstruction of Bridges in the Cul-De-Sac Basin, aimed at promoting the social and economic development of Saint Lucia by reconstructing the bridges, which are in vulnerable areas to natural disaster risks in the Cul-De-Sac Basin (Japan International Cooperation Agency: Nippon Koei Co., Ltd., 2017). The project is aligned with the mission of the Ministry of Infrastructure, Ports, Energy and Labour

(MIPEL) and will help the ministry to achieve its mandate to develop a superior network that promotes social and economic growth. The redesign and reconstruction of the three bridges will be undertaken in a phased approach, with the Cul-De-Sac Bridge as Phase 1, which will pave the way for the other two bridges through lessons learned.

The proposed project management plan is to ensure that the redesign and reconstruction of the Cul-De-Sac Bridge is completed successfully.

1.2. Statement of the problem

The MIPEL is implementing the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) and requires a project management plan to ensure the successful delivery of the project and fulfillment of the intended outcome.

The Government of Japan, through the Japan International Cooperation Agency (JICA), is providing a significant grant aid of approximately 13.9 million United States Dollars (Embassy of Japan in Trinidad and Tobago, 2017) for the redesign and reconstruction of the Cul-De-Sac Bridge. Given the high external investment in the project and the role the Cul-De-Sac Bridge plays in reducing flood risks in the basin and supporting the country's economy and social connections, it is imperative that every effort is made for the project to be successful.

The standard operating procedures of the MIPEL are not sufficiently detailed to provide guidance for project management. Furthermore, the standard operating procedures of the MIPEL do not conform to the guidelines of the Project Management Institute, which details best practices in project management. Reliance on only the standard operating

procedures of the MIPEL for the management of the project, therefore, may not facilitate the successful completion of the project. The identified deficiencies and the significant impact expected to result from the project emphasize the need for an effective project management plan to realize project success. The project management plan will be established on the knowledge areas, processes, tools, and techniques detailed in the PMBOK Guide (2017).

1.3. Purpose

Eja and Ramegowda (2020) indicated that lack or inadequacy of resources, poor project planning, changes in project scope, and poor communication are among the common causes of project failure, globally. Schedule delays and cost overruns due to various reasons have been experienced in past infrastructure projects implemented by the MIPEL. The failure of public infrastructure projects can have negative economic and social impacts. For instance, for externally funded public infrastructure projects, failure may result in loss of support from donors and the application of more stringent requirements and/or regulations by donors.

A project management plan is a key document to ensure the successful completion of a project. An effective project management plan will be developed as a blueprint to guide the execution of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) to increase the chances of achieving project success and benefit the project in other ways.

It is also often said that stakeholders can make or break a project. The Project Management Institute (2021) highlights that stakeholder engagement can affect the success of a project and can facilitate stronger project performance and outcomes and stakeholder satisfaction. An effective project management plan for the first phase is likely to result in a successfully completed project, which will result in donor satisfaction. Success may also increase the likelihood of the GOSL receiving grant-aid support for the redesign and reconstruction of the other two main bridges in the basin as well as future support for other infrastructure projects. Additionally, residents and businesses are the victims of past flood events; therefore, knowledge of their requirements is important for the success of the project. The project management plan through one of its subsidiary plans, the stakeholder engagement plan, will provide an effective strategy for the engagement of the residents and businesses that are impacted by the project to ensure their requirements are met.

The project management plan will include the scope, schedule, and cost baselines. Project Management Institute (2021) defines baselines as "the approved version of a work product or plan" (p. 188). The Project Management Institute (2021) indicates that a comparison of the actual performance and the baselines can identify variances. The evaluation of projects using baselines will enable the early identification of emerging issues for the appropriate remedies to be determined and implemented. The ability to assess the project performance in terms of cost, schedule, and scope is critical as schedule delays, cost overruns, and changes in scope are among the common causes of project failure.

1.4. General objective

To develop a project management plan that considers all the necessary project management knowledge areas on how the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia, will be performed to ensure a successful project realization.

1.5. Specific objectives

1. To create a project charter to initiate the project and document high-level project information to facilitate the development of the project management plan.
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.
3. To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.

8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.
9. To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.
11. To validate the project from a regenerative/sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.

2 THEORETICAL FRAMEWORK

This chapter explains the concepts and theories that underpin the research. It also provides information sources, the research methods and tools used to conduct the research, as well as provides specific insights on the organization where the study is conducted.

2.1 Company/Enterprise framework

In this sub-section, background information on the organization is provided as well as its mission and vision statements. The organizational structure of the organization and the products and/or services offered are also presented.

2.1.1 Company/Enterprise background

The MIPEL is a government ministry in Saint Lucia. The responsibility of the MIPEL encompasses, inter alia, transport, traffic safety, energy, public infrastructure, occupational health and safety, labour relations, and employment rights. The MIPEL is divided into two departments: the Department of Infrastructure, Ports and Energy (DIPE) and the Department of Labour. The role of the MIPEL is critical as infrastructure underpins the economic activity of a country.

One of the responsibilities of the DIPE is the development and maintenance of public infrastructure including the management of infrastructure projects. The execution of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) lies within the responsibility of the DIPE. This department may engage consultants for undertaking feasibility studies, preparation of detailed designs, and the supervision of construction projects based on the project size, complexity of the problem to be addressed, and the requirements of the funding agency or sponsor. The DIPE outsources contractors

for construction works. The procurement of consultancy services and works are guided by either local public procurement regulations and/or the procurement guidelines or policy of the sponsor. For the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), both a consultant and contractor will be outsourced. Maintenance works for public roads are performed both internally by the staff of the DIPE and externally by contractors.

The support of other governmental departments, including the Department of Finance, Department of Economic Development, and the Department of Physical Planning, is often necessary for the planning and execution of public infrastructure projects. Financial resources are critical for the success of any project. The Department of Finance is responsible for the management of the country's financial resources. The main sources of finance include public funds, grants, and loans. The Department of Economic Development is responsible for national planning, thus plays a fundamental role in development planning such as the planning of infrastructure development. Public infrastructure projects often require temporary and/or permanent land access, which may include the displacement and resettlement of people. Land acquisition for public projects lies within the jurisdiction of the Department of Planning.

2.1.2 Mission and vision statements

The mission of the MIPEL is "Creating an environment that fosters sustainable, social and economic growth of Saint Lucia through the development of: a superior road and transportation network; advanced global communication services; exceptional public utility

services; vigilant and well-equipped meteorological services; and a dynamic regulatory framework that fulfils the diverse needs of customers and stakeholders with a cadre of professional employees" (Ministry of Infrastructure, Ports, Transport, Physical Development and Urban Renewal, n.d.).

Its vision is "To be a flagship Ministry critical to the achievement of infrastructural and national development" (Ministry of Infrastructure, Ports, Transport, Physical Development and Urban Renewal, n.d.).

The redesign and reconstruction of the Cul-De-Sac Bridge will enhance resilience to flooding and ensure the road remains passable during the occurrence of natural hazards. This will help the ministry achieve its mandate to develop a superior road and transportation network that promotes social and economic growth. The project is also aligned with the ministry's vision as it will contribute to developing critical national infrastructure.

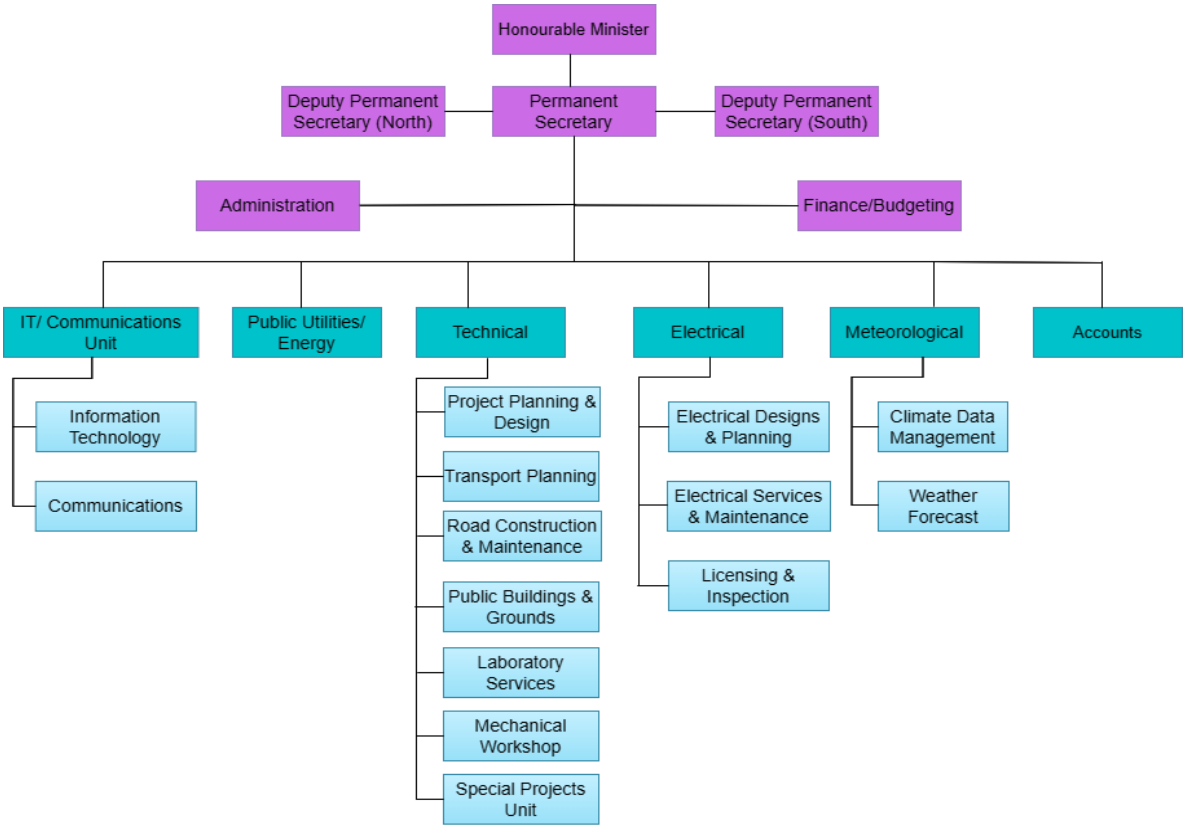
2.1.3 Organizational structure

The MIPEL is headed by a cabinet minister, whose ultimate responsibility is policy. Ministers are appointed by the Governor General on the advice of the Prime Minister, and the senators and members of the House of Assembly. Each of its two departments is supervised by a permanent secretary, a senior civil servant. For each department, the permanent secretary is the administrative head or accounting officer and has responsibility for the daily operations of the assigned department. A deputy permanent secretary supports the permanent secretary in each department. The DIPE achieves its mandate through six

divisions: IT/Communications, Public Utilities/Energy, Technical, Electrical, Meteorological, and Accounts. Each division is responsible for a unique function and is managed by a divisional head. The organizational structure for the DIPE is illustrated in Figure 1 below.

Figure 1

Organizational Structure of the DIPE (Source: Japan International Cooperation Agency: Nippon Koei Co., Ltd., 2017)



Note. Adapted from the *Preparatory Survey Report on The Project for Reconstruction of Bridges in Cul-De-Sac Basin in Saint Lucia*, by Japan International Cooperation Agency:

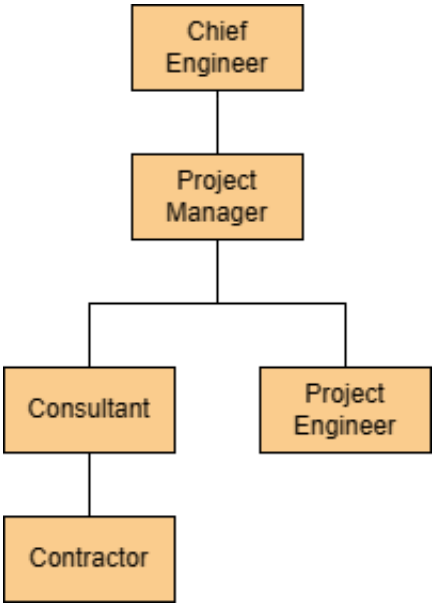
Nippon Koei Co., Ltd., 2017 (https://openjicareport.jica.go.jp/pdf/12291308_02.pdf), in the public domain.

As noted above, one function of the Technical Division is to execute road infrastructure projects, which include roads, bridges, drainage structures, and earth retaining structures. The Technical Division is led by a Chief Engineer, supported by a deputy chief engineer. There are seven units within the Technical Division: Project Planning and Design, Transport Planning, Road Construction and Maintenance, Public Buildings and Grounds, Laboratory Services, Mechanical Workshop and Special Projects. The management of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) falls under the responsibility of the Project Planning and Design Unit within the Technical Division.

The Project Planning and Design has not been established; however, an "Implementing Arm" exists. The organizational chart for the "Implementing Arm" is provided in Figure 2 below. The Chief Engineer acts as the head of the "Implementing Arm."

Figure 2

Organizational Structure of the Planning and Design Unit



Note. The organization chart of the "Implementing Arm" for the Project Planning and Design Unit is shown. Own work.

2.1.4 Products offered

The services of the DIPE include:

i. Planning, design, construction, and maintenance of road infrastructure including roads, bridges, drainage structures, earth retaining structures, traffic signs, pedestrian facilities, and bus stops.

ii. Planning, design, construction and maintenance of public buildings and grounds.

iii. Materials, soil, and field testing.

iv. Traffic safety including the installation of traffic signs, traffic signals, approval of traffic management plans and pedestrian crossing facilities.

v. Operations of air and seaports managed by the St. Lucia Air and Sea Ports Authority, a statutory body.

vi. Electrical inspection and licensing.

vii. Meteorological services including weather forecasting and climate data management.

viii. Energy planning and management.

The services to be provided under the Project for the Reconstruction of Bridges in Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) form part of planning, design, construction, and maintenance of road infrastructure.

2.2 Project Management concepts

The project management concepts established by the Project Management Institute (2021 and 2017) that guide the research are introduced here.

2.2.1 Project management principles

The Project Management Institute (2021) presents twelve principles of project management consistent with the values outlined in the PMI Code of Ethics and Professional Conduct (Project Management Institute, 2006). The principles are as follows:

i. Be a diligent, respectful, and caring steward.

ii. Create a collaborative project team environment.

iii. Effectively engage with stakeholders.

iv. Focus on value.

v. Recognize, evaluate, and respond to system interactions.

vi. Demonstrate leadership behaviours.

vii. Tailor based on context.

viii. Build quality into processes and deliverables.

ix. Navigate complexity.

x. Optimize risk responses.

xi. Embrace adaptability and resiliency.

xii. Enable change to achieve the envisioned future state.

The principles of project management are applicable to the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) and the developed project management plan. The principle of stewardship is upheld as the project is aligned with the vision and mission of the DIPE. The project will foster a collaborative team environment through the clear definition of roles and responsibilities, the establishment of a culture of respect and accountability, and the free exchange of information and knowledge sharing. The stakeholder engagement plan developed for the project ensures that all stakeholders are actively involved as necessary throughout the project lifecycle, based on the interest, potential influence, requirements, and expectations of each stakeholder documented in the stakeholder register. The project focuses on value as it seeks to minimize flood risks in a community with a long history of flooding. The quality management plan developed also contributes towards the creation of value. The risk management plan and communications management plan d are aligned with the principle of

systems thinking. Effective communication is an essential leadership skill. Consequently, the development of a communications management plan is consistent with the principle of leadership. The project management plan developed adopted a tailoring approach. The developed quality management plan ensures that the designed and constructed bridge conforms to the acceptance criteria. The developed risk management plan also ensures that risks are managed properly with the goal of reducing the impacts of negative risks (threats) and increasing that of positive risks (opportunities).

2.2.2 Project management domains

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)-Seventh Edition (Project Management Institute, 2021) details the eight project performance domains that collectively form an integrated system to allow the successful delivery of the project and achievement of the intended outcomes. The Project Management Institute (2021) defines a project performance domain as "a group of related activities that are critical for the effective delivery of project outcome" (p. 7). The project performance domains include:

i. stakeholders
ii. team
iii. a development approach and life cycle
iv. a plan
v. project work
vi. delivery

vii. measurement

viii. uncertainty.

The Project Management Institute (2021) defines a stakeholder as “an individual, group or organization that may affect, be affected by or perceive itself to be affected by a decision, activity, or outcome of a project, program or portfolio” (p. 8). Stakeholders may differ in the various phases of a project. The stakeholder performance domain includes stakeholder alignment and engagement to build and sustain positive relationships with stakeholders and promote satisfaction (Project Management Institute, 2021).

A project team is defined as “a set of individuals performing the work of the project to achieve its objectives” (Project Management Institute, 2021, p. 16). The team performance domain encompasses establishing an environment and culture to support the team in evolving into a high-performing project team, including identification of the activities required to encourage project team development and leadership behaviours from all project team members (Project Management Institute, 2021).

Within the development approach and life cycle performance domain, the development approach, delivery cadence, and project life cycle are established to optimize project outcomes. According to the Project Management Institute (2021), a development approach is “a method used to create and evolve the product, service, or result during the project life cycle such as the predictive, iterative, incremental, adaptive, or hybrid method” (p. 33).

The activities and functions affiliated with the initial, ongoing, evolving organization and coordination required for the delivery of the project deliverables and

outcomes are addressed in the planning performance domain (Project Management Institute, 2021). Planning ensures the development of a suitable approach to create the project deliverables, which drives the outcomes for which the project seeks to achieve.

The project work performance domain is related to establishing the processes and undertaking the work to enable the delivery of the expected deliverables and outcomes by the project team (Project Management Institute, 2021). It includes managing the flow of work, keeping the project team focused, communicating, managing physical resources, and procurement and monitoring changes that may have project implications.

Activities and functions for delivery of the intended scope and quality are addressed in the delivery performance domain (Project Management Institute, 2021), which is centred on meeting requirements, scope, and quality expectations to deliver the anticipated outputs that will drive expected outcomes.

The measurement performance domain entails project performance assessment and the implementation of appropriate responses to maintain optimal performance (Project Management Institute, 2021). It assesses the degree to which project deliveries and performance are meeting established metrics in the planning performance domain. Timely and accurate information about the project work and performance enables the project team to determine appropriate actions that should be taken to address existing or anticipated variances from the desired performance.

Uncertainties are inherent in project environments, which present threats and opportunities that project teams explore and evaluate to determine the appropriate responses. The Project Management Institute (2021) defines uncertainty as “a lack of

understanding and awareness of issues, events, paths to follow, or solutions to pursue" (p. 117). Several aspects of the environment may contribute to project uncertainty, including economic factors, technical considerations, legal constraints or requirements, the physical environment, ambiguity associated with not being aware of current or future conditions, and social, market and political influences (Project Management Institute, 2021).

Given that only the project management plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) will be developed in the FGP, the work, delivery, and measurement performance domains are not applicable.

2.2.3 Predictive, adaptative and hybrid projects

Predictive, adaptive and hybrid are the three commonly used development approaches. The selection of an appropriate development approach may be influenced by several factors, including the product, the service, the result, the project, and/or the involved organizations.

According to the Project Management Institute (2021), a predictive approach, also referred to as a waterfall approach, may be used for the following:

i. Projects where the project and products requirements are defined at project commencement.
ii. Projects involving a significant investment and a high level of risk requiring frequent reviews, change control mechanisms, and replanning between development phases.

In the early phases of predictive projects, the scope, schedule, cost, resource needs, and risks can be well defined with minimal changes as the project progresses. The level of uncertainty can be reduced early in predictive projects with upfront planning.

An adaptive approach is beneficial to projects in which the requirements are subject to a high level of uncertainty or volatility and are likely to change throughout the project (Project Management Institute, 2021). While a clear vision is established at the commencement of the project, the initial requirements are refined, detailed, changed, or replaced based on user feedback, the environment, or unexpected events. Adaptive approaches may use iterative and incremental strategies. The iterations, however, tend to get shorter and the product tends to evolve according to feedback from stakeholders. Some agile approaches may be considered adaptive.

The hybrid approach combines elements of the predictive and adaptive approaches, with more of the adaptive approach. A hybrid approach is useful when there is uncertainty or risk associated with the requirements (Project Management Institute, 2021). The hybrid approach uses an iterative or incremental approach. An iterative approach is beneficial for clarifying requirements and evaluating different options. Adequate capability may be produced to be deemed acceptable before the final iteration. An incremental approach produces a deliverable throughout a series of iterations with each iteration of a predetermined timeframe and adding functionality. The deliverable only achieves the capability to be considered as completed after the final iteration.

The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) will adopt a predictive approach. The undertaking of the necessary

stakeholder consultations, social and environmental impact assessments, topographical, hydraulic, hydrological, traffic, geological, and geotechnical surveys will enable the project and product (bridge and approach road) requirements to be defined at the start of the project.

2.2.4 Project management

The Project Management Institute (2021) defines project management as "the application of knowledge, skills, tools, and techniques to project activities to meet requirements" (p. 4). Project management is achieved through the application and integration of the appropriate project management processes identified for the project and it allows organizations to execute projects effectively and efficiently (Project Management Institute, 2017). Project management may also be defined as the application of processes, methods, skills, knowledge, and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters (Murray-Webster & Dalcher, 2019). On the contrary, project administration can be defined as the process of managing administrative tasks that enable project management teams to plan, execute, and successfully deliver projects (Landau, 2023).

The development of the FGP will require aspects of both project management and project administration.

2.2.5 Project management knowledge areas and processes

According to the Project Management Institute (2017), a knowledge area is "an identified area of project management defined by its knowledge requirements and described

in terms of its component processes, practices, inputs, outputs, tools, and techniques" (p. 23). The Project Management Institute (2017) outlines ten knowledge areas as follows:

i. Project Integration Management which "includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group" (p. 23).

ii. Project Scope Management which includes the required processes to ensure the project is inclusive of all the work required to successfully complete the project.

iii. Project Schedule Management which includes the processes necessary to complete the project in a timely manner.

iv. Project Cost Management which "includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget" (p. 24).

v. Project Quality Management which entails the processes for incorporating the quality policy of the organization regarding quality, planning, managing, and controlling the project and product quality requirements to meet the expectations of stakeholders.

vi. Project Resource Management which includes the processes for the identification, acquisition, and management of the resources necessary for the successful completion of the project.

vii. Project Communications Management which includes the processes necessary for timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and ultimate dissemination of project information.

viii. Project Risk Management which entails "the processes for conducting risk management planning, identification, analysis, response planning, response implantation, and monitoring risk on of project" (p. 24).

ix. Project Procurement Management which includes the processes required for purchasing or acquiring products, services, or results needed externally.

x. Project Stakeholder Management which includes the processes necessary for the identification of the people, groups, or organization that could be affected by the project, analysis of stakeholder expectations, and their impact on the project and the development of the appropriate management strategies for effective engagement of stakeholders in project decisions and execution.

The Project Management Institute (2017) categorizes the project management processes into five project management process groups as follows:

i. Initiating Process Group which includes the process(es) undertaken to define a project or a new phase of an existing project through obtaining authorization to commence the project or phase.

ii. Planning Process Group which entails the process(es) necessary for establishing the project scope, refining the objectives, and defining the course of action required for achieving the intended project objectives.

iii. Executing Process Group which includes the process(es) undertaken to complete the work defined in the project management plan to fulfil the project requirements.

iv. Monitoring and Controlling Process Group which entails the process(es) necessary for tracking, reviewing, and regulating the progress and performance of the project; identifying which changes to the plan are necessary; and initiating the corresponding changes.

v. Closing Process Group which includes the process(es) performed to close or complete the project, phase, or contract, formally.

Figure 3 presents a mapping of the project management process groups and the knowledge areas.

Figure 3

Project Management Process Groups and Knowledge Areas **(Source: Project Management Institute, 2017)**

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

Note. From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, 2017, p. 25.

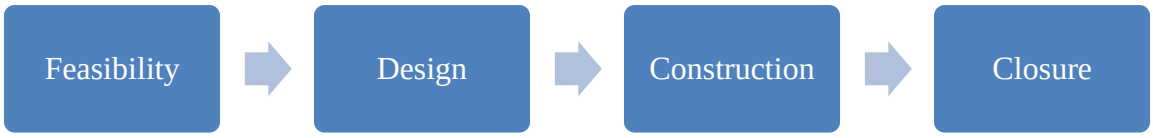
2.2.6 Project life cycle

A project life cycle is defined as “a series of phases that a project passes through from its start to completion” (Project Management Institute, 2021, p. 33). According to Bridges (2023), all projects go through the same cycle, which is made up of five stages: project initiation, project planning, project execution, project monitoring and controlling, and project closing. Bridges (2023) further indicates that each of the phases is needed to deliver the project effectively. The project life cycle is also described as “a step-by-step framework of best practices used to shepherd a project from its beginning to its end” (Coursera, 2023).

The life cycle of all major projects, within the Technical Division of the DIPE, includes four distinct stages: feasibility, design, construction, and closing. The life cycle of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) is illustrated in Figure 4 below.

Figure 4

Project Life Cycle



Note. The project life cycle for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge). Own work.

2.2.7 Company strategy, portfolios, programs and projects

The Project Management Institute (2021) describes a business strategy as "the reason for the project and all needs related to the strategy to achieve value" (p. 35). Brooks (2023) indicates that "a business strategy outlines the specific ways in which an organization plans to position itself, achieve its short-term and long-term goals, and grow over a period of time." A business strategy will assist with delivering value by ensuring projects are aligned with the strategic goals of the organization.

A project is defined as "a temporary endeavor undertaken to create a unique product, service, or result" (Project Management Institute, 2021, p. 4). The temporary nature of projects indicates specific start and end dates or a phase of the project work. While a project can stand alone, it may form part of a program or portfolio. Murray-Webster and Dalcher (2019) define a project as "a unique, transient endeavor, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes, or benefits."

The Project Management Institute (2021) defines a program as "related projects, subsidiary programs, and program activities that are managed in a coordinated manner to obtain benefits not available from managing them individually" (p. 4). Murray-Webster and Dalcher (2019) also describe a program as a unique and transient strategic endeavor undertaken for a beneficial change, which incorporates a group of related projects and business-as-usual activities.

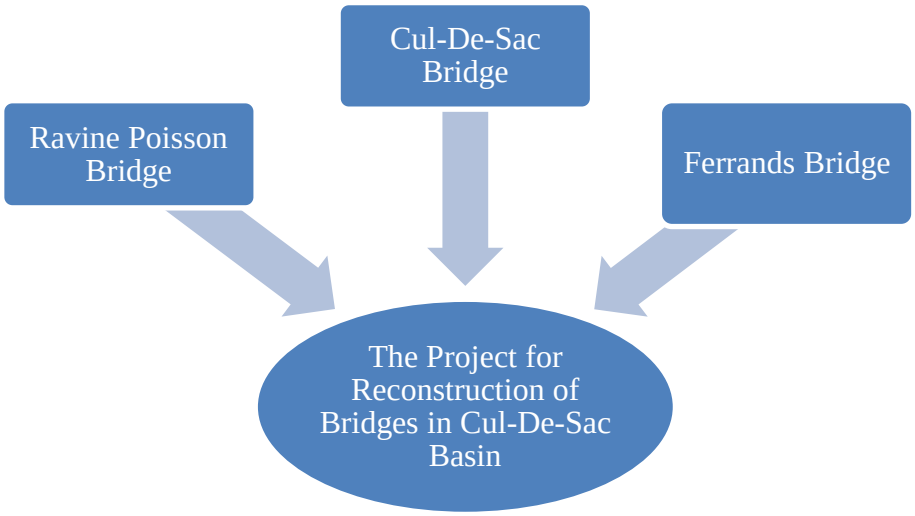
The Project Management Institute (2021) describes a portfolio as "projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic

objectives" (p. 4). Murray-Webster and Dalcher (2019) also define a portfolio as "a collection of projects and/or programmes used to structure and manage investments at an organizational or functional level to optimize strategic benefits or operational efficiency."

The FGP is a standalone. Therefore, it is a project. The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), however, forms part of a program as the redesign and reconstruction of all the major bridges and river training works within the Cul-De-Sac Basin must be undertaken to reduce flood risks in the Cul-De-Sac Basin.

Figure 5

Components of Main Project



Note. The components of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin for the creation of value. Own work.

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

This sub-section focuses on other concepts and theories related to the study. It provides an overview and significance of the problem to be addressed in the study and identifies and discusses previous studies related to the research problem.

2.3.1 Current situation of the problem or opportunity in study

The Project for Reconstruction of Bridges in the Cul-De-Sac Basin in Saint Lucia seeks to reduce the vulnerability of main roads within the Cul-De-Sac Basin to natural disasters by redesigning and reconstructing three main bridges. The Cul-De-Sac Bridge, which connects the North and West of the island will be the first bridge for redesign and reconstruction. The North is the capital, and several tourist attractions and accommodation facilities are in Soufriere, which is located on the West of the island. The economy of Saint Lucia is highly dependent on the tourism industry; therefore, the Cul-De-Sac Bridge is part of a critical link. The new bridge will be the longest bridge in Saint Lucia and its construction will include the use of new technology. As the first undertaking of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin, the redesign and reconstruction of the Cul-De-Sac Bridge will pave the way for the other two bridges to be redesigned and reconstructed through the lessons learned. A project management plan is therefore critical to ensure the success of the project.

2.3.2 Previous research done for the topic in study

Previous research has been undertaken to reduce flood risks within the Cul-De-Sac Basin. A Preparatory Survey Report (Japan International Cooperation Agency: Nippon Koei

Co., Ltd., 2017) has been specifically undertaken for the project, which includes inter alia background information, a description of the project, the requirements of the DIPE, the identification of possible solutions, the definition of the scope of the preferred solution, the presentation of a tentative project schedule, highlighting the potential social and environmental impacts, and the identification of persons that may affect or will be affected by the project. The information provided will serve as a key input for the development of the subsidiary project management plans.

2.3.3 Other theory related to the topic in study

Disaster risk reduction and sustainability

Disaster risk reduction forms an integral part of social and economic development and contributes towards sustainability. The project seeks to reduce the vulnerability of the main roads within the Cul-De-Sac Bridge to hydrometeorological hazards, including tropical storms, hurricanes, and flooding. Hydraulic structures like bridges play a critical role in storm water management. One of the fundamental strategies for reducing flood risk through the lens of sustainability is effective and efficient hydraulic structures. The project aims to deliver a bridge that can withstand the design storm event and serve the growing traffic demands.

3 METHODOLOGICAL FRAMEWORK

This chapter outlines the information sources, research methods, and tools used to conduct the research. It also details the assumptions and constraints of the research and the deliverables for the research.

3.1 Information sources

The sources from which information is obtained are called information sources. Information sources are classified based on the closeness to the original material content.

3.1.1 Primary sources

Primary sources provide a first-hand or contemporary account of the direct evidence regarding the concerned subject (Harvard Library, 2023). The main primary source for the FGP was the report summarizing the findings of the preparatory survey report conducted by the consultant.

3.1.2 Secondary sources

According to the Harvard Library (2023), secondary sources offer interpretation and analysis of primary sources. Secondary sources for the FGP include the project management standards and guide.

A summary of information sources is presented in Chart 1.

Chart 1

Information Sources

Objectives	Information sources	
	Primary	**Secondary**
1. To create a project charter to initiate the project and document high--level project information to facilitate the development of the project management plan.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017) • Government department websites • Sponsor website • Journal Articles from the PMI
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • Practice Standard for Work Breakdown Structures–Third Edition (2019) • PMBOK® Guide (2017) • Journal Articles from the PMI
3. To develop a schedule management plan to establish the criteria and activities for generating,	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021)

Objectives	Information sources	
	Primary	**Secondary**
monitoring, and controlling the project schedule.		• Practice Standard for Scheduling- Third Edition (2019) • PMBOK® Guide (2017) • Journal Articles from the PMI
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017) • Journal Articles from the PMI
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017) • Journal Articles from the PMI • Books on project quality management
6. To develop a resource management plan to guide the categorization, allocation, management,	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017)

Objectives	Information sources	
	Primary	**Secondary**
and release of project resources.		• Journal Articles from the PMI
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017) • Journal Articles from the PMI
8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • The Standard for Risk Management in Portfolios, Programs, and Projects (2019) • PMBOK® Guide (2017) • Journal Articles from the PMI
9. To develop a procurement management plan to outline the procurement	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021)

Objectives	Information sources	
	Primary	**Secondary**
activities to be undertaken for the acquisition of the required external goods and services.		• PMBOK® Guide (2017) • Journal Articles from the PMI • Procurement guidelines for Japanese grant aid • Procurement regulations for Saint Lucia
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.	• Sponsor/Consultant's Project Preparatory Survey Report	• Process Groups: A Practice Guide (2022) • PMBOK® Guide (2021) • PMBOK® Guide (2017) • Journal Articles from the PMI
11. To validate the project from a regenerative/sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.	• Sponsor/Consultant's Project Preparatory Survey Report	• The GPM® P5™ Standard (2023) • The GPM Reference Guide (2018) • United Nations webpage on Sustainable Development Goals • Journal Articles from the PMI

Note. Own work.

3.2 Research methods

Research methods are strategies, processes, or techniques employed in data collection to uncover new information or gain improved understanding of a subject. There are different types of research methods. In the FGP, the analytic-synthetic method was predominantly used as existing information will be collected, analyzed, evaluated, and combined to develop the required deliverable.

A summary of research methods is presented in Chart 2.

Chart 2

Research Methods

Objectives	**Research Method**
	Analytic-synthetic method
1. To create a project charter to initiate the project and document high-level project information to facilitate the development of the project management plan.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to create the project charter.
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the scope management plan.
3. To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the schedule management plan.
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the cost management plan.
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the quality management plan.

Objectives	Research Method
	Analytic-synthetic method
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the resource management plan.
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the communications management plan.
8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the risk management plan.
9. To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the procurement management plan.
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.	The information available from the sources highlighted in Chart 1 will be analyzed individually and synthesized to develop the stakeholder engagement plan.
11. To validate the project from a regenerative/sustainability perspective	The information available from the sources highlighted in Chart 1 will be

Objectives	Research Method
	Analytic-synthetic method
to identify and minimize any negative environmental, social, and economic impacts.	analyzed individually and synthesized to validate the project from a regenerate/sustainability perspective.

Note. Own work.

3.3 Tools

The Project Management Institute (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" (p. 725). Data gathering techniques were used to collect data and information from different sources. Data analysis techniques were used to process, analyze, and evaluate the collected data and information. Data representation techniques were also utilized to present or convey data and information in graphical representations. Decision-making tools were used to select an appropriate course of action from various alternatives. Other tools employed included templates and software program.

The summary of the tools used for the FGP is presented in Chart 3.

Chart 3

Tools Utilized for the FGP

Objectives	Tools
1. To create a project charter to initiate the project and document high level project information to facilitate the development of the project management plan.	• Expert judgement • Project Charter Template
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	• Expert judgement • Data analysis technique • Decomposition technique • Scope management plan template • Work breakdown structure generator
3. To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.	• Expert judgement • Data analysis technique • Decomposition technique • Dependency determination and integration • Analogous estimating • Parametric estimating • Schedule management plan template • Microsoft Project software
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	• Expert judgement • Data analysis technique • Analogous estimating • Parametric estimating • Microsoft Excel software

Objectives	Tools
	• Cost aggregation technique • Historical information review • Cost management plan template
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.	• Expert judgement • Decision-making technique • Test and inspection planning • Quality management plan template
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.	• Expert judgement • Data representation technique • Organizational theory • Resource management plan template
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.	• Expert judgement • Communication requirements analysis • Communication methods • Communication technology • Communication models • Communications management plan template
8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.	• Expert judgement • Data analysis technique • Risk management plan template • Risk register template • Microsoft Excel software
9. To develop a procurement management plan to outline the procurement activities to be	• Expert judgement • Data gathering technique • Data analysis technique

Objectives	Tools
undertaken for the acquisition of the required external goods and services.	• Source selection analysis • Procurement management plan template
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.	• Expert judgement • Data analysis technique • Data gathering technique • Decision-making technique • Data representation technique • Stakeholder engagement plan template • Stakeholder register template • Microsoft Excel Software
11. To validate the project from a regenerative/sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.	• Expert judgement • P5 Impact Analysis • Sustainable management plan template

Note. Own work.

3.4 Assumptions and constraints

The Project Management Institute (2021) defines an assumption as “a factor that is considered real, true, or certain, without proof or demonstration” (p. 174). On the contrary, a constraint is defined as “a limiting factor that affects the execution of a project, program, portfolio, or process” (Project Management Institute, 2021, p. 174).

The summary of assumptions and constraints is presented in Chart 4.

Chart 4

Assumptions and Constraints

Objectives	Assumptions	Constraints
1. To create a project charter to initiate the project and document high-level project information to facilitate the development of the project management plan.	• Adequate, high-level project information is available to facilitate the development of the project charter. • The researcher possesses the knowledge required to develop a project charter.	• The project charter must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the required work.
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	• Sufficient project information and details are available to facilitate the development of the scope management plan. • The researcher possesses the knowledge required to develop a scope management plan.	• The development of a scope management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
3. To develop a schedule management plan to establish the criteria and	• Sufficient project information and details are available to facilitate	• The schedule management plan must

Objectives	Assumptions	Constraints
activities for generating, monitoring, and controlling the project schedule.	the development of the schedule management plan. • The researcher possesses the knowledge required to develop a schedule management plan.	be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	• Sufficient project information and details are available to facilitate the development of the cost management plan. • The researcher possesses the knowledge required to develop a cost management plan.	• The cost management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.	• Sufficient project information and details are available to facilitate the development of the quality management plan. • The researcher possesses the knowledge required to develop a quality management plan.	• The quality management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and

Objectives	Assumptions	Constraints
		undertaking the work required.
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.	• Sufficient information and project details are available to facilitate the development of the resource management plan. • The researcher possesses the knowledge required to develop a resource management plan.	• The resource management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.	• Sufficient information and project details are available to facilitate the development of the communications management plan. • The researcher possesses the knowledge required to develop a communications management plan.	• The communications management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
8. To develop a risk management plan that defines how risk management activities	• Sufficient project information and details are available to facilitate	• The risk management plan must be completed within the specified time.

Objectives	Assumptions	Constraints
will be conducted to ensure project risks are kept at acceptable levels.	the development of a risk management plan. • The researcher possesses the knowledge required to develop a risk management plan.	• The researcher is the only human resource person conducting the research and undertaking the work required.
9. To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.	• Sufficient project information and details are available to facilitate the development of the procurement management plan. • The researcher possesses the knowledge required to develop a procurement management plan.	• The procurement management plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.	• Sufficient project information and details are available to facilitate the development of the stakeholder engagement plan. • The researcher possesses the knowledge required to develop a stakeholder management plan.	• The stakeholder engagement plan must be completed within the specified time. • The researcher is the only human resource person conducting the research and undertaking the work required.

Objectives	Assumptions	Constraints
11. To validate the project from a regenerative and sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.	• Information on the regenerative/sustainable considerations of the project are readily available. • The researcher possesses the required knowledge to validate the regeneration or sustainable aspects of the project.	• The validation of the regenerative/sustainability perspectives must be completed within the specified time. • The researcher is the only human resource person evaluating the regenerative and sustainable perspectives of the project.

Note. Own work.

3.5 Deliverables

The Project Management Institute (2017) defines a deliverable 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" (p.704).

A summary of deliverables is presented in Chart 5.

Chart 5

Deliverables

Objectives	Deliverables
1. To create a project charter to initiate the project and document high-level project information to facilitate the development of the project management plan.	Project charter that documents high-level information about the project.
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	Scope management plan that describes how the project scope will be defined, developed, monitored, controlled, and validated. It will include the scope baseline.
3. To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.	Schedule management plan that establishes the criteria and activities for developing, monitoring, and controlling the schedule. It will include the schedule baseline.
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	Cost management plan that details how the project costs will be planned, structured, and controlled. It will include the cost baseline.
5. To develop a quality management plan to outline how the policies, procedures, and guidelines will be implemented to achieve the project quality objectives.	Quality management plan that describes how policies, guidelines, and procedures will be implemented to realize the quality objectives of the project.

Objectives	Deliverables
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.	Resource management plan that guides how the project resources will be used, allocated, managed, and released.
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.	Communications management plan that details how the project communications will be planned, structured, implemented, and monitored to ensure it is effective.
8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.	Risk management plan details how the risk management activities of the project will be conducted. It will include the initial risk register for the project.
9. To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.	Procurement management plan that documents the activities to be undertaken to acquire the necessary goods and services externally.
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.	Stakeholder engagement plan that highlights the strategies and actions necessary to encourage the active and meaningful participation of stakeholders. It will include the development of the initial stakeholder register.
11. To validate the project from a regenerative/sustainability perspective	It will include the validation of the project from a regenerative or sustainability

Objectives	Deliverables
to identify and minimize any negative environmental, social, and economic impacts.	perspective. It will highlight the regenerative and sustainability perspectives of the project.

Note. Own work.

4 RESULTS

The results of the research are contained within this chapter. The project charter, scope, schedule, cost, quality, resource, communications, risk and procurement management plans, and the stakeholder engagement plan are presented. The change control process is also described.

4.1 Project integration management

4.1.1 Project charter

The project charter is one of the two outputs of the 'Develop Project Charter' process within project integration management. A project charter is defined as "a document issued by the project sponsor that formally authorizes the existence of a project and provides the project manager with authority to apply organizational resources to project activities" (Project Management Institute, 2017, p. 34). The project charter documents high-level information on the project to ensure mutual understanding among the project stakeholders. The project charter is presented in Chart 6 and details the project purpose, objectives, deliverables, assumptions, constraints, risks, budget, summary milestone schedule, and key stakeholders.

Chart 6

Project Charter

Date	**Project title**	
November 7, 2023	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia	
Project life cycle	Predictive	
Knowledge areas/ process groups	**Application areas (sector / activity)**	
Knowledge areas: Integration management Scope management Schedule management Cost management Quality management Resource management Communications management Risk management Procurement management Stakeholder management Process groups: Initiating Planning Executing Monitoring and control Closing	Transport infrastructure / bridge construction	
Tentative start date	**Tentative completion date**	**Duration (months)**
June 3, 2024	August 3, 2028	50 months

Project objectives (general and specific)

General objective

To redesign and reconstruct the Cul-De-Sac Bridge with a 500% increase in flow area to enable smooth traffic and enhance traffic safety, thereby promoting the social and economic development of Saint Lucia by reducing its vulnerability to natural hazards and climate change.

Specific objectives

1. To conduct a preparatory survey to assess the technical and economic viability of constructing a new Cul-De-Sac Bridge and determine the most feasible solution.
2. To prepare detailed engineering designs of the new bridge that considers climate change adaptation and disaster risk reduction and provide complete and detailed information to guide its construction.
3. To construct the new Cul-De- Sac Bridge in accordance with the engineering designs and technical specifications to ensure the safety and structural integrity of the newly constructed bridge.
4. To prepare a completion report to signal the closure of the project.

Justification or purpose of the project (Contribution and expected results)

The Cul-De-Sac Basin in Saint Lucia has had a long history of flooding. Flooding in the Cul-De-Sac Basin often results in damage to private property and public infrastructure, as well as business interruption and disruption of road transport, which hinder access to essential goods and services.

The economy of Saint Lucia is highly dependent on the tourism sector. Saint Lucia has experienced significant economic losses in terms of infrastructure due to natural disasters such as flooding. The Cul-De-Sac Bridge is along the primary road network in Saint Lucia and forms part of a critical link to the North and West of the island. The capital of Saint Lucia lies within the North of the island while the West is renowned for tourist attractions and hotel accommodation.

High discharges at the Cul-De-Sac Bridge during heavy rainfall are usually compounded by significant debris flows, resulting in overtopping due to the obstruction of flow caused by the

accumulation of woody debris at the bridge piers. This situation restricts the movement of goods, services, and people. Flooding in the area also renders business development unattractive. Additionally, climate change is projected to increase the intensity and frequency of extreme rainfall events, which is likely to increase flood risks.

The expected benefits of the project include:

1. The creation of short-term employment opportunities during the construction phase.
2. Disaster (flood) risk reduction and resilience to climate change in Saint Lucia.
3. Reduced damage and losses associated with flooding in the Cul-De-Sac Basin and Saint Lucia.
4. Enhanced aesthetics of the physical environment of Cul-De-Sac.
5. Enhanced attractiveness of the Cul-De-Sac area for business development.
6. Improved operational access to a section of the West Coast Road.

Description of the product or service that the project will generate – Final deliverables of the project

The final product of the project is a newly constructed Cul-De-Sac Bridge.

The main deliverables of the project will include:

1. Preparatory Survey Report
2. Design Reports (Draft and Final)
3. Constructed Bridge and Approach Road
4. As-Built Drawings and Maintenance Manual
5. Project Completion Report

Assumptions

The assumptions include:

1. Sufficient grant aid will be available as the primary funding source for the project.
2. The materials and equipment required for the construction works will be readily available and on island as needed.
3. Construction works will be negligibly impacted by adverse weather conditions.
4. The execution of the project will not be negatively impacted by outbreaks of infectious

diseases and occurrences of natural hazards.

5. The project budget will be a true reflection of the project's actual cost.
6. All suppliers (consultant and contractor) will remain involved in the project until its completion.
7. Economic conditions will remain the same throughout the duration of the project.
8. Early buy-in from project stakeholders (Cul-De-Sac community and motoring public) will be gained.
9. The preparatory survey and final design reports will be approved by the relevant approving and regulatory agencies in a timely manner.
10. The project estimated duration is a true representation of the time required to deliver the project.

Restrictions/Constraints

The constraints include:

1. The project must be completed within a timeframe of forty-eight (48) months.
2. The project budget must not be exceeded.
3. The construction of the bridge must follow a 6-day working week.
4. The procurement of suppliers (consultant and contractor) must in accordance with the procurement guidelines of the project sponsor (JICA) for grant aid.

Preliminary risk identification

The potential risks include:

1. As a result of economic environment changes, the cost of resources may change and impact the cost of the project.
2. As a result of the unavailability or insufficiency of grant aid, the execution of the project may be delayed or prevented.
3. As a result of disruptions in the supply of key construction materials, the project's schedule may be impacted, and the final product may be delayed.
4. As a result of a lack of a supplier's (consultant and contractor) ability to deliver in a timely manner, the project schedule may be impacted, and the final product may be delayed.

5. As a result of inclement weather conditions and the occurrence of natural hazards, the construction schedule may be negatively impacted and the final product delayed.
6. As a result of the outbreaks of infectious diseases, the project schedule may be impacted and the final product delayed.
7. As a result of delays in the approval of the preparatory survey report and final design report by approving and regulatory agencies, the project schedule may be delayed.
8. As a result of protests by the Cul-De-Sac community and motoring public, the execution of the project may be delayed.
9. As a result of design changes after the commencement of construction, the project schedule and cost may be negatively impacted.
10. As a result of poor assessment of utility infrastructure to be impacted by the project, the project schedule and cost may be negatively impacted.
11. As a result of non-compliant work by the contractor, there may be a need for reworking, which may delay the project.
12. As a result of labour disputes between the contractor and contractor's employees, the project may be delayed.
13. As a result of construction site accidents/incidents, the project may be delayed.

General resources and budget

Deliverables	Type of the Resource	Unit	Quantity	Unit Cost	Total cost
Preparatory Survey Report	Human, hiring	Sum	1	$ 1,520,000	$ 1,520,000
Design Reports (Draft and Final)	Human, hiring	Sum	1	$ 850,000	$ 850,000
Constructed Bridge and Approach Road	Human, hiring	Sum	1	$ 32,100,000	$ 32,100,000
As-Built Drawings and Maintenance Manual	Human, hiring	Sum	1	$ 25,000	$ 25,000
Project Completion Report	Human, hiring	Sum	1	$ 5,000	$ 5,000
				Total	$ 34,500,000

Milestone schedule	
Milestone name	End date
Project Commencement	June 3, 2024
Award of Contract to Successful Consultant	October 4, 2024
End of Feasibility Phase	June 15, 2025
End of Design Phase	November 30, 2025
Award of Contract to Successful Contractor	March 30, 2026
Commencement of Construction Phase	April 30, 2026
End of Construction Phase	March 30, 2028
Project Completion	August 3, 2028

Relevant historical information

The DIPE is a department within the MIPEL in Saint Lucia. The DIPE is the authority responsible for the development of the road infrastructure in Saint Lucia. The mission of the MIPEL is "Creating an environment that fosters sustainable, social, and economic growth of Saint Lucia through the development of a superior road and transportation network; advanced global communication services; exceptional public utility services; vigilant and well-equipped meteorological services; and a dynamic regulatory framework that fulfils the diverse needs of customers and stakeholders with a cadre of professional employees." (Ministry of Infrastructure, Ports, Transport, Physical Development and Urban Renewal, n.d.). In keeping with the MIPEL's mission, the DIPE over the past ten years has undertaken several projects involving the reconstruction and rehabilitation of roads and the reconstruction of bridges to improve the road network. Bridges that have been reconstructed in the past ten years include the Thomazo, Alba, and Bois D'orange bridges. The DIPE will be embarking on the Millennium Highway and West Coast Road Reconstruction Project simultaneously with this project. The aim of these two projects is to enhance the resilience of the West Coast Road.

Identification of interest groups (involved)	
Direct stakeholders	Indirect stakeholders
DIPE	Ministry of Agriculture, GOSL

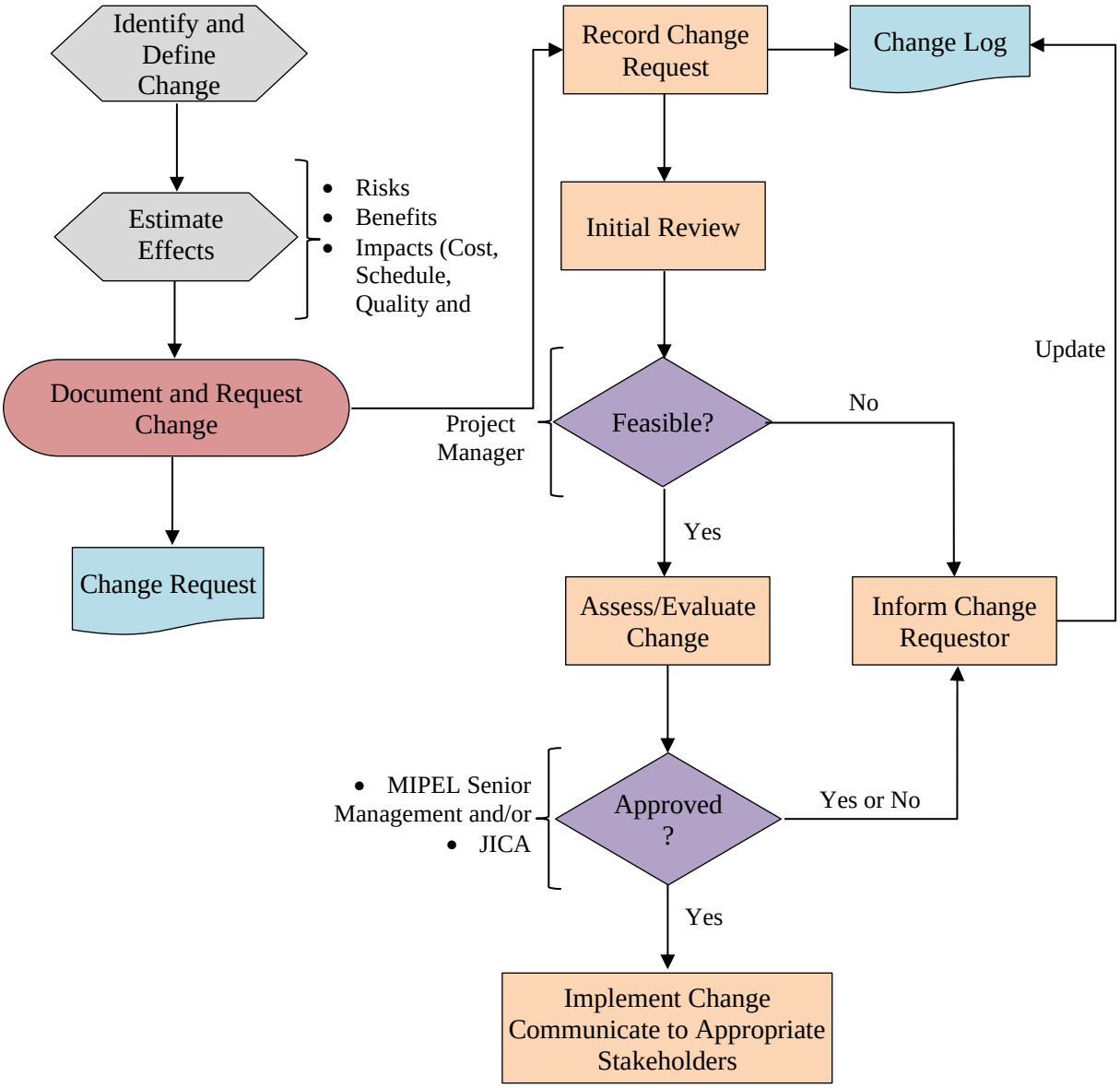
JICA Department of Finance, GOSL Department of Economic Development, GOSL Department of Physical Planning, GOSL Design and Supervision Consultant Main Contractor	Utility Companies (LUCELEC, WASCO, FLOW and Digicel) Project-Affected Community (Cul-De-Sac Residents, Vendors and Businesses) National Taxi Association National Council on Public Transportation Parliamentary Representatives for Cul-De-Sac Community General public Media
Name of the project manager:	**Signature:**
Name and position of the person authorizing (facilitator):	**Signature:**

4.1.2 Integrated change control process

The ‘Perform Integrated Change Control’ process is the process in which change requests are reviewed and the resolution of each request determined and communicated to the appropriate stakeholders (Project Management Institute, 2017). The Project Management Institute (2021) defines a change as “a modification to any formally controlled deliverable, project management plan component, or project document” (p. 236). The ‘Perform Integrated Change Control Process’ is performed throughout the project, from start through completion. A flowchart illustrating the change control process for the project is illustrated in Figure 6.

Figure 6

Flowchart for Change Control Process



Note. Own work.

The Project Management Institute (2017) recommends that all changes be recorded in written form. All requests for changes for the project will, therefore, be documented and submitted through a change request. A change request template is presented in Figure 7.

Figure 7

Change Request Template

CHANGE REQUEST	
Project Title:	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)

I. GENERAL INFORMATION ON CHANGE REQUESTED			
Request ID:		**Date Requested:**	
Requestor's Name:		**Date Required:**	
Change Classification:	□ Corrective Action □ Updates	□ Preventative Action	□ Other
Priority:	□ Low □ Medium	□ High	
Description of Change:			
Benefit/Reason for Change:			
Alternatives Considered:			

II. IMPACT ASSESSMENT	
Impact on Cost:	
Impact on Schedule:	
Impact on Scope:	
Impact on Quality:	
Impact on Resources:	
Contractual Implications:	

Other Impacts:	
Impact on Related Project(s):	
Associated Risks:	

III. INITIAL REVIEW (PROJECT MANAGER USE ONLY)			
Feasible?	□ Yes □ No		
Comments:			
Signature:		**Date:**	
Name:		**Title:**	Project Manager

IV. CHANGE EVALUATION (EVALUATING AUTHORITY USE ONLY)			
Disposition:	□ Approve □ Reject □ Defer		
Justification:			
Other Comments:			
Signature:		**Date:**	
Name:		**Title:**	

Note. Own work.

All submitted change requests will be recorded in a change log. A change log template is presented in Figure 8.

Figure 8

Change Log Template

THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CUL-DE-SAC BASIN (PHASE 1: CUL-DE-SAC BRIDGE)										
CHANGE LOG										
Request ID	Requestor's Name	Date Requested	Change Classification	Description of Change	Initial Review		Evaluation		Requestor Informed Date	Implementation Status
					Date	Feasible?	Date	Disposition		

Note. Own work.

4.2 Project scope management

4.2.1 Requirements traceability matrix

The requirements traceability matrix is an output of the ‘Collect Requirements’ process with project scope management. Product requirements from their origin are mapped to the deliverable through which they are satisfied in the requirements traceability matrix (Project Management Institute, 2017). According to the Project Management Institute (2021), a requirement is defined as “a condition or capability that is necessary to be present in a product, service, or result to satisfy a need” (p. 81). The requirements traceability matrix for the project is presented in Chart 7.

Chart 7

Requirements Traceability Matrix

ID	Requirements description	Business needs, opportunities, goals, objectives	Project objectives	Source	Priority	WBS deliverable
01	A minimum of three options should be presented and evaluated as possible solutions.	To identify and evaluate different solutions to the identified problem.	To conduct a preparatory survey to assess the technical and economic viability of constructing a new Cul-De-Sac Bridge and determine the most feasible solution.	DIPE	High	Preparatory Survey Report
02	The bridge should be of a hollow slab type.	To design and construct a bridge of low cost.	To prepare detailed engineering designs of the new bridge to provide complete and detailed information needed to guide its construction.	DIPE	High	Draft and Final Design Reports

ID	Requirements description	Business needs, opportunities, goals, objectives	Project objectives	Source	Priority	WBS deliverable
03	The minimum width of the bridge should be 10.5 m and should accommodate two lanes and sidewalks along both sides.	To meet the anticipated traffic demands and improve the safety of pedestrians.	To prepare detailed engineering designs of the new bridge and provide complete and detailed information needed to guide its construction.	DIPE	High	Draft and Final Design Reports
04	The bridge span clearance should accommodate the high-water level of a 50-year flood.	To improve the resilience of critical national infrastructure.	To prepare detailed engineering designs of the new bridge to provide complete and detailed information needed to guide its construction.	DIPE	High	Draft and Final Design Reports
05	The maximum span of the bridge should be 25 m.	To ensure a safe, structurally sound, and durable bridge.	To prepare detailed engineering designs of the new bridge and provide complete and	DIPE	High	Draft and Final Design Reports

ID	Requirements description	Business needs, opportunities, goals, objectives	Project objectives	Source	Priority	WBS deliverable
			detailed information needed to guide its construction.			
06	The new bridge, approach road drainage, and river structures must be designed in accordance with prevailing design standards in Japan, except for the seismic design aspects which must be in accordance with that of Saint Lucia.	To ensure a compliant design.	To prepare detailed engineering designs of the new bridge and to provide complete and detailed information needed to guide its construction.	Project Sponsor (JICA)	High	Draft and Final Design Reports
07	Utility companies must be consulted and accept the design of utility accommodations.	To ensure adequate provisions for utilities.	To prepare detailed engineering designs of the new bridge and to provide complete and detailed information	Utility Companies (WASCO, LUCELEC,	High	Draft and Final Design Reports

ID	Requirements description	Business needs, opportunities, goals, objectives	Project objectives	Source	Priority	WBS deliverable
			needed to guide its construction.	FLOW and Digicel)		
08	The new bridge, approach road, and drainage and river structures must be constructed in accordance with the contract document (technical specifications and drawings).	To ensure a safe, structurally sound, and durable bridge.	To construct the new Cul-De- Sac Bridge in accordance with the engineering designs and technical specifications to ensure the safety and structural integrity of the newly constructed bridge	DIPE	High	Constructed Bridge
09	Proper coordination of the utility relocation works, and sufficient notice should be given to utility companies prior to when the utility relocation works are anticipated to commence.	To ensure the project is completed in a timely manner.	To construct the new Cul-De- Sac Bridge in accordance with the engineering designs and technical specifications to ensure the safety and structural	Utility Companies (WASCO, LUCELEC, FLOW and Digicel)	High	Constructed Bridge

ID	Requirements description	Business needs, opportunities, goals, objectives	Project objectives	Source	Priority	WBS deliverable
			integrity of the newly constructed bridge			
10	Utility relocation works should be undertaken in a timely manner.	To ensure the project is completed in a timely manner.	To construct the new Cul-De- Sac Bridge in accordance with the engineering designs and technical specifications to ensure the safety and structural integrity of the newly constructed bridge	Main Contractor	High	Constructed Bridge
11	The project completion report must be submitted within six (6) months of the completion of the project.	To evaluate the overall success of the project.	To prepare a completion report to signal the closure of the project.	Project Sponsor (JICA)	High	Project Completion Report

4.2.2 Scope baseline

The scope baseline is an output of the ‘Create WBS’ process of project scope management. It consists of the approved version of the project scope statement, work breakdown structure (WBS), and the WBS dictionary (Project Management Institute, 2017). The scope baseline will be used as a basis for comparison between actual and planned results.

4.2.2.1 Project scope statement

The scope statement is the output of the ‘Define Scope’ process of project scope management. According to the Project Management Institute (2017), the project scope statement is described as “the description of the project scope, major deliverables, and exclusions” (p. 154). It facilitates a mutual understanding of the project scope among project stakeholders. The project scope statement includes the project scope description, deliverables, acceptance criteria, and exclusions, and it is presented in Chart 8.

Chart 8

Project Scope Statement

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	December 4, 2023

Project scope description
The project scope involves the design and construction of a hollow slab bridge and its southern approach road, including drainage and river structures, road safety facilities, and accommodation for utilities. The new bridge will replace the existing Cul-De-Sac Bridge to reduce the flood risks of the Cul-De-Sac Basin.

Project deliverables
The project deliverables are as follows: 1. A preparatory survey report. 2. A draft design report. 3. A final design report. 4. A constructed bridge and its southern approach road 5. As-built drawings and maintenance manual 6. A project completion report.

Acceptance criteria
The acceptance criteria for each deliverable are as follows: 1. Preparatory Survey Report a. Undertaking all tasks set out in the ‘Scope of Services of Consultant’ for the preparatory survey phase of the consulting service agreement between MIPEL and the Consultant.

b. Adherence to all requirements for the preparatory survey report set out in the 'Deliverables' Section of the Terms of Reference annexed to the consulting service agreement.

2. Draft Design Report
   a. Undertaking all tasks for the design phase set out in the 'Scope of Services of Consultant' for the design phase of the consulting service agreement between MIPEL and the Consultant.
   b. Conformance to all design requirements, including but not limited to design standards and structure types set out in the Terms of Reference annexed to the consulting service agreement.
   c. Adherence to all requirements for the draft design report set out in the 'Deliverables' Section of the Terms of Reference annexed to the consulting service agreement.
3. Final Design Report
   a. Incorporation of the review comments of the draft final report as agreed with the DIPE and JICA.
4. Constructed Bridge and its Southern Approach Road
   a. Conformance to the general conditions, technical specifications, and drawings of the contract between MIPEL and the contractor.
5. As-Built Drawings and Maintenance Manual
   a. Adherence to the requirements set out in the technical conditions of the contract between MIPEL and the contractor.
6. Project Completion Report
   a. Adherence to the report requirements set out by the project sponsor (JICA).

Project exclusions
The scope of the project excludes the following: 1. The construction of any temporary roads. 2. The design and construction of the northern bridge approach.

3. The design and construction of the tie-in of the existing West Coast Road and the southern approach of the new bridge.
4. The operation and maintenance of the new bridge and its approach road.

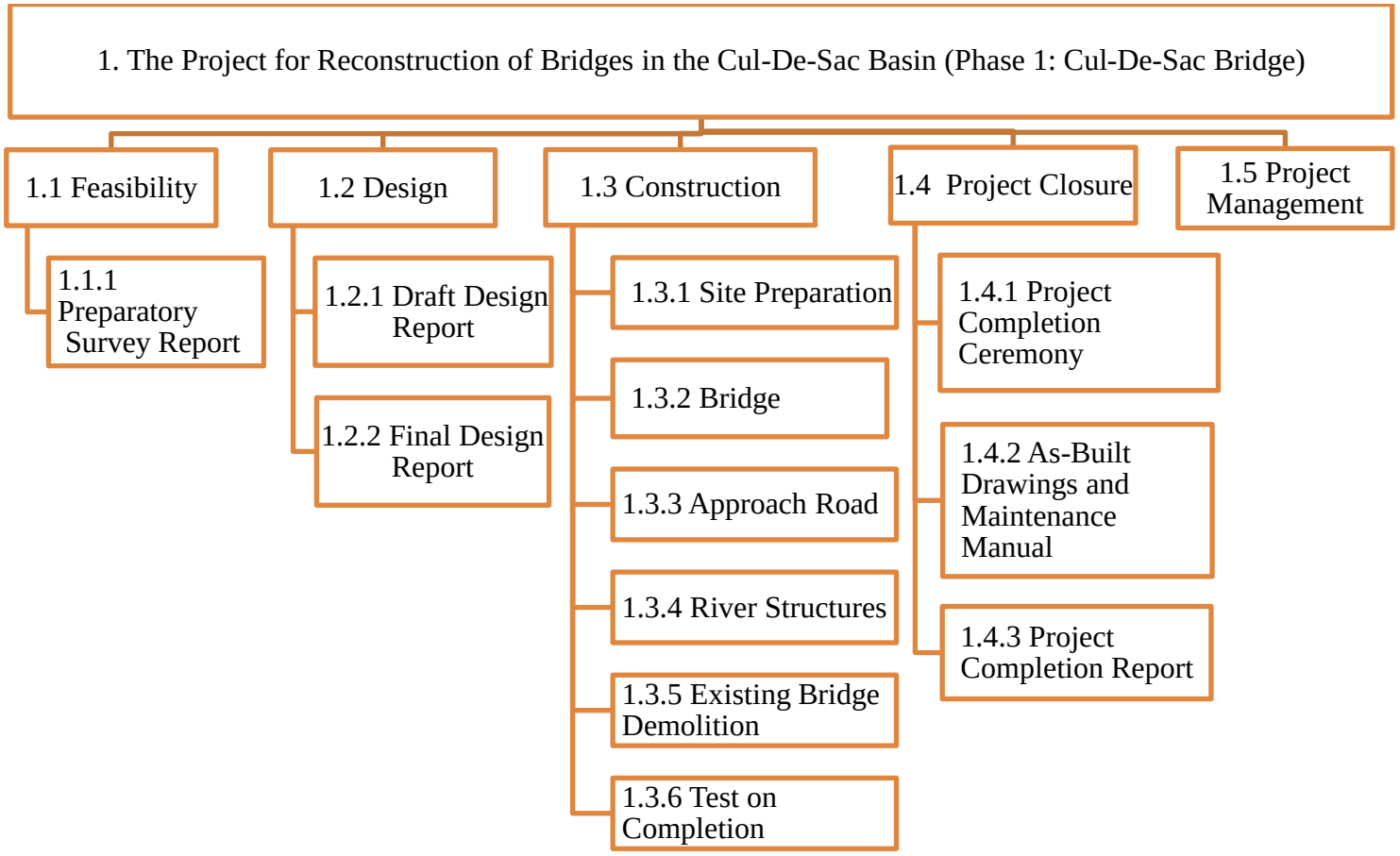
Note. Own work.

4.2.2.2 Work breakdown structure

The Project Management Institute (2021) defines a work breakdown structure (WBS) as a "hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the objectives and create the required deliverables" (p. 81). According to the Project Management Institute (2019a), the WBS can be represented in several forms. For the project, the WBS takes the form of using phases at the second level of decomposition with project level deliverables included at the third level. Project and contract management is added at the second level to capture the implementation of best project management practices and the management of contracts or agreements within the project. The WBS is illustrated in Figure 9 below.

Figure 9

Work Breakdown Structure



Note. Own work.

4.2.2.3 WBS dictionary

The WBS Dictionary supports the WBS and provides detailed information on each component in the WBS (Project Management Institute, 2017). The WBS is presented in Chart 9.

Chart 9

WBS Dictionary

Level	Code	Element name	Definition	Responsible organization
1	1	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)	All the work required to complete the project, which is the design and construction of a new Cul-De-Sac Bridge, including its southern approach road, drainage and river structures, road safety facilities, and accommodation of utilities.	MIPEL
2	1.2	Feasibility	It encompasses all the work required to assess the technical and economic viability of designing and constructing a new Cul-	Design and Supervision Consultant

Level	Code	Element name	Definition	Responsible organization
			De-Sac Bridge and determining the most feasible solution.	
3	1.1.1	Preparatory Survey Report	The preparatory survey report is a comprehensive report, which presents the findings of the preparatory survey. It is used to make an informed decision on whether to proceed with the project.	Design and Supervision Consultant
2	1.2	Design	The design encompasses all the work required to produce compliant designs of the new bridge and its approach road, drainage and river structures, and road safety facilities and accommodation of utilities.	Design and Supervision Consultant
3	1.2.1	Draft Design Report	The draft design report is the first version of the design report. The design report documents	Design and Supervision Consultant

Level	Code	Element name	Definition	Responsible organization
			the design process and its outcome. It provides the basis of the design.	
3	1.2.2	Final Design Report	The final design report incorporates the comments received from the review of the draft design report.	Design and Supervision Consultant.
2	1.3	Construction	It encompasses all the physical works involved in constructing the bridge and its southern approach road, drainage and river structures, traffic safety facilities, and accommodation of utilities in compliance with the drawings and technical specifications.	Main Contractor
3	1.3.1	Site Preparation	It involves all the work required to prepare the site for construction.	Main Contractor
3	1.3.2	Bridge	It involves the construction of the bridge in compliance with the drawings and technical specifications.	Main Contractor

Level	Code	Element name	Definition	Responsible organization
3	1.3.3	Approach Road	It involves the construction of the southern bridge approach in compliance with the drawings and technical specifications.	Main Contractor
3	1.3.4	River Structures	It involves the construction of all river structures in compliance with the drawings and technical specifications.	Main Contractor
3	1.3.5	Existing Bridge Demolition	It involves the full removal of the existing Cul-De-Sac Bridge.	Main Contractor
3	1.3.6	Test on Completion	It involves the full removal of the existing Cul-De-Sac Bridge.	Design and Supervision Consultant
2	1.4	Project Closure	It encompasses all the work required to bring the project to a closure.	Main Contractor; and DIPE
3	1.4.1	Project completion ceremony	It entails a ceremony to mark the completion of the feasibility, design and construction phases.	DIPE
3	1.4.2	As-Built Drawings and Maintenance Manual	The As-Built Drawings are a revised set of drawings that reflect all	Main Contractor

Level	Code	Element name	Definition	Responsible organization
			the changes made to the original drawings during the construction process. The Maintenance Manual provides essential details to upkeep the bridge and its approach road.	
2	1.4.3	Project Completion Report	The Project Completion Report summarizes the results of the project and the lessons learned and provides recommendations.	DIPE

Note. Own work.

4.3 Project schedule management

4.3.1 Schedule management plan

The schedule management plan is the output of the 'Plan Schedule Management' process within project schedule management. According to the Project Management Institute (2017), "the schedule management plan establishes the criteria and the activities for developing, monitoring and controlling the schedule" (p.181). The schedule management plan for the project is presented in Chart 10 below.

Chart 10

Schedule Management Plan

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Project schedule model development
Activities should be defined to identify the specific activities which must be performed to complete each deliverable. The decomposition technique should be employed to define activities. Activity sequencing should then be used to determine the logical order of the work for maximum efficiency by assigning logical relationships between activities. The duration of activities should be estimated to determine the approximate number of work periods required to complete each activity with the estimated resources. The availability of resources can influence activity durations; therefore, resources for activities should be determined prior to estimating activity durations. Parametric estimating should be used to estimate activity durations. In cases where this is not possible, analogous estimating should be used. Scheduling network analysis techniques, particularly the critical path method, should be employed in the development of the project schedule. Project schedules should be developed using MS Projects 2019. Project schedules should maintain the project's work breakdown structure and be presented in Gantt chart form. The initial project schedule should be reviewed by the project team for its acceptance, followed by approval from senior management of the DIPT and JICA. On the acceptance and approval of the project schedule, the first instance of the project model should be considered as the project baseline schedule model.

Level of accuracy

Activity duration estimates should include a contingency reserve of ten percent (10%) of the estimated activity duration.

Units of measure

The units of measure of all activities should be weeks, except for activities with short durations (less than a week), whose units of measure should be days.

Project schedule model maintenance

The schedule progress should be reviewed and reported monthly during the feasibility and design phases and bi-weekly during the construction phase. The date and time of each review should be noted as the status date. The reported progress should include the actual start date, the percent complete and the duration of time needed to complete activities that have started. For completed activities, the end dates should be reported.

The information gathered during the periodic reporting process should be incorporated into the project schedule model to generate an updated model. The newly updated schedule model should be compared to the current baseline schedule model to identify and explain variances. Any schedule variance outside of the acceptable threshold should be reported and analyzed further. This approach should stir discussion on possible ways to mitigate any unfavorable trends and slippages.

The schedule model should also be updated as needed to reflect any changes through the formal change control process to ensure the model is representative of the project's current scope.

The baseline schedule model should be reviewed monthly. A re-baseline may be necessary to reflect major changes resulting from the formal change control process or external events. The project team should first agree that any revisions to the baseline schedule model is an accurate representation of the project path forward, followed by approval by senior management of the DIPT and JICA. Once agreed and approved, it becomes the re-baseline.

Control thresholds
The project is only accepted to be behind schedule by one (1) week.

Rules of performance measurement
The percent complete will be calculated as the ratio of actual work to total work multiplied by 100. The schedule performance should be measured using the schedule variance and schedule performance index. Variance analysis should also be performed to determine the cause of any variances, estimate their implications on the work to be completed in the future, and determine the required corrective or preventative action.

Reporting formats
Reporting on schedule management is particularly critical during the construction phase. Schedule performance measurement should be included in the monthly status report during the construction phase. Variance analysis should be performed at the end of every week during the construction phase and the findings reported during the following weekly progress meeting. Reporting for all other phases of the project should be included in the quarterly status report.

Note. Own work.

4.3.2 Milestone list

The Project Management Institute (2017) defines a milestone as “a significant point or event in a project” (p. 186). The milestone list is an output of the ‘Define Activities’ process in project schedule management and identifies all project milestones. The milestone list for the project is presented in Chart 11.

Chart 11

Milestone List

Milestone ID	Milestone	Mandatory/ Optional	Completion date
001	Project Commencement	Mandatory	June 3, 2024
002	Award of Contract to Successful Consultant	Mandatory	October 4, 2024
003	End of Feasibility Phase	Mandatory	June 18, 2025
004	End of Design Phase	Mandatory	November 26, 2025
005	Award of Contract to Successful Consultant	Mandatory	April 1, 2026
006	Commencement of Construction Phase	Mandatory	April 29, 2026
007	End of Construction Phase	Mandatory	March 22, 2028
008	Project Completion	Mandatory	July 20, 2028

Note. Own work.

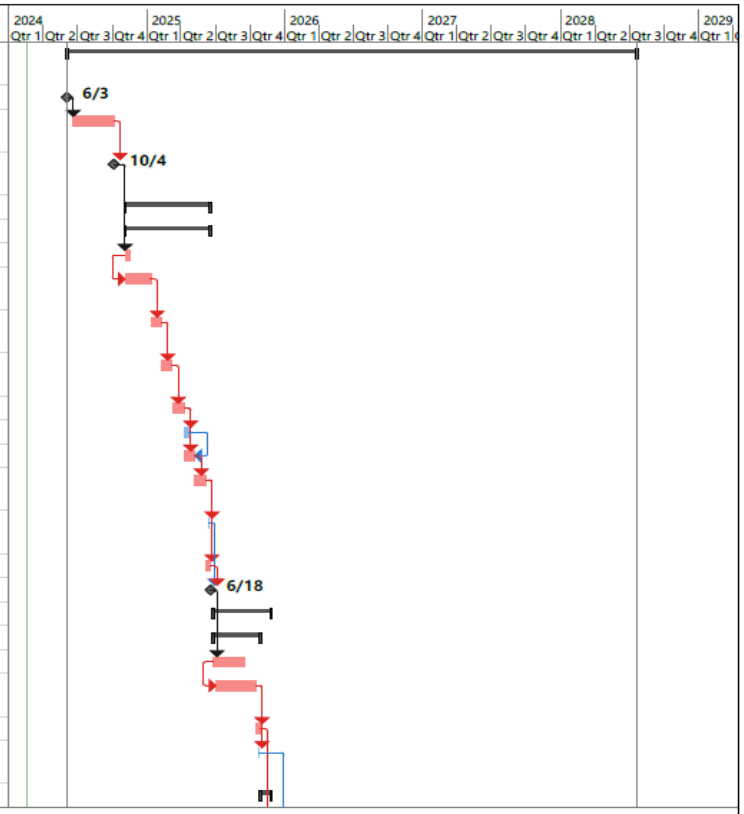
4.3.3 Project schedule

The project schedule is an output of the ‘Develop Schedule’ process within project schedule management which, at a minimum, includes planned start and end dates for each activity and may be presented in summary form or in detail (Project Management Institute, 2017). The project schedule depicting the planned start and end dates of each project activity, the critical path, and dates for milestones are presented as Gantt charts as illustrated in Figure 10.

Figure 10

Project Schedule

ID	Task Name	Duration	Start	Finish
1	**1 The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)**	**215.7 wks**	**Jun 3 '24**	**Jul 20 '28**
2	1.1 Project Commencement	0 wks	Jun 3 '24	Jun 3 '24
3	1.2 Project Management- Procurement of Consultant	16 wks	Jun 17 '24	Oct 4 '24
4	1.3 Project Management- Award of Contract to Successful Consultant	0 wks	Oct 4 '24	Oct 4 '24
5	**1.4 Feasibility**	**32.5 wks**	**Nov 4 '24**	**Jun 18 '25**
6	**1.4.1 Preparatory Survey Report**	**32.5 wks**	**Nov 4 '24**	**Jun 18 '25**
7	1.4.1.1 Carry out desk study	2 wks	Nov 4 '24	Nov 15 '24
8	1.4.1.2 Carry out engineering surveys and investigations	10 wks	Nov 4 '24	Jan 10 '25
9	1.4.1.3 Conduct hydrologic and hydraulic study	4 wks	Jan 13 '25	Feb 7 '25
10	1.4.1.4 Develop options and evaluate options	4 wks	Feb 10 '25	Mar 7 '25
11	1.4.1.5 Undertake preliminary designs	4.5 wks	Mar 10 '25	Apr 9 '25
12	1.4.1.6 Conduct an ESIA	2 wks	Apr 9 '25	Apr 23 '25
13	1.4.1.7 Assess project feasibility	4 wks	Apr 9 '25	May 7 '25
14	1.4.1.8 Prepare and submit Preparatory Survey Report	4 wks	May 7 '25	Jun 4 '25
15	1.4.1.9 Make a presentation on Preparatory Survey Report	1 day	Jun 11 '25	Jun 12 '25
16	1.4.1.10 Review Preparatory Survey Report	2 wks	Jun 4 '25	Jun 18 '25
17	1.4.1.11 End of Feasibility Phase	0 wks	Jun 18 '25	Jun 18 '25
18	**1.5 Design**	**22 wks**	**Jun 25 '25**	**Nov 26 '25**
19	**1.5.1 Draft Design Report**	**18 wks**	**Jun 25 '25**	**Oct 29 '25**
20	1.5.1.1 Undertake draft detailed designs	12 wks	Jun 25 '25	Sep 17 '25
21	1.5.1.2 Prepare and submit Draft Design Report	15 wks	Jul 2 '25	Oct 15 '25
22	1.5.1.3 Review Draft Design Report	2 wks	Oct 15 '25	Oct 29 '25
23	1.5.1.4 Make presentation on Draft Design Report	1 day	Oct 22 '25	Oct 23 '25
24	**1.5.2 Final Design Report**	**4 wks**	**Oct 29 '25**	**Nov 26 '25**

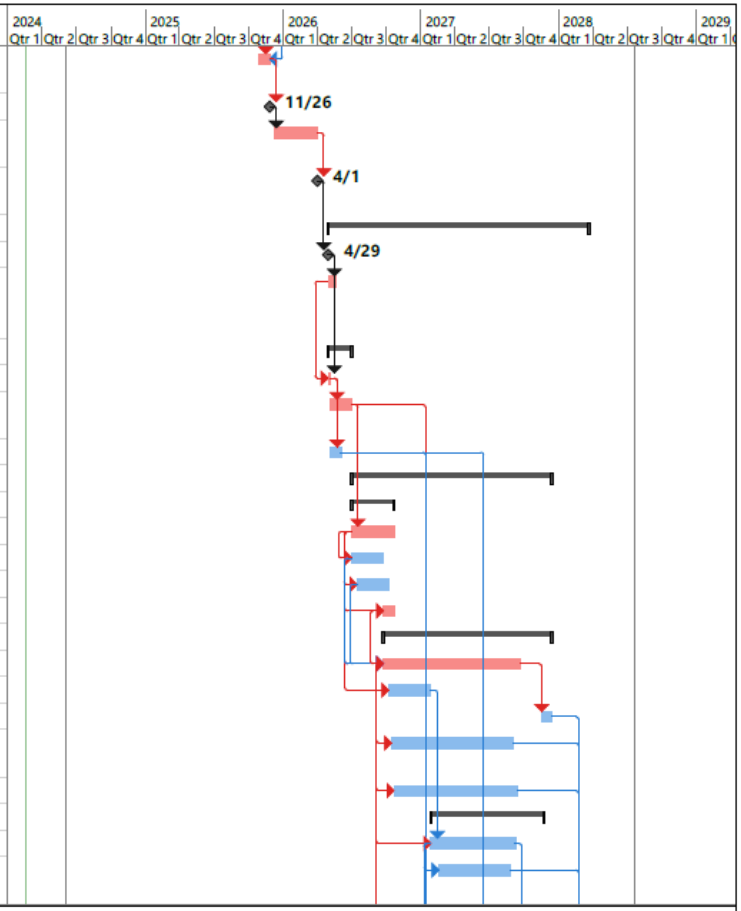


Project: BridgeProjectSchedule_
Date: Feb 19 '24

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

Page 1

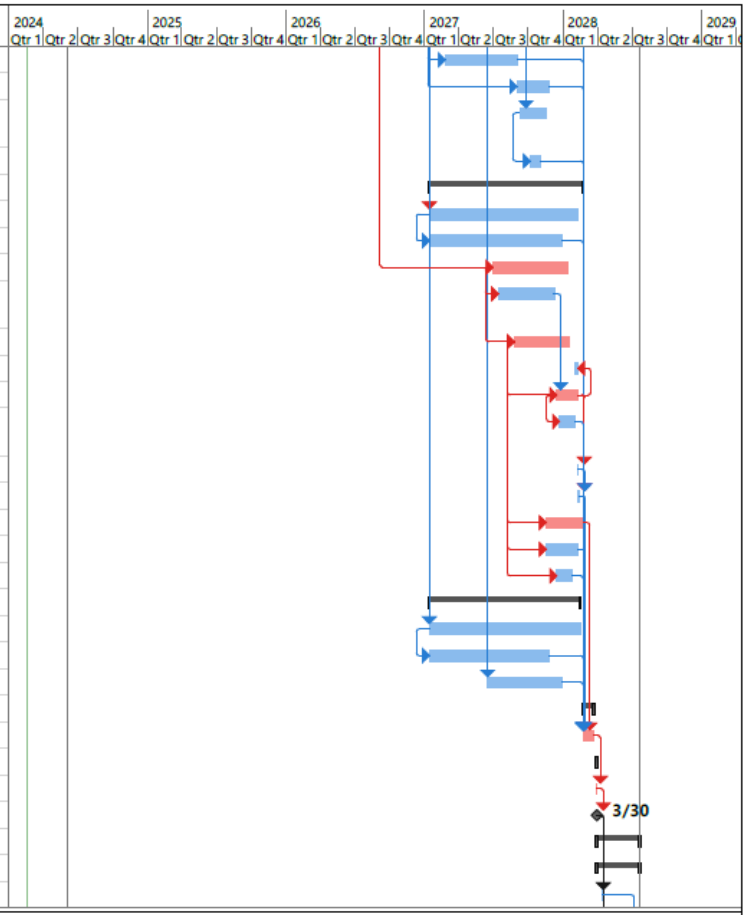
ID	Task Name	Duration	Start	Finish
25	1.5.2.1 Prepare and submit Final Design Report	4 wks	Oct 29 '25	Nov 26 '25
26	1.5.2.2 End of Design Phase	0 wks	Nov 26 '25	Nov 26 '25
27	1.6 Project Management-Procurement of Contractor	16 wks	Dec 10 '25	Apr 1 '26
28	1.7 Project Management- Award of Contract to Successful Contractor	0 wks	Apr 1 '26	Apr 1 '26
29	**1.8 Construction**	**99 wks**	**Apr 29 '26**	**Mar 22 '28**
30	1.8.1 Commencement of Construction Phase	0 wks	Apr 29 '26	Apr 29 '26
31	1.8.2 Prepare and submit construction methodology including health and safety plan and disaster management plan	3 wks	Apr 29 '26	May 20 '26
32	**1.8.3 Site Preparation**	**9 wks**	**Apr 29 '26**	**Jul 1 '26**
33	1.8.3.1 Perform construction staking	5 days	Apr 29 '26	May 6 '26
34	1.8.3.2 Undertake temporary utility relocation	8 wks	May 6 '26	Jul 1 '26
35	1.8.3.3 Clear the site	4 wks	May 6 '26	Jun 3 '26
36	**1.8.4 Bridge**	**76 wks**	**Jul 1 '26**	**Dec 15 '27**
37	**1.8.4.1 Foundation**	**16 wks**	**Jul 1 '26**	**Oct 21 '26**
38	1.8.4.1.1 Install concrete piles	16 wks	Jul 1 '26	Oct 21 '26
39	1.8.4.1.2 Inspect reinforcement for found	12 wks	Jul 1 '26	Sep 23 '26
40	1.8.4.1.3 Test concrete for foundation	12 wks	Jul 15 '26	Oct 7 '26
41	1.8.4.1.4 Perform concrete integrity tests	4 wks	Sep 23 '26	Oct 21 '26
42	**1.8.4.2 Substructures**	**64 wks**	**Sep 23 '26**	**Dec 15 '27**
43	1.8.4.2.1 Construct bridge abutments	52 wks	Sep 23 '26	Sep 22 '27
44	1.8.4.2.2 Construct bridge piers	16 wks	Oct 7 '26	Jan 27 '27
45	1.8.4.2.3 Construct bridge approach slab	4 wks	Nov 17 '27	Dec 15 '27
46	1.8.4.2.4 Inspect reinforcement for substructures	46 wks	Oct 14 '26	Sep 1 '27
47	1.8.4.2.5 Test concrete for substructures	47 wks	Oct 21 '26	Sep 15 '27
48	**1.8.4.3 Superstructure**	**43 wks**	**Jan 27 '27**	**Nov 24 '27**
49	1.8.4.3.1 Construct hollow slab	32 wks	Jan 27 '27	Sep 8 '27
50	1.8.4.3.2 Inspect reinforcement for superstructure	27 wks	Feb 17 '27	Aug 25 '27



Project: BridgeProjectSchedule_
Date: Feb 19 '24

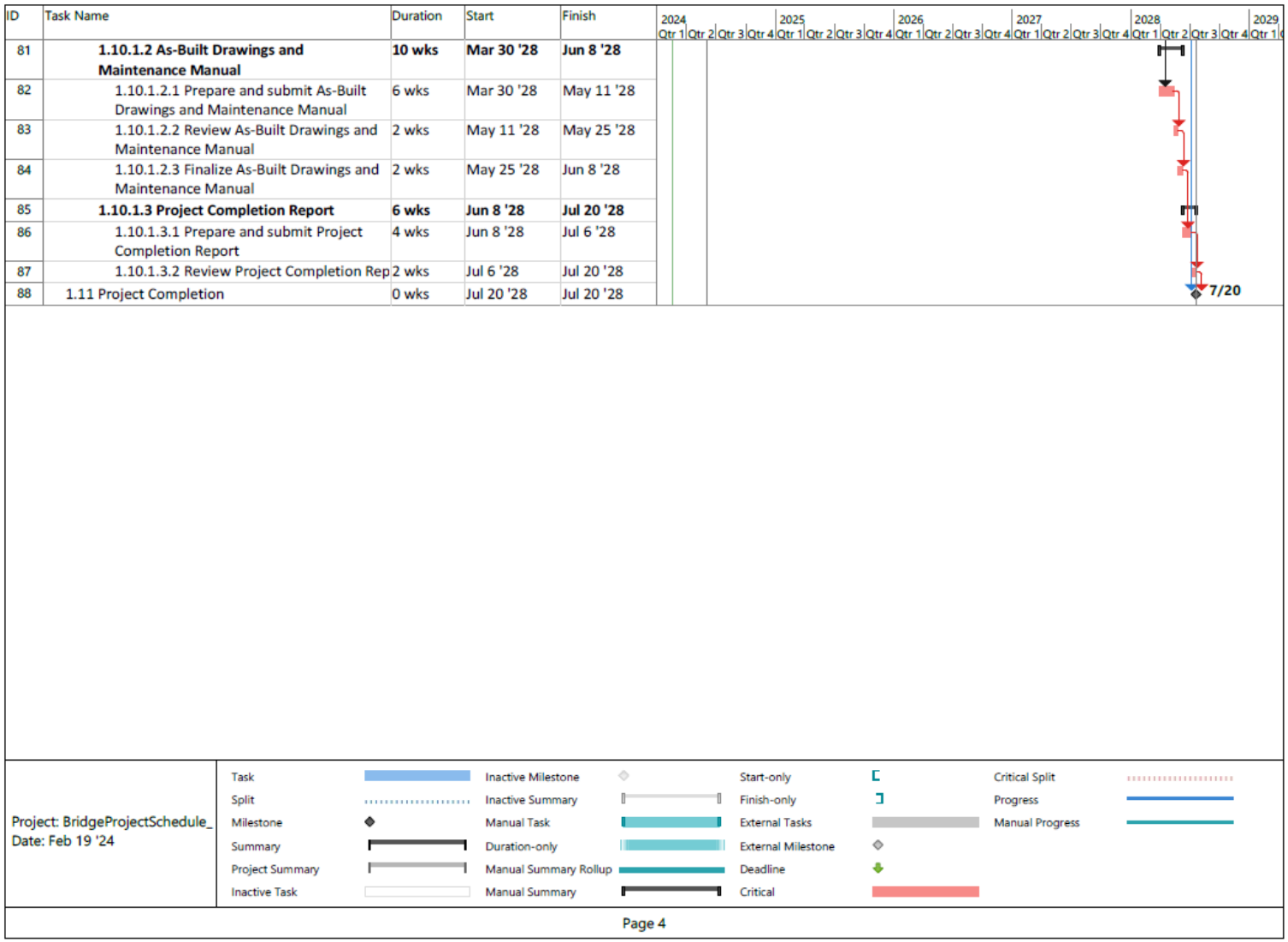
Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Critical
Critical Split
Progress
Manual Progress

ID	Task Name	Duration	Start	Finish
51	1.8.4.3.3 Test concrete for superstructure	27 wks	Feb 24 '27	Sep 1 '27
52	1.8.4.3.4 Install bridge accessories	12 wks	Sep 1 '27	Nov 24 '27
53	1.8.4.3.5 Undertake surfacing of bridge deck	10 wks	Sep 8 '27	Nov 17 '27
54	1.8.4.3.6 Install bridge railings	4 wks	Oct 6 '27	Nov 3 '27
55	**1.8.5 Approach Road**	**58 wks**	**Jan 13 '27**	**Feb 23 '28**
56	1.8.5.1 Construct drainage structures	56 wks	Jan 13 '27	Feb 9 '28
57	1.8.5.2 Inspect excavated areas	50 wks	Jan 13 '27	Dec 29 '27
58	1.8.5.3 Construct retaining walls	28 wks	Jun 30 '27	Jan 12 '28
59	1.8.5.4 Perform field density tests for embankment	21 wks	Jul 14 '27	Dec 8 '27
60	1.8.5.5 Install road accessories	21 wks	Aug 25 '27	Jan 19 '28
61	1.8.5.6 Test pavement materials	1 wk	Feb 2 '28	Feb 9 '28
62	1.8.5.7 Construct pavement structure	8 wks	Dec 15 '27	Feb 9 '28
63	1.8.5.8 Perform field density tests for pavement	6 wks	Dec 22 '27	Feb 2 '28
64	1.8.5.9 Perform asphalt core tests	0.2 wks	Feb 9 '28	Feb 10 '28
65	1.8.5.10 Install road markings	0.2 wks	Feb 10 '28	Feb 11 '28
66	1.8.5.11 Install road barriers	14 wks	Nov 17 '27	Feb 23 '28
67	1.8.5.12 Install streetlights	12 wks	Nov 17 '27	Feb 9 '28
68	1.8.5.13 Install traffic signs	6 wks	Dec 15 '27	Jan 26 '28
69	**1.8.6 River Structures**	**57 wks**	**Jan 13 '27**	**Feb 16 '28**
70	1.8.6.1 Construct riverbank protection	57 wks	Jan 13 '27	Feb 16 '28
71	1.8.6.2 Inspect excavated areas	45 wks	Jan 13 '27	Nov 24 '27
72	1.8.6.3 Construct riverbed protection	28 wks	Jun 16 '27	Dec 29 '27
73	**1.8.7 Existing Bridge Demolition**	**4 wks**	**Feb 23 '28**	**Mar 22 '28**
74	1.8.7.1 Demolish existing road and bridge	4 wks	Feb 23 '28	Mar 22 '28
75	**1.9 Test on Completion**	**0.2 wks**	**Mar 29 '28**	**Mar 30 '28**
76	1.9.1 Carry out test on completion	1 day	Mar 29 '28	Mar 30 '28
77	1.9.2 End of Construction Phase	0 wks	Mar 30 '28	Mar 30 '28
78	**1.10 Project Closure**	**16 wks**	**Mar 30 '28**	**Jul 20 '28**
79	**1.10.1 Project Completion Ceremony**	**16 wks**	**Mar 30 '28**	**Jul 20 '28**
80	1.10.1.1 Host project completion ceremony	1 day	Apr 13 '28	Apr 14 '28



Project: BridgeProjectSchedule_
Date: Feb 19 '24

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



Note. Own work.

4.4 Project cost management

4.4.1 Cost management plan

The ‘Plan Cost Management’ process offers guidance and direction on the management of project costs throughout the project (Project Management Institute, 2017). A cost management plan results from the ‘Plan Cost Management’ process within project cost management. The cost management plan describes procedures for planning, structuring, and controlling the project cost. The cost management plan for the project is presented in Chart 12.

Chart 12

Cost Management Plan

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Units of measure
The unit for all quantity measures should be sums, except for professional services. The unit of measure for professional services (human resources) should be person days. For the construction phase, the units of measure should be refined at the end of the design phase. A unit of measure should be provided for each item of work based on the approved final designs.

Currency

All costs in estimates should be expressed in Eastern Caribbean Dollars (XCD) and the United States Dollar (USD), as a fully convertible currency.

Level of precision

All cost estimates should be rounded up to the nearest XCD $100.

Level of accuracy

Cost estimates should include a contingency reserve of fifteen percent (15%) of the base cost of each work package.

Control thresholds

The acceptable cost variance range is ± 2%.

Rules of performance measurement

Measurement of control accounts should be performed at the end of each phase of the project, except the construction phase. Measurement of control accounts should be performed monthly during the construction phase.

Reporting formats

Reporting on cost management using earned value metrics (cost variance and cost performance index) should be reported in status/progress reports for all phases of the project. All cost variances outside of the acceptable thresholds should be reported, including the proposed corrective actions.

Additional details

1. Strategic funding

The project will be funded through grant aid from the Government of Japan and counterpart funding. Counterpart funding sources will be a combination of revenue, bonds, and loans.

2. Estimating techniques

Analogous estimating should be used to develop the initial cost estimates of the work packages. Following the design phase, the cost estimate for the construction control account should be refined using parametric estimating in which the direct cost will result from the product of the estimated quantities and unit rates.

b. Management reserve

The management reserve should be five percent (5%) of the base cost.

Note. Own work.

4.4.2 Cost estimates

Cost estimates are the key outputs of the 'Estimate Cost' process with project cost management, which determines required monetary resources for project completion (Project Management Institute, 2017). The cost estimates for the work pages are presented from Charts 13 to 23.

Chart 13

Preparatory Survey Report Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Chief consultant/highway engineer	Days	100	$ 2,700.00	$ 270,000.00
Bridge/structural engineer	Days	25	$ 2,400.00	$ 60,000.00
Hydraulics engineer	Days	50	$ 2,200.00	$ 110,000.00
Geotechnical engineer	Days	25	$ 2,400.00	$ 60,000.00
Environmental specialist	Days	50	$ 1,900.00	$ 95,000.00
Social/Gender specialist	Days	50	$ 1,900.00	$ 95,000.00
Transport economist	Days	20	$ 2,200.00	$ 44,000.00
CAD technician	Days	30	$ 1,400.00	$ 42,000.00
Administrative consultant	Days	100	$ 1,400.00	$ 140,000.00
Air and ground transportation	Sum	1	$ 54,000.00	$ 54,000.00
Per diem	Sum	1	$ 10,700.00	$ 10,700.00
Travel accommodation	Sum	1	$ 6,000.00	$ 6,000.00
Office accommodation	Sum	1	$ 20,000.00	$ 16,000.00
Surveys and investigations	Sum	1	$ 67,000.00	$ 67,000.00
Preparatory Survey Report printing and binding	Sum	1	$ 7,000.00	$ 7,000.00
Base cost				$1,080,700.00
Contingency reserve (15%)				$ 162,100.00
Sub-total				$1,242,800.00
Management reserve (5%)				$ 54,000.00
Estimated cost of Preparatory Survey Report				$1,296,800.00

Note. Own work.

Chart 14

Draft Design Report Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Chief consultant/Highway engineer	Days	55	$ 2,700.00	$ 148,500.00
Bridge/Structural engineer	Days	20	$ 2,400.00	$ 48,000.00
Hydraulics engineer	Days	30	$ 2,200.00	$ 66,000.00
Geotechnical engineer	Days	10	$ 2,400.00	$ 24,000.00
Environmental specialist	Days	5	$ 1,900.00	$ 9,500.00
Social/Gender specialist	Days	5	$ 1,900.00	$ 9,500.00
Transport economist	Days	5	$ 2,200.00	$ 11,000.00
CAD technician	Days	30	$ 1,400.00	$ 42,000.00
Administrative consultant	Days	55	$ 1,400.00	$ 77,000.00
Air and ground transportation	Sum	1	$30,000.00	$ 30,000.00
Per diem	Sum	1	$ 6,000.00	$ 6,000.00
Travel accommodation	Sum	1	$ 3,000.00	$ 3,000.00
Office accommodation	Sum	1	$10,000.00	$ 10,000.00
Surveys and investigations	Sum	1	$25,000.00	$ 25,000.00
Draft Design Report	Sum	1	$ 7,000.00	$ 7,000.00
Base cost				$ 516,500.00
Contingency reserve (15%)				$ 77,500.00
Sub-total				$ 594,000.00
Management reserve (5%)				$ 25,800.00
Estimated cost of Draft Design Report				$ 619,800.00

Note. Own work.

Chart 15

Final Design Report Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Chief consultant/Highway engineer	Days	10	$ 2,700.00	$ 27,000.00
Bridge/Structural engineer	Days	5	$ 2,400.00	$ 12,000.00
Hydraulics engineer	Days	5	$ 2,200.00	$ 11,000.00
Geotechnical engineer	Days	5	$ 2,400.00	$ 12,000.00
Environmental specialist	Days	2	$ 1,900.00	$ 3,800.00
Social/Gender specialist	Days	2	$ 1,900.00	$ 3,800.00
Transport economist	Days	2	$ 2,200.00	$ 4,400.00
CAD technician	Days	5	$ 1,400.00	$ 7,000.00
Administrative consultant	Days	10	$ 1,400.00	$ 14,000.00
Air and ground transportation	Sum	1	$ 3,000.00	$ 3,000.00
Per diem	Sum	1	$ 2,000.00	$ 2,000.00
Office accommodation	Sum	1	$ 3,000.00	$ 3,000.00
Final Design Report printing and binding	Sum	1	$ 7,000.00	$ 7,000.00
Base cost				$ 110,000.00
Contingency reserve (15%)				$ 16,500.00
Sub-total				$ 126,500.00
Management reserve (5%)				$ 5,500.00
Estimated cost of Final Design Report				$ 132,000.00

Note. Own work.

Chart 16

Site Preparation Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Construction supervision	Sum	1	$ 35,000.00	$ 35,000.00
Site surveying and layout	Sum	1	$ 5,000.00	$ 5,000.00
Temporary utility relocation	Sum	1	$300,000.00	$ 300,000.00
Site clearing	Sum	1	$ 50,000.00	$ 50,000.00
Base cost				$ 390,000.00
Contingency reserve (15%)				$ 58,500.00
Sub-total				$ 448,500.00
Management reserve (5%)				$ 19,500.00
Estimated cost of site preparation				$ 468,000.00

Note. Own work.

Chart 17

Bridge Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Construction supervision	Sum	1	$2,000,000.00	$ 2,000,000.00
Foundation	Sum	1	$4,210,000.00	$ 4,210,000.00
Substructures	Sum	1	$2,420,000.00	$ 2,420,000.00
Superstructure	Sum	1	$8,000,000.00	$ 8,000,000.00
Base cost				$16,630,000.00
Contingency reserve (15%)				$ 2,494,500.00
Sub-total				$19,124,500.00

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Management reserve (5%)				$ 831,500.00
Estimated cost of bridge				$19,956,000.00

Note. Own work.

Chart 18

Approach Road Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Construction supervision	Sum	1	$ 80,000.00	$ 80,000.00
Drainage structures	Sum	1	$ 620,000.00	$ 620,000.00
Retaining walls	Sum	1	$ 3,500,000.00	$ 3,500,000.00
Road accessories	Sum	1	$ 160,000.00	$ 160,000.00
Road pavement	Sum	1	$ 320,000.00	$ 320,000.00
Road markings	Sum	1	$ 145,000.00	$ 145,000.00
Road barriers	Sum	1	$ 185,000.00	$ 185,000.00
Streetlights	Sum	1	$ 125,000.00	$ 125,000.00
Traffic signs	Sum	1	$ 7,200.00	$ 7,200.00
Base cost				$ 5,142,200.00
Contingency reserve (15%)				$ 771,300.00
Sub-total				$ 5,913,500.00
Management reserve (5%)				$ 257,100.00
Estimated cost of approach road				$ 6,170,600.00

Note. Own work.

Chart 19

River Structures Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Construction supervision	Sum	1	$ 310,000.00	$ 310,000.00
Riverbank protection	Sum	1	$ 1,500,000.00	$ 1,500,000.00
Riverbed protection	Sum	1	$ 520,000.00	$ 520,000.00
Base cost				$ 2,330,000.00
Contingency reserve (15%)				$ 349,500.00
Sub-total				$ 2,679,500.00
Management reserve (5%)				$ 116,500.00
Estimated cost of river structures				$ 2,796,000.00

Note. Own work.

Chart 20

Existing Bridge Demolition Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Construction supervision	Sum	1	$ 15,000.00	$ 15,000.00
Demolition works	Sum	1	$ 150,000.00	$ 150,000.00
Base cost				$ 165,000.00
Contingency reserve (15%)				$ 24,800.00
Sub-total				$ 189,800.00
Management reserve (5%)				$ 8,300.00
Estimated cost of existing bridge demolition				$ 198,100.00

Note. Own work.

Chart 21

As-Built Drawings and Maintenance Manual Cost Estimate

Description	**Unit**	**Quantity**	**Unit cost (XCD)**	**Sub-total (XCD)**
As-Bult Drawings preparation	Sum	1	$ 8,000.00	$ 8,000.00
Maintenance Manual preparation	Sum	1	$ 5,000.00	$ 5,000.00
Revision of As-Bult Drawings and Maintenance Manual	Sum	1	$ 2,000.00	$ 2,000.00
Base cost				$ 15,000.00
Contingency reserve (15%)				$ 2,300.00
Sub-total				$ 17,300.00
Management reserve (5%)				$ 800.00
Estimated cost of As-Built Drawings and Maintenance Manual				$ 18,100.00

Note. Own work.

Chart 22

Project Completion Report Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Preparation of Completion Report	Sum	1	$ 2,500.00	$ 2,500.00
Base cost				$ 2,500.00
Contingency reserve (15%)				$ 400.00
Sub-total				$ 2,900.00
Management reserve (5%)				$ 100.00
Estimated cost of Project Completion Report				$ 3,000.00

Note. Own work.

Chart 23

Project Management Cost Estimate

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Project manager	Days	750	$ 1,000.00	$ 750,000.00
Project engineer	Days	600	$ 600.00	$ 360,000.00
Office accommodation and utility expenses	Sum	1	$ 300,000.00	$ 300,000.00
Office equipment and supplies	Sum	1	$ 100,000.00	$ 100,000.00
Transportation (local ground travel)	Sum	1	$ 155,000.00	$ 155,000.00

Description	Unit	Quantity	Unit cost (XCD)	Sub-total (XCD)
Stakeholder consultations	Sum	1	$ 50,000.00	$ 50,000.00
Base cost				$ 1,715,000.00
Contingency reserve (15%)				$ 257,300.00
Sub-total				$ 1,972,300.00
Management reserve (5%)				$ 85,800.00
Estimated cost of project management				$ 2,058,100.00

Note. Own work.

4.4.3 Cost baseline

The cost baseline results from the 'Determine Budget' process within project cost management. The cost baseline is defined as "the approved version of the time-phased project budget, excluding any management reserves, which can only be changed through formal change control procedure" (p. 254). The cost baseline facilitates the comparison with the actual cost. It is developed by aggregating the individual work package cost estimates and the contingency reserves. The cost baseline is presented in tabular form in Chart 24 and graphical form in Figure 11.

Chart 24

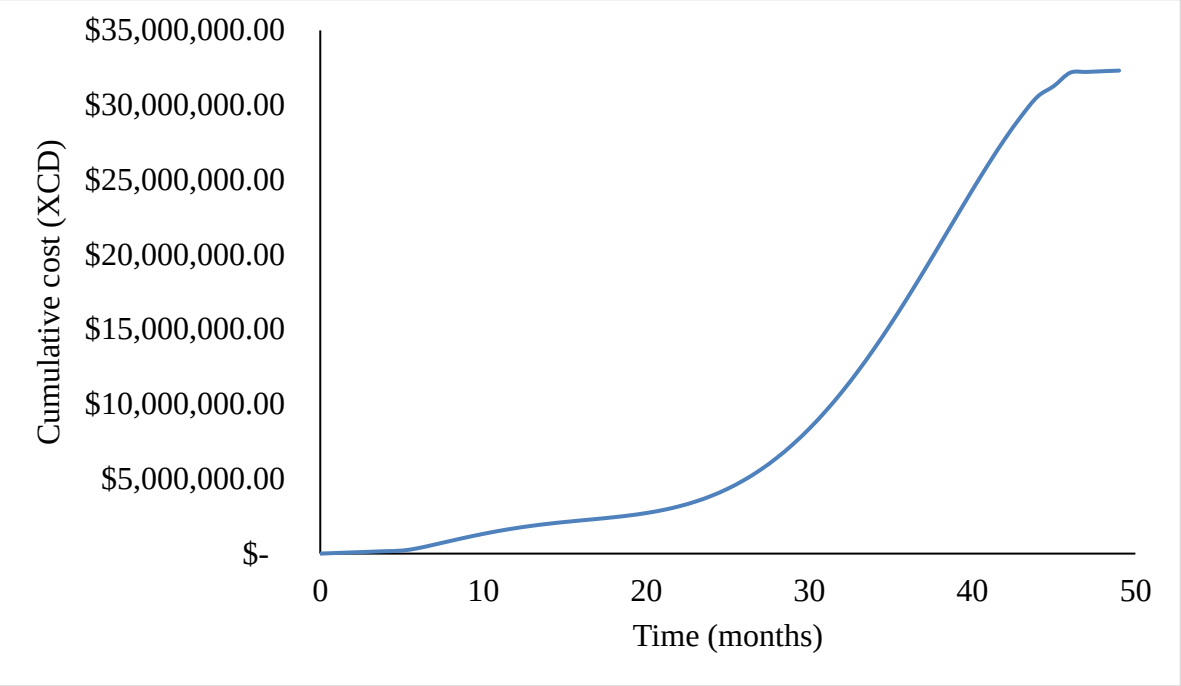
Cost Baseline Chart

WBS code	Work package	Base cost (XCD)	Contingency reserve (XCD)
1.1.1	Preparatory Survey Report	$ 1,080,700.00	$ 162,100.00
1.2.1	Draft Design Report	$ 516,500.00	$ 77,500.00
1.2.2	Final Design Report	$ 110,000.00	$ 16,500.00
1.3.1	Site preparation	$ 390,000.00	$ 58,500.00
1.3.2	Bridge	$ 16,630,000.00	$ 2,494,500.00
1.3.3	Approach road	$ 5,142,200.00	$ 771,300.00
1.3.4	River structures	$ 2,330,000.00	$ 349,500.00
1.3.5	Existing bridge demolition	$ 165,000.00	$ 24,800.00
1.4.1	As-Built Drawings and Maintenance Manual	$ 15,000.00	$ 2,300.00
1.4.2	Project Completion Report	$ 2,500.00	$ 400.00
1.5	Project management	$ 1,715,000.00	$ 257,300.00
Total		$ 28,096,900.00	$ 4,214,700.00
Cost baseline		$ 32,311,600.00	

Note. Own work.

Figure 11

Cost Baseline S-curve



Note. Own work.

4.4.4 Project budget

The project budget is determined by adding the management reserves to the cost baseline and is presented in Chart 25.

Chart 25

Project Budget Chart

WBS code	Work package	Estimated cost inclusive of contingency and management reserves (XCD)
1.1.1	Preparatory Survey Report	$ 1,296,800.00
1.2.1	Draft Design Report	$ 619,800.00
1.2.2	Final Design Report	$ 132,000.00
1.3.1	Site preparation	$ 468,000.00
1.3.2	Bridge	$ 19,956,000.00
1.3.3	Approach road	$ 6,170,600.00
1.3.4	River structures	$ 2,796,000.00
1.3.5	Existing bridge demolition	$ 198,100.00
1.4.1	As-Built Drawings and Maintenance Manual	$ 18,100.00
1.4.2	Project Completion Report	$ 3,000.00
1.5	Project management	$ 2,058,100.00
Project budget		$ 33,716,500.00

Note. Own work.

4.5 Project quality management

4.5.1 Quality management plan

The quality management plan is an output of the "Plan Quality Management" process with project quality management, which describes how quality will be managed and verified throughout the lifecycle of the project (Project Management Institute, 2017).

The purpose of the quality management plan is to ensure that the project achieves its quality objectives. The quality management plan for the project is presented in Chart 26.

Chart 26

Quality Management Plan

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Quality standards
The applicable standards and regulations are as follows: 1. Specifications, Guidelines, Standards and Manuals of the Japan Road Association 2. Japanese Industrial Standards 3. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHT0), 2001 4. AASHTO Guide for Design of Pavement Structures, 1993 5. Traffic Signs Drawing Manual, DIPE, 2017 6. Physical Planning and Development Act, Saint Lucia 7. Works and Roads Act, Saint Lucia

Quality objectives			
The overall quality objectives during project implementation are as follows:			
Quality objective	Metric/Measure	Target Value	Frequency

To deliver project scope on time	Schedule variance	0	Monthly for feasibility phases and weekly for construction phase
	Schedule performance index	1	Monthly for feasibility phases and weekly for construction phase
To deliver project scope within budget	Cost Variance	0	Monthly
	Cost performance index	1	Monthly
To undertake a feasibility study that meets all requirements.	Preparatory Survey Report accepted by the DIPE and JICA	Yes	Once
To produce a bridge and road design that satisfies all design requirements.	Final Design Report accepted by the DIPE and JICA	Yes	Once
To construct a bridge and its southern approach road in accordance with the contract document.	Certificate of Completion issued by the DIPE	Yes	Once
To produce As-Built Drawings reflective of the actual construction	As-Built Drawings approved by the Design and Supervision Consultant	Yes	Once
To produce a Maintenance Manual that considers all elements constructed	Maintenance Manual approved by the Design and	Yes	Once

	Supervision Consultant		
To submit a project completion report that provides all the required information	Project Completion Report accepted by JICA.	Yes	Once

The quality objectives post project completion are as follows:

Quality objective	Measure
To meet overall project objectives	1. Number of impassable cars due to road blockage (per annum) 2. Number of days of road closure due to overtopping (per annum)

Quality roles and responsibilities

The roles and responsibilities to manage the project quality are as follows:

Role	Responsibilities
DIPE senior management	Monitors work performance
Project manager, DIPE	Overall oversight of all quality control and assurance procedures for the project.
Project engineer, DIPE	Assists project manager with overseeing quality control and assurance procedures for the project.
DIPE and JICA design review teams	Review/evaluate the Preparatory Survey Report and Draft Final Reports ensuring all requirements are satisfied.
JICA	Monitors work performance and conducts post completion evaluation.

	Reviews all procurement processes undertaken by the DIPE to ensure compliance with the procurement guidelines.
Design and supervision consultant	Complies with feasibility study and design requirements and quality standards, and ensures the construction works performed by the main contractor comply with the quality standards and requirements.
Main contractor	Complies with the quality standards and regulatory requirements for construction works and participates in quality control activities.

Project deliverables and processes subject to quality review

All project deliverables will be subject to quality review.

Quality control and quality management activities

The quality control and quality management activities will be as follows:

Project phase	Activity description	Frequency
Feasibility	Review of Preparatory Survey Report to ensure all requirements are satisfied	Once
Design	Review of the Draft Design Report to ensure all requirements are met	Once
Construction	Inspection of excavation	As needed after every excavation
	Perform pile integrity test	One per substructure

	Test concrete mix design	Once for each required concrete strength
	Perform 7 and 28-day concrete compressive strength test	As needed for each concrete placement
	Inspection of reinforcement for all concrete works	As needed prior to each concrete placement
	Perform concrete slump and air content tests	Once every batch
	Perform material tests (sieve gradation, liquid limit, plastic index, aggregate strength, and aggregate density) for base and sub-base course materials	Once
	Perform field density test for placement of sub-base and base courses	Once for each layer
	Test asphalt mix design	Once
	Test asphalt	Once every batch or as required by Design and Supervision Consultant
	Perform asphalt core testing	As required by Design and Supervision Consultant
	Conduct test on completion	Once
Project Completion	Review of As-Built Drawings to ensure it is reflective of the actual construction	Once
	Review the Maintenance Manual to ensure it provides details for the upkeep of all constructed elements	Once

	Review the Project Completion Report to ensure all required information is provided.	Once

Quality tools

The following tools and techniques will be used:

1. Document analysis: Document analysis will include test reports and quality reports.
2. Audits: Audits will be conducted by GOSL's internal audit department.
3. Root cause analysis: Root cause analysis will be used to identify the underlying cause of any defect during the construction phase.
4. Problem solving: A structured problem-solving method will be used to determine the best solution for any quality problem that may arise.

Procedures for dealing with nonconformance and implementing corrective actions

1. The Design and Supervision Consultant will inform the Main Contractor and the DIPE simultaneously of any nonconformance during the construction phase.
2. The Main Contractor will propose corrective actions for resolving all nonconformance during the construction phase for approval by the Design and Supervision Consultant.
3. The Main Contractor will inform the Design and Supervision Consultant of when the corrective action will be implemented.
4. The Main Contractor will implement and bear the cost of the corrective action.
5. The Design and Supervision Consultant will supervise the implementation of the corrective action and approve the works.

Note. Own work.

4.6 Project resource management

4.6.1 Resource management plan

The resource management plan results from the "Plan Resource Management" process within project resource management, which describes how resources will be estimated, acquired, allocated, and managed (Project Management Institute, 2017). The purpose of the resource management plan is to ensure adequate resources are available for the project. The resource management plan for the project is presented in Chart 27.

Chart 27

Resource Management Plan

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Identification of resources		
DIPE staff members within the Technical Division with the following qualifications and experience will be assigned as the project manager and project engineer.		
Position	Education/ Professional Requirements	Experience
Project Manager	i. A first degree and postgraduate degree in a relevant engineering discipline and/or	i. Minimum of ten years' experience in project management, contract management, contract administration, or logistics.

	construction/ project management. ii. Project management certification will be an asset.	ii. Minimum of five years' experience in managing projects of comparable complexity and budgetary value as the project.
Project engineer	i. A first degree and postgraduate degree in an engineering discipline such as civil, structural, and bridge engineering. ii. A member of a bona fide Professional Engineering Association.	i. A minimum of eight years' relevant experience in the supervision of civil engineering projects. ii. A minimum of five years' relevant experience in the review and preparation of civil engineering designs.

If the DIPE staff members are unable to satisfy the above requirements, the project manager and project engineer will be outsourced.

A design and supervision consultant and main contractor will be outsourced in accordance with the procurement guidelines set out in the financing agreement between the GOSL and JICA. The design supervision and consultant will be responsible for the identification of the physical resources required to conduct the preparatory survey and undertake the detailed designs in accordance with the scope of services detailed in the consulting services agreement. Similarly, the main contractor will be responsible for the identification of the physical resources required to undertake the construction works in accordance with the contractual requirements.

Acquiring resources

The key resources required for the project will be acquired as follows.

Resource	Quantity	Source
Project manager	1	Internal, DIPE
Project engineer	1	Internal, DIPE
Design and supervision consultant	1	External; contracting
Main contractor	1	External; contracting

The design and supervision consultant will be responsible for acquiring the physical resources required to conduct their scope of services. Similarly, the main contractor will be responsible for the acquisition of the physical resources required to undertake the construction works.

Roles and Responsibilities

The roles, responsibilities, and authority of the project team within the DIPE will be as follows.

Role	Responsibilities	Authority	Competence
Chief engineer	Full oversight of the project	Almost total	Appointed by the Governor General
Project manager	Coordinate and monitor all aspects of the implementation of the project	Little to none	*Educational* A first degree and postgraduate degree in a relevant engineering discipline and/or construction/ project management. *Experience* Ten years' experience in project management, contract management, contract administration, or logistics; and five years' experience in

			managing projects of comparable complexity and budgetary value as the project.
Project engineer	Provide expert advice on the construction of works, quality control of works, and the compliance to contracts by the consultant and contractor	Little to none	*Educational* A first degree and postgraduate degree in an engineering discipline, such as civil, structural, and bridge engineering. *Experience* Eight years' relevant experience in the supervision of civil engineering projects; and five years' relevant experience in the review and preparation of civil engineering designs.

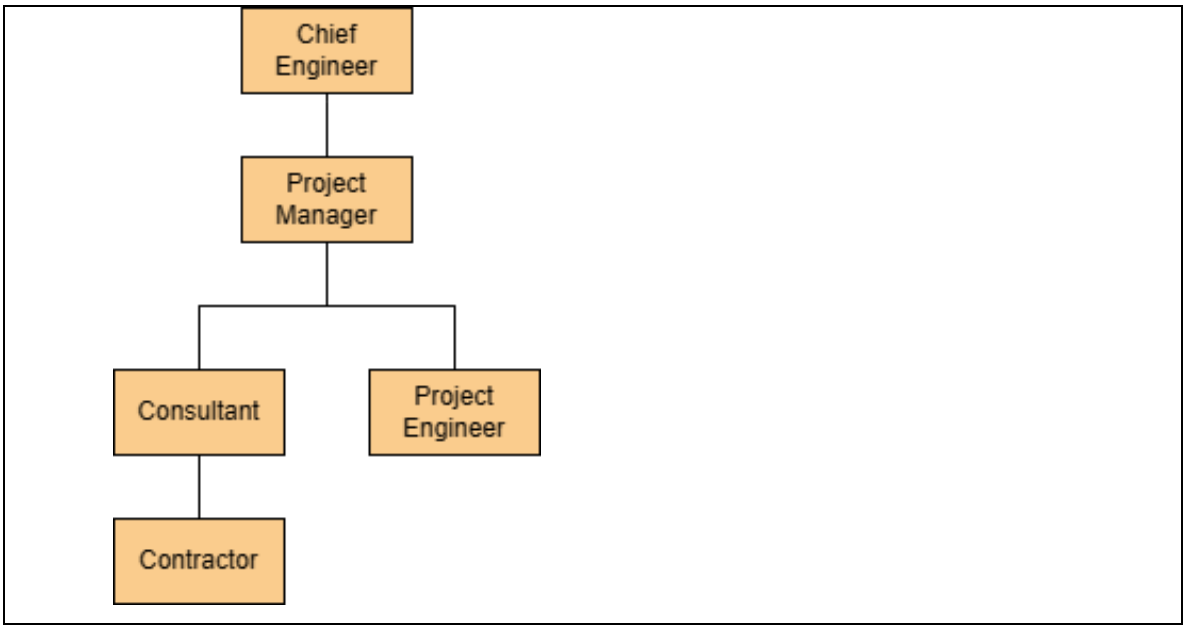
The Permanent Secretary of the DIPE will be the authorized signatory for all project payments and correspondence to formally accept deliverables.

JICA will also appoint an internal team for the oversight of the project as the funding agency.

The main contractor and the design and supervision team will be responsible for appointing their project team members in accordance with their contractual obligations.

Project organization charts

The organization chart for the project is as follows.



Project team resource management

The contracts of the consultant and contractor will provide guidance for their definition, management, and release of the required resources.

Training

Scheduled Training

Procurement training specific to the guidelines to be used for the project will be provided to DIPE team members prior to the procurement of a consultant and contractor.

Unplanned Training

Other training may be recommended by the Chief Engineer during the conduct of performance appraisals and based on observations. Additionally, team members have the option of requesting specific training throughout the project. All requests will be considered and approved by the Chief Engineer.

Training Costs

The MIPEL will bear all costs associated with training team members for the project and these costs will not be included in the project budget.

Team Development
The following techniques will be used to develop the team: 1. Colocation - All DIPE team members will be relocated to a project office within proximity to the project site. 2. Individual assessments - this will be achieved through quarterly performance appraisals. Project team members will first conduct and complete a self-assessment. This will be followed by a face-to-face review and discussion with their reporting officer, which will result in a signed-off version of the performance appraisals. 3. Recognition and rewards 4. Training

Resource control
The consultant and contractor are responsible for ensuring adequate physical resources are available as required to fulfil their contractual obligations.

Recognition plan
Recognition and rewards for team members within the DIPE will be in accordance with the recognition and rewards policy of MIPEL. The consultant and contractor will be responsible for recognizing and rewarding their team members in accordance with company's policies.

Note. Own work.

4.7 Project communications management

4.7.1 Communications management plan

A communications management plan is the key output of the ‘Plan Communications Management’ process within project communications management, which describes how the communications of the project will be planned, structured, implemented, and monitored to ensure effectiveness (Project Management Institute, 2017). Project communications seek to ensure well-informed and supportive stakeholders by meeting their information needs. The communications management plan serves as a guide for communications throughout the lifecycle of the project.

The communication management plan contains stakeholder requirements, communications matrix, flowcharts for information flow and authorizing release of confidential information, escalation processes, guidelines for reporting and meetings, and the glossary of terminology.

4.7.1.1 Stakeholder communications requirements

The communication needs of stakeholders have been identified and presented in Chart 28.

Chart 28

Stakeholder Communication Requirements

Stakeholder	Role	Communication requirements
DIPE	Executing agency - undertakes the project and coordinates with all relevant agencies to ensure the smooth implementation of the project.	• Project status meetings • Monthly progress reports • Updates on acquisition of required lands • Meetings to understand utility infrastructure to be impacted by the project • Updates on utility relocation works • Communication of issues and/or challenges encountered by Consultant and Contractor • Presentation of findings from preparatory survey • Presentation of designs
JICA	Project sponsor - provides technical and financial assistance.	• Initial discussion of project following grant aid request • Updates on project progress • Updates on fulfillment of grantee obligations • Project completion report • Site visits to show progress of construction works • Communication of project issues and challenges
Department of Finance	Allocates the required financial resources.	• Quarterly project status reports including actual expenditure and expenditure forecasts

Stakeholder	Role	Communication requirements
Department of Economic Development	Supports the development of the project and monitors its progress.	• Presentation to inform of proposed project and discussion • Updates on project progress • Communication of project issues and challenges
Department of Physical Planning	Provides cadastral information and acquires the required lands for the project.	• Presentation to inform of proposed project and discussion • Site visits to ensure understanding of land acquisition request • Meetings with project-affected persons to understand impacts on private property, livelihood, and revenue, and discuss and negotiate compensation.
Design and Supervision Consultant	Conducts the preparatory survey to assist with project preparation, prepares detailed designs, and provides technical supervision of the construction works.	• Kickoff meeting • Feedback on submitted deliverables • Notice for inspection of works • Construction submittals • Updates on acquisition of required lands • Updates on utility relocation works
Main Contractor	Undertakes the construction works.	• Kickoff meeting • Response to notice of inspection of works • Response to construction submittals • Updates on utility relocation works • Updates on acquisition of required lands
Ministry of Agriculture	Ensures the consideration of sustainable riverbank protection measures in the	• Presentation to inform of proposed project and discussion • Updates of project progress

Stakeholder	Role	Communication requirements
	bridge design and the water quality of the Cul-De-Sac River is not impaired by the project.	
Utility Companies (LUCELEC, WASCO, FLOW and Digicel)	Ensures the consideration of public utility infrastructure in the project and supports the necessary temporary or permanent relocation of utility infrastructure.	• Meetings and site visits to explain utility infrastructure to be impacted by the project • Updates on project progress
Project-Affected Community (Cul-De-Sac Residents, Vendors, Businesses)	Participate in public consultations; raise concern(s) regarding the project.	• Stakeholder consultations • Meetings to understand the impacts of project on their livelihood, revenue, and property. • Communication indicating impacts of construction works on traffic. • Project progress updates
National Taxi Association	Participates in public consultations; raises concern(s) regarding project aspects that may affect taxi drivers.	• Stakeholder consultations • Communication indicating impacts of construction works on traffic. • Project progress updates
National Council on Public Transport	Participates in public consultations; raises concern(s) regarding project aspects that may affect minibus drivers.	• Stakeholder consultations • Communication indicating impacts of construction works on traffic

Stakeholder	Role	Communication requirements
		• Project progress updates
Parliamentary Representatives for Cul-De-Sac Community	Ensure the project does not infringe the rights of constituents and raises concern(s).	• Stakeholder consultations • Project progress updates
General Public	Holds the DIPE to account for the project's decisions and raises concern(s).	• Communication indicating impacts of construction works traffic • Project progress updates
Media	Keep the general public updated on the project's progress.	• Communication indicating impacts of construction works traffic • Public information on project

Note. Own work.

4.7.1.2 Communications matrix

The communications matrix of the project is presented in Chart 29. It provides an overview of who is responsible for sending and receiving, the purpose of each type of communication, as well as when, how often, and through which channel.

Chart 29

Communications Matrix

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Public project announcements	All stakeholders	To provide updates on the progress of the project; inform of impacts of the construction works on traffic.	DIPE (owner); Media (sender)	As needed	Press releases
Project news	All stakeholders	To keep the public informed of the project	Media	As needed	News broadcast
Project Initiation Meeting	DIPE, Department of Economic Development	To facilitate discussion to ensure understanding of the request for grant aid and the project.	JICA	Once, at start of the project	Face-to-face meeting
Presentation on project	Department of Economic Development, Department of Finance, Department	To present the project background, purpose/benefits, intended outcome and impact; and facilitate discussion on the project.	DIPE	Once	Face-to-face meeting

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
	of Physical Planning and Ministry of Agriculture.				
Kickoff Meeting-Feasibility and Design Phases	Design and Supervision Consultant, Department of Economic Development	To create a mutual understanding of the project, set expectations, and discuss key roles.	DIPE	Once, at the start of the feasibility phase	Face-to-face meeting
Progress Meeting	JICA, Design and Supervision Consultant, Department of Economic Development	To provide updates on the preparatory survey and preparation of the detailed designs and identify and resolve issues and challenges.	DIPE	Monthly, during the feasibility and design phases	Hybrid: face-to-face meeting and virtual meeting
Grantee obligation-updates	JICA	To inform of the progress of fulfilling grant obligations and to highlight any challenges.	DIPE	As needed	Letter, e-mail
Stakeholder consultations-Utility Companies	Utility Companies (LUCELEC,	To determine the existing utility infrastructure within the bridge and approach roads; and to	DIPE and Design and	As needed	Face-to-face meetings and site meetings

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
	WASCO, FLOW and Digicel)	understand the requirements of utility companies and their intentions to expand within the short and long term.	Supervision Consultant		
Stakeholder Consultations-Project-Affected Community	Cul-De-Sac residents, vendors, business owners; parliamentary representatives for Cul-De-Sac community.	To inform of project; gather local knowledge of past flooding events and the site; understand requirements/expectations; and determine possible impacts of the project.	DIPE and Design and Supervision Consultant	As needed	Face-to-face meetings
Stakeholder Consultations-Transport Associations	National Taxi Association and National Council on Public Transportation	To inform of project; understand requirements/expectations; and determine possible impacts of project on public transportation routes.	DIPE and Design and Supervision Consultant	Once	Face-to-face meetings
Preparatory Survey Presentation	DIPE, JICA, Department of Economic Development, Department of	To present and discuss the findings of the preparatory survey.	Design and Supervision Consultant	Once, after the submission of the Preparatory Survey Report	Face-to-face meeting

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
	Physical Planning, Ministry of Agriculture				
Design Review	DIPE, JICA, Department of Economic Development, Department of Physical Planning, Ministry of Agriculture, Utility Companies (LUCELEC, WASCO, FLOW and Digicel)	To present the proposed design, and allow participants to provide feedback and clarifications, discuss possible challenges, and suggest improvements.	Design and Supervision Consultant	Once, after the submission of the Draft Design Report	Face-to-face meeting
Land Acquisition Planning Meeting	DIPE, Design and Supervision Consultant, Department of Economic Development	To ensure the understanding and discussion of the project's land acquisition needs.	Department of Physical Planning	Once, after the submission of the land acquisition request	Face-to-face meeting

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Notice of Potential Acquisition	Landowners/ Cul-De-Sac residents and business owners)	To inform of potential acquisition of lands	Department of Physical Planning	Once, after notice of intention to acquire lands is published in the gazette twice.	Letter
Meeting with Project-Affected Persons	Residents, vendors, and business owners of the Cul-De-Sac community affected by land acquisition	To inform and ensure understanding of the impacts of the project on private property, discuss entitlement and compensation, and negotiate compensation.	Department of Physical Planning	As needed	Face-to-face meeting
Land Acquisition-Status Updates	DIPE	To inform of the progress of the land acquisition	Department of Physical Planning	As needed	Email/ memorandum
Kickoff Meeting (Construction Phase)	Main Contractor, Design and Supervision Consultant, Department of Economic Development	To create a mutual understanding of the project, set expectations, and discuss key roles.	DIPE	Once, at the start of the construction phase	Face-to-face meeting

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Project Information Board	All Stakeholders	To convey important project information, including nature of project, duration, and parties involved.	Main Contractor	Installed once at the start of the construction phase and maintained until completion of the construction works.	Signboard
Construction Progress Meeting	DIPE, Main Contractor	To review the construction progress made during the past week, to inform of the construction activities planned for the upcoming week and identify and resolve any issues and challenges.	Design and Supervision Consultant	Weekly, during the construction phase	Face-to-face meeting
Project Status Meeting	DIPE, Design and Supervision Consultant, Main Contractor	Provides a high-level overview of the progress of the construction works, discuss risks, challenges, and issues facing the project, and any lessons learned.	JICA	Monthly, during the construction phase	Hybrid: face-to-face meeting and virtual meeting

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Construction Progress Report	DIPE and JICA	To provide the status of the construction works, present a comparison of actual and planned construction progress, and highlight major accomplishments during the reporting period.	Design and Supervision Consultant	Monthly, during the construction phase	Written report
Project Status Reports	Department of Finance, Department of Economic Development	To provide an overview of the progress of the project, total project expenditure, forecast expenditure for the following quarter, and highlight any issues or challenges.	DIPE	Quarterly	Written report
Progress Site Meetings	DIPE, JICA, Design and Supervision Consultant	To show the progress of the construction works.	Main Contractor	Quarterly, during the construction phase	Face-to-face meetings
Construction Submittals	Design and Supervision Consultant, DIPE	To provide data and information that validate compliance with the contract document.	Main Contractor	As needed	Written document

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Construction Submittal Review	Main Contractor, DIPE	To indicate the approval, rejection, or acceptance of the submitted construction submittals.	Design and Supervision Consultant	As needed, at least two-weeks after the submission of each submittal.	Written document
Notice of Inspection	Design and Supervision Consultant	To inform of the proposed date and time for an inspection including the type of inspection required.	Main Contractor	As needed, at least two days prior to the inspection date.	E-mail
Acknowledgement of Notice of Inspection	Main Contractor	To acknowledge receipt of the notice of inspection.	Design and Supervision Consultant	As needed, at least one day within the submission of the notice of inspection.	E-mail
Utility Relocation Updates	DIPE, Design and Supervision Consultant, Main Contractor	To inform of the progress of utility relocations works.	Utility Companies (LUCELEC, WASCO, FLOW and Digicel)	As needed	Letters, e-mails

Communication type	Audience	Description/Purpose	Owner and sender	Frequency/ Timing	Channel
Project Completion Report	JICA	To provide an overview of the entire project, evaluate the success of the project, document the lessons learned, and provide recommendations for future projects.	DIPE	Once, at the end of the project	Written Report

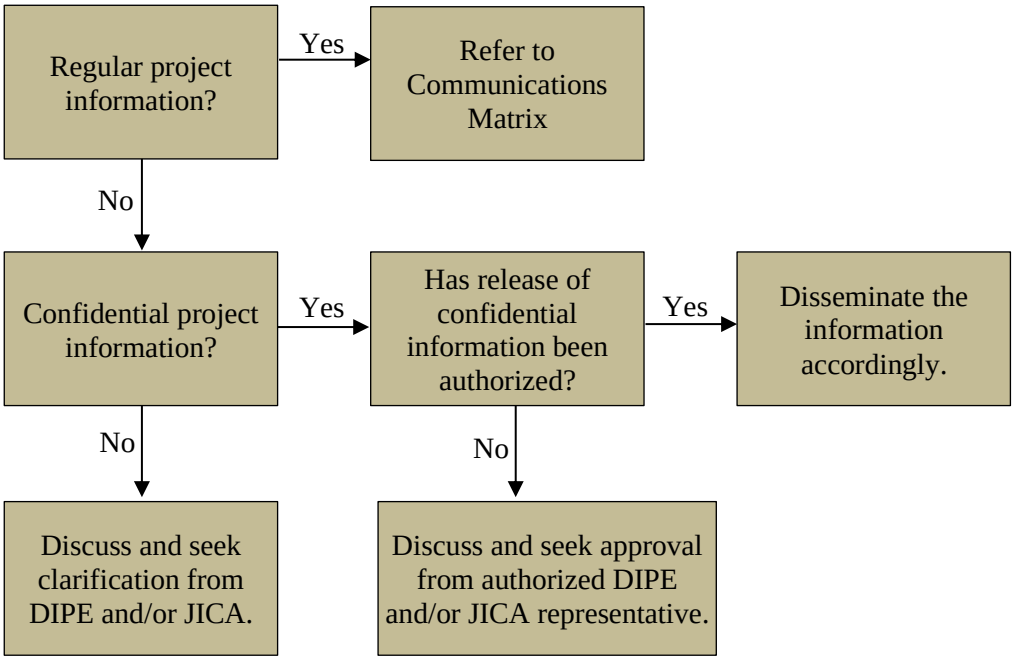
Note. Own work.

4.7.1.3 Project information flow

A flowchart illustrated in Figure 12 is intended to aid in project communication by providing a visual representation of communication flows for the project.

Figure 12

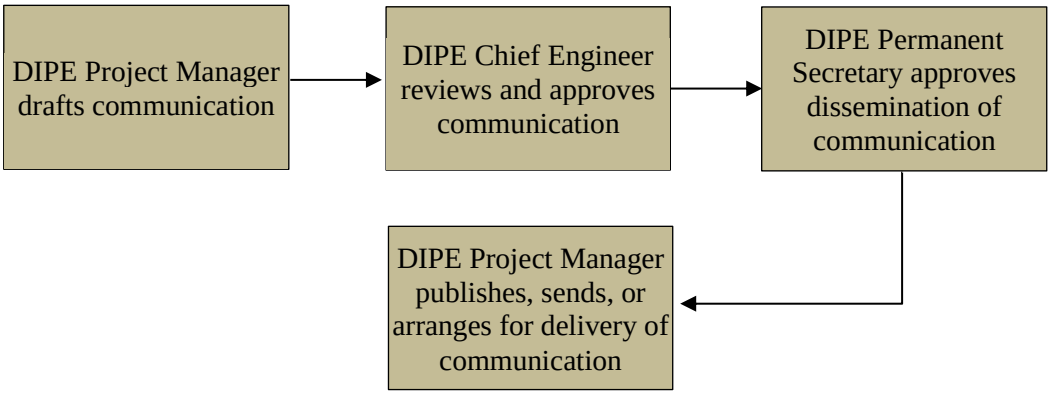
Communication Flowchart



Note. The flowchart for communications within the DIPE is shown. Own work.

Figure 13

Regular DIPE Communication Approval Process



Note. The approval process for regular communication within the DIPE is shown. Own work.

4.7.1.4 Communication escalation process

Communication is critical to the success of a project. The primary objective of the escalation process regarding project communication seeks to resolve communication issues in a timely and efficient manner to avoid any undesired impacts. Hierarchical escalation will be used for the project, where each level in the escalation process necessitates the involvement of a higher level of authority or responsibility. The escalation process is presented in Chart 30.

Chart 30

Communication Escalation Matrix

Priority Level	Description	Responsible party	Resolution timeframe
3	Communication issue may have a low impact on scope, schedule, cost, and quality, if unresolved.	Project Manager, DIPE	Work continues and recommendations are made through the change control process.
2	Communication issue may have a medium impact on scope, schedule, cost, and quality, if unresolved.	Chief Engineer, DIPE	Within 2-3 days
1	Communication issue may have a major impact on scope, schedule, cost, and quality, if unresolved.	Permanent Secretary, DIPE and/or JICA	Within 1-2 days

Note. Own work.

4.7.1.5 Project reporting guidelines

All reports should be written in English and formal language. All typefaces used for reports should be legible and clear. All abbreviations and acronyms used in reports should be defined.

4.7.1.5.1 Quarterly project status report

The structure of the quarterly project status report should be as follows:

a. executing agency

b. project title

c. project objectives

d. project description

e. project start date: original and revised (if applicable)

f. project completion date: original and revised (if applicable)

g. project location

h. budgeted cost

i. cost at the start of implementation

j. revised total cost

k. approved variations to date

l. financing sources including the agency, amount, date approved/signed; amount disbursed, and date disbursed for each source.

m. expenditure to date - the cumulative expenditure of the project from its start disaggregated by source with a reference date.

n. reimbursable external financing - amount eligible for disbursement, amount reimbursed, and amount outstanding.

o. financing in the current financial year based on approved budget estimates.

p. expenditure for the current financial year - the original/initial project, revised projection (if applicable) and actual expenditure disaggregated by quarter.

q. summary of implementation progress to date including a description of the physical progress works performed to date and a percentage of activities completed and certified to date; comparison of planned and actual progress; and achieved outputs.

r. summary of problems or issues to date, including a brief description of the problems/issues encountered and proposed corrective actions that have or will be taken by the project team to resolve them; and

s. summary of the works planned for the next quarter, including each major activity or component to be undertaken, the anticipated start and finish date, and the cost of each.

4.7.1.5.2 Monthly construction progress report

The structure of the monthly construction progress report should be as follows:

a. cover page - including the project title, executing agency/client, sponsor, design and supervision consultant, main contractor, reporting period, and issue number.

b. frontispiece/ project location

c. table of contents

d. list of abbreviations/acronyms

e. project description - background information, project objectives and the scope of works.

f. progress - the construction progress of the reporting period, cumulative construction progress, comparison of the actual and planned overall progress for the reporting

period and cumulatively, explanation of any differences between the actual and planned progress.

g. contractor's organization: the contractor's organizational structure and monthly records of manpower and equipment hours.

h. consultant's organization: the consultant's organizational structure and monthly records of manpower input.

i. quality control overview for the reporting period.

j. health and safety overview: a summary of any site accidents and incidents that occurred during the reporting period.

k. cost management overview: earned value analysis and cost variance analysis for the construction phase and a summary of the payment claims requested by the contractor and approved contractor payments to date.

l. variations overview: a summary of all approved variations related to the construction works to date and their status.

m. risks and issues overview: risk analysis for the construction works and summary of the challenges or issues encountered, proposed resolution, status, and date resolved/to be resolved.

n. correspondence overview: a list of the particulars of all correspondence issued by the client, consultant, and main contractor for the reporting period.

o. meetings and site visits: key details for all meetings and visitors to site during the reporting period.

p. annexes: construction progress photographs, illustration of the physical progress of the construction works, S-curve, weather records for the reporting period, minutes of weekly construction progress meetings for the reporting period, and any other supporting information.

4.7.1.5.3 Project completion report

The structure of the quarterly project status report should be as follows:

a. cover page including project title, date of report, recipient government, sponsor, and report type.
b. table of contents
c. list of abbreviations/acronyms
d. basic information of the project: the recipient country, project title, duration of the project (planned and actual), project background, project purpose, project objectives, and executing agency.
e. results of the project:
    i. inputs by the Japanese side (planned and actual), inputs by the GOSL side (planned and actual), and activities (planned and actual).
    ii. achievements of the project- outputs and indicators and project purpose and indicators including target values and actual values achieved at completion.
    iii. history of project design matrix modification.
f. others including results of environmental and social considerations (if applicable).

g. results of joint review: results of review based on the Development Assistance Committee evaluation criteria, key factors affecting implementation and outcomes, evaluation on the results of the project risk management, lessons learnt, performance and additionality.

h. for the achievement of overall goals after the project completion: prospects to achieve overall objective, plan of operation and implementation structure of the GOSL side to achieve overall objective, recommendations for the GOSL side and monitoring plan from the end of the project to the ex-post evaluation.

i. annexes: any supporting information.

4.7.1.6 Guidelines for project meetings

4.7.1.6.1 Meeting invitation/announcement

A meeting invitation in the form of a formal letter, memorandum, or email should be issued by the organization or government department chairing the meeting, at least two weeks in advance of the meeting, to each participant except for construction progress meetings. Construction progress meetings should be held on the same day and time every week, hence meeting invitations are unnecessary. In some instances, a change in the day and/or time of the construction progress meeting may be necessary to accommodate other project or organizational activities. All participants should be informed through email at least one day and three days in advance of the new time and date of the meeting, respectively.

Meeting invitations in the form of a formal letter or email should also be issued to each participant by the organization or government department chairing the stakeholder

consultation at least two weeks in advance of the consultation. For stakeholder consultations with members of the project-affected (Cul-De-Sac) community, a town crier should also be used to announce the meeting in the community at least one week in advance of the consultation.

The meeting invitation/announcement should provide the objective of the meeting, type of meeting (if other than a face-to-face meeting), date, time, and venue.

4.7.1.6.2 Meeting agenda

The agenda of all project meetings, except construction progress meetings, should be distributed by the meeting chairperson at least one week in advance of the meeting. A standing meeting agenda will be established at the first construction progress meeting and maintained for all subsequent construction progress meetings. An ‘any other business’ item should be included as the last item in the standing meeting agenda for construction progress meetings to facilitate the discussion of non-recurring agenda items.

For all stakeholders’ consultations, except with project-affected community members, the meeting agenda should be distributed by the meeting chairperson at least one week in advance of the meeting. The agenda of stakeholder consultations with project-affected community members should be presented at the start of each consultation.

4.7.1.6.3 Meeting attendance

An attendance register should be kept for each stakeholder consultation. The register should record the name, contact number, and signature of each attendant. Attendance registers for project meetings are not mandatory as the details of participants should be recorded in the meeting minutes.

4.7.1.6.4 Meeting minutes

The meeting chairperson will appoint a note taker for each project meeting and for stakeholder consultations. The note taker will be responsible for recording the key discussions and decisions during the meeting, preparing the minutes in the agreed format, and submitting the prepared minutes to the meeting chairperson for review and signature. The meeting chairperson will then distribute the minutes to each participant.

The meeting minutes should include the subject of the meeting, type of meeting, date, venue, start and end times of the meeting, names of all participants and the note taker, the participants' position, and organization each is representing, the objectives of the meeting, summary of discussions, and resulting action items with the responsible person/organization. Documents shared during the meeting should also be attached to the minutes. For documents containing confidential information, approval must be obtained prior to dissemination.

4.8 Project risk management

4.8.1 Risk management plan

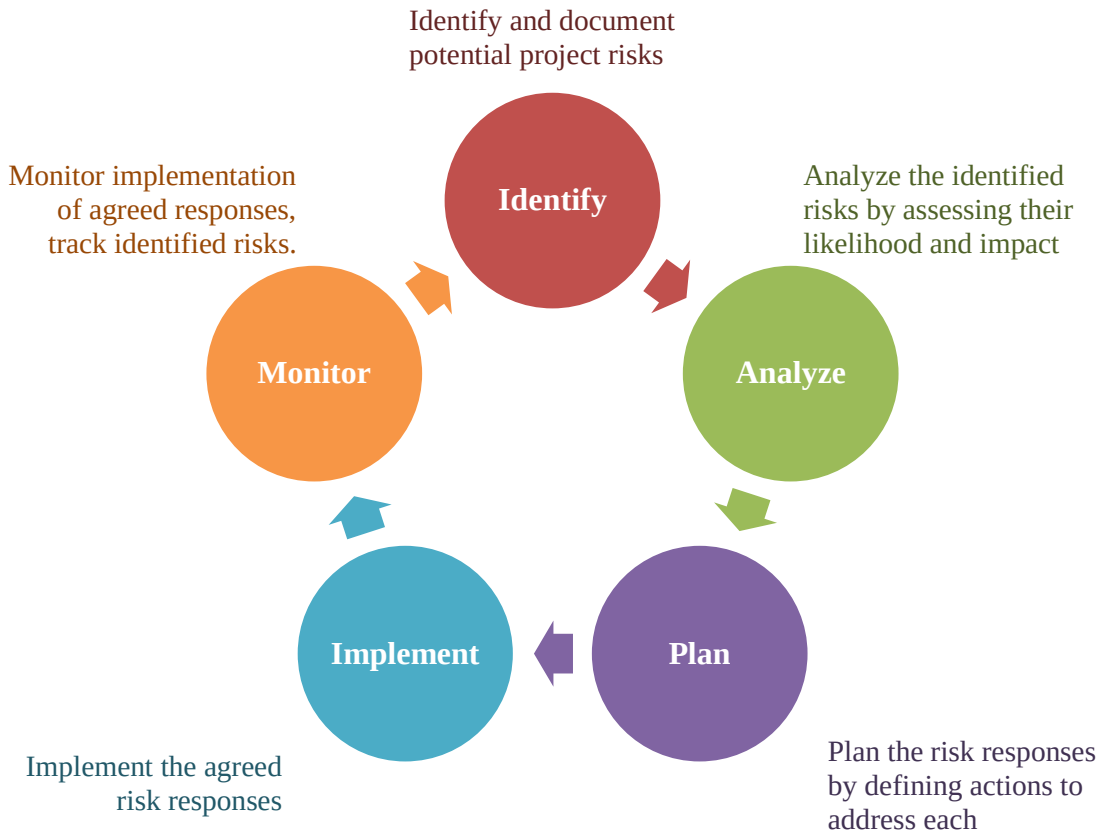
The risk management plan is the key output of the 'Plan Risk Management' process within project risk management and it provides a description of how risk management activities will be structured and conducted (Project Management Institute, 2017). The risk management plan is presented in Chart 31.

Chart 31

Risk Management Plan

Project title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Risk strategy
The general approach to managing risk on the project is illustrated below.



Methodology

Only qualitative risks analyses will be performed for the project. The specific tools to be employed in each stage of the risk management process will be as follows:

1. Identify risks
    i. Project team brainstorming
    ii. Stakeholder interviews/consultations
    iii. Interviews with experienced DIPE and JICA staff
    iv. Project team meetings
    v. SWOT analysis
    vi. Assumption and constraint analysis
2. Analyze risks
    i. Meetings
    ii. Data gathering
    iii. Risk probability and impact assessment
    iv. Probability and impact matrix
    v. Risk categorization
3. Plan risk responses
    i. Strategies for overall project risk including:
        a) Avoid: will be adopted for risks with substantially negative impacts.
        b) Exploit: will be adopted for risks with substantially positive impacts.
        c) Transfer/Share: will be adopted if the risk is high, but unable to be addressed effectively by the concerned organization. The risk will be managed by a third party on behalf of the organization. Risks with positive impacts will be shared, while risks with negative impacts will be transferred.

d) Mitigate/Enhance: involves optimizing the chances of achieving the project's objectives by changing the risk level. Risks with negative impacts will be mitigated, while risks with positive impacts will be enhanced.

e) Accept: will be adopted when a proactive response strategy to address the risk is unable to be determined.

4. Implement risk responses
    i. Project management information system - the DIPE and the project sponsor will agree on the use of specific software to ensure the integration of the agreed-upon risk response plans and their related activities into the project's activities.
5. Monitor risks
    i. Risk audits.
    ii. Meetings.
    iii. Reserve analysis.

Roles and responsibilities

The risk management team will consist of the following members:

1. Project manager, DIPE
2. Project engineer, DIPE
3. Chief engineer, DIPE
4. Permanent secretary, DIPE
5. Chief consultant, design and supervision consultant
6. Resident engineer, design and supervision consultant
7. Construction manager, main contractor

The project manager will lead risk management for the overall project. All other team members will have a supporting role.

Funding

A request for review and concurrence must be issued by the DIPE to project sponsor for the use of contingency reserves before any action is taken related to the use of the contingencies. The use of management reserves can only be initiated by the project sponsor.

Timing

A risk identification exercise will be undertaken at the start of the project. Risks identification activities will be undertaken during all progress meetings. A qualitative risk analysis will be performed at the start of the project (initial), as well as throughout the project as new risks are identified. The planning and implementation of risk responses will be undertaken in a similar approach to the performing of risk analyses. Monitoring risks will be undertaken throughout the project.

Risk categories

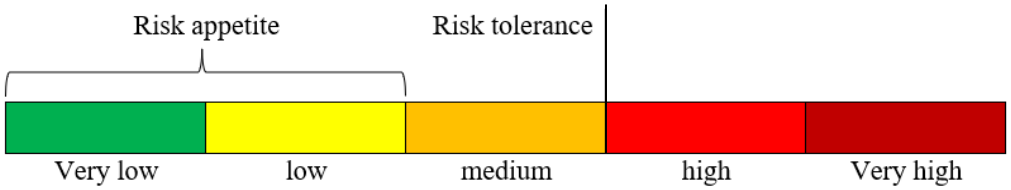
The project risk breakdown structure is presented below.

RBS level 0	RBS level 1	RBS level 2
0. All sources of project risk	1. Technical risk	1.1 Scope definition
		1.2 Requirements definition
		1.3 Estimates, assumptions, and constraints
		1.4 Technical specifications
		1.5 Technical processes
		1.6 Supplier performance
	2. Management risk	2.1 Communications
		2.2 Resources
		2.3 Procurement processes
		2.4 Occupational health and safety
		2.5 Organization

	3. External risk	3.1 Legislation and regulations
		3.2 Environmental/weather
		1.3 Supply chain
		3.4 Competition
		3.5 Global/regional health risks
		3.6 Indirect stakeholders

Stakeholder risk appetite

The risk appetite of key stakeholders is illustrated below.



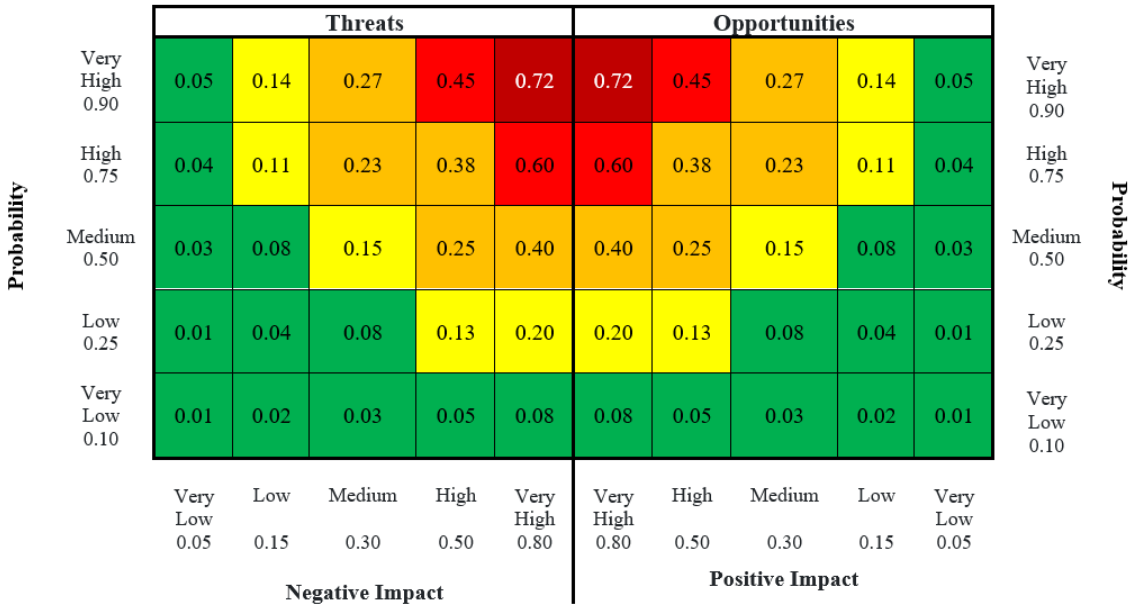
Definitions of risk probability and impacts

The definitions for probability and impacts specific to the project context are presented below.

Scale	Probability	Impact		
		Cost	Time	Quality
Very High	>70%	>40%	>20%	Very significant impact on overall functionality
High	50 to <70%	>20% to 40%	>10 to 20%	Significant impact on overall functionality
Medium	30 to <50%	>10 to 20%	>5 to 10%	Some impact on critical functions
Low	10 to <30%	5 to 10%	3 to 5%	Minor impact on overall functionality
Very Low	<10%	<5%	<3%	Minor impact on secondary functions

Probability and impact matrix

The probability and impact matrix to be used for the project along with the numeric risk scoring scheme is presented below.



Risk rating

The following risk rating scheme will be used for the project.

Risk Rating	Risk Level
Very High	0.61 to 0.72
High	0.41 to 0.60
Medium	0.21 to 0.40
Low	0.11 to 0.20
Very Low	0.00 to 0.10

Reporting formats

The outcomes of the project risk management processes will be communicated at the monthly progress meetings, which will be held during the feasibility and design

phases and the weekly progress meetings, during the construction phase. Reporting on risk management processes will also be done through the monthly and quarterly progress reports.

Note. Own work.

4.8.2 Risk register

A risk register results from the ‘Identify Risks’ process within project risk management and provides details of identified individual project risks (Project Management Institute, 2017). The initial risk register is presented in Chart 32.

Chart 32

Risk Register

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
001	1.3	3.2	Inclement weather or weather-related disasters	Difficult working site conditions	Schedule delays	Excessive rainfall and special weather advisories	0.90	0.50	0.45	*Mitigate* Develop a disaster management plan and include a contingency (schedule) reserve	Main Contractor
002	1.3	1.5	Changes in the physical development of the site which informed the land acquisition and	Approved land acquisition and resettlement plan is not valid	Revision of the land acquisition and resettlement plan; schedule delays;	Observation of new physical development within the site	0.50	0.80	0.40	*Mitigate* Declare the site and a 5 m buffer around the site as a Special Enforcement Area in	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
			resettlement plan.		increased cost					accordance with the Physical Planning and Development Act, (Cap 5.12) until construction commences.	
003	1.5	2.5	Lack of coordination among government agencies	Delays in approvals and issuance of permits	Schedule delays	Permits and approvals exceed normal processing time.	0.50	0.50	0.25	*Mitigate* Identify accountable point persons in related agencies, conduct frequent follow-ups and escalate as needed	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
004	1.3	3.6	Change in utility company standards/ policies	Change in requirements of utility companies	Schedule delays; increased costs	Notification of change in company standards/ policies	0.50	0.50	0.25	*Accept (Active)* Establish a contingency (cost) reserve	DIPE
005	1.3	3.5	Pandemic or epidemic impacts	High number of sick-related absences	Schedule delays	Pandemic confirmed cases in Saint Lucia; announcement of epidemic or pandemic threats	0.50	0.50	0.25	*Mitigate* Develop and implement a prevention and control plan in accordance with national protocols.	Main Contractor
006	1.5	2.3	Poor preparation of construction contract	Poorly specified or rigorous technical specifications	Contractual disputes; schedule delays	Technical specification inconsistent with industry standards	0.25	0.90	0.23	*Mitigate* Create and implement proper review and approval processes for contracts.	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
007	1.5	2.5	Inexperienced DIPE staff to manage project	DIPE staff unable to function as project manager and project engineer	Schedule delays as project is unable to advance	DIPE staff with limited experience	0.75	0.30	0.23	*Mitigate* Outsource a project manager and project engineer.	DIPE
008	1.5	2.5	Poor project management; bureaucracy; ineffective leadership	Failure to deal with project issues in a timely manner	Schedule delays and possible cost implications	Failure to meet project milestones	0.25	0.80	0.20	*Mitigate* Employ effective project management and decision-making techniques.	DIPE
009	1.5	1.1	Poor understanding of requirements	Poorly defined project scope	Schedule delays; increased project costs	Frequent change requests	0.25	0.80	0.20	*Mitigate* Ensure project team members properly	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
										understand all requirements.	
010	1.3	1.3	Poor scheduling assumptions due to poor understanding of nature of project activities	Poor construction scheduling	Schedule delays	Performing/ competent contractor unable to maintain project schedule	0.25	0.80	0.20	*Mitigate* Select an experienced project manager with technical expertise.	DIPE
011	1.3	1.3	Inaccurate estimating assumptions	Insufficient project budget	Reduced project scope; schedule delays to source additional funding	Unacceptable cost variance at early project phases	0.25	0.80	0.20	*Mitigate* Develop project budget with the support of an experienced quantity surveyor and	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
										technical team.	
012	1.5	3.6	Lack of public trust in government initiatives	Lack of buy-in from the project affected community and the public	Opposition to project scope; community protests; schedule delays	Poor participation in and/or aggressive behaviors during stakeholder consultations	0.50	0.30	0.15	*Mitigate* Sensitize the community and public on the project and its intended benefits.	DIPE
013	1.5	2.3	Ineffective procurement process	Incompetent contractor	Reduced construction quality; schedule delays	Performance below required level	0.15	0.90	0.14	*Mitigate* Employ effective procurement processes and clearly define requirements.	DIPE

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
014	1.5	2.3	Ineffective procurement process	Inexperienced and/or incompetent designer	Schedule delays and possible cost implications	Performance below required level	0.15	0.90	0.14	*Mitigate* Implement effective procurement processes and define requirements.	DIPE
015	1.3	3.3	Supply chain issues	Material shortages	Schedule delays; reduced project scope	Unavailability of critical construction materials at key material suppliers; announcement of national shortages	0.25	0.50	0.13	*Mitigate* Procure materials in advance and ensure material supplier has a steady supply.	Main Contractor
016	1.3	2.4	Unsafe site working conditions	Injuries or fatalities to site workers and/or visitors	Suspension of construction works; schedule	Site incident/ accident reports	0.25	0.30	0.08	*Mitigate* Develop and adhere to a site health and safety	Main Contractor

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
					delays; cost implications					management plan.	
017	1.3	1.6	Malfunctioning equipment and poorly maintained equipment	Construction equipment breakdown during working hours	Schedule delays	High use of aged equipment	0.25	0.30	0.08	*Mitigate* Engage a full-time site mechanic and include delay penalty clauses in contract.	Main Contractor
018	1.3	3.4	High number of ongoing construction projects; and immigration	Skilled (local) labour shortage	Schedule delays	Few responses to advertised openings	0.25	0.30	0.08	*Mitigate* Advertise employment opportunities locally and regionally; offer attractive remuneration	Main Contractor

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
										packages and employ innovative recruitment approaches.	
019	1.3	2.1	Language barrier between non-national and local construction workers	Japanese construction employees unable to communicate effectively with local site workers	Increasing number of site accidents/ incidents; schedule delays due to low productivity	Engagement of workers from non-English speaking countries	0.90	0.05	0.05	*Mitigate* Stipulate fluency in English as a requirement for non-national workers.	Main Contractor

Risk ID	WBS Code	RBS Code	Cause	Risk description	Effect	Symptom	Probability	Impact	Risk score/ rating	Response	Owner
020	1.3	2.5	Unsatisfactory working conditions	Labour unrest	Schedule delays	Unmet staff needs	0.10	0.50	0.05	*Mitigate* Ensure compliance with the Labour Act.	Main Contractor
021	1.3	2.5	Cultural differences and poor knowledge of differing cultures	Frequent disagreements between local and non-national construction workers	Schedule delays due to high turnover and/or dismissals	Culturally diverse workforce	0.90	0.05	0.05	*Mitigate* Promote cultural awareness and respect.	Main Contractor

Note. Own work.

4.9 Project procurement management

4.9.1 Procurement management plan

The procurement management plan is one of the outputs of the 'Plan Procurement Management' process within project procurement management and details the activities to be undertaken throughout the procurement process (Project Management Institute, 2017). The procurement management plan is presented in Chart 33.

Chart 33

Procurement Management Plan

Project Title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

Coordination of procurement activities
The procurement schedule must be coordinated with the project schedule.

Procurement schedule for consulting services

Assignment Description:
Consulting Services for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)

Procurement activity	Planned date
Development of terms of reference and preparation of high-level cost estimate	June 6, 2024
Expression of interest notice	June 10, 2024
Expression of interest submission	July 1, 2024

Expression of interest evaluation report	July 8, 2024
Issuance of Request for proposal	July 22, 2024
Submission of proposals	August 22, 2024
Public opening of technical proposal	August 23, 2024
Technical proposal evaluation	August 30, 2024
Public opening of financial proposal	September 3, 2024
Financial proposal evaluation	September 10, 2024
Final evaluation report	September 17, 2024
Negotiations and award of contract	October 4, 2024

Procurement schedule for works

Assignment Description:

Construction Works for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)

Procurement activity	Planned date
Development of works requirement and high-level cost estimate	December 9, 2025
Invitation to prequalification	December 11, 2025
Submission of application for prequalification	January 2, 2026
Prequalification evaluation report	January 9, 2026
Issuance of invitation to bid	January 23, 2026
Submission of bid	February 23, 2026
Public opening of technical bids	February 24, 2026
Technical bids evaluation	March 3, 2026
Public opening of financial bids	March 6, 2026
Financial bids evaluation	March 10, 2026
Final evaluation report	March 17, 2026
Negotiations and award of contract	March 26, 2026

Procurement metrics

Procurement solicitations for the purpose of this plan are the invitation to bid and request for proposal. The following metrics will be used for procurement solicitations:

Goal	Metric
To ensure procurement processes are efficient and inviting	Rebids: Frequency of solicitation cycle repetition due to cancellations and failed solicitations
To ensure that procurement processes result in the desired outcomes	Response rate: Number of proposals received; and number of bids received

Stakeholder roles and responsibilities

The DIPE is responsible for procurement execution and must ensure that procurement processes conform to the financing agreement between the GOSL and JICA. DIPE's project manager will be responsible for managing procurement execution.

JICA is responsible for overseeing procurement execution and must ensure that JICA's financing is used for the intended purposes and the procurement complies with the requirements of the financing agreement between the GOSL and JICA. JICA's review and concurrence are therefore required for all procurement documents and processes.

Constraints and assumptions related to procurement

The constraints related to procurement are as follows:

1. The eligible nationality of suppliers shall be Japanese.
2. Open competitive bidding procedures shall be applied for all procurement processes.
3. The least-cost method shall be used for the selection of the contractor.

4. The quality and cost-based method shall be used for the selection of the consultant.

The assumptions related to procurement are as follows:

1. At least one (1) responsive bid or proposal will be within the budget upset limit.
2. At least three (3) bids and proposals will be received.
3. The project manager is familiar with and clear about the procurement guidelines.

Legal jurisdiction and currency of payments

The financing agreement between the GOSL and JICA governs the legal relationship between the GOSL and JICA, which will reference the procurement guidelines under which the GOSL shall undertake the procurement of contracts financed by JICA.

All agreements with suppliers shall be governed by and interpreted by the laws of Saint Lucia.

The currency of all payments made under contracts financed by JICA will be the Japanese Yen.

Use of independent estimates

Independent estimates will not be used for the project.

Risk management issues

The risks related to procurement and the mitigation measures are as follows:

Risk	Mitigation Measure
High number of non-responsive bids or proposals	Host pre-proposal and pre-bid conferences to ensure bidders/proposers understand the project and the procurement procedures.
Issuance of solicitations is not consistent with the procurement plan	Senior management of the DIPE to monitor the progress of the solicitations preparation

	and to hold the project manager accountable for deadlines.
Evaluation of bids and proposals take a longer timeframe than planned	Ensure the planned time for evaluation of bids and proposals is reasonable and that evaluation committee members are available and well-informed of the schedule.

Prequalified sellers
A list of shortlisted consultants will result from the evaluation of expressions of interest and a list of prequalified contractors from the evaluation of applications for prequalification.

Note. Own work.

4.9.2 Procurement strategy

The procurement strategy is another output of the 'Plan Procurement Management' process within project procurement management and indicates the project delivery method and types of legally binding agreements to be used. It also provides information on the procurement phases for the project. The procurement strategy is presented in Chart 34.

Chart 34

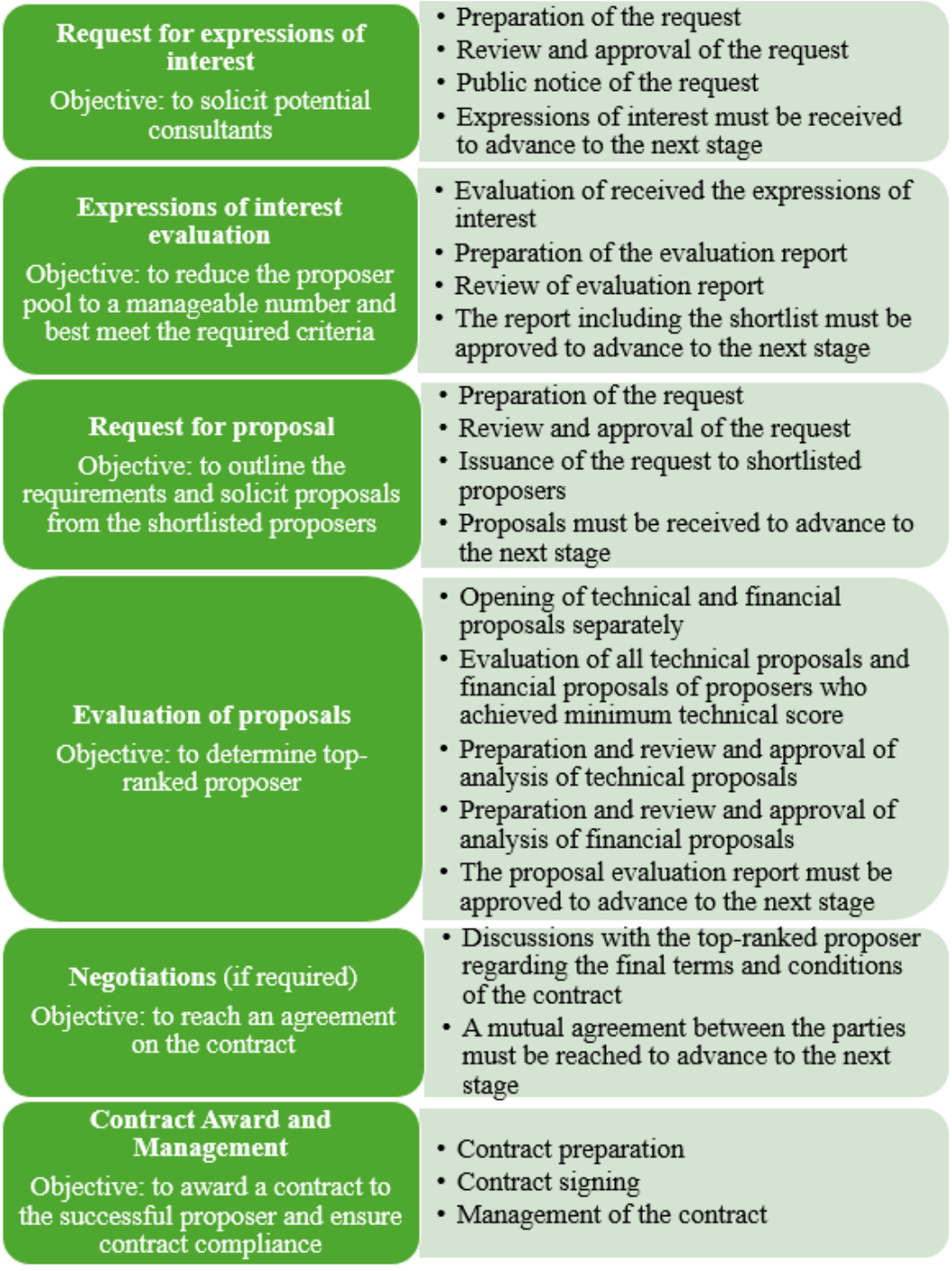
Procurement Strategy

Project Title	The Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge)
Date	January 14, 2023

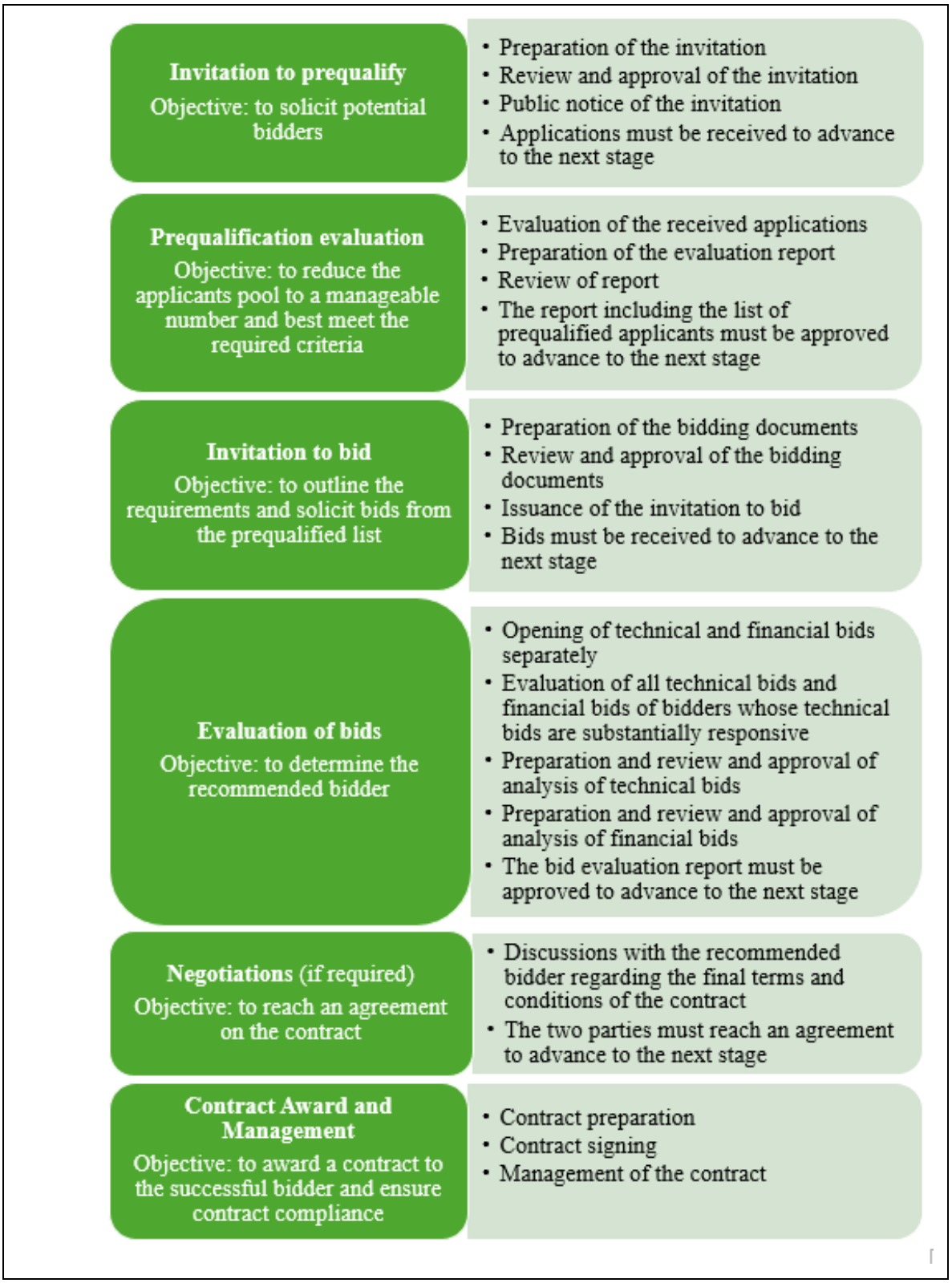
Delivery method
The project will be delivered using the design-bid-build method.

Contract payment types
Fixed-price contracts will be used for the engagement of the main contractor and the design and supervision consultant. The Form of Consultant Agreement under JICA's Grants will be used for the agreement with the consultant. The Form of Construction Contract under JICA's Grants will be used for the agreement with the contractor.

Procurement phases
The figure below details the process for the procurement of a consultant.



The figure below illustrates the process for the procurement of a contractor.


Invitation to prequalify
Objective: to solicit potential bidders
• Preparation of the invitation
• Review and approval of the invitation
• Public notice of the invitation
• Applications must be received to advance to the next stage
Prequalification evaluation
Objective: to reduce the applicants pool to a manageable number and best meet the required criteria
• Evaluation of the received applications
• Preparation of the evaluation report
• Review of report
• The report including the list of prequalified applicants must be approved to advance to the next stage
Invitation to bid
Objective: to outline the requirements and solicit bids from the prequalified list
• Preparation of the bidding documents
• Review and approval of the bidding documents
• Issuance of the invitation to bid
• Bids must be received to advance to the next stage
Evaluation of bids
Objective: to determine the recommended bidder
• Opening of technical and financial bids separately
• Evaluation of all technical bids and financial bids of bidders whose technical bids are substantially responsive
• Preparation and review and approval of analysis of technical bids
• Preparation and review and approval of analysis of financial bids
• The bid evaluation report must be approved to advance to the next stage
Negotiations (if required)
Objective: to reach an agreement on the contract
• Discussions with the recommended bidder regarding the final terms and conditions of the contract
• The two parties must reach an agreement to advance to the next stage
Contract Award and Management
Objective: to award a contract to the successful bidder and ensure contract compliance
• Contract preparation
• Contract signing
• Management of the contract

Procurement performance indicators

The indicators to be used to evaluate the performance of each stage of the procurement of a consultant are presented below as well as target values.

Phase	Indicator	Target
Request for expressions of interest	1. Drafted request for expressions of interest approved	Yes
	2. Number of expressions of interest received	5
Evaluation of expressions of interest	Evaluation report approved	Yes
Request for proposal	1. Drafted request for proposal approved	Yes
	2. Number of proposals received	3
	3. Frequency of phase repetition due to cancellations and failures	0
Evaluation of proposals	Evaluation report approved	Yes
Negotiations	Agreement reached by parties	Yes
Award of contract and contract management	Adherence to the commencement date	Yes
	Adherence to the service completion period	Yes

The indicators to be used to evaluate the performance of each stage of the procurement of a consultant are presented below as well as target values.

Phase	Indicator	Target
Invitation to prequalify	3. Drafted invitation to prequalify approved	Yes
	4. Number of applications received	5
Evaluation of prequalification	Evaluation report approved	Yes
Invitation to bid	4. Drafted invitation to bid approved	Yes

	5. Number of bids received	3
	6. Frequency of phase repetition due to cancellations and failures	0
Evaluation of bid	Evaluation report approved	Yes
Negotiations	Agreement reached by parties	Yes
Award of contract and contract management	Adherence to the commencement date	Yes
	Adherence to the time for completion	Yes

Procurement milestones

The milestones for the procurement of a consultant will be as follows:

1. Issuance of requests for expressions of interest.
2. Approval of the shortlist of proposers.
3. Issuance of the request for proposal.
4. Approval of the selected top-ranked consultant.
5. Completion of negotiations (if required).
6. Award of contract.

The milestones for the procurement of a contractor will be as follows:

1. Issuance of the invitation to prequalify.
2. Approval of the list of prequalified applicants.
3. Issuance of the invitation to bid.
4. Approval of the recommended bidder.
5. Completion of negotiations (if required).
6. Award of contract.

Monitoring and evaluation plan for tracking progress

Progress will be monitored by comparing the planned dates to the actual dates of milestones.

Process for knowledge transfer for use in subsequent phases
Lessons learned from previous phases will be taken into consideration into subsequent phases, where appropriate.

Note. Own work.

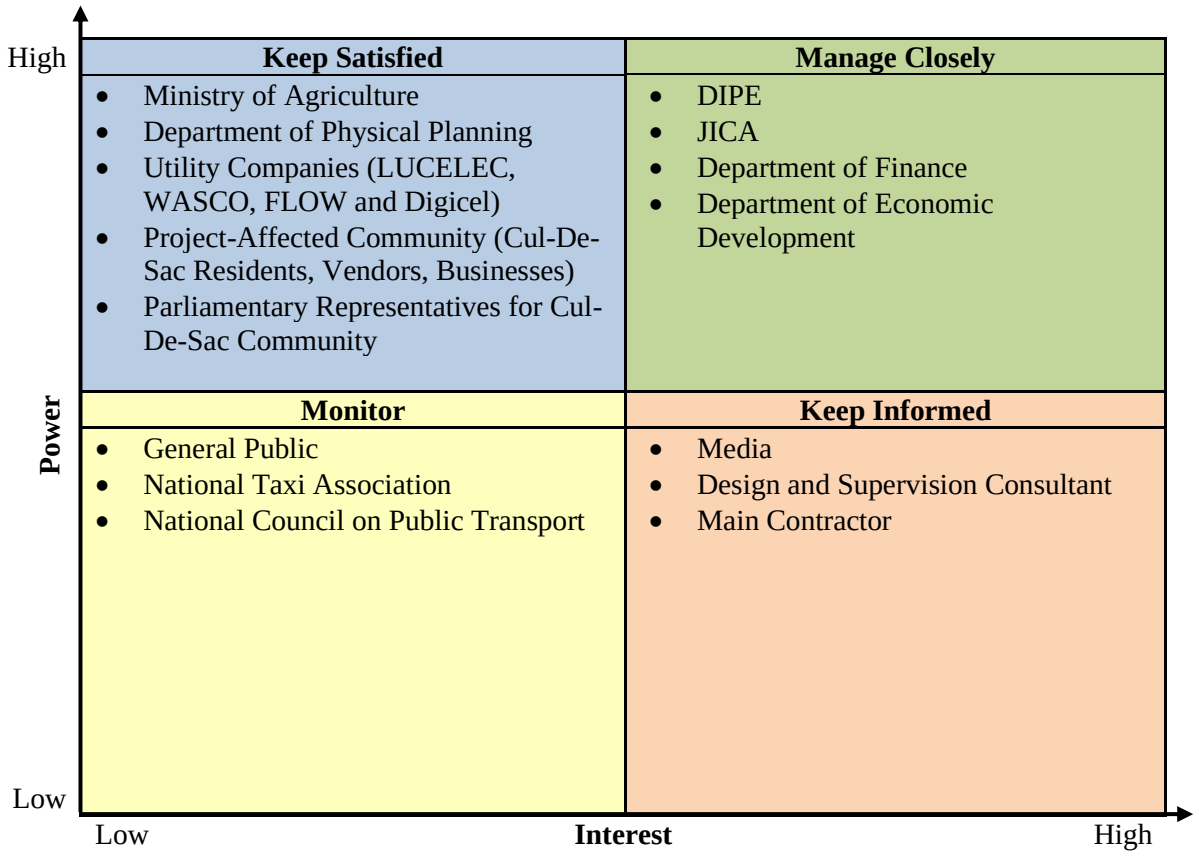
4.10 Project stakeholder management

4.10.1 Stakeholder mapping

Stakeholder mapping is a data representation technique that is used in the 'Identify Stakeholders' process within project stakeholder management to categorize stakeholders using various methods. One of the common methods is the power/interest grid, where stakeholders are categorized according to their level of authority (power) and concern about the project's outcomes (interest) (Project Management Institute, 2017). The power-interest grid for the project is presented in Figure 14 below.

Figure 14

Power-Interest Grid



Note. Own work.

4.10.2 Stakeholder register

The stakeholder register is the key output of the 'Identify Stakeholders' process and contains relevant information about the identified project stakeholders (Project Management Institute, 2017). The initial stakeholder register for the project is presented in Chart 35.

Chart 35

Initial Stakeholder Register

ID	Stakeholder	Role	Project Phase	Main Expectations	Major Requirements	Power / Interest (Low/High)
1	DIPE	Executing agency - undertakes the project and coordinates with all relevant agencies to ensure the smooth implementation of the project.	All phases	Successful delivery of the project; and collaboration among project stakeholders.	Lead the execution of the project.	High interest, high power
2	JICA	Project sponsor - provides technical and financial assistance.	All phases	Successful delivery of the project.	Involvement in critical decision making of the project; kept updated on the fulfilment of grantee obligations by the GOSL and kept informed on the progress of the project.	High interest, high power
3	Department of Finance	Allocates the required financial resources.	All phases	Completion of the project within budget.	Involvement in project funding decisions, receive funding requirements,	High interest, high power

ID	Stakeholder	Role	Project Phase	Main Expectations	Major Requirements	Power / Interest (Low/High)
					(total and periodic) and work performance information.	
4	Department of Economic Development	Supports the development of the project and monitors its progress.	All phases	Successful delivery of the project.	Involvement in the development of the project and kept informed on the progress of the project.	High interest, high power
5	Department of Physical Planning	Provides cadastral information and acquires the required lands for the project.	Feasibility, Design and Construction	Timely communication of the land acquisition needs of the project; and cooperation of project-affected persons.	Involvement in all project decision making related to land acquisition and resettlement; and receive estimated lands subject to acquisition and their characteristics.	Low interest, high power
6	Design and Supervision Consultant	Conducts the preparatory survey to assist with project preparation, prepares detailed designs and provides technical	Feasibility, Design and Construction	Collaboration with contractor; well-defined scope of services; and effective communication.	Receive compensation for services.	High interest, low power

ID	Stakeholder	Role	Project Phase	Main Expectations	Major Requirements	Power / Interest (Low/High)
		supervision of the construction works.				
7	Main Contractor	Undertakes the construction works.	Construction	Collaboration with consultant; well-defined scope of work; and effective communication;	Receive compensation for works.	
8	Ministry of Agriculture	Ensures the consideration of sustainable riverbank protection measures in the bridge design and the water quality of the Cul-De-Sac River is not impaired.	Feasibility, Design and Construction	Minimal impacts on the water quality of the Cul-De-Sac River and protection of the riverbank.	Involvement in the preparation of the project; and kept informed of the progress of the project.	Low interest, high power
9	Utility Companies (LUCELEC, WASCO, FLOW and Digicel)	Ensures the consideration of public utility infrastructure in the project and supports the necessary temporary or permanent relocation of utility infrastructure	Feasibility, Design and Construction	Minimal impacts to utility infrastructure.	Involvement in decision making related to relocating utility infrastructure; receive compensation for relocation of utility infrastructure; and kept	Low interest, high power

ID	Stakeholder	Role	Project Phase	Main Expectations	Major Requirements	Power / Interest (Low/High)
					informed of the progress of the project.	
10	Project-Affected Community (Cul-De-Sac Residents, Vendors, Businesses)	Participate in public consultations; raise concern(s) regarding the project.	Design and Construction	Minimal impacts to property, livelihood, and revenue; and reduction in flood risks of the Cul-De-Sac area.	Receive compensation for any loss of property, revenue, and livelihood due to the implementation of the project; and kept informed of the overall progress of the project.	Low interest, high power
11	National Taxi Association	Participates in public consultations; raises concern(s) regarding project aspects that may affect taxi drivers.	Construction	Minimal traffic delays and disruptions during the construction phase of the project; and a reliable bridge.	Informed of traffic management measures during the construction phase of the project; and kept informed of the overall progress of the construction works.	Low interest, low power
12	National Council on Public Transport	Participates in public consultations; raises concern(s) regarding project	Construction	Minimal traffic delays and disruption to standard routes during the construction phase of	Informed of traffic management measures during the construction phase of the project; and	Low interest, low power

ID	Stakeholder	Role	Project Phase	Main Expectations	Major Requirements	Power / Interest (Low/High)
		aspects that may affect minibus drivers.		the project; and a reliable bridge.	kept informed of the overall progress of the construction works.	
13	Parliamentary Representatives for Cul-De-Sac Community	Ensure the project does not infringe the rights of constituents and raise concern(s).	Feasibility, Design and Construction	No infringement of rights of constituents; and a reduction in the flood risks of the Cul-De-Sac basin.	Consulted during the preparation of the project; and kept informed of the progress of the project.	Low interest, high power
14	General Public	Holds the DIPE to account for the project's decisions and raises concern(s).	Construction	Minimal traffic delays and disruptions during the construction phase of the project; and a reliable bridge.	Informed of traffic management measures during the construction phase of the project; and kept informed of the overall progress of the construction works.	Low interest, low power
15	Media	Keep the general public updated on the project's progress.	Construction	Access to public information regarding the project.	Receive information on the project's progress to keep the public informed.	High interest, low power

Note. Own work.

4.10.3 Stakeholder engagement assessment matrix

A stakeholder engagement assessment matrix is a data representation technique used in the ‘Plan Stakeholder Engagement’ process within project stakeholder management. It facilitates the comparison between the current engagement levels of stakeholders and that desire to ensure the project success (Project Management Institute, 2017). The Project Management Institute (2017) presented the following five classifications for the engagement level of stakeholders and will be adopted for the project:

1. Unaware - The stakeholder is unaware of the project and its potential impacts.
2. Resistant - The stakeholder is aware of the project and its potential impacts; however, is unsupportive and opposed to it.
3. Neutral - The stakeholder is aware of the project and its potential impacts, however, is neither supportive nor unsupportive.
4. Supportive - The stakeholder is aware of the project and its potential impacts and is supportive of it.
5. Leading - The stakeholder is aware of the project and its potential impacts and is not only supportive, but also actively involved in ensuring the project’s success.

The stakeholder engagement assessment matrix presented in Chart 36 will be used to monitor stakeholder engagement as needed throughout the project to ensure stakeholders

are effectively engaged. The current level of engagement should be noted ‘C’ and the desired as ‘D’ within the matrix.

Chart 36

Stakeholder Engagement Assessment Matrix

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
DIPE					D
JICA					D
Department of Finance					D
Department of Economic Development					D
Department of Physical Planning					D
Design and Supervision Consultant					D
Main Contractor					D
Ministry of Agriculture				D	
Utility Companies (LUCELEC, WASCO, FLOW and Digicel)				D	
Project-Affected Community (Cul-De-Sac Residents, Vendors, Businesses)				D	
National Taxi Association				D	

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
National Council on Public Transport				D	
Parliamentary Representatives for Cul-De-Sac Community				D	
General Public				D	
Media			D		

Note. Own work.

4.10.4 Stakeholder engagement plan

A stakeholder engagement plan is a component of the project management plan and is the output of the 'Plan Stakeholder Engagement' process within project stakeholder management (Project Management Institute, 2017). It identifies the strategies and actions necessary to foster involvement of stakeholders that is beneficial to project or program decision making and execution (Project Management Institute, 2021). The initial stakeholder engagement plan for the project is presented in Chart 37.

Chart 37

Initial Stakeholder Engagement Plan

Stakeholder	Purpose of engagement	Power/interest	Engagement strategy
DIPE	To ensure the successful execution of the project.	High interest, high power	Leads stakeholder engagement activities
JICA	To understand and meet necessary requirements for grant funding and be informed on the progress of the project.	High interest, high power	Initial discussion on proposed project; submission of grant aid request; provides updates on project's progress and fulfilment of grantee obligations; and seeks input on project deliverables.
Department of Finance	To understand and meet necessary requirements for approval of estimated project expenditure and issuance of allocations.	High interest, high power	Initial discussion of proposed project; provides budget preparation documents; provides updates on the project's progress; and seeks input for fulfilment of grantee (GOSL) obligations.
Department of Economic Development	To ensure support throughout the development of the project.	High interest, high power	Initial discussion of proposed project; provides updates on the project's progress; and seeks input for fulfilment of grantee (GOSL) obligations.

Stakeholder	Purpose of engagement	Power/interest	Engagement strategy
Department of Physical Planning	To understand and meet the necessary requirements for the timely acquisition of the required lands for the project.	Low interest, high power	Initial discussion on proposed project; seeks input on resettlement action plan; and formally requests for land acquisition.
Design and Supervision Consultant	To ensure the design and construction of the bridge is a success.	High interest, low power	Kick-off meeting and regular project meetings.
Main Contractor	To ensure the construction of the bridge is a success.		Kick-off meeting and regular project meetings.
Ministry of Agriculture	To get early buy-in; to understand and meet requirements for the protection of the riverbank; and to ensure the Cul-De-Sac River maintains water quality that is safe throughout the implementation of the project.	Low interest, high power	Initial discussion on proposed project; site visits; seeks input on riverbank protection design; and provides updates on the project's progress.
Utility Companies (LUCELEC, WASCO, FLOW and Digicel)	To determine all utility infrastructure to be affected by the project; to understand the requirements for the relocation of utility infrastructure; and to ensure the timely relocation of all utility infrastructure.	Low interest, high power	Stakeholder consultations, site visits, and provides updates on the progress of the project.

Stakeholder	Purpose of engagement	Power/interest	Engagement strategy
Project-Affected Community (Cul-De-Sac Residents, Vendors, Businesses)	To get buy-in from project affected persons; and ensure the voices of project-affected persons are heard and their grievances addressed in a timely and fair manner.	Low interest, high power	Stakeholder consultations and provides updates on the project's progress and land acquisition process.
National Taxi Association	To get buy-in; to be informed of how construction activities will impact the road network and traffic flow; and to identify and address unintended impacts of the project.	Low interest, low power	Stakeholder consultations; provides updates on the project's progress; and provides information on the impacts of the project on the road network and traffic flow.
National Council on Public Transport	To get buy-in; to be informed of how construction activities will impact the road network and traffic flow; and to identify and address unintended impacts of the project.	Low interest, low power	Stakeholder consultations; provides updates on the project's progress; and provides information on the impacts of the project on the road network and traffic flow.
Parliamentary Representatives for Cul-De-Sac Community	To get early buy-in; to identify and address unintended impacts of the project on the Cul-De-Sac community	Low interest, high power	Stakeholder consultations, site visits, and provides updates on the project's progress.

Stakeholder	Purpose of engagement	Power/interest	Engagement strategy
General Public	To get buy-in; to be informed of how construction activities will impact the road network and traffic flow; and to identify and address unintended impacts of the project.	Low interest, low power	Provides updates on the project's progress and information on the impacts of the project on the road network and traffic flow.
Media	To ensure the dissemination of public information regarding the project.	High interest, low power	Issue press releases and media interviews.

Note. Own work.

5 RECOMMENDATIONS

The following are suggestions to ensure the project is successful and to improve the project management capacity of the DIPE:

1. The project manager should ensure that all changes be initiated using the change control process and the established change request form. The project manager should also ensure that the change log is updated as necessary to reflect the status of each change request. Enforcement of the use of the change control process will alleviate the risks associated with changes and improve traceability, transparency, efficiency, and productivity.
2. The project manager should consider the development of a change management plan, which will serve as the overarching plan to guide the authorization and incorporation of change requests throughout the project.
3. The project manager should ensure that the communications management plan is updated as the communication needs of the project change. This will ensure the communication requirements of all stakeholders are well known and will help the team focus on satisfying them.
4. The project manager should ensure that the stakeholder register is updated periodically or as needed throughout the project to reflect any changes in the documented information. This will ensure that engagement strategies are planned for all stakeholders, which will contribute to stakeholder satisfaction.
5. The project manager should also implement a grievance redress mechanism to ensure an effective and systematic approach to addressing the concerns of the project-affected

community and the public. This will contribute to managing risks associated with stakeholders (indirect) and increase their support as well as project success.

6. The DIPE, along with the project sponsor, should determine a suitable project management information system to be utilized for the project to ensure the integration of the agreed risk response plans and their related activities into the project's activities.
7. The project manager should ensure that the risk register is updated as necessary to reflect all project risks to ensure effective risk management.
8. The DIPE should consider investing in specialized risk software to perform quantitative risk analyses for capital projects to assist with making informed decisions guided by reliable risk data. The employment of a risk management specialist with knowledge and experience in developing and interpreting risk models should also be considered.
9. The DIPE should require a project management plan for all projects to increase the likelihood of the success of projects executed by the DIPE and to guide the execution and management of projects.
10. The DIPE should consider including a monitoring and evaluation specialist to ensure high-quality projects are delivered by the DIPE and the desired results of projects are achieved.

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

This chapter contains an evaluation of the project from a regenerative and sustainable development perspective. The dimensions of regenerative development presented by Müller (2017) is used to validate the project's regenerative development aspects. The sustainability of the project is evaluated using the United Nations Sustainable Development Goals. The impacts of the project were also assessed using the P5 ontology presented by GPM Global (2023).

6.1 Regenerative development

Müller (2017) indicated that regenerative development requires a holistic approach that integrates six processes: environmental, social, economic, political, cultural, and spiritual. The execution of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin and its end product, the new Cul-De-Sac bridge, will be assessed through the lens of each of the six processes.

The new bridge will have a long service life or possess good durability performance, which will benefit the environment. Low initial eco-costs should not be the only criterion for regenerative development. Concrete is a durable material. A bridge with a low initial eco-cost but a short service life will have to be replaced earlier. This is likely to increase the total eco-costs. On the contrary, a bridge constructed with a durable material like concrete may have high initial eco-costs; however, due to its durability or long service life, lower total eco-costs may be realized. Although concrete possesses a high embodied energy due to the emission of carbon dioxide from the manufacturing of one of its key ingredients,

cement (Ordinary Portland), its long service life can offer benefits to the environment. The bridge also has a hollow core slab, which is a slab which contains longitudinal voids. The intentional voids reduce the self-weight of the bridge deck. This translates not only into fewer material quantities, particularly concrete required for the bridge deck, but also fewer supports (abutments, piers, and foundation) of the bridge. The service life of a properly designed and constructed concrete bridge is typically 120 years or more. Well designed and constructed concrete bridges will minimize the need for maintenance and repairs, which translates to reduced consumption of energy and resources (water, man-made construction materials, labour, and costs), as well as the generation of waste throughout its service life. A bridge with a long service life will also value the efforts of workers involved in its construction as well as the efforts of workers throughout the supply chains of the required construction materials in contrast to that with a short service life.

At the end of the service life of the bridge, its concrete components can be demolished and recycled to produce recycled coarse aggregates. Recycled coarse aggregates will reduce waste production or the amount of waste sent to the landfill. Reducing the amount of waste will also decrease the energy consumption of landfills and greenhouse gas emissions from the trucks that will be used to transport the concrete waste. Recycling concrete waste products will also reduce carbon emissions to produce new aggregates.

In the design of the bridge, the future traffic needs will be considered. The design of the new bridge will consider a growth factor that aids the prediction of future traffic volumes or loading. If the project meets the current and future demands, the likelihood of it

requiring upgrades or replacements to meet the future demands prior to the end of its service life is significantly reduced. This translates to minimized environmental impacts in terms of carbon emissions, consumption of energy and resources, as well as waste production. Additionally, the existing bridge does not have provisions for pedestrians. The proposed design provides safe spaces for pedestrians through the provision of sidewalks on either side of the bridge. The design will be inclusive. Hence, the width of the new sidewalks in accordance with international standards will cater for persons with disabilities who require the use of wheelchairs.

Transport links or networks underpin the economy, thus enabling the movement of goods and services including food, water, education, and health. Improving the resilience of this vital transport link will ensure that citizens' access to essential needs is not disrupted during and after heavy rainfall events.

The construction of the bridge will generate income for workers and suppliers. Although it may only be for a maximum of approximately two years, during that period it will ensure that some families in the community provide the essentials for their families. Additionally, the construction of this bridge may cause the Cul-De-Sac area to be more attractive for business or investment, given its history of flooding, which will create employment opportunities for residents. It can also create new opportunities such as housing.

The participation of both females and males throughout the project is important. Both females and males will be given equal opportunities in the design of the bridge as well

as during its construction. Every effort will be made to ensure that both women and men are treated fairly.

The project will be undertaken by the Department of Infrastructure, Ports and Transport, which is the government department responsible for infrastructural development in Saint Lucia. Both residents of the community and other citizens affected will be given an opportunity to exercise their political voice during the design process. Residents of the community and other citizens will be able to express their experiences of Cul-De-Sac being flooded and its impacts as well as their views on how to address this problem.

A state-of-the-art bridge will be designed and constructed. The construction of the bridge will offer some level of social justice for the residents and businesses, who have been significantly affected by flooding in the past years and may have felt neglected by the government.

The degenerative aspects of the project were also assessed. Mitigative strategies were identified to reduce the negative impacts. The project uses Ordinary Portland Cement. Ordinary Portland cement, a key ingredient in concrete, has high embodied energy and contributes to carbon emissions, a primary driver for climate change. The bridge will be designed with a long service life to reduce the negative impacts. Additionally, a hollow slab will be used to reduce the quantities of concrete required. Although all efforts will be made to minimize environmental pollution due to the bridge construction, environmental pollution is inevitable. Consequently, the construction of the bridge will contribute to some level of air, noise, and water pollution. For instance, the local air and water quality may be impacted by the bridge construction which may pose health risks to residents. Poor water

quality may also affect the health of ecosystems. Thus, the prospective contractor will be required to submit a construction environmental plan for approval to ensure that all construction activities are undertaken to minimize environmental or nuisance impacts.

6.2 Sustainable development goals

The project is aligned with three of the United Nations Sustainable Development Goals:

1. Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
2. Goal 11- Make cities and human settlements inclusive, safe, resilient, and sustainable.
3. Goal 13 - Take urgent action to combat climate change and its impacts.

The new bridge will consider road safety using appropriate sight distances in the design of the bridge and its approaches. Effective traffic management plans will also be developed to manage traffic during the construction phase and after its completion. Sidewalk provisions will accommodate persons with disabilities. This will ensure a safe and inclusive bridge design.

The bridge will also reduce the flood risks of the Cul-De-Sac Basin. One of the potential threats of climate change is the increased frequency and intensity of extreme weather events. As such, climate change considerations will be incorporated in the design of the bridge to ensure a resilient bridge.

6.3 P5 impact assessment

The impacts of the project were assessed, using two of the three classifications of the P5 ontology presented by GPM Global (2023).

The impacts of the project on the ‘People’ classification will include:

1. Labour Practices and Decent Work
    a. Labour/Management Relations - The project will adhere to the Saint Lucia Labour Code, particularly where remuneration and working hours are concerned.
    b. Project Health and Safety - The project will comply with the Employee Occupational Health and Safety Act of Saint Lucia. It will ensure successful contractors follow the approved health and safety plan to ensure the health and safety of both workers and non-workers to avoid onsite accidents and incidents. Monthly site safety patrols/inspections will be conducted onsite to identify hazards onsite and corrective actions. Successful contractors will be responsible for implementing these corrective actions in the least possible time.
    c. Equal Opportunity - Successful contractors will employ all genders and all genders will be given equal consideration for positions. Irrespective of position, all workers will be treated fairly.
    d. Local Competence Development - Local competence will be developed using new technologies.

e. Work-Life Harmony and Mental Health - Successful contractors will be encouraged to celebrate milestones (for example, completion of foundation, substructures, and superstructure) with a social activity for staff. Successful contractors will encourage initiatives, such as site worker and office worker of the month to encourage productivity and motivate workers to perform.

2. Society and Customers
    a. Community engagement - Communities will be engaged at all stages of the project.
    b. Public policy/compliance - The project will comply with all applicable public policies.
    c. Customer health and safety - The project will be executed in a manner that will maintain the health and safety of motorists and pedestrians who utilize the Cul-de-Sac business area.
3. Human Rights
    a. Harassment and Discrimination - the project will have a zero-tolerance approach for harassment and discrimination.
    b. Age-appropriate Labour - All successful contractors and consultants will adhere to the minimum age for employment in Saint Lucia. The project will have a zero-tolerance approach to non-compliance.
    c. Forced/Involuntary Labour - The project will have a zero-tolerance approach to forced and/or involuntary labour.
4. Ethical Behavior

a. Sustainable Procurement and Contracts - Project materials will be procured from vendors who use resources that are compatible with the protection of the environment and society.
b. Anti-corruption - The project will have a zero-tolerance approach to corruption in any form.
c. Fair competition - The project will adopt practices of fair competition.
d. Responsible technology - The project will encourage the use of hollow core slabs, vetiver grass technology, and other sustainable construction technology and techniques.

The impact of the project on the 'Planet' classification will include:

1. Transport
    a. Local Procurement - Successful contractors will be encouraged to prioritize the purchase of materials available locally. This will be controlled by requiring contractors to submit an imports list for approval. Any item on the list that is available locally and, in the quality and quantity required, will be rejected.
    b. Traveling and Commuting - Successful contractors will be encouraged to use bulk purchasing arrangements to reduce travelling costs. Additionally, the use of bigger trucks for transportation of materials will be encouraged to reduce the number of truck trips, thereby reducing greenhouse gas emissions.

c. Logistics - Successful contractors will be encouraged to purchase materials in bulk to reduce the frequency of delivery (for local purchasing) and shipping (for materials imported).

2. Energy
    a. GHG Emissions - Successful contractors will be encouraged to use solar energy for their daily operations, where possible.
3. Land, Air, and Water
    a. Biological Diversity - The project will incorporate biodiversity in the environmental impact assessment of the project. This will assist in identifying both the habitats and species that will be affected by the project and the necessary actions that must be taken to limit impacts. The project will allocate the necessary budget for these activities.
    b. Air and Water Quality - The successful contractor will be required to implement control techniques to reduce pollutants in the environment, such as washout stations on site to wash down equipment and collect and retain concrete washout waste.
    c. Water Consumption - Successful contractors will be required to educate workers about the importance of responsible usage. Successful contractors will also be encouraged to adopt water conservation and management techniques.
    d. Soil Erosion and Regeneration - the project will reduce the erosion of soil along the riverbanks by considering soft engineering techniques in the

design phase, including but not limited to vetiver grass technology and reforestation.

e. Noise Pollution - Successful contractors will be responsible for the provision of ear protection for site workers. All site workers will use the provided ear protection when exposed to noise hazards. Successful contractors will be required to use less noisy construction equipment as much as possible.

4. Consumption

a. Recycling and Reuse - For the demolition of concrete components of existing bridges, concrete recycling will be encouraged. Crushed concrete waste can be used as recycled coarse aggregates.

b. Disposal - The project will establish a disposal site and adhere to relevant regulations for the disposal of waste in St. Lucia. The project will track all materials leaving the site to ensure they are disposed of properly and consistent with regulations.

c. Contamination and Pollution - The project will ensure successful contractors implement proper waste management procedures. The successful contractors will also be required to provide a waste management plan for approval.

d. Waste Generation - The project will adopt recycling practices to reduce waste generation throughout the project.

7 CONCLUSIONS

1. The project charter was created to provide high-level information and ensure mutual understanding among project stakeholders. It documents inter alia the project purpose, objectives, deliverables, assumptions, budget, and key stakeholders. The change control process was also developed to set out a systematic approach to managing changes throughout the project.
2. The scope management plan will be informal. A scope baseline, which includes the scope statement, work breakdown structure, and WBS dictionary will be critical components for the management of the project scope. The requirements traceability matrix was also developed to track all requirements throughout the project and ensure all approved requirements are delivered at project completion.
3. The schedule management plan was developed to define the approach to developing, monitoring, and controlling the project schedule. The milestones list was also generated. The project schedule was developed in the form of a Gantt chart, with the critical path identified. The project is expected to commence on June 3, 2024, and be completed by July 20, 2028.
4. The cost management was developed, and it provides a detailed outline of how the project cost will be planned, managed, and controlled throughout the project. Cost estimates for each work package were also developed, using primarily analogous estimating techniques. The cost baseline was produced by aggregating the cost of each work package. The cost baseline was also illustrated in an S-curve, enabling a time

phased view of the cost baseline. The project was determined to be XCD $ 33,716,500.00.

5. Quality management seeks to ensure the project meets its quality requirements and complies with the standards. The quality management plan developed therefore describes the required activities to ensure that the quality objectives set for the project are achieved. It provides metrics for each quality objective and target values.
6. Resources are critical for the successful implementation of a project. The resource management plan was developed to guide how the project resources should be allocated, managed, and released. The project management plan will ensure that the right resources are available at the right time to achieve the project objectives.
7. The importance of effective communication cannot be overestimated. The communication plan was developed to ensure the information is delivered in an appropriate and efficient manner to the identified stakeholders. The communications management plan provides guidelines for project meetings and reports. Determining the communication requirements of each identified stakeholder was at the core of the plan. A communications matrix was used to provide a framework to plan and manage project communications.
8. Unmanaged risks can prevent a project from achieving its objectives. A risk management plan was developed to outline the approach to managing project risks. An initial risk register was also developed to identify potential project risks. Twenty-one (21) risks were identified with their causes, effects, triggers, potential risk responses, and owners also detailed.

9. Successful procurement depends on well-planned and effective processes. The procurement management plan was developed to describe how project procurement activities will be conducted by providing a timetable for procurement activities and metrics to evaluate procurement activities, roles, and responsibilities. A procurement strategy was also developed which identifies the project delivery method and types of contracts and details the procurement process.
10. Engaging stakeholders is critical for project success. An initial stakeholder register was developed which documents pertinent information about project stakeholders, including requirements, expectations, roles, power, and interests. The stakeholder engagement plan was developed and provides strategies to ensure the support of all stakeholders. A stakeholder engagement assessment matrix was developed to show the engagement levels required for the successful delivery of the project. It will also be used to monitor stakeholder engagement.
11. The project's regenerative and sustainable development aspects were assessed. The project is aligned with three of the United Nations Sustainable Development Goals. Based on the regenerative development analysis, using the dimensions established by Müller (2017), the project incorporates all six dimensions. The impacts of the project were also assessed using the P5 ontology presented by GPM Global (2023). The project incorporates two of the three classifications. The project can therefore be considered as a sustainable and regenerative initiative.

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APPENDICES

Appendix 1: FGP Charter

CHARTER OF THE PROPOSED
FINAL GRADUATION PROJECT (FGP)

1. Student name

Shian Jessima Edwin

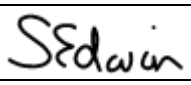
2. FGP name

Project Management Plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia

3. Application Area (Sector or activity)

Construction

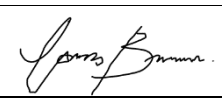
4. Student signature



5. Name of the Graduation Seminar facilitator

Mr. Carlos Brenes

6. Signature of the facilitator



7. Date of charter approval

October 16, 2023

8. Project start and finish date

August 28, 2023	NA

9. Research question

What components are required for the development of a project management plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia that allows it to be effective in describing how the project will be performed?

10. Research hypothesis

Is it possible to develop a project management plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia which might enable it to be effective in describing how the project will be performed?

11. General objective

To develop a project management plan that considers all the necessary project management knowledge areas on how the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Basin), Saint Lucia will be performed to ensure successful project realization.

12. Specific objectives

1. To create a project charter to initiate the project and document high level project information to facilitate the development of the project management plan.
2. To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.
3. To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.
4. To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.
5. To develop a quality management plan to outline how the policies, procedures and guidelines will be implemented to achieve the project quality objectives.
6. To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.
7. To develop a communications management plan that outlines how project communication will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.
8. To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.

9. To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.
10. To develop a stakeholder engagement plan that outlines strategies for the effective engagement of project stakeholders to foster active involvement.
11. To validate the project from a regenerative/sustainability perspective to identify and minimize any negative environmental, social, and economic impacts.

13. FGP purpose or justification

The FGP is important as it will provide a blueprint that guides the execution of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia, which will increase the likelihood of achieving project success. Given that the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge) will result in the construction of the longest bridge in Saint Lucia, a well-developed project management plan is critical.

The completion of the FGP is also a requirement for the attainment of a Master in Project Management Degree at the Universidad Para La Cooperacion Internacional. The development of a project management plan will demonstrate an ability to integrate and apply the knowledge gained.

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

1. FGP- Project Management Plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia
    1.1 Graduation Seminar
        1.1.1 FGP Deliverables
            1.1.1.1 Week 1
                1.1.1.1.1 Appendix 1. FGP Charter (Sections 1 to 10)
                1.1.1.1.2 Appendix 4. Bibliographic Reference
            1.1.1.2 Week 2
                1.1.1.2.1 Appendix 1. FGP Charter (Sections 11 to 12)
                1.1.1.2.2 Appendix 2. FGP WBS
            1.1.1.3 Week 3
                1.1.1.3.1 Appendix 1. FGP Charter (Sections 13 to 19)
            1.1.1.4 Week 4
                1.1.1.4.1 Chapter II. Theoretical Framework

1.3.2.2 Reviewer 2
1.3.2.2.1 FGP Reading
1.3.3.2.2 Reader 2 Report
1.4 Adjustments
1.4.1 Report for Reviewers
1.4.2 FGP Update
1.4.3 Second Review by Reviewers
1.5 Presentation to Board of Examiners
1.5.1 Final Review by Board
1.5.2 FGP Grade Report

15. FGP budget

The budget for the FGP development process is USD $770.00.

Item	Estimated Cost (USD)
Software Licenses Acquisition	50.00
Philologist Review Services	150.00
Communication Expenses	100.00
Printing	150.00
Document Binding	50.00
Courier Services	200.00
Sub Total	*700.00*
Contingency Allowance (10%)	70.00
Total	**770.00**

16. FGP planning and development assumptions

a. The researcher (student) has the requisite knowledge and skills for the development of the FGP.
b. The required information on the Project for Reconstruction of Bridges in Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia to facilitate the development of the FGP is available.
c. The assigned tutor will be supportive and responsive throughout the development of the FGP.
d. The researcher (student) will not be incapacitated by ill-health.
e. The researcher's (student's) time for the FGP will be at least 15 hours per week during the undertaking of the FGP.

17. FGP constraints

a. The FGP must be completed within a three (3) months' time frame.

b. The scope of the FGP is limited to the development of the project management plan.
c. The FGP must comply with the regulations set out by the Universidad Para La Cooperacion Internacional.
d. The primary human resource available for undertaking the FGP is the researcher (student).
e. The FGP cost should not exceed the budget.

18. FGP development risks

a. Delays with the courier service may result in the delayed receipt (that is outside of the established time period) of the written FGP document by the Universidad Para La Cooperacion Internacional.
b. Unexpected disruptive events (such as political unrest, epidemic, pandemic, and natural disasters) may negatively impact the researcher's (student's) ability to complete the FGP in a timely manner.
c. Poor internet connectivity may result in the non-attendance of the researcher (student) inability) at the virtual FGP defense meeting.
d. Underestimation of the cost associated with the review of the written document by a philologist may result in FGP cost overruns.
e. The assigned tutor may require significant changes or adjustments to the academic products developed during the Graduation Seminar, which may impact the FGP schedule.

19. FGP main milestones

Milestones are related to deliverables on the second level (deliverables) and third level (control accounts) of the WBS of section 14 of this Charter. At the same time the deliverables are related to the specific objectives (in the case of the FGP please include the times for the tutorship reviews as well as for the readership).

Deliverable	**Estimated Finish Date**
FGP (Start)	28 August, 2023
1.1 Graduation Seminar (Start)	29 August, 2023
1.1.1 FGP Deliverables	16 October, 2023
1.2 Tutoring Process (Start)	24 October, 2023
1.2.1 Tutor	26 October, 2023
1.2.2 Adjustments of Previous Chapters (if needed)	2 November, 2023
1.2.3 Chapter IV. Development (Results)	16 January, 2024
1.2.4 Conclusion	23 January, 2024

1.2.5 Recommendations	30 January, 2024
1.3 Reading by Reviewers (Start)	31 January, 2024
1.3.1 Reviewer's Assignment Request	6 February, 2024
1.3.2 Reviewers Work	20 February, 2024
1.4 Adjustments (Start)	21 February, 2024
1.4.1 Report for Reviewers	4 March, 2024
1.4.2 FGP Update	54 March, 2024
1.4.3 Second Review by Reviewers	19 March, 2024
1.5 Presentation to Board of Examiners (Start)	20 March, 2024
1.5.1 Final Review by Board	21 March, 2024
1.5.2 FGP Grade Report	26 March, 2024
FGP (End)	26 March, 2024

20. Theoretical framework

20.1 Estate of the "matter"

The Project for Reconstruction of Bridges in the Cul-De-Sac Basin in Saint Lucia seeks to reduce the vulnerability of main roads within the Cul-De-Sac Basin to natural disasters by redesigning and reconstructing three main bridges. Transport infrastructure including bridges are drivers of economic activity, which rely on the connectivity of people, goods, and services. The Cul-De-Sac Bridge, which connects the north and west of the island, will be the first bridge for redesign and reconstruction. The north is the capital, and several tourist attractions and accommodation are in Soufriere, which is located on the west of the island. The economy of Saint Lucia is highly dependent on the tourism industry; therefore, the Cul-De-Sac Bridge forms part of a critical link. The new bridge will be the longest bridge in Saint Lucia and its construction will include the use of new technology. As the first undertaking of the Project for Reconstruction of Bridges in the Cul-De-Sac Basin, the redesign and reconstruction of the Cul-De-Sac Bridge will pave the way for the other two bridges to be redesigned and reconstructed through the lessons learned. A project management plan is therefore critical to ensure the success of the project.

20.2 Basic conceptual framework

Project Management Processes
Project Management Process Groups
Knowledge Areas
Project Process Groups
Project Management Plan
Sustainability

Regenerative Development Bridge Design and Construction Disaster Risk Reduction

21. Methodological framework

Objective	**Name of deliverable**	**Information sources**	**Research method**	**Tools**	**Restrictions**
To create a project charter to initiate the project and document high level project information to facilitate the development of the project management plan.	Project Charter	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a scope management plan to guide how the project scope will be defined, validated, and controlled.	Scope management plan	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a schedule management plan to establish the criteria and activities for generating, monitoring, and controlling the project schedule.	Schedule management plan	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
To develop a cost management plan to guide how the project costs will be planned, estimated, budgeted, monitored, and controlled.	Cost management plan	Secondary: Books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a quality management plan to outline how the policies, procedures and guidelines will be implemented to achieve the project quality objectives.	Quality management plan	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a resource management plan to guide the categorization, allocation, management, and release of project resources.	Resource management plant	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a communication s management plan that outlines how project communication	Communications management plan	Secondary: books journal articles websites	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human

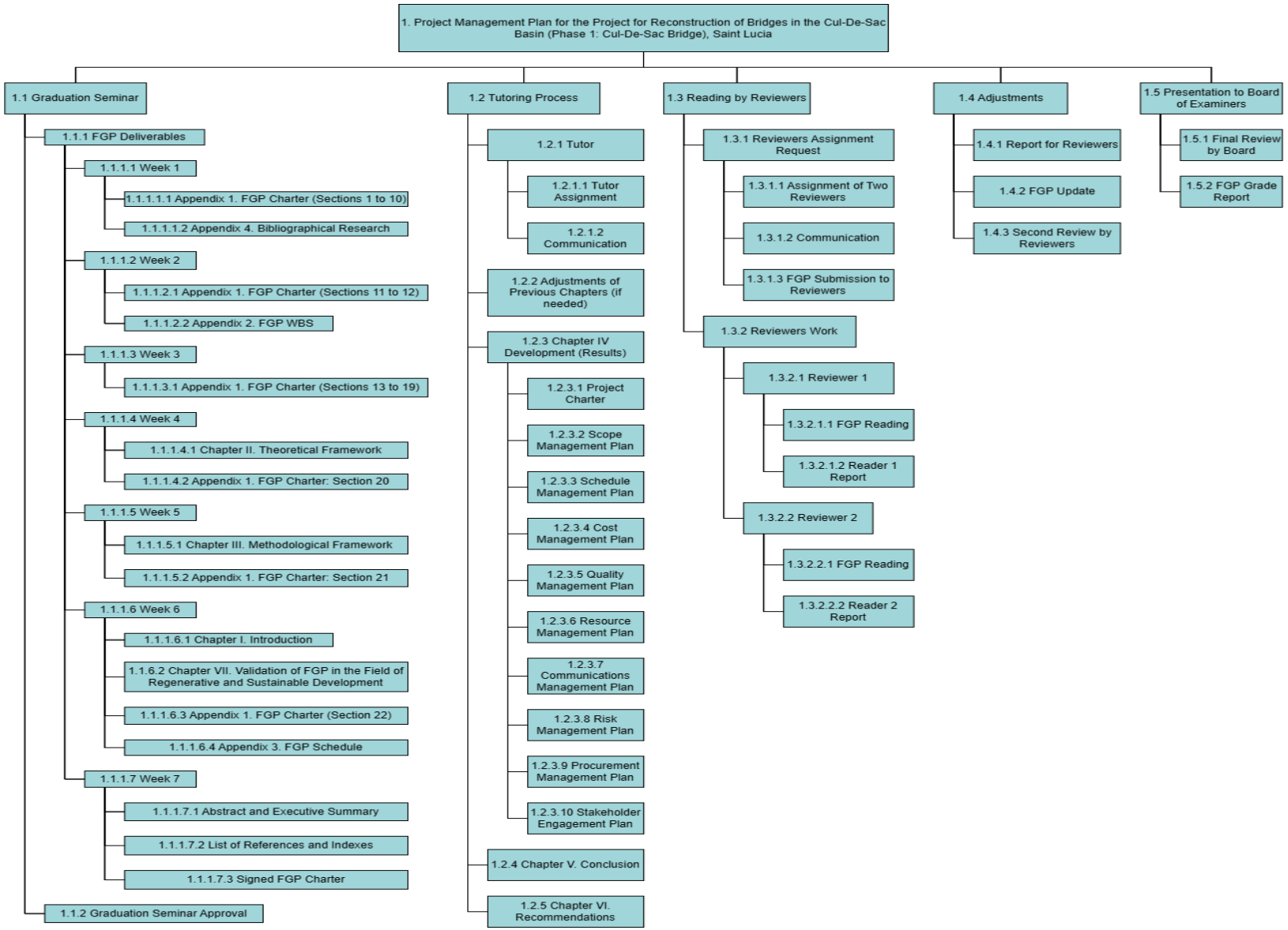
Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
will be planned, structured, implemented, and monitored to effectively meet the information needs of the project.		Primary: reports			resource available
To develop a risk management plan that defines how risk management activities will be conducted to ensure project risks are kept at acceptable levels.	Risk management plan	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a procurement management plan to outline the procurement activities to be undertaken for the acquisition of the required external goods and services.	Procurement management plan	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available
To develop a stakeholder engagement plan that outlines strategies for the effective	Stakeholder engagement plan	Secondary: books journal articles websites	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
engagement of project stakeholders to foster active involvement.		Primary: reports			resource available
To validate the project from a regenerative/ sustainability perspective to identify and minimize any negative environmental, social and economic impacts.	Validation of the project from a regenerative/ sustainable perspective.	Secondary: books journal articles websites Primary: reports	Analytic-Synthetic method	expert judgement templates	Limited time for development Only one human resource available

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

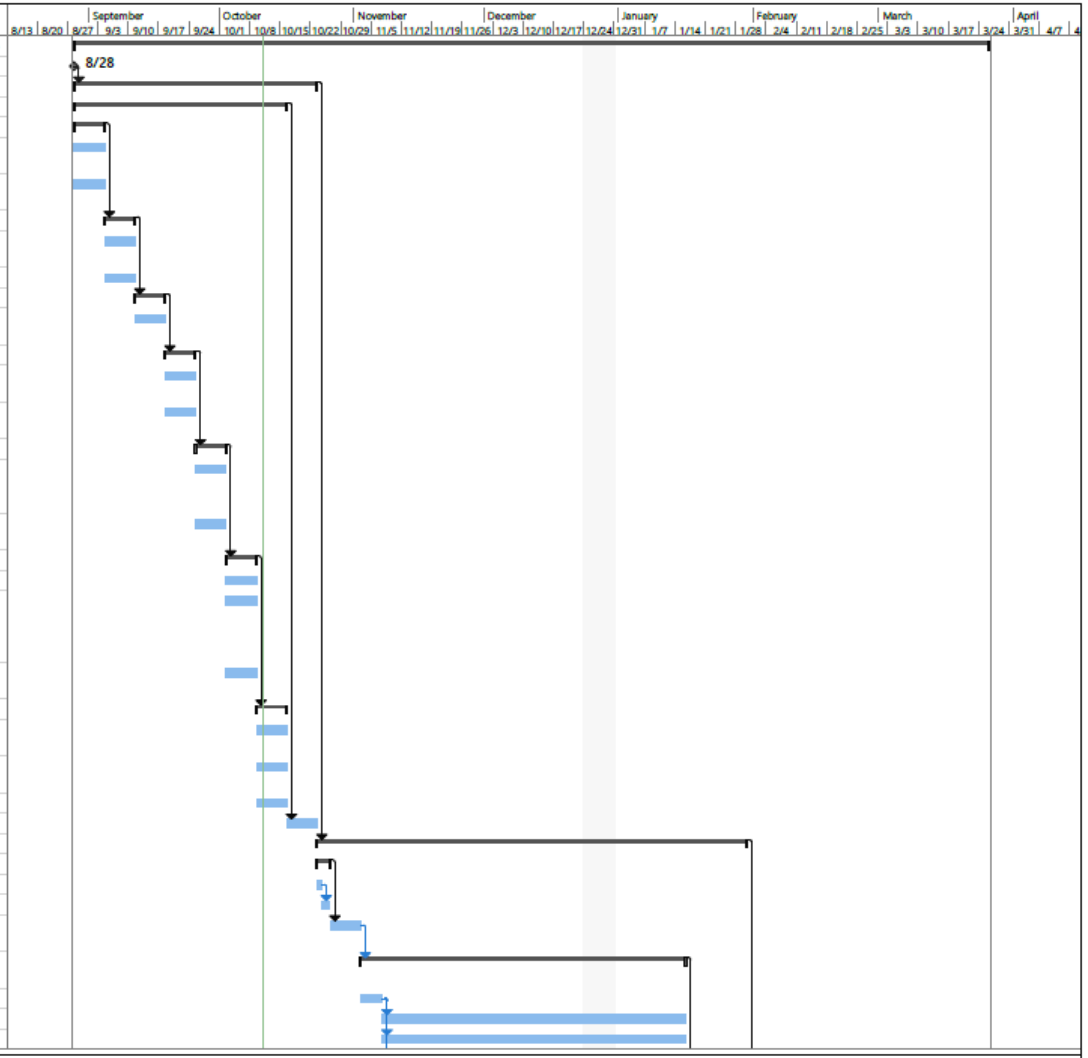
The project will comply with the concepts of regenerative and sustainable development. The project will ensure a resilient bridge will result from the design and construction phases. Climate change considerations will be implemented in the design. The bridge will be designed with a long service life to conserve materials. Additionally, the design of pedestrian facilities will consider persons with disabilities to ensure an inclusive design. The use of a hollow concrete slab will reduce the required concrete quantity. It will also result in a lighter structure, thus reducing the loading to be carried by the substructures and foundation. The traffic assessment for the bridge design will apply a growth factor to accommodate future traffic demands to ensure the bridge design can meet both current and future demands. The project is likely to make the Cul-De-Sac area more attractive and encourage new business opportunities which will contribute to the economic growth of the country.
Potential indicators will include the number of days of road/bridge closures due to overtopping per annum and the number of impassable cars due to road/bridge closure per annum.

Appendix 2: FGP WBS

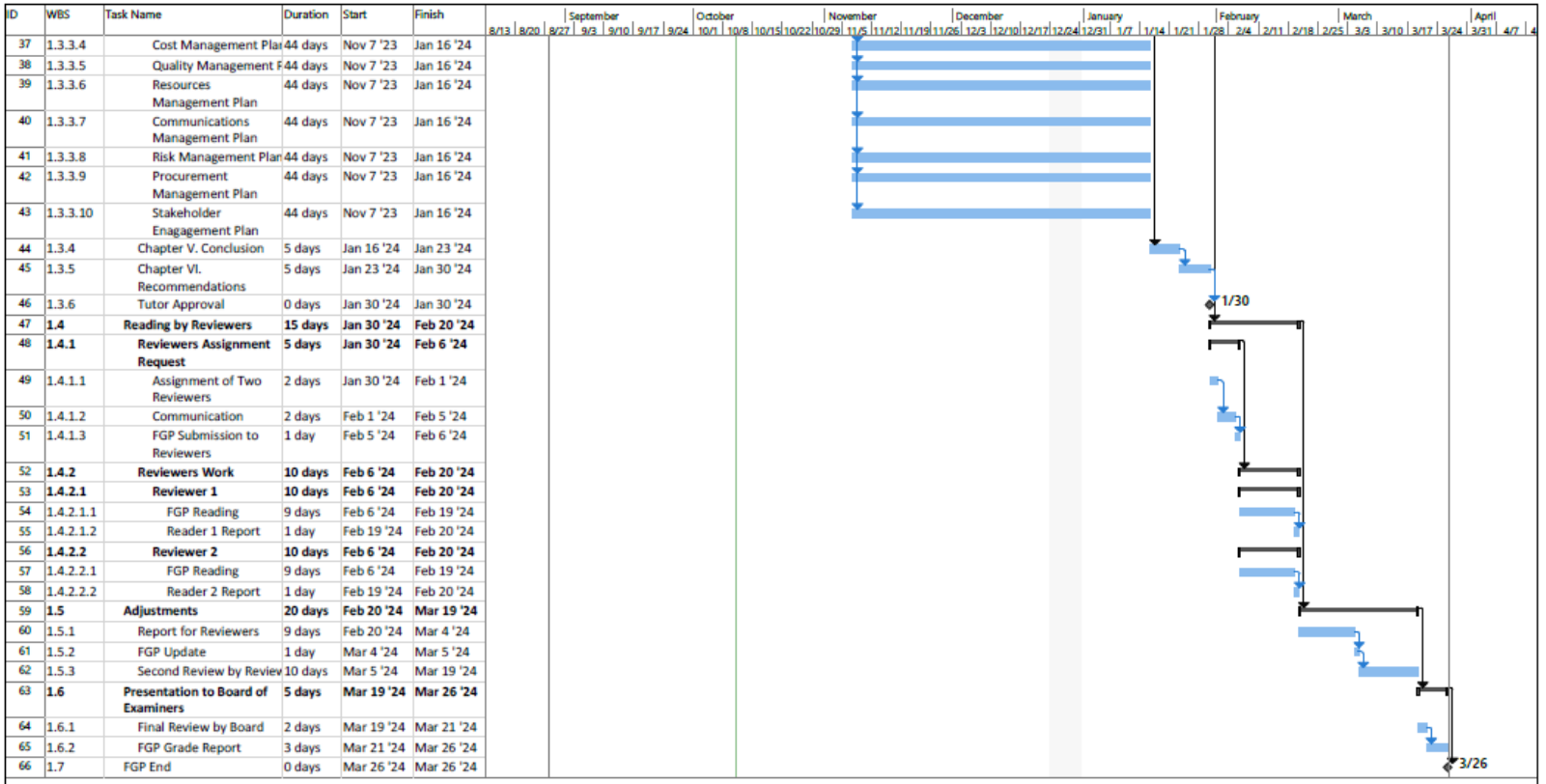

1. Project Management Plan for the Project for Reconstruction of Bridges in the Cul-De-Sac Basin (Phase 1: Cul-De-Sac Bridge), Saint Lucia
1.1 Graduation Seminar
1.1.1 FGP Deliverables
1.1.1.1 Week 1
1.1.1.1.1 Appendix 1. FGP Charter (Sections 1 to 10)
1.1.1.1.2 Appendix 4. Bibliographical Research
1.1.1.2 Week 2
1.1.1.2.1 Appendix 1. FGP Charter (Sections 11 to 12)
1.1.1.2.2 Appendix 2. FGP WBS
1.1.1.3 Week 3
1.1.1.3.1 Appendix 1. FGP Charter (Sections 13 to 19)
1.1.1.4 Week 4
1.1.1.4.1 Chapter II. Theoretical Framework
1.1.1.4.2 Appendix 1. FGP Charter: Section 20
1.1.1.5 Week 5
1.1.1.5.1 Chapter III. Methodological Framework
1.1.1.5.2 Appendix 1. FGP Charter: Section 21
1.1.1.6 Week 6
1.1.1.6.1 Chapter I. Introduction
1.1.6.2 Chapter VII. Validation of FGP in the Field of Regenerative and Sustainable Development
1.1.1.6.3 Appendix 1. FGP Charter (Section 22)
1.1.1.6.4 Appendix 3. FGP Schedule
1.1.1.7 Week 7
1.1.1.7.1 Abstract and Executive Summary
1.1.1.7.2 List of References and Indexes
1.1.1.7.3 Signed FGP Charter
1.1.2 Graduation Seminar Approval
1.2 Tutoring Process
1.2.1 Tutor
1.2.1.1 Tutor Assignment
1.2.1.2 Communication
1.2.2 Adjustments of Previous Chapters (if needed)
1.2.3 Chapter IV Development (Results)
1.2.3.1 Project Charter
1.2.3.2 Scope Management Plan
1.2.3.3 Schedule Management Plan
1.2.3.4 Cost Management Plan
1.2.3.5 Quality Management Plan
1.2.3.6 Resource Management Plan
1.2.3.7 Communications Management Plan
1.2.3.8 Risk Management Plan
1.2.3.9 Procurement Management Plan
1.2.3.10 Stakeholder Engagement Plan
1.2.4 Chapter V. Conclusion
1.2.5 Chapter VI. Recommendations
1.3 Reading by Reviewers
1.3.1 Reviewers Assignment Request
1.3.1.1 Assignment of Two Reviewers
1.3.1.2 Communication
1.3.1.3 FGP Submission to Reviewers
1.3.2 Reviewers Work
1.3.2.1 Reviewer 1
1.3.2.1.1 FGP Reading
1.3.2.1.2 Reader 1 Report
1.3.2.2 Reviewer 2
1.3.2.2.1 FGP Reading
1.3.2.2.2 Reader 2 Report
1.4 Adjustments
1.4.1 Report for Reviewers
1.4.2 FGP Update
1.4.3 Second Review by Reviewers
1.5 Presentation to Board of Examiners
1.5.1 Final Review by Board
1.5.2 FGP Grade Report

Appendix 3: FGP Schedule

ID	WBS	Task Name	Duration	Start	Finish
1	**1**	**Final Graduation Project**	**145 days**	**Aug 28 '23**	**Mar 26 '24**
2	1.1	FGP Start	0 days	Aug 28 '23	Aug 28 '23
3	**1.1**	**Graduation Seminar**	**40 days**	**Aug 28 '23**	**Oct 23 '23**
4	**1.1.1**	**FGP Deliverables**	**35 days**	**Aug 28 '23**	**Oct 16 '23**
5	**1.1.1.1**	**Week 1**	**5 days**	**Aug 28 '23**	**Sep 4 '23**
6	1.1.1.1.1	Appendix 1: FGP Charter (Sections 1	5 days	Aug 28 '23	Sep 4 '23
7	1.1.1.1.2	Appendix 4: Bibligraphic	5 days	Aug 28 '23	Sep 4 '23
8	**1.1.1.2**	**Week 2**	**5 days**	**Sep 4 '23**	**Sep 11 '23**
9	1.1.1.2.1	Appendix 1: FGP Charter (Sections	5 days	Sep 4 '23	Sep 11 '23
10	1.1.1.2.2	Appendix 2: FGP WE	5 days	Sep 4 '23	Sep 11 '23
11	**1.1.1.3**	**Week 3**	**5 days**	**Sep 11 '23**	**Sep 18 '23**
12	1.1.1.3.1	Appendix 1: FGP Charter (Sections	5 days	Sep 11 '23	Sep 18 '23
13	**1.1.1.4**	**Week 4**	**5 days**	**Sep 18 '23**	**Sep 25 '23**
14	1.1.1.4.1	Chapter II. Theoretical	5 days	Sep 18 '23	Sep 25 '23
15	1.1.1.4.2	Appendix 1: FGP Charter (Section	5 days	Sep 18 '23	Sep 25 '23
16	**1.1.1.5**	**Week 5**	**5 days**	**Sep 25 '23**	**Oct 2 '23**
17	1.1.1.5.1	Chapter III. Methodological Framework	5 days	Sep 25 '23	Oct 2 '23
18	1.1.1.5.2	Appendix 1: FGP Charter (Section	5 days	Sep 25 '23	Oct 2 '23
19	**1.1.1.6**	**Week 6**	**5 days**	**Oct 2 '23**	**Oct 9 '23**
20	1.1.1.6.1	Chapter I. Introducti	5 days	Oct 2 '23	Oct 9 '23
21	1.1.1.6.2	Chapter VII. Validation of FGP in the Field of Regenerative and	5 days	Oct 2 '23	Oct 9 '23
22	1.1.1.6.3	Appendix 1: FGP Charter (Section	5 days	Oct 2 '23	Oct 9 '23
23	**1.1.1.7**	**Week 7**	**5 days**	**Oct 9 '23**	**Oct 16 '23**
24	1.1.1.7.1	Abstract and Executive Summary	5 days	Oct 9 '23	Oct 16 '23
25	1.1.1.7.2	List of References and Indexes	5 days	Oct 9 '23	Oct 16 '23
26	1.1.1.7.3	Signed FGP Charter	5 days	Oct 9 '23	Oct 16 '23
27	1.1.2	Graduation Seminar Appr	5 days	Oct 16 '23	Oct 23 '23
28	**1.2**	**Tutoring Process**	**65 days**	**Oct 23 '23**	**Jan 30 '24**
29	**1.3.1**	**Tutor**	**3 days**	**Oct 23 '23**	**Oct 26 '23**
30	1.3.1.1	Tutor Assignment	1 day	Oct 23 '23	Oct 24 '23
31	1.3.1.2	Communication	2 days	Oct 24 '23	Oct 26 '23
32	1.3.2	Adjustments of Previous Chapter (if needed)	5 days	Oct 26 '23	Nov 2 '23
33	**1.3.3**	**Chapter IV Development (Results)**	**47 days**	**Nov 2 '23**	**Jan 16 '24**
34	1.3.3.1	Project Charter	3 days	Nov 2 '23	Nov 7 '23
35	1.3.3.2	Scope Management Pl	44 days	Nov 7 '23	Jan 16 '24
36	1.3.3.3	Schedule Management	44 days	Nov 7 '23	Jan 16 '24



ID	WBS	Task Name	Duration	Start	Finish
37	1.3.3.4	Cost Management Plan	44 days	Nov 7 '23	Jan 16 '24
38	1.3.3.5	Quality Management Pl	44 days	Nov 7 '23	Jan 16 '24
39	1.3.3.6	Resources Management Plan	44 days	Nov 7 '23	Jan 16 '24
40	1.3.3.7	Communications Management Plan	44 days	Nov 7 '23	Jan 16 '24
41	1.3.3.8	Risk Management Plan	44 days	Nov 7 '23	Jan 16 '24
42	1.3.3.9	Procurement Management Plan	44 days	Nov 7 '23	Jan 16 '24
43	1.3.3.10	Stakeholder Enagagement Plan	44 days	Nov 7 '23	Jan 16 '24
44	1.3.4	Chapter V. Conclusion	5 days	Jan 16 '24	Jan 23 '24
45	1.3.5	Chapter VI. Recommendations	5 days	Jan 23 '24	Jan 30 '24
46	1.3.6	Tutor Approval	0 days	Jan 30 '24	Jan 30 '24
47	**1.4**	**Reading by Reviewers**	**15 days**	**Jan 30 '24**	**Feb 20 '24**
48	**1.4.1**	**Reviewers Assignment Request**	**5 days**	**Jan 30 '24**	**Feb 6 '24**
49	1.4.1.1	Assignment of Two Reviewers	2 days	Jan 30 '24	Feb 1 '24
50	1.4.1.2	Communication	2 days	Feb 1 '24	Feb 5 '24
51	1.4.1.3	FGP Submission to Reviewers	1 day	Feb 5 '24	Feb 6 '24
52	**1.4.2**	**Reviewers Work**	**10 days**	**Feb 6 '24**	**Feb 20 '24**
53	**1.4.2.1**	**Reviewer 1**	**10 days**	**Feb 6 '24**	**Feb 20 '24**
54	1.4.2.1.1	FGP Reading	9 days	Feb 6 '24	Feb 19 '24
55	1.4.2.1.2	Reader 1 Report	1 day	Feb 19 '24	Feb 20 '24
56	**1.4.2.2**	**Reviewer 2**	**10 days**	**Feb 6 '24**	**Feb 20 '24**
57	1.4.2.2.1	FGP Reading	9 days	Feb 6 '24	Feb 19 '24
58	1.4.2.2.2	Reader 2 Report	1 day	Feb 19 '24	Feb 20 '24
59	**1.5**	**Adjustments**	**20 days**	**Feb 20 '24**	**Mar 19 '24**
60	1.5.1	Report for Reviewers	9 days	Feb 20 '24	Mar 4 '24
61	1.5.2	FGP Update	1 day	Mar 4 '24	Mar 5 '24
62	1.5.3	Second Review by Review	10 days	Mar 5 '24	Mar 19 '24
63	**1.6**	**Presentation to Board of Examiners**	**5 days**	**Mar 19 '24**	**Mar 26 '24**
64	1.6.1	Final Review by Board	2 days	Mar 19 '24	Mar 21 '24
65	1.6.2	FGP Grade Report	3 days	Mar 21 '24	Mar 26 '24
66	1.7	FGP End	0 days	Mar 26 '24	Mar 26 '24



Project: Project1
Date: Oct 11 '23

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 | Progress | Manual Progress

Appendix 4: Preliminary bibliographical research

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The reference provides general information on the organization funding the project.

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The reference provides information on scheduling useful for the development of a schedule management plan.

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Project Management Institute. (2019c). *The standard for risk management in portfolios, programs and projects*. Project Management Institute, Inc.

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Appendix 5: Revision dictum

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Master of Arts in English Language
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February 1, 2024

Academic Advisor
Master in Project Management (MPM) Degree
Universidad para la Cooperacion Internacional (UCI)

Dear Academic Advisor,

Re: **Thorough Review and Proofreading of Final Graduation Project submitted by Shian Jessima Edwin in partial fulfillment of the requirements for the Master in Project Management (MPM) Degree**

I hereby confirm that Ms. Shian Jessima Edwin has made all the corrections to the Final Graduation Project document as I have advised. In my opinion, the document now meets the literary and linguistic standards expected of a student for a degree at the Masters Level.

Respectfully submitted,

P. Hytmiah

Pamela Hytmiah (Mrs.)
M.A. in English Language