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Project Management Plan to Assess the Availability and Accessibility of Environmental Data in Saint Lucia

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DEDICATION

First and foremost, I dedicate this project to Almighty God who has been there right from the beginning to this very point. Special dedication to my ever-supportive mother, husband, family, and friends for their relentless support and compassion towards me during this MPM. Furthermore, I want to dedicate this project to my children — may this serve as proof that you can do all things through Christ who strengthens you.

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ABSTRACT

The objective of this document is to develop an integrated Project Management Plan, in accordance with the standards of the Project Management Institute, to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia. This assessment will, in part, determine the scope, implications, and feasibility of a Regional Environmental Information System in the Caribbean. This system will facilitate scenario development and forecasting for strategic planning and evidence-based policy development, enhanced environmental management, increased compliance and reporting to key Multilateral environmental agreements, and public participation in environmental management.

Saint Lucia has approximately 27 data-producing agencies so the assessment will require input from all these agencies as well as external stakeholders and coordination of resources, supporting activities and processes. In consideration of this, the final deliverable of this project is an integrated project management plan including subsidiary plans for effective management of integration, scope, schedule, cost, quality, resources, communications, risks, procurement, and stakeholders. This integrated project management plan is developed using Aristotle's analytic-synthetic method to systematically analyse identified sources of information. By triangulating the data in these sources, convergence and corroboration of findings are sought to reduce the impact of biases during the synthesis of this plan.

The expected benefits to be derived from the implementation of this project include *inter alia* timely and comprehensive completion of the assessment report, effective communication among all stakeholders and organisation of work interdependencies, effectual monitoring and control of project's progress and improved schedule and cost efficiency. Fundamentally, the approved version of this project management plan will serve as a baseline for monitoring and controlling processes; a primary artifact which will complemented by other project documents to efficiently manage the project; and a crucial organisational process asset for the budding consulting partnership.

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ABBREVIATIONS AND ACRONYMS

AC	Actual Cost
CCB	Change Control Board
CPI	Cost Performance Index
COQ	Cost of Quality
CPM	Critical Path Method
CV	Cost variance
DSD	Department of Sustainable Development
EC	Eastern Caribbean
EV	Earned value
FFP	Firm Fixed Price
FGP	Final Graduation Project
GEF	Global Environment Facility
GOSL	Government of Saint Lucia
MEAs	Multilateral environmental agreements
NEIS	National Environmental Information System
PCA	Project Cooperation Agreement
PMI	Project Management Institute
PMU	Project Management Unit
PV	Planned value
RACI	Responsible, Accountable, Consult and Inform
REIS	Regional Environmental Information System
SIDS	Small Island developing state
SPI	Schedule Performance Index
SV	Schedule Variance
TOR	Terms of Reference
UNEP	United Nations Environment Programme
USD	United States Dollars
WBS	Work Breakdown Structure

EXECUTIVE SUMMARY

Saint Lucia is among the Small Island Developing States (SIDS) in the Caribbean that are sensitive to the effects of climate-related hazards and have limited capacities to cope and adapt. In consideration of the patterns of increasing hazards, acute vulnerability and high levels of exposure, transformational adaptation is required. Effective management, monitoring and analysis of environmental data is critical for this. To date, Saint Lucia is one of two countries in the Caribbean that has made progress to the establishment of a comprehensive national environmental information system. The likelihood or timing of the development of an environmental information system in each Caribbean Island is unpredictable given the financial and capacity constraints, current macroeconomic conditions, and redirection of funds to domestic COVID-19 responses. A more feasible option is the development of a Regional Environmental Information System (REIS) to serve all Caribbean islands. The long-term benefit is a data driven culture for long-term success and value. To fully determine the scope, implications, and feasibility of REIS, an assessment of environmental data availability and accessibility in each Caribbean Island using an agreed environmental data assessment tool is required.

This assessment will be conducted by a duo of Saint Lucian consultants with experience in environmental data management. However, this is the first project of this nature the consultants are going to execute. Saint Lucia has approximately 27 data-producing agencies. Therefore, to ensure the timely delivery of a comprehensive assessment report with input from all stakeholders, an integrated project management plan was required. This plan defines how the project will be executed, monitored, controlled, and closed. Fundamentally, it will serve as a baseline for monitoring and controlling processes, a primary project artifact and an essential organisational process asset for the budding consulting partnership.

The general objective was to create a Project Management Plan, in accordance with the standards of the Project Management Institute, to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia. The specific objectives were: to develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan, to develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep, to create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule, to create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled, to produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints, to create a resource management plan to guide the categorisation, allocation, management, and release of human and physical resources, to develop a communication management plan to describe the planning, structuring,

implementation and monitoring of communication for effective communication of project status and other key information, to create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks, to create a procurement management plan for the timely acquisition of products, services, or results, and to create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.

The methodology for this research was a combination of quantitative and qualitative elements in the analytic-synthetic method. Identified sources of information — such as journal articles, conference papers, government documents and reports— were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. During the synthesis of this integrated management plan, the data from these sources of information were triangulated to converge and corroborate findings to reduce the impact of biases.

The project charter for the development of Plan was developed by the author and approved by the lecturer. The scope management plan identifies and defines the actions to produce the deliverables within three months while avoiding scope creep. In consideration of the predictive development approach of the project deliverables, the schedule will be managed at the individual task level using the Critical Path Method. Due to the firm fixed price contract, as per the cost management plan, out of scope changes will require a contact modification and earned value analysis will be used to compare the performance measurement baseline to the actual cost performance so the cost baseline is maintained throughout the project. The quality management plan includes quality objectives that guide the monitoring and control of quality. The categorisation, organisation, allocation, and management of the requisite human, equipment, software, and material resources are outlined in the resource management plan. The communications management plan describes the expected frequency and mode of interactive, push and pull communication between the primary stakeholders to ensure effective communication and facilitate a degree of flexibility. The risk management plan includes the urgency of the identified technical, management and external risks, corresponding management strategies, and associated costs. There is currently no need for the consultants to procure any services or goods outside of the project team. In consideration of the high power-high interest of all primary stakeholders, their directions of influence and desired engagement level the stakeholder engagement plan is designed to ensure all stakeholders will be informed and consulted through pragmatic collaboration. Together, these subsidiary management plans constitute the Project Management Plan.

The author recommends a longer implementation period of six months and authorisation to subcontract a Data Assistant for higher quality data acquisition; and the expansion of the communications and stakeholder engagement plan including both internal and external stakeholders in a subsequent phase of the programme to help garner higher level support for the REIS.

1. INTRODUCTION

1.1. Background

Despite being negligible contributors to anthropogenic climate change, small island developing states (SIDS) like Saint Lucia in the Caribbean (Figure 1) are on the frontlines of climate change due to their high vulnerability. These vulnerabilities are in part due to "*narrow resource bases, dominance of economic sectors that are reliant on the natural environment, limited industrial activity, physical remoteness and limited economies of scale*"(Thomas et al., 2020, p. 2). Essentially, SIDS are sensitive to the effects of climate-related hazards and have limited capacities to cope and adapt — particularly, to hazards associated with the cryosphere and ocean including *inter alia* marine heatwaves, sea-level rise, and ocean acidification.

Figure 1. **Small Island Developing States in the Caribbean**

Note. From "Climate Change and Small Island Developing States" by A. Thomas, A. Baptiste, R. Martyr-Koller, P. Pringle, and K. Rhiney, 2020, *Annual Review of Environment and Resources, 45,* p.4. Copyright 2020 by Annual Reviews. Permission not sought.

In consideration of the patterns of increasing hazards, acute vulnerability and high

levels of exposure, transformational adaptation is required. Effective management, monitoring and analysis of environmental data is critical for this. However, in some instances, an environmental data vacuum exists due to narrow resource bases for data collection, purchase of up-to-date technologies, training, development and enforcement of network and communication protocols; political and administrative barriers and lack of environmental awareness and education (Verma, 2020).

In 2018 Saint Lucia launched a web-based, publicly accessible National Environmental Information System (NEIS) — with a focus on indicators for three multilateral environmental agreements (MEAs) —under a GEF-funded project through the United Nations Environment Programme (UNEP) executed by the Department of Sustainable Development. This project successfully concluded in 2020. However, the NEIS continues to be managed by the Department of Sustainable Development with data contributions from multiple public and private agencies—signatory to the Memorandum of Understanding for consistent and timely uploads of environmental data. The work plan for this project was guided by the terms and conditions outlined in a Project Cooperation Agreement (PCA) between UNEP and the Government of Saint Lucia (GOSL). However, in some instances, knowledge areas were either developed through consultancies or in accordance with GOSL guidelines. For example, the communication management plan was developed through a consultancy, but procurement was done in accordance with GOSL procurement guidelines. Said work plan was executed through a Project Management Unit which comprised of a Project Manager, Monitoring and Evaluating Officer, Project Assistant and Webmaster. Although an assessment of the availability and accessibility of environmental data was conducted through this project, another assessment is required using the framework of an agreed assessment tool that will be applied to other islands in the Caribbean for the development of a Regional Environmental Information System.

Both consultants conducting this assessment served as the Project Managers for different components of the aforementioned GEF-funded project to increase Saint

Lucia's capacity to monitor the implementation of MEAs and sustainable development; and are trained and have practical experience in environmental data management and related fields. Thus, the duo's technical knowledge and experience; access to relevant reports; further research, consultations with experts and in-service project management training will guide the development of this integrated project management plan. This plan will also be developed in consideration of the enterprise environmental factors (EEFs) — particularly, the uncertainty introduced by the ongoing COVID-19 pandemic —, assumptions and preliminary risks.

1.2. Statement of the problem

Saint Lucia has approximately 27 data-producing agencies. This is the first project of this nature the consultants are going to execute. Therefore, an assessment of the availability and accessibility of environmental data in Saint Lucia requires the acquisition of input from all these agencies as well as external stakeholders; and coordination ofresources, supporting activities and processes. An integrated project management plan is of utmost importance to the initiating and planning processes — including theIntegration, Scope, Schedule, Cost, Quality, Resource, Communications, Risk, Procurement and Stakeholder management knowledge areas — of this project. The development of these subsidiary mananagement plans will be tailored to the needs of this project.

The initiating process group is critical "*to align the stakeholders' expectations and the project purpose, inform stakeholders of the scope and objectives, and discuss how their participation in the project and its associated phases can help ensuretheir expectations are met*" (Project Management Institute, 2017a, p. 561). Other benefits of this process group include the identification of stakeholders that will interact and influence the overall outcome of the project; and alignment of project with strategic objectives.According to the Project Management Institute, the planning process group enhances these benefits by establishing th total scope of effort, defining and

refining the objectives, and developing the acourse of action required to attain those objectives.In summary, the planning process group will describe the course of action to successfully complete the assessment of the availability and accessibility of environmental data in Saint Lucia.

The result of the initial planning effort is an approved version of the project management plan that will serve as a baseline for monitoring and controlling processes — including measurement of project performance. Furthermore, this project management plan will serve as a primary project artifact which will be complemented by other project documents to efficiently manage the project.

1.3. Purpose

To date, Saint Lucia is one of two countries in the Caribbean that has made progress to the establishment of a comprehensive national environmental information system. The opportunities, gaps and strengths for the establishment of environmental information systems in small island developing states like Saint Lucia include inter alia political will, institutional arrangements, technology, compliance, monitoring and enforcement and resource mobilization. The likelihood or timing of the development of an environmental information system in each Caribbean island is unpredictable given the financial and capacity constraints, current macroeconomic conditions and redirection of funds to domestic COVID-19 responses. A more feasible option is the development of a Regional Environmental Information System to serve all Caribbean islands. This will faciliate scenario development and forecasting for strategic planning and evidence-based policy development, enhanced environmental management, increased compliance and reporting to key Multilateral Environmental Agreements, and public participation in environmental management. The latter can only truly be achieved if citizens are provided access to, informed and educated on matters that can influence environmental behaviour. The long-term benefit is a data-driven culture for long-term success and value. Unfortunately, an evident cross-cutting theme is that much of the data is not periodicially and systematically collected

and managed, is disperse and may be archived, and at times, protected by generating institutions.

To fully determine the scope, implications and feasibililty of a Regional Environmental Information System an assessment of environmental data availability and accessibility in each Caribbean island using an agreed environmental data assessment tool is required. Hence, the application area of this Project is environmental data management. A duo of Saint Lucian consultants — a Lead Consultant and an Associate Consultant —with experience in envronmental management will be conducting this assessment in Saint Lucia. The Lead Consultant serves also as the Project Manager.Saint Lucia has approximately 27 data-producing agencies.Therefore, to ensure the timely delivery of this comprehensive assessment report with input from all stakeholders, an integrated project management plan is required. This plan will define how the project will be executed, monitored, controlled and closed.

The final deliverable to be generated by this Project is an integrated Project Management Plan for the assessment of the availability and accessibility of environmental data in Saint Lucia.The expected benefits to be derived from implementation of this project include *inter alia:*

- successful completion of the assessment of the availability and accessibility of environmental data in Saint Lucia
- effective communication among all stakeholders and organisation of work interdependencies
- effectual monitoring and control of project’s progress
- reduced likelihood of project scope
- systematic approach for the coordination of processes and activities
- improved schedule and cost efficiency

1.4. General objective

To create a Project Management Plan, in accordance with the standards of the Project Management Institute, to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia.

1.5. Specific objectives

1.5.1. To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan (Appendix 1).

1.5.2. To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.

1.5.3. To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.

1.5.4. To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.

1.5.5. To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints.

1.5.6. To create a resource management plan to guide the categorisation, allocation, management, and release of human and physical resources.

1.5.7. To develop a communication management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.

1.5.8. To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.

1.5.9. To create a procurement management plan for the timely acquisition of products, services, or results.

1.5.10. To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.

2. THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

The assessment of the availability and accessibility of environmental data in Saint Lucia is being conducted by a duo of Saint Lucian consultants — a Lead Consultant and an Associate Consultant —with graduate level knowledge of the subject matter; practical experience in environmental data management and are currently receiving training in project management. This consulting partnership was birthed when support was required for the execution of a previous project, so it has not been formalised through the formation of a company. The study area for the assessment are the data-producing agencies throughout Saint Lucia. Approximately 80% of the data-producing agencies are located within the Government of Saint Lucia (GOSL) so this section will focus primarily on the framework of the GOSL.

2.1.2 Mission and vision statements

Each agency within the Government of Saint Lucia has its own mission statement and strategic priorities that contribute to the overarching mission "*to serve the needs of the public and to provide administrative, technical and professional support in the task of fostering and promoting good governance, and effective coordination of the Government machinery*"(Government Information Service, 2012, para. 1). For this reason, the individual mission statements, and strategic priorities of three major environmental data-producing agencies within the Government of Saint Lucia are presented in Chart 1. However, it is important to note that the lead agency managing environmental data in Saint Lucia is the Department of Sustainable Development (DSD). DSD is currently the administrator of Saint Lucia's National Environmental Information System (NEIS).

Chart 1 Mission Statements and Strategic Priorities of Major Environmental Data Producing Agencies within the Government of Saint Lucia

Agency	Mission Statements and Strategic Priorities
Department of Agriculture, Fisheries, Natural Resources & Cooperatives	**Mission**: "*To promote a diversified national income base from agriculture and fisheries and to enhance food security and livelihood systems by generating the capacity for efficiency and competitive production and marketing of respective goods and services"*(Department of Finance, 2021, p. 177)
	Strategic Priorities: "*Contributing to economic growth enhancing value-added agriculture and fisheries"* (Department of Finance, 2021, p. 177)
Department of Sustainable Development	**Mission**: "*To lead the process of Sustainable Development by facilitating an integrated and participatory approach to governance, promoting environmental management and innovative technologies, building capacity to adapt and mitigate the impacts of climate change and reduce risks and demonstrating the value of building a green economy"* (Department of Finance, 2021, p. 503)
	Strategic Priorities: "*To achieve sustainable development on a platform of integrated and effective environmental management, in order that socio-cultural, economic, environmental goals are realized and collectively contribute to a continuous improvement in the quality of life of all Saint Lucians*" (Department of Finance, 2021, p. 503)
Department of Economic Development, Transport and Civil Aviation	**Mission:** "*To lead Saint Lucia's National Development by promoting a holistic approach through evidence-based planning, resource mobilization and a supportive regulatory environment*" (Department of Finance, 2021, p. 517)
	Strategic Priorities: *"To strengthen the planning, donor coordination and project cycle management functions, through coordinated approaches with line agencies and the design of programmes that will enhance competitiveness and growth"*(Department of Finance, 2021, p. 517)

Note. Adapted from *Estimates of Revenue and Expenditure 2021-2022*(pp. 177, 503 and 517) by Department of Finance, 2021, Government of Saint Lucia.

Based on the information presented in Chart 1, the collective mission of these agencies is to employ integrated, participatory, coordinated, and holistic approaches to create an enabling environment for enhanced and efficient governance and management of projects, programmes, and resources. The development of this integrated project management plan will underscore the value of these efforts and embody the related principles to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia — particularly, through the creation of scope, schedule, cost, quality, resource, communication, risk, procurement, and stakeholder management plans.

2.1.3 Organizational structure

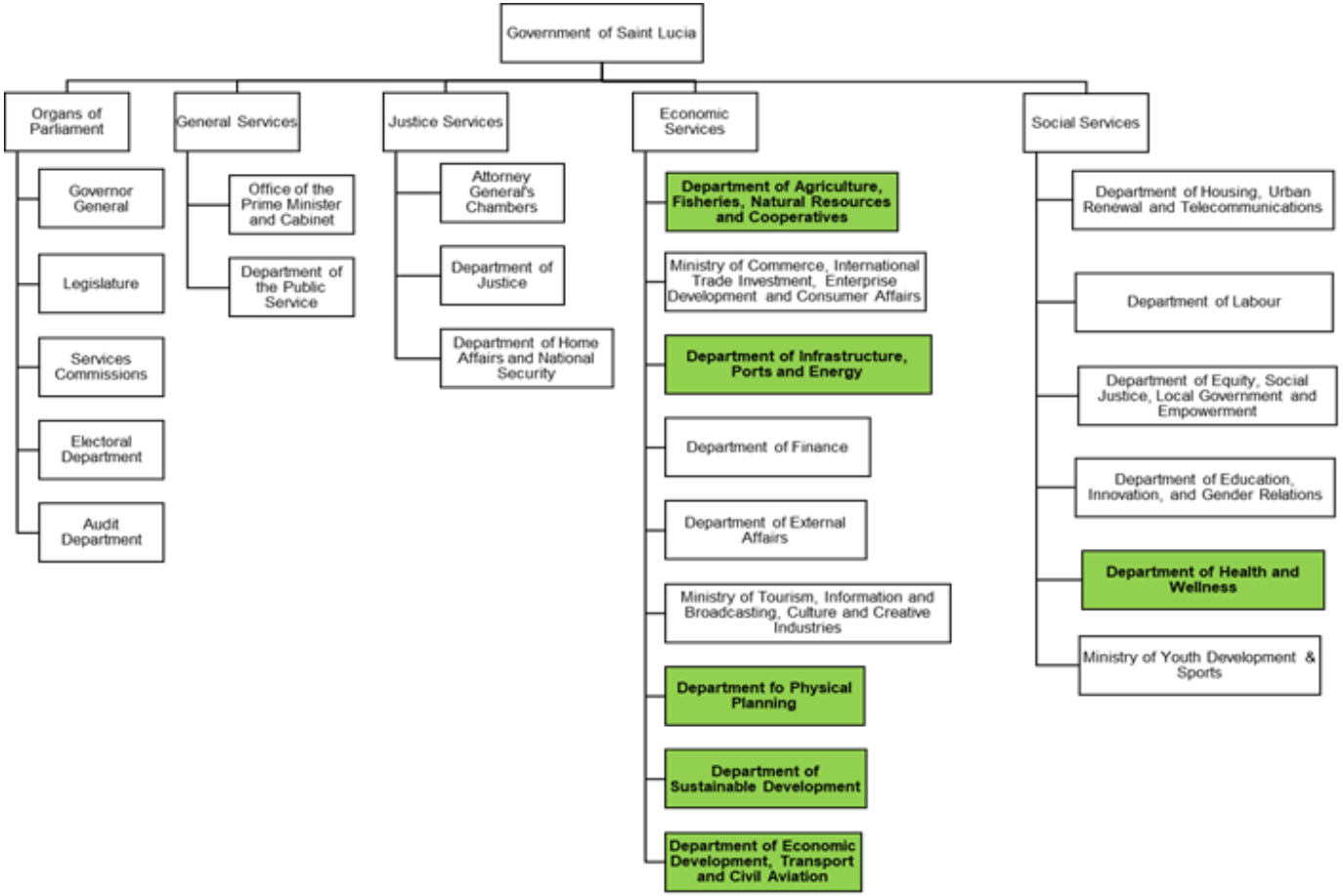

Figure 2. Organisational Structure of the Government of Saint Lucia

Note. Environmental data-producing agencies are highlighted in green. Adapted from *Estimates of Revenue and Expenditure 2021-2022* (p. xxvii) by Department of Finance, 2021, Government of Saint Lucia.

Although Figure 2 illustrates a mere six government agencies directly involved in environmental data collection and management, each of these agencies have one or more programmes dedicated to this. Since the Department of Sustainable Development (DSD) is the lead agency for environmental data management in Saint Lucia, the organisational structure of this department is presented in Figure 3. The structure of the *Executive Direction and Administration* division is similar for all government data-producing agencies included in the assessment.

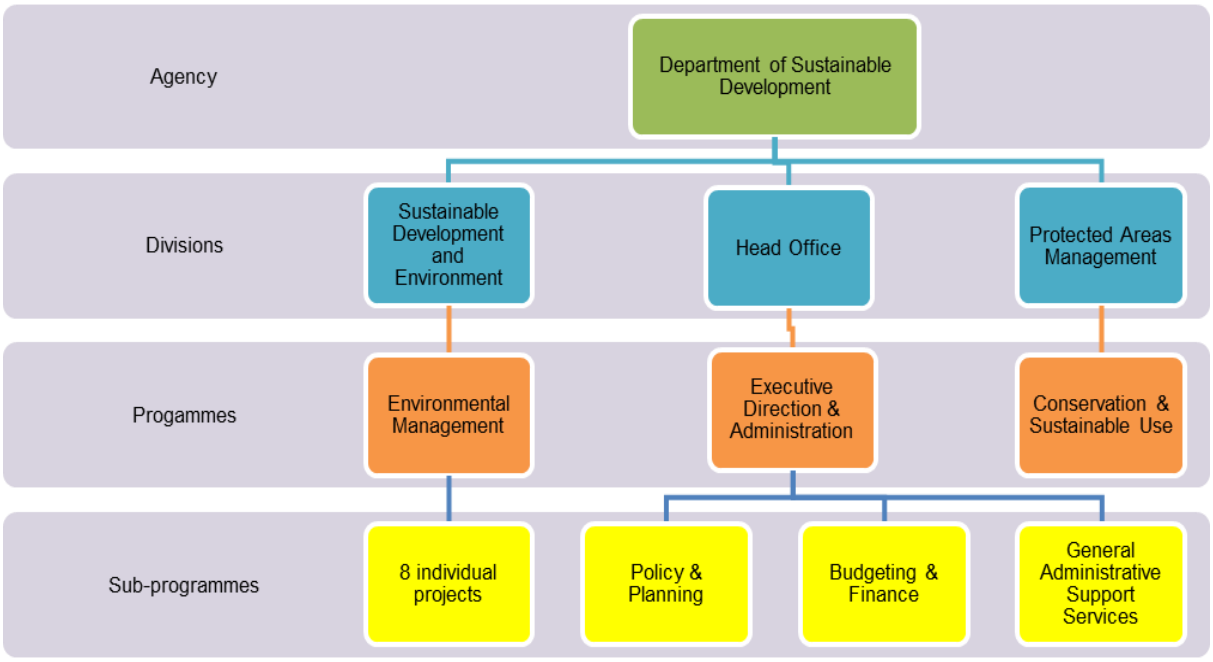

Figure 3. Organisational Structure of the Department of Sustainable Development

Note. Adapted from *Estimates of Revenue and Expenditure 2021-2022* (pp. 503- 516) by Department of Finance, 2021, Government of Saint Lucia.

Staffing resources in government agencies are generally categorised as executive/managerial; technical/front line services; administrative support and non-established. Within the DSD, there are 4, 11, 16 and 3 personnel in each of these categories, respectively. 73% of the technical/front line officers operate within the Environmental Management programme where all the projects executed by the Department are managed. This programme's objective is "*to foster and promote sustainable development at the national level, through research, networking, resource mobilization and reporting, by focusing on chemicals management, climate*

change and sustainable use of coastal zone resources"(Department of Finance, 2021, p. 505). Due to the resource and capacity constraints within the Government of Saint Lucia, these projects are usually donor-funded so the implementing agencies are external to the Government of Saint Lucia. However, these projects are locally managed by either a Sustainable Development and Environment Officer on permanent establishment or an individual contracted for part or the full duration of the project implementation period. In both instances, the project managers report directly to either the Chief Sustainable Development and Environment Officer or the Deputy Chief Sustainable Development and Environment Officer. In addition to this, with guidance from department superiors, the Project Manager is required to satisfy reporting obligations to the donor agency.

When an individual is contracted outside of the public service to serve as a Project Manager, a full complement of Project Management Unit (PMU) staff is also hired. A PMU within the DSD usually comprises a Project Manager, Project Assistant; and a Monitoring and Evaluating Officer. Both the Project Assistant and the Monitoring and Evaluating Officer report to the Project Manager. Irrespective of whether a full complement of PMU staff is hired or assigned to the project, the Project Manager or the PMU does not operate in a silo as support is readily accessible and often required from other sub-programmes within the DSD. Hence, this organisational structure is a combination matrix and projectized.

Although this integrated project management plan is being developed to guide the assessment of the availability and accessibility of environmental data in Saint Lucia by a duo of consultants, a plan like this would be particularly beneficial to the individual project management units within DSD and by extension, the Department's programmes. As highlighted in Section 1.1 both consultants conducting this assessment served as the Project Managers for different components of the same donor-funded project which involved multiple stakeholders from various programmes across government agencies and private agencies. This Project was executed by the DSD so this plan can be shared with colleagues within the DSD —with whom

both consultants continue to maintain a professional work relationship — to enhance project implementation.

2.1.4 Products offered

The Government agencies included in the assessment provide economic and social services to the citizenry of Saint Lucia (Department of Finance, 2021). These services include *inter alia* primary, public, secondary, and tertiary health care services; marketing; cooperatives administration and oversight; fisheries and livestock development; forest and land management; information management and dissemination; disaster risk and response management and recovery; meteorological services; sustainable energy development; statistical services; and environmental management.

2.2 Project Management concepts

2.2.1 Project

A project is defined as "*a temporary endeavour undertaken to create a unique product, service or result*" (Project Management Institute, 2017a, p. 4). A project is executed for the fulfilment of objectives through the production of deliverables. The deliverable of this project is a unique combination of a service and a result. The consultants involved in this project are providing knowledge-based services for the development of an integrated Project Management Plan to assess the availability and accessibility of environmental data in Saint Lucia. Although a project management plan is a repetitive element in some project deliverables and activities, each project management plan is tailored to the unique characteristics of the project. Due to the array of public and private agencies involved in environmental data production and management, this project will involve multiple organizational units from multiple organizations but will be managed by a duo of consultants.

It is anticipated that the integrated project management plan will be ready within a 12-week period. Therefore, completion of this integrated project management plan

will signify the achievement of both the general and specific project objectives outlined in Sections 1.4 and 1.5. Regardless of the temporary nature of this project, its deliverable will exist beyond the end of the project to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia in subsequent months; become an organisational process asset of the budding consulting partnership; and be used for knowledge sharing with other professionals in the field.

This integrated project management plan is key to the timely delivery of a comprehensive assessment report — of the availability and accessibility of environmental data in Saint Lucia —with input from all stakeholders. By enabling the timely delivery of this report, the integrated project management plan will drive change towards a regional environmental information system; and enable business value creation for both the region and the consulting partnership. Business value is described as"…*the return, in the form of time, money, goods, or intangibles in return for something exchanged*" (Project Management Institute, 2015, p. 185). The reputation of the consultants will be improved and become well-known within their respective networks. The practical experience derived from execution of this project will expand their knowledge base and improve their competitive advantage in the field for even larger projects with even higher returns. Therefore, the benefits of this project are both tangible and intangible.

Although the consultants' deliverables of the first project executed together were submitted in a timely manner and exceeded the expectations of the customer without a formal project management plan, their ongoing formal project management training has highlighted the critical role of an integrated project management plan. Therefore, the initiation context of this project is to enhance the consultants' project management strategy.

2.2.2 Project management

Project Management is "*the application of knowledge, skills, tools and techniques to project activities to meet the project requirements*" (Project Management Institute, 2017a, p. 10). The tailored application and integration of project-specific management processes are key to effective and efficient project management. Failure to do so may result in rework, missed deadlines, unsatisfied stakeholders, scope creep, loss of reputation and poor quality. Undeniably, effective project management is a strategic competency required to consistently deliver business value and increase competitive edge in an ever-evolving project environment. This project is being managed as a stand-alone project with a focus on doing the project the "right" way via the development, implementation, and progressive elaboration of this integrated project management plan.

2.2.3 Project life cycle

The series of phases that a project goes through from start to completion is the project life cycle (Project Management Institute, 2017a). This is the basic framework upon which the project is managed and determines how the Project Integration Management processes are applied. Whether these phases are sequential, iterative, or overlapping all projects follow the phases generic project life cycle illustrated in Figure 4.

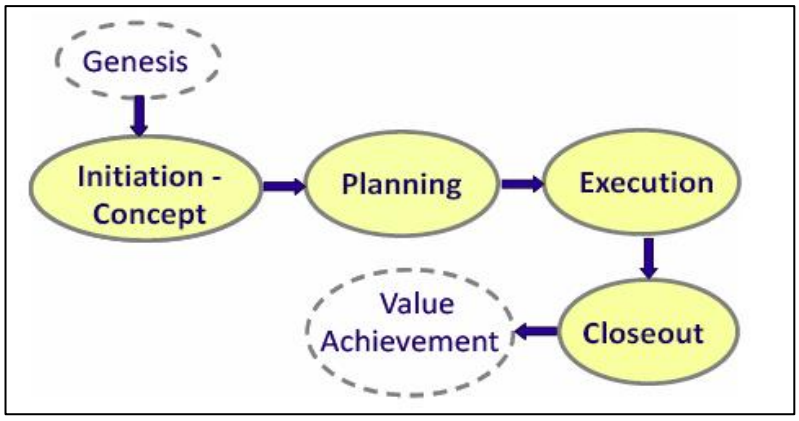

Figure 4. Generic Project Life Cycle – including genesis and value achievement phases

Note. From "Value achievement — The final project phase" by J. A. Lukas, 2014, *PMI® Global Congress 2014—North America, Phoenix, AZ*, p. 1. Copyright 2014 by Author. Permission not sought.

Lukas (2014) refers to the pre-project work phase where the project charter is developed as the genesis phase. He purports the final phase of any project should be value achievement. This phase includes the actions taken during and after the project to ensure the proposed project benefits are realised and provide value to the stakeholders. Evidently, this phase can overlap with another phase earlier in the project. The absence of these two phases in essentially all published project life cycles is attributed to the lack of involvement of the project manager. This is particularly true in government agencies such as the Department of Sustainable Development where quite often, the Project Manager is either assigned or hired after the genesis phase; and/or the contracted Project Manager's term ends at closeout. Unfortunately, the timing of the measurement of benefits achieved; application of additional corrective actions to achieve planned benefits; management of risks and communications; and the conduct of an audit of results surpasses the contract period of Project Managers sourced outside the Government of Saint Lucia.

It is indeed true that "*more project management discipline is needed for the genesis and value achievement phases, and the expectation for project managers will grow from just delivering the project to delivering the project benefits"* (Lukas, 2014, para. 6).Although the implementing agency is accountable for the achievement of project benefits, the project manager and by extension, the PMU within the executing agency should have a sense of shared responsibility in delivering project benefits. Typically, the value achievement phase is led by the implementing agencies, but the project manager and the PMU should be available to support the value achievement phase even after project closure.

This project takes a different approach as the Project Manager was directly involved in the genesis phase and intends to be part of the value achievement phase as one of the consultants using this plan to conduct the assessment. The ideal life cycle for this project is a predictive life cycle as the project scope, time and cost were determined during the genesis phase. Additionally, changes to the scope can be carefully managed.

2.2.4 Project management processes

Each project management process results in one or more outputs — that is, deliverables or outcomes — that serve as inputs for the execution of subsequent project management processes. Therefore, the execution of a series of project management processes results in the project life cycle through logical links. The project requirements determine the number of process iterations and interactions between processes.

Project Management processes are logically grouped into five categories — independent of project phases— to achieve specific project objectives. These groups are:

i. Initiating Process Group
ii. Planning Process Group
iii. Executing Process Group
iv. Monitoring and Controlling Process Group
v. Closing Process Group

This project's charter was developed as part of the Initiating Process Group. Moving forward, the focus of this FGP will be the Planning Process Group. This group includes "*processes required to establish the scope of the project, refine the objectives and define the course of action required to attain the objectives that the project was undertaken to achieve"*(Project Management Institute, 2017a, p. 23). As such subsidiary plans for scope, schedule, cost, quality, resource, communications, risk, procurement, and stakeholder management will be created as part of the major deliverable of this endeavour — an integrated project management plan.

2.2.5 Project management knowledge areas

Project management processes are also categorised into knowledge areas — "*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"* (Project Management Institute, 2017a, p. 23). PMI identifies the knowledge areas that are used in most projects quite often as:

i. Project Integration Management
ii. Project Scope Management
iii. Project Schedule Management
iv. Project Cost Management
v. Project Quality Management
vi. Project Resource Management
vii. Project Communications Management
viii. Project Risk Management
ix. Project Procurement Management
x. Project Stakeholder Management

Based on the scope of the assessment, these project management knowledge areas will be used in the development of the integrated project management plan. The specific processes that will be used for the development of this plan are highlighted in Chart 2.

Chart 2 Mapping of Project Management Process Groups and Knowledge Areas

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. Adapted from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th ed., p. 25), by Project Management Institute, 2017, Project Management Institute, Inc. Copyright 2017 by Project Management Institute, Inc. Permission not sought.

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

2.3.1. Project Integration Management

PMI describes Project Integration Management as the "*processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups*"(Project Management Institute, 2017a, p. 69). It is recommended that these processes and activities should be applied from project commencement to completion. Project Integration Management processes include (1) develop project charter; (2) develop project management plan; (3) direct and manage project work; (4) manage project knowledge; (5) monitor and control project work; (6) perform integrated change control; and (7) close project or phase. In practice, these processes overlap and interact (Project Management Institute, 2017a; Team Asana, 2021).

To apply Project Integration Management processes, trends and emerging practices include *inter alia* the use of automated tools to collect, analyse and use information to achieve objectives; and visual management tools to facilitate knowledge transfer and provide an overview of project status in real-time. The Project Manager is accountable for Project Integration Management. As such the Project Manager should apply the Project Integration Management processes in consideration of the project and development life cycle; change; management approaches; governance; benefits and knowledge management.

2.3.2. Project Charter

A Project Charter is "*a document that formally authorises the existence of a project and provides the project manager with the authority to apply organizational resources to project activities"* (Project Management Institute, 2017a, p. 75). Thus, this project is authorised by the charter in Appendix 1. Its development was part of the Initiating Process Group. It clearly outlines this project's purpose, objectives, expected benefits, risk and other high-level information that provide a better

understanding to the Project Manager. Essentially, the Project Manager is now authorised to plan, execute, and control the project.

2.3.3. Project Management Plan

A project management plan is "*the document that describes how the project will be executed, monitored and controlled*" (Project Management Institute, 2017a, p. 192). Its development is part of the Planning Process Group and includes the definition, preparation, coordination, and consolidation of all plan components into an integrated project management plan to define the foundation of all project work and how it will be executed. The Project Charter referenced in Section 2.3.2 alongside outputs from other processes (any baseline or component plan), enterprise environmental factors (EEFs) and organisational process assets (OPAs) are critical inputs into the development of an integrated project management plan (Figure 5).

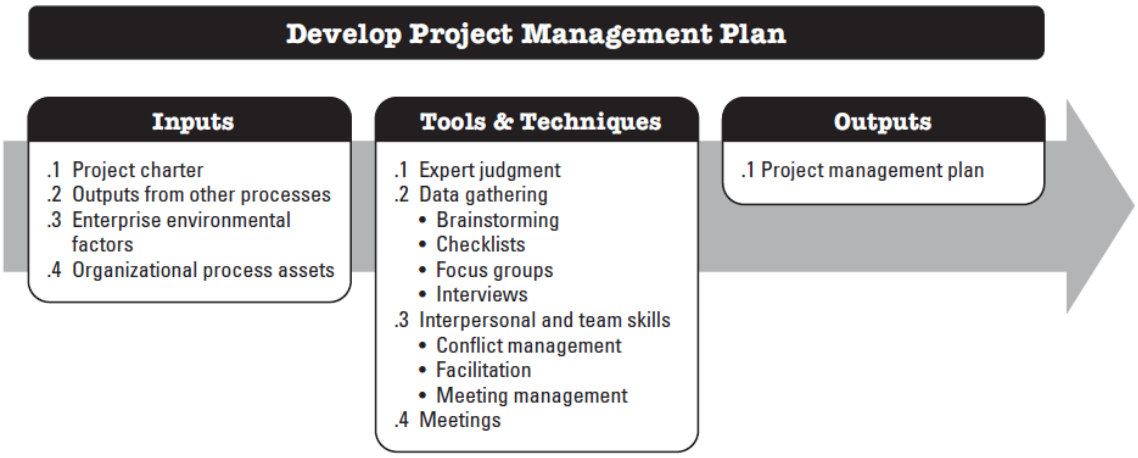

Figure 5. Develop Project Management Plan: Inputs, Tools & Techniques, and Outputs

Note. From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th ed., p. 82), by Project Management Institute, 2017, Project Management Institute, Inc. Copyright 2017 by Project Management Institute, Inc. Permission not sought.

The content of an integrated project management plan is determined by the application area and the project's complexity. This plan can either be summary level

or detailed but each component of the plan — that is, subsidiary management plans, baselines and additional components developed as part of the Develop Project Management Plan process — must be described to the extent that is required by the project. Also, the robustness of the plan should facilitate timely responses to the ever-changing project environment. Most importantly, the project management plan should be baselined with references for scope, schedule, and cost to enable monitoring and evaluation of the project's performance; and serve as one of the primary documents to manage the project. After this plan is baselined, it can only be changed and progressively elaborated through the Perform Integrated Change Control process — for controlled and approved updates until project closure (Project Management Institute, 2017a).

The subsidiary management plans relevant to this Project include:

(i) Scope Management Plan
(ii) Schedule Management Plan
(iii) Cost Management Plan
(iv) Quality Management Plan
(v) Resource Management Plan
(vi) Communications Management Plan
(vii) Risk Management Plan
(viii) Procurement Management Plan
(ix) Stakeholder Engagement Plan

2.3.3.1. Scope Management Plan

The *Scope Management Plan* is an output of the *Plan Scope Management* process in Project Scope Management (see Chart 2). This plan includes processes for preparation of a project scope statement, creation of a work breakdown structure from the detailed project scope statement, establishment of how the scope baseline will be approved and maintained; and how the completed project deliverables will be formally accepted. The project deliverables are defined at the start of the project so

any changes to the scope are progressively managed. However, in an adaptive or agile life cycle, the detailed scope is defined and approved for each iteration when it commences because the deliverables are developed over multiple iterations.

The assessment of the availability and accessibility of environmental data in Saint Lucia follows a predictive life cycle. The approved version of the project scope statement, work breakdown structure (WBS) and its associated WBS dictionary will constitute the scope baseline of this project. This baseline can only be changed through formal control procedures and will be used as a basis for comparison while validating and controlling scope processes. Essentially, "*the scope management plan is a component of the project management plan that describes how the scope will be defined, developed, monitored, controlled, and validated*" (Project Management Institute, 2017a, p. 135). Its development involves the analysis of the Project Charter, the latest approved subsidiary plans of the project management plan, historical information in the organisational process assets and any other relevant enterprise environmental factors.

2.3.3.2. Schedule Management Plan

The schedule management plan is the output of the Plan Schedule Management process (see Chart 2). A *schedule management plan* is unique to a project as it is "*a collection of processes, approaches, templates, and tools that comprise the project's execution strategy and objectives as reflected in the project's schedule model*" (Project Management Institute, 2019b, p. 47). This plan defines how the schedule model will be developed, updated, progressed, and shared. As the output of the first process in Project Schedule Management — Plan Schedule Management—it facilitates consistent performance by project team members and an efficient scheduling process. This is achieved via its representation of how and when the project will deliver the results defined in the project scope; and establishing the criteria and activities for the development, monitoring, and control of the schedule. Additionally, a schedule management plan is a key tool for communication,

management of stakeholders' expectations and provides a basis for performance reporting. Project scheduling begins with the selection of a scheduling method such as an agile approach or critical path. This is followed by the inclusion of project-specific data — activities, planned dates, durations, resources, dependencies, and constraints — into a scheduling tool to generate a project-specific schedule model. This model generates a project schedule. This Schedule Management Plan will be developed in consideration of the Scope Management Plan; the predictive development approach of project deliverables; enterprise environmental factors including *inter alia* scheduling software and team resource availability; organisational process assets including *inter alia* lessons learned repository; guidelines and criteria set within the Terms of Reference; and discussions between the client and consultants. When a schedule baseline is established, changes to the schedule must be managed through the project's integrate change control process.

Using earned value analysis, the performance measurement baseline can be compared to the actual results to determine if a change, corrective action, or preventative action is necessary. SV is the difference between earned value (EV) and planned value (PV) so it is the amount by which the project is ahead or behind the planned delivery date, at any given time (Project Management Institute, 2017a). When SV is negative, the work is behind schedule. When SV is equal to 0, as much as planned has been accomplished. SPI uses the same variables but measures schedule efficiency as a ratio of EV to PV. An SPI of less than 1.0 indicates less work than planned was completed. Alternatively, an SPI of more than 1.0 indicates more work than planned was completed. Percent complete is "*an estimate of the percent complete of the budget at completion at each measurement point"* (Project Management Institute, 2019d, p. 34). It is the amount of work that has been completed divided by the budget at completion.

2.3.3.3. Cost Management Plan

The cost management plan is the output of the Plan Cost Management process (see Chart 2). A Cost Management Plan defines how the project costs will be estimated, budgeted, managed, monitored and controlled (Project Management Institute, 2017). Essentially, providing guidance on how costs will be managed throughout the project. The focus of Project Cost Management is the cost of the resources needed to complete project activities. The cost management planning effort is commenced early in project planning to set the framework for the efficient and coordinated execution of each of the cost management processes —estimate costs, determine budget, and control costs. These processes and their associated tools and techniques are documented in the cost management plan. The impact of project decisions on the recurring cost of use, maintenance and support of the product, service, or result of the project is a major consideration during these processes. Using the project charter, other subsidiary management plans, EEFs, OPAs, expert judgement, data analysis and meetings the cost management plan establishes *inter alia* the units of measure, rules of performance measurement, levels of accuracy and precision, organizational procedures links and control thresholds.

The practice of cost management also includes earned value management. Cost variance (CV) is the difference between earned value (EV) and actual cost (AC), so it is the amount of budget deficit or surplus, at any given time(Project Management Institute, 2017a). CV provides an indication of the physical performance relative to the costs spent. A negative CV is unfavourable as it indicates more money was spent to complete a task than budgeted for. However, a positive CV indicates that work was completed under budget. CV often lags SV, and unlike SV, CV does not improve as the contract nears completion. Therefore, a negative CV is often difficult for the project to recover. CPI uses the same variables, but measures cost efficiency as a ratio of EV to AC. An CPI of less than 1.0 indicates a cost overrun. Alternatively, an CPI of more than 1.0 indicates cost underrun of performance to date.

2.3.3.4. Quality Management Plan

Plan Quality Management, Manage Quality and Control Quality are the Project Quality Management processes for planning, managing, verifying, and controlling project and product quality requirements to ensure stakeholders' objectives are met. Irrespective of the nature of a project's deliverables, project quality management is applicable. One of the outputs of the Plan Quality Management process is the Quality Management Plan (see Chart 2). This process serves to identify quality requirements and/or standards for the project and respective deliverables, and to document how the project demonstrates compliance these quality requirements and/or standards(Project Management Institute, 2017a). In practice, Plan Quality Management overlaps and interacts with the other Project Quality Management processes. The Quality Management Plan is translated into executable quality activities which incorporate the organisation's quality policies into the project through the Manage Quality process. The monitoring and recording of these activities' results is achieved through the Control Quality process to evaluate performance and make certain that the deliverables are correct, complete and satisfy stakeholders' expectations.

Effective management of quality is to key increasing the probability of meeting quality objectives and identifying ineffective processes and causes of poor quality. The incorporation of quality into the design of the deliverables is preferred because the cost of correcting mistakes — discovered during inspection or usage — is higher than the cost of preventing mistakes. Cost of quality (COQ) encompasses "*all costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework)*" (Project Management Institute, 2017a, p. 274). The latter component —failure costs — are also referred to as the cost of poor quality.

Additionally, quality planning should be performed in concurrence with other planning processes so adjustments to cost, schedule or risk analysis can be assessed when changes are proposed to meet identified quality standards. As a result, the quality management plan will facilitate "*a sharper focus on the project's value proposition, reduction in costs, and less frequent schedule overruns that are caused by rework*" (Project Management Institute, 2017a, p. 286) through the documentation of quality objectives, quality control and management activities, quality metrics etc.

2.3.3.5. Resource Management Plan

Project Resource Management focuses on the identification, acquisition, and management of physical and human resources required for the successful completion of the project. Project Resource Management overlaps with Project Stakeholder Management since the former focuses on the subset of stakeholders within the project team. Some factors which influence the team are geographical locations of team members, cultural issues, communications among stakeholders and the team environment(Huemann, 2016). The management of the physical resources focuses on the efficient and effective allocation and use of physical resources (such as supplies, material, and equipment) for the successful completion of the project. To optimise resource use trends and emerging practices in Project Resource Management include emotional intelligence, virtual/distributed teams, self-organising teams, and resource management methods (such as just-in-time manufacturing, theory of constraints and Kaizen). The project's physical location, project team life cycle approach and industry-specific specific resources determine the way Project Resource Management processes are applied.

The resource management plan is one of the outputs of the Plan Resource Management process (See Chart 2). This process focuses on the definition of the project's resources are estimated, acquired, managed, and used. In doing so, the requisite approach and level of management effort to ensure that adequate

resources are accessible for a successful outcome — in consideration of the project's type and complexity; availability of or competition for scarce resources — is established. The required resources may be obtained from the organisation's internal assets or procured from outside the organisation. In both instances, other projects may be competing for the same resources at the same time and in the same location which can negatively impact project schedule, risks, quality, and costs. In consideration of this, the resource management plan guides the identification, categorisation, allocation, acquisition, management, and release of project resources through the documentation of roles and responsibilities, training and team development strategies, recognition plan and resource control. Key inputs into the development of the resource management plan are the project charter; other subsidiary management plans; project schedule; risk, and stakeholder registers; EEFs and OPAs.

2.3.3.6. Communications Management Plan

Project Communications Management comprises three processes: (i) Plan Communications Management, (ii) Manage Communications and (iii) Monitor Communications. These processes make certain that the information needs of the project and its stakeholders are satisfied through the development of artifacts and execution of activities to facilitate valuable information exchange (Project Management Institute, 2017a). Information can be relayed through communication activities — meetings and presentations — or artifacts — social media, projects reports, project documentation and emails. The dimensions of the communication activities include but are not limited to hierarchical focus; written and oral; internal; external; formal; informal; official and unofficial. Hence, effective communication bridges the gap between diverse stakeholders with different cultural and organisational backgrounds, different levels of interests, expertise, and perspectives(Plowman & Diffendal, 2020).

As the primary output of the Plan Communications Management Process (see Chart 2), a communications management plan ensures that the correct messages are relayed to stakeholders through various artifacts and activities based on the information needs of the project and its stakeholders. It is a documented approach of how the stakeholders will be engaged with relevant information in a timely manner. A change in the stakeholder community or the start of a new project phase necessitates the review and modification of the communications management plan. Some of the information captured in the communications management plan includes stakeholder communication requirements, escalation processes, glossary of common terminology, constraints derived from legislation or organisational policies, methods or technologies used to relay information, timeframe, and frequency for distribution of required information.

2.3.3.7. Risk Management Plan

The complexity of a project is a key driver of project uncertainty (Qazi et al., 2021). Project uncertainty can result in a positive outcome (opportunity) and a negative outcome (risk)(Qazi et al., 2020). In project management literature, risks are defined as "*tolerated or unintended consequences of purposeful human action which may occur that violate something that humans value*" (Kasperson, 2017, p. 28). In this context, the realization of the project is the something that humans value. A focus on the risks only can led to the selection of suboptimal strategies. Project risks exist at the individual and overall levels. Individual project risks impact the achievement of project objectives. The combination of individual project risks and other sources of uncertainty contribute to the overall project risk.

Project risk management aims to increase the probability and/or impact of opportunities and decrease the probability and/or impact of risks (or threats) for project success. The processes involved in Project Risk Management are (i) Plan Risk Management; (ii) Identify Risks; (iii) Perform Qualitative Risk Analysis; (iv) Perform Quantitative Risk Analysis; (v) Plan Risk Responses; (vi) Implement Risk

Responses and (vii) Monitor Risks(Project Management Institute, 2019e).In practice, these processes overlap and interact. The identification of risks is an iterative process because new individual project risks may arise throughout the project life cycle. The qualitative analysis of the identified project risks assesses their priority based on probability of occurrence and the potential impact on project objectives. The quantitative risk analysis functions to numerically analyse the combined effect of identified individual project risks and other sources of uncertainty on overall project objectives. The options, selection and implementation of strategies and actions to address the overall and individual project risks are guided by the results of the qualitative and quantitative analyses. The effectiveness of the risk responses; identified risks are tracked; and the new risks are identified and analysed during the Monitor Risks process. The risk management plan is the output of the Plan Risk Management process that defines how risk management activities for a project will be structured and performed. All subsidiary management plans, project charter, stakeholder register, EEFs and OPAs are used in the development of the risk management plan. The elements of the risk management plan include *inter alia* risk categories, risk strategy, roles and responsibilities, timing, funding, and methodology.

2.3.3.8. Procurement Management Plan

Procurement processes exist to ensure that goods and/or services are acquired — outside the team — at the best possible cost in terms of quality, time and other relevant factors to support business operations (International Organization for Standardization, 2022). The procurement of said goods and/or services can be authorised by members of the project team, management, or the organization's procurement department. The management and control processes to create and administer agreements including *inter alia* contracts, internal service level agreements or memoranda of understandings — between a buyer and a seller— constitutes Project Procurement Management. The procurement processes include

(i) Plan Procurement Management; (ii) Conduct Procurements and (iii) Control Procurements(Project Management Institute, 2017a). Known risks in procurement processes include "*specialization, reliability, intellectual property, product integration, invention, architecture, confidentiality, regional stability et al*" (Kumar, 2003, para. 8). Additionally, COVID-19 has resulted in negative impacts on supply chains, a constrained labour market, fabrications, and long-lead procurement timelines(Hendershot &Schmidt, 2021).

The procurement management plan is one of the outputs of the Plan Procurement Management process. The inputs in this process are the project charter; business documents; other subsidiary management plans such as the scope, quality, and resource management plans; project documents such as project team assignments, resource requirements, risk, and stakeholder registers; EEFs such as marketplace conditions and unique local requirements; and OPAs including preapproved seller lists, contract types and formal procurement policies, procedures, and guidelines. These inputs are analysed by experts with specialized knowledge or training in procurement, purchasing, regulations and compliance using data and source selection analysis techniques. The result is a procurement management plan which in part comprises the activities that will be executed throughout the procurement process and provides guidance for the coordination of procurement with other project aspects, procurement metrics, legal jurisdiction etc (Guth, 2018). The structure of this procurement management plan may be highly detailed or broadly framed in either a formal or informal format.

2.3.3.9. Stakeholder Engagement Plan

A stakeholder is "*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*" (Project Management Institute, 2017b, p. 12). Stakeholders can either directly or indirectly influence the performance or outcome of project in a positive or negative way by affecting aspects such as scope/requirements, schedule,

cost, culture, benefits realization, quality and risk (Project Management Institute, 2021). Hence, it is critical to identify, analyse and proactively engage stakeholders from throughout the project lifecycle to enable success. Therefore, a stakeholder engagement plan provides the essential strategies and actions for the promotion of productive involvement of stakeholders in the project, program, or portfolio decision making and execution. This engagement establishes and maintains solid relationships, and creates shared understanding and alignment through frequent, two-way communication during interactive meetings, informal dialogue, and knowledge-sharing activities. The effectiveness of this communication is heavily reliant on the stakeholders' interpersonal skills of attitudes.

The Project Stakeholder Management processes are (i) Identify Stakeholders, (ii) Plan Stakeholder Engagement, (iii) Manage Stakeholder Engagement, and (iv) Monitor Stakeholder Engagement (Project Management Institute, 2017a). After stakeholders are identified and classified in consideration of their interests, potential impact, influence, involvement, and interdependencies the stakeholder engagement plan is developed as the only output of the Plan Stakeholder Engagement process. As seen in the development of other subsidiary management plans the inputs for this process are the project charter; other project management plan components such as resource, communications and risk management plans; project documents; EEFs such as stakeholder risk appetites, established communication channels and geographic distribution of facilities and resources; and OPAs such as lessons learned repository, organizational communication requirements and corporate policies for social media, ethics and security. Experts are required to gather and analyse required data during meetings for decision making and data representation. The scope of the resultant stakeholder engagement plan incudes but is not limited to the specific strategies or approaches for the engagement of individuals or groups of stakeholders.

3. METHODOLOGICAL FRAMEWORK

3.1 Information sources

An information source is "*a person, thing, or place from which information comes, arises, or is obtained*" (IGI Global, 2021, para. 2). The categorisation of information sources as primary or secondary are "*based on the originality of the material and proximity of the source or origin*" (University of Minnesota Crookston Library, 2015, para. 1).

3.1.1 Primary sources

Primary sources of information either share new information, represent original thinking or report on discoveries and/or events through first-hand accounts without any interpretation or commentary (University of Minnesota Crookston Library, 2015). These sources are often created at the time of the discovery or when the event occurs or during the period of research; and "*are usually the first formal appearance of original research"* (University of New South Wales Library, 2021, para. 1). The primary information sources used in this FGP included *inter alia* interviews, speeches, annual reports, government documents, statistical data, research reports, videos, newspaper advertisements, records of organisations and regulations.

3.1.2 Secondary sources

Secondary information sources describe or explain primary sources through "*an analysis, interpretation or a restatement of primary sources*"(University of New South Wales Library, 2021, para. 7); synthesis, generalisation, commentary, or evaluation to emphasise the creator's argument by adding value. This is considered a second-hand source of information. The secondary information sources used in this FGP included *inter alia* textbooks, journal articles, reviews, research reports, and previous final graduation projects.

Chart 3 Information sources

Objectives	Information sources	
	Primary	**Secondary**
1. To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned, other government documents or reports etc. • Mass communication from multiple mediums • Project Charter	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
2. To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines;	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums

Objectives	Information sources	
	Primary	**Secondary**
	lessons learned; change control procedures, other government documents or reports etc. • Project Charter	• Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
3. To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures; project closure guidelines, other government documents or reports etc. • Mass communication from multiple mediums • Project Charter	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers

Objectives	Information sources	
	Primary	**Secondary**
		• Works of criticism and interpretation
4. To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures; project closure guidelines; budget classification; budgeting-related policies, other government documents or reports etc. • Mass communication from multiple mediums • Project Charter	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
5. To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines;	• Textbooks • Previous final graduation projects • Journal articles

Objectives	Information sources	
	Primary	**Secondary**
time, cost, and scope constraints.	lessons learned; change control procedures; project closure guidelines; budget classification; key performance indicators, other government documents or reports etc • Mass communication from multiple mediums • Project Charter	• Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
6. To create a resource management plan to guide the categorisation, allocation, management, and release of human physical resources.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures; project closure guidelines; budget classification; key performance indicators; organisational structure, other	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes

Objectives	Information sources	
	Primary	**Secondary**
	government documents or reports, etc. • Mass communication from multiple mediums • Project Charter	• Conference papers • Works of criticism and interpretation
7. To develop a communications management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures; project closure guidelines; budget classification; key performance indicators; organisational structure, other government documents or reports, etc. • Mass communication from multiple mediums • Project Charter	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
8. To create a risk management plan to describe how risk management processes will be	• Personal communication including emails, conversations, and interviews	• Textbooks • Previous final graduation projects

Objectives	Information sources	
	Primary	**Secondary**
structured and performed to reduce the likelihood of risks.	• OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures, other government documents or reports, etc. • Mass communication from multiple mediums • Project Charter	• Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation
9. To create a procurement management plan for the timely acquisition of products, services, or results.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures, other government documents or reports etc. • Mass communication from multiple mediums	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews

Objectives	Information sources	
	Primary	**Secondary**
	• Project Charter	• Lecture notes • Conference papers • Works of criticism and interpretation
10. To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.	• Personal communication including emails, conversations, and interviews • OPAs including Project Cooperation Agreements; standardised guidelines; lessons learned; change control procedures, other government documents or reports etc. • Mass communication from multiple mediums • Project Charter	• Textbooks • Previous final graduation projects • Journal articles • Mass communication from multiple mediums • Previous information • Web research • Relevant historical data and information • Assessment and reviews • Lecture notes • Conference papers • Works of criticism and interpretation

3.2 Research methods

The strategies, processes or techniques used to collect data or evidence for analysis to reveal new information or enhance an understanding of a topic are called research methods (Booth, 2020). Research can be qualitative, quantitative or a mixture of both. Booth (2020) also states that qualitative research facilitates the interpretation and description of events to explore how or why things occur for a better understanding of cultural phenomena, complex concepts, and social interactions. Quantitative research compiles numerical data for statistical analysis to highlight patterns or relationships for generalisations to determine how many, how much, to what extent or how often. The integration of both qualitative and quantitative research is referred to as Mixed Methods research. This holistic approach can be used for verification of data from two or more sources. In this FGP, a combination of elements from quantitative and qualitative research were used in the analytic-synthetic method described in Chart 4 (Bowen, 2009; Morgan, 2022; Project Management Institute, 2017a).

3.2.1 Analytic Method

An analytic method breaks down a complex process into component parts for enhanced understanding of the process as a whole (American Psychological Association, 2020). Aristotle replaced this analytic method with the analytic-synthetic method. To Aristotle, "*analysis is the discovery of demonstration*" (Cellucci, 2013, p. 1). Using Aristotle's analytic-synthetic method, a deduction of a given conclusion can be found from given prime premises by syllogism or induction.

3.2.2 Synthetic Method

The synthetic method results in the combination of skills, systems, processes, and other components into a more complex whole (American Psychological Association, 2020). In this FGP, the definition, preparation, coordination, and consolidation of all plan components resulted in the desired integrated project management plan.

Chart 4 Research Methods

Objectives	Research methods
	Analytic-Synthetic Method
To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence, and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the project charter. The analysis of these sources provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for project charter development.
To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the scope management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the scope management plan.
To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the schedule management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used

Objectives	Research methods
	Analytic-Synthetic Method
	the development of a schedule management plan.
To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings will be sought to the reduce the impact of biases during the synthesis of the cost management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the cost management plan.
To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the quality management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the quality management plan.
To create a resource management plan to guide the categorisation, allocation, management, and release of human physical resources.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the resource management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's

Objectives	Research methods
	Analytic-Synthetic Method
	knowledge base; and track the change and development in the tools and techniques used for the development of the resource management plan.
To develop a communication management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the communication management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the communication management plan.
To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the risk management plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the risk management plan.
To create a procurement management plan for the timely acquisition of products, services, or results.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the procurement management plan. The analysis of these sources

Objectives	Research methods
	Analytic-Synthetic Method
	also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the procurement management plan.
To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.	The sources of information identified for this objective were systematically analysed to find relevant information, elicit meaning, gain understanding, and develop empirical knowledge. By triangulating the data in these sources, convergence and corroboration of findings were sought to the reduce the impact of biases during the synthesis of the stakeholder engagement plan. The analysis of these sources also provided supplementary research and insights to expand the Project Manager's knowledge base; and track the change and development in the tools and techniques used for the development of the stakeholder engagement plan.

3.3 Tools

PMI (2017) describes a tool as a tangible item used to perform an activity to produce a result or a product. This FGP, in part, used communication, data gathering, analysis and representation tools ranging from templates to software to produce deliverables. A summary of these tools is compiled in Chart 5.

Chart 5Tools

Objectives	Tools
To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.	• Project Charter template • Microsoft Word • Zotero
To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.	• Scope Management Plan template • Zotero • Microsoft Word • Work breakdown structure and dictionary template
To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.	• Schedule Management Plan template • Microsoft Project & Word • Zotero
To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.	• Cost Management Plan template • Microsoft Project, Word & Excel • Zotero • Statistical Analysis tools • Cost estimation software
To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints.	• Quality Management Plan template • Microsoft Word • Zotero • Checklists
To create a resource management plan to guide the categorisation, allocation, management, and release of human physical resources.	• Quality Management Plan template • Microsoft Word • Zotero

Objectives	Tools
	• Resource breakdown structure • Responsibility assignment matrix • Resource management software
To develop a communication management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.	• Communication Management Plan template • Microsoft Word • Zotero
To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.	• Risk Management Plan template • Microsoft Word • Zotero • Risk register template • Risk checklists
To create a procurement management plan for the timely acquisition of products, services, or results.	• Procurement Management Plan template • Microsoft Word and Excel • Scheduling software • Zotero
To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.	• Stakeholder management software • Microsoft Word and Excel • Zotero • Google Forms (Survey/Questionnaire) • Stakeholder analysis matrix template

3.4 Assumptions and constraints

An assumption is a "*factor in the planning process that is considered to be true, real, or certain, without proof or demonstration*" (Project Management Institute, 2017a, p. 699). On the other hand, a constraint is any restriction that affects the execution of a project, program, portfolio, or process(Project Management Institute, 2017b). The analytic-synthetic research method was applied throughout the project to achieve objectives. Therefore, the cross-applicable constraints of this method include *inter alia:*

i. Insufficient detail in available information
ii. Low retrievability or difficult retrievability of relevant information
iii. Incomplete information

These limitations can result in biased selectivity of information (Bowen, 2009; Morgan, 2022) and low quality deliverables.

Chart 6. Assumptions and constraints

Objectives	Assumptions	Constraints
To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.	The Project Charter will be developed and approved before the development of the integrated project management plan begins.	• Time for the development of the project charter was limited to one week. • (i) to (iii)
To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.	The project goal is clear and specific.	• (i) to (iii)
To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.	Time allocated for the development of the schedule management plan and execution of assessment is sufficient.	• (i) to (iii) • Schedule management plan should be created within one week • Project implementation period for the assessment should not exceed 4 months
To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.	Cost management plan will be robust enough to maintain high-cost efficiency.	• (i) to (iii) • Expenditure for creation of cost management plan should be kept minimal
To produce a quality management plan to outline the project quality	Quality management plan will be robust enough to maintain high	• (i) to (iii) Sub-par quality of environmental data

Objectives	Assumptions	Constraints
requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints.	quality within cost, scope, and time constraints.	assessment can result in the development of an obsolete regional environmental information system
To create a resource management plan to guide the categorisation, allocation, management, and release of human physical resources.	Sufficient resources are available to execute project.	• (i) to (iii)
To develop a communication management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.	The requisite technology required to engage stakeholders is affordable and accessible.	• (i) to (iii) • Impacts of COVID-19 • Unstable internet connections
To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.	Sufficient information is available to compile a comprehensive list of risks	• (i) to (iii)
To create a procurement management plan for the timely acquisition of products, services, or results.	A list of pre-approved vendors is available.	• (i) to (iii) • Financial constraints may limit options for procurement

Objectives	Assumptions	Constraints
To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.	The robustness of the stakeholder engagement plan will ensure stakeholders are consistently involved based on their needs, expectations, interests, and potential impact on the project.	• (i) to (iii) • Diversity of stakeholders involved may require a variety of tools and techniques for active participation etc.

3.5 Deliverables

A deliverable is "*any unique and verifiable product, result of capability to perform a service that is required to be produced to complete a process, phase, or project*" (Project Management Institute, 2017a, p. 704). The integrated Project Management Plan for the assessment of the availability and accessibility of environmental data in Saint Lucia was the major deliverable of this FGP. The other deliverables in this FGP included the Project Charter and sub-components of this integrated Project Management Plan. Further detail is provided in Chart 7.

Chart 7. Final Graduation Project Deliverables

Objectives	Deliverables
To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.	• Project Charter (Appendix 1)
To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.	• Scope Management Plan
To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.	• Schedule Management Plan • Activity List • Project timeline (Gantt Chart) • Schedule baseline
To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored, and controlled.	• Cost Management Plan • Cost Baseline
To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost, and scope constraints.	• Quality Management Plan
To create a resource management plan to guide the categorisation, allocation, management, and release of human physical resources.	• Resource Management Plan
To develop a communication management plan to describe the planning, structuring, implementation, and monitoring of communication for effective communication of project status and other key information.	• Communication Management Plan

Objectives	Deliverables
To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.	• Risk Management Plan • Risk Register
To create a procurement management plan for the timely acquisition of products, services, or results.	• Procurement Management Plan
To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.	• Stakeholder Engagement Plan • Stakeholder Register • Stakeholder Map

4. RESULTS

4.1. Scope Management Plan

4.1.1. Scope Baseline

4.1.1.1. Project Scope Statement

4.1.1.1.1. Project Scope Description

The availability and accessibility of the environmental data in Saint Lucia will be assessed — within three months — through the achievement of the following objectives:

i. To prepare an inception report outlining the key steps in the process of how the work will be executed, a work plan and a methodology within 30 days after the start of the consultancy.

ii. To complete a preliminary version of the environmental data assessment tool based on results of desk research, interviews, and on-site review two months after the start of the consultancy.

iii. To conduct a national workshop to validate preliminary results of the environmental data assessment tool two months after the start of the consultancy.

iv. To present a comprehensive structure diagnosis report with a relevant set of data and indicators for inclusion in the regional Environmental Information System (EIS) inventory proposal three months after the start of the consultancy.

4.1.1.1.2. Project Deliverables and Acceptance Criteria

Chart 8. Project Deliverables and Acceptance Criteria

Deliverables	Acceptance Criteria
Inception Report	• Use of Standard English • Coherent workplan for completion within 3 months • Appropriate methodology • Delivery within 30 days after the start of the consultancy • Proof of contact with designated focal points • Including evidence of inception meeting and participation in training • Submission as MS Word document with all diagrams, images, and corresponding supporting Excel files
Environmental Data Assessment Tool	• Use of Standard English • Use of agreed tool • Validated through desk research, interviews, on-site review, and national workshop • Complete list of information sources and contact information • Feedback under all topics • Justification for missing data • Delivery of preliminary version within two months after the start of the consultancy • Submission as MS Word document with all diagrams, images, and corresponding supporting Excel files
National Workshop	• Use of Standard English • Active participation • Recording of proceedings • Inclusion of relevant national agencies, stakeholders, and relevant committees • Facilitation within two months after the start of the consultancy • Submission as MS Word document with all diagrams, images, and corresponding supporting Excel files

Deliverables	Acceptance Criteria
Structure Diagnosis Report	• Use of Standard English • Referencing using single format throughout • Sound data analysis based on results from assessment tool and national workshop • Including a proposal for a set of data and indicators for inclusion in regional Environmental Information System • Submission as MS Word document with all diagrams, images, and corresponding supporting Excel files

4.1.1.1.3. Project Exclusions

The assessment will focus on the availability and the accessibility of environmental data in Saint Lucia. It will not include any other country. The agreed environmental data assessment tool will provide the basis for this assessment. Additionally, only the core indicators of this tool will be used to perform the assessment. In consideration of COVID-19, the consultant is expected to perform these duties remotely as much as possible. The consultant is not required to leave home country to perform any duties for this assignment.

4.1.1.2. Work Breakdown Structure

The creation of a work breakdown structure (WBS) involves the subdivision of project deliverables and project work into smaller manageable work packages— using expertise from experience with similar projects to identify and analyse the deliverables; and decomposition to divide and subdivide the upper WBS levels into lower-level detailed components with unique identifiers (top-down approach). This unique identifier will also facilitate the structuring of hierarchical summation of costs, schedule, and resource information (Cockfield, 1987). Each descending level is indicative of an increasingly detailed definition of project objectives. Expertise is also required for the verify that the degree of decomposition of the deliverables is appropriate. Ultimately, the WBS provides a framework of what must be delivered. The WBS for the *Assessment of the Availability and Accessibility of Environmental Data in Saint Lucia* is represented in Figure 6 using the major deliverables as the second level of decomposition. This will be presented to the client as part of the *Inception Report* for formal work authorisation. The *Inception Report* will serve to outline the key steps of how the work will be executed along, a workplan and methodology. An audit trail of all work authorisations shall be maintained throughout the project as this documentation will facilitate effective internal communication and coordination.

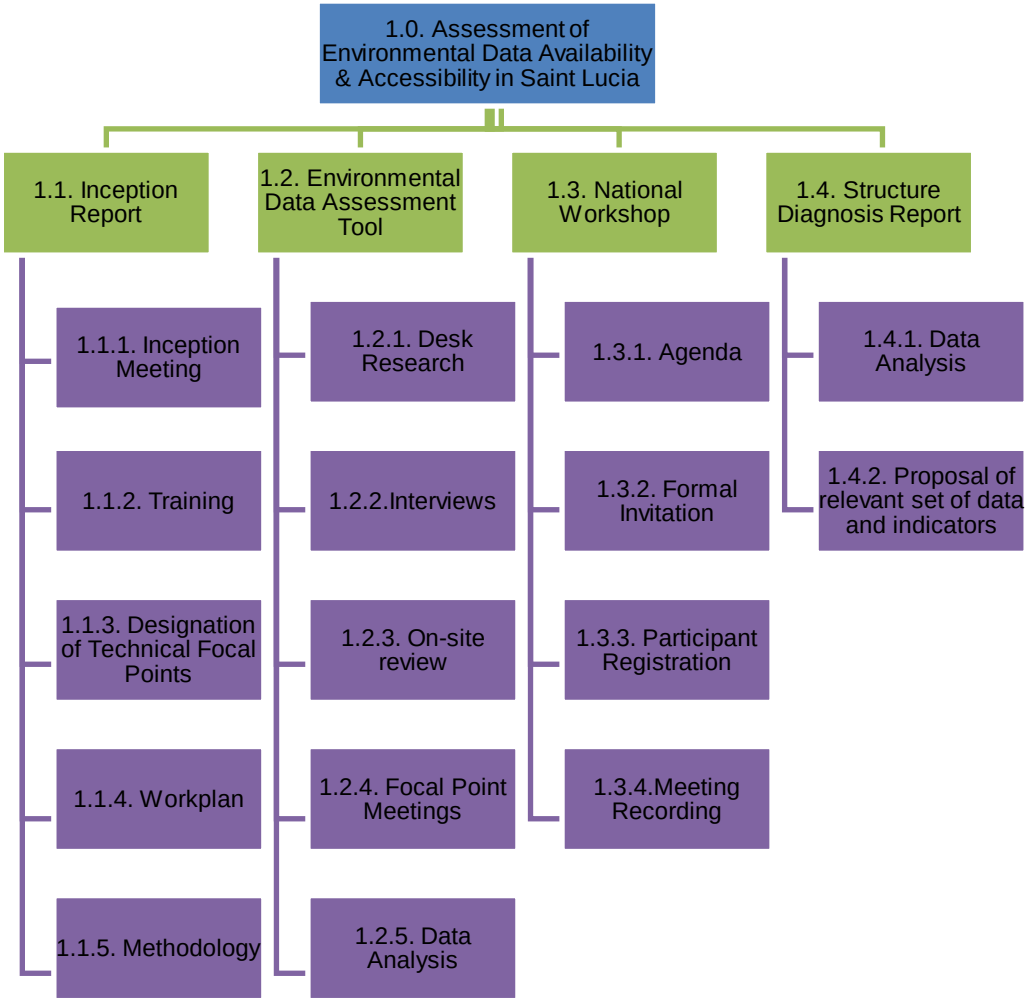

Figure 6. Work Breakdown Structure to Assess Environmental Data Availability & Accessibility in Saint Lucia

4.1.1.3. Work Breakdown Structure Dictionary

A WBS dictionary "*provides deliverable, activity, scheduling and estimating information for each element in the WBS"* (Project Management Institute, 2019c, p. 40). This dictionary includes *inter alia* WBS code, description of work, assumptions and constraints, responsible individual/team/organisation, schedule milestones, required resources, acceptance criteria, technical references, cost estimates etc. The schedule milestones and acceptance criteria are captured in Chart 8 so this dictionary will focus on the other elements. The consulting team includes two persons so owners will not be assigned as the consultants will always share duties.

Chart 9. WBS Dictionary

WBS Code	Description of Work[1]	Assumptions & constraints	Required Resources	Technical References	Cost Estimates/US
1.1.	Prepare an inception report outlining the key steps in the process of how the work will be executed, a work plan and a methodology within 30 days after the start of the consultancy.	• 30 days is sufficient time • Sub-activities will be executed within 30 days	• Laptop • Internet • MS Office	• TOR	$ 5,000.00
1.1.1.	Attend and actively participate in inception meeting with client to discuss deliverables, chain of command and communication channels with stakeholders	• Differing time zones • Competing full-time work schedule	• Laptop • Internet • Zoom	• TOR • Training documents	$1,000.00
1.1.2.	Participate in training hosted by client				
1.1.3.	Contact both selected government agencies for designation of technical focal points	• Availability of staff to perform additional duties • Supervisors will approve time for active participation in assignment	• Phone • E-mail • Laptop	• Formal correspondence from client to Heads of departments	$ 500.00
1.1.4.	Create a workplan including task implementation timeline	• Schedule milestones will be maintained • Timely feedback will be provided by stakeholders	• Laptop • Internet • MS Office	• TOR • Minutes of inception meeting	$1,500.00

[1]The description of work also provides insight into the individual requirements for the satisfaction of the business need of the project.

WBS Code	Description of Work[1]	Assumptions & constraints	Required Resources	Technical References	Cost Estimates/US
1.1.5	Develop suitable methodology for achievement of each objective	• TOR and discussions and comprehensive enough to facilitate methodology selection	• Technical expertise • Internet • Laptop • MS Office	• OPAs • TOR • Minutes of inception Meeting	$2,000.00
1.2	Complete a preliminary version of the environmental data assessment tool based on results of desk research, interviews, and on-site review two months after the start of the consultancy.	• Availability and willingness of stakeholders to be interviewed • Accuracy of responses	• Technical expertise • Internet • Laptop • MS Office • Environmental data assessment tool •	• Formal correspondence from client • Publicly accessible databases • Data sharing protocols/policies	$5,000.00
1.2.1. 1.2.2. 1.2.3. 1.2.4 1.2.5.	Conduct desk research, interviews, on-site reviews, focal meetings, and data analysis to determine the availability and accessibility of core environmental data in Saint Lucia	• Availability and willingness of stakeholders to be interviewed • Accuracy of responses	• Technical expertise • Internet • Laptop • MS Office • Environmental data assessment tool • MS Excel	• Formal correspondence from client • Publicly accessible databases • Data sharing protocols/policies	$5,000.00
1.3.	Conduct a national workshop to validate preliminary results of the environmental data assessment tool	• Differing time zones	• Zoom • Laptop • Internet	• Formal correspondence from client	$2,500.00

WBS Code	Description of Work[1]	Assumptions & constraints	Required Resources	Technical References	Cost Estimates/US
	two months after the start of the consultancy.	• Competing full time work schedules	• Email	• TOR	
1.3.1	Create and obtain approval for meeting agenda	• Availability of presenters • Competing scheduled meetings	• Laptop • Email • Internet	• TOR • Correspondence from client	$500.00
1.3.2.	Extend formal invitation to at least 50 stakeholders	• All invitees will attend	• Laptop • Email • Internet • Stakeholder register	• Approved meeting agenda	$500.00
1.3.3.	Create participant registration portal	• All attendees can use portal • All attendees will register by deadline	• Laptop • Internet • Google Forms		$500.00
1.3.4	Record proceedings for future reference	• Attendees will not object	• Laptop • Internet • Zoom	• TOR • Approved meeting agenda	$1,000.00
1.4.	Present a comprehensive structure diagnosis report with a relevant set of data and indicators for inclusion in the regional Environmental Information System (EIS) inventory proposal three months after the start of the consultancy.	• All information for completion of assessment tool will be available	• Laptop • Internet • MS Word • Structure Diagnosis Report Template	• TOR • Validated results of environmental data assessment tool	$2,500.00

WBS Code	Description of Work[1]	Assumptions & constraints	Required Resources	Technical References	Cost Estimates/US
1.4.1.	Perform data analysis using results of assessment tool and validation workshop to determine which environmental data is available in Saint Lucia.	• All information for completion of assessment tool will be available	• Laptop • Email • Internet • MS Word • MS Excel	• Validated results of environmental data assessment tool • Meeting recording	$1,000.00
1.4.2.	Propose relevant set of environmental data and indicators for inclusion in regional Environmental Information System	• Validated results of environmental data assessment tool cover all types of environmental data in Saint Lucia	• Laptop • Email • Internet • MS Word • MS Excel	• Validated results of environmental data assessment tool • Meeting recording • TOR	$1,500.00

4.1.2. Scope Reporting and Controlling Scope

Assessment of project performance necessitates recording and accumulation of project progress data and structured information. Therefore, it is expected that the processing, integration, summarisation, and display of project results are displayed through presentation of drafts of deliverables when feasible, weekly progress updates via email, virtual presentations to stakeholders, active participation in team meetings etc. This will facilitate review by various levels of authority to ensure continued attainment of project objectives. In doing so, changes to the scope baseline can also be managed. All requested changes and recommended corrective or preventative actions — by the client or consultant — can be managed in real-time through the *Perform Integrated Control p*rocess. Hence, any changes to the scope will be made in conjunction changes to cost estimates, activity sequences, schedule dates, resource requirements and/or analysis of risk response alternatives. This avoids scope creep — the uncontrollable expansion of project scope without adjustments to other key aspects of the project. Every documented change request must be approved, deferred, or rejected through voting by primary stakeholders after due consideration of alternatives, schedule, and estimated cost impacts.

4.1.3. Validating Scope

Validation of scope involves the formal and objective acceptance of completed project deliverables. The validation of scope and the control of quality shall be performed in parallel to ensure deliverables are complete and correct with specified quality requirements acceptance by client. Therefore, deliverables will be sent the client for inspection. Accepted deliverables will be formally signed off and approved by the client. The client will send formal documentation via email to the consultant as proof of formal stakeholder acceptance of the project’s deliverables. This documentation will also facilitate payment and serve as a record for Project closure. Any completed deliverables that have not been formally accepted will also documented with the reasons for non-acceptance of these deliverables. However,

the onus is on the consultant to address these reasons and take the necessary reparatory action to ensure the deliverable is accepted. If the reasons provided necessitate a change request, the change request must be reviewed through the *Perform Integrated Change Control* process.

4.2. Schedule Management Plan

This Schedule Management Plan was developed in consideration of the Scope Management Plan (Section 4.1); the predictive development approach of project deliverables; enterprise environmental factors including *inter alia* scheduling software and team resource availability; organisational process assets including *inter alia* lessons learned repository; guidelines and criteria set within the Terms of Reference (Appendix 4); and discussions between the client and consultants. When a schedule baseline is established, changes to the schedule must be managed through the project's integrate change control process.

4.2.1. Schedule Model Development

The project schedule will be developed based on the Work Breakdown Structure (Figure 6) that was developed as part of the Scope Management Plan. It will be managed at the individual task level. Each task is reflected in the third level of the WBS. A dependency analysis will be used to determine to determine the order in which the work must occur. The tasks, resources, associated activities, and durations will be entered into the project schedule software tool — Microsoft Project —with predecessor and successor tasks assigned at each activity level. The Project Manager will then ensure this schedule is technically correct, reasonable and satisfies the three-month duration as per Section 4.1.2.1.1. Upon approval of this schedule, the project will be baselined and put under configuration control. The schedule model illustrates the time phasing for execution of the scope of work (Project Management Institute, 2019d).

4.2.2. Units of Measure and Level of Accuracy

As appropriate, the duration of tasks will be measured in terms of hours, days, weeks and/or months. The level of accuracy is considered ± 10%. This is the acceptable range that will be used in the determination of realistic activity duration estimates and allows for contingencies.

4.2.3. Schedule Model Maintenance

Schedule Model Maintenance serves to update the status and record progress of the project in the schedule model during project execution. On a weekly basis, the consultants will report their work time and progress using Microsoft Project. The consultants will also review the project status and provide weekly progress reports to the client via email or during progress meetings.

4.2.4. Control Thresholds

This section specifies the variance threshold for monitoring schedule performance. It provides an agreed-upon amount of variation that can be allowed before action is taken. After a proposed change is reviewed and evaluation; and the variance has been calculated, a list of alternatives must be generated for consideration. If the proposed change exceeds the established threshold of 10%, a change request must be submitted to the Change Control Board (CCB). For instance, a change request is necessary if the proposed change is estimated to increase or reduce:

- the work package duration by 10% relative to the baseline.
- the overall project duration by 10% or more relative to the baseline.

If the schedule change is approved, the following must occur:

- record the change request result,
- store the documents in the project repository,
- modify the schedule in accordance with the approved change, and
- communicate the change and its impacts to the client.

4.2.5. Schedule Control

The schedule will be managed and controlled based on the progress information provided in the reporting period, perceived project risks, and open/ongoing issues using the Critical Path Method (CPM). The shortest possible project duration is determined by the critical path — the sequence of activities that represents the

longest path through the project. This critical path is usually characterised by zero total float. The total float or schedule flexibility is determined by the amount of time that schedule activity can be delayed or extended from its early start date without delaying the project end date or exceeding a schedule constraint. This method also enables the calculation of free float — the amount of time an activity can be delayed without delaying the early start date of any of its successors or exceeding a schedule constraint. Knowledge of this defines critical and non-critical tasks with the goal of preventing time-frame problems and process bottlenecks.

4.2.6. Performance Metrics

At end of every week, the magnitude of the variation relative to the original schedule baseline will be assessed using schedule variance (SV), schedule performance index (SPI) and percent complete in Microsoft Project. When SV is negative, and the SPI is less than 1.0 a performance review is required to identify the factors that are resulting in the completion of less work than planned.

4.2.7. Reporting Formats

On a weekly basis, the Project Manager should generate an updated timeline (Figure 7) and Tracking Gantt chart (Figure 8) from Microsoft Project for use in project status meetings and for presentation to the client in draft submission of deliverables. During these meetings, and as necessary, via email, the Project Manager will report schedule deviations, and if necessary, propose solutions for getting the schedule back on track. All schedule changes must go through the Integrated Change Control process. The Critical Path Method will be used to control and monitor the schedule.

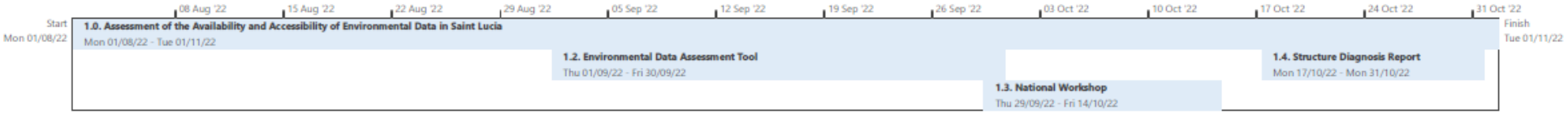

Figure 7. Project Timeline

ID	Task Mode	Task Name	Duration	Start	Finish
1		**1.0. Assessment of the Availability and Accessibility of Environmental Data in Saint Lucia**	**67 days?**	**Mon 01/08/22**	**Tue 01/11/22**
2		**1.1. Inception Report**	**23 days?**	**Mon 01/08/22**	**Wed 31/08/22**
3		1.1.1. Inception Meeting	1 day	Mon 01/08/22	Mon 01/08/22
4		1.1.2. Training	2 days	Tue 02/08/22	Wed 03/08/22
5		1.1.3. Designation of Technical Focal Points	2 days	Tue 02/08/22	Wed 03/08/22
6		1.1.4. Workplan	9 days	Thu 04/08/22	Tue 16/08/22
7		1.1.5. Methodology	9 days	Wed 17/08/22	Mon 29/08/22
8		**1.2. Environmental Data Assessment Tool**	**22 days?**	**Thu 01/09/22**	**Fri 30/09/22**
9		1.2.1. Desk Research	22 days	Tue 30/08/22	Wed 28/09/22
10		1.2.2. Interviews	22 days	Tue 30/08/22	Wed 28/09/22
11		1.2.3. On-site review	22 days	Tue 30/08/22	Wed 28/09/22
12		1.2.4. Focal Point Meetings	22 days	Tue 30/08/22	Wed 28/09/22
13		1.2.5. Data Analysis	22 days	Tue 30/08/22	Wed 28/09/22
14		**1.3. National Workshop**	**12 days**	**Thu 29/09/22**	**Fri 14/10/22**
15		1.3.1. Agenda	1 day	Thu 29/09/22	Thu 29/09/22
16		1.3.2. Formal Invitation	1 day	Fri 30/09/22	Fri 30/09/22
17		1.3.3. Participant Registration	6 days	Wed 05/10/22	Wed 12/10/22
18		1.3.4. Meeting Recording	2 days	Thu 13/10/22	Fri 14/10/22
19		**1.4. Structure Diagnosis Report**	**11 days?**	**Mon 17/10/22**	**Mon 31/10/22**
20		1.4.1. Data Analysis	5 days	Mon 17/10/22	Fri 21/10/22
21		1.4.2. Proposal of relevant set of data and indicators	6 days	Mon 24/10/22	Mon 31/10/22

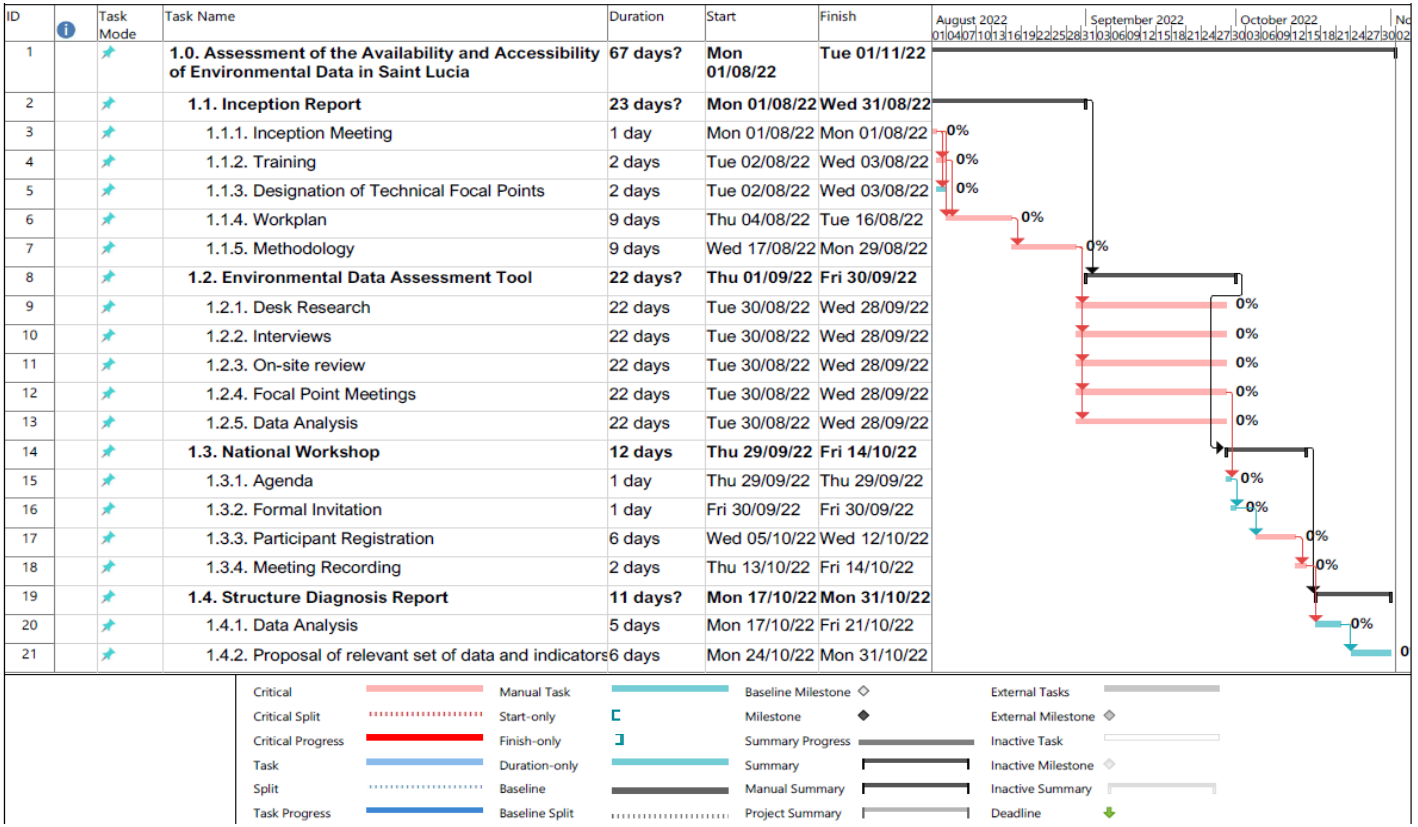

Figure 8. Tracking Gantt Chart

4.3. Cost Management Plan

The inputs of this Cost Management Plan were the preapproved financial resources and project approval requirements defined in the project charter; Terms of Reference (Appendix 4); Schedule Management Plan; enterprise environmental factors — currency exchange rates for project costs sourced from more than one country and productivity differences in different parts of the world—; and organisational process assets — client's financial controls procedures including *inter alia* standard contract provisions and required expenditure and disbursement reviews, client's lessons learned repository, and client's existing formal cost estimating and budgeting-related policies, procedures, and guidelines. The client is an international organisation with over 70 years' experience in project and programme management, so the tools and techniques used included expert judgment, alternative analysis, and planning meetings. As such the client determined that it was best to contract the services for the assessment of the availability and accessibility of environmental data in Saint Lucia to a duo of local Saint Lucian consultants using a firm-fixed-price contract (Appendix 4).

4.3.1. Cost Estimation and Budget Determination

As the scope of the project was clearly defined early, cost estimation and budget determination were tightly linked and conducted as a single process. The cost estimates were expressed as United States Dollars (USD). The effect of currency fluctuations was not a determining factor in this process as the Eastern Caribbean (EC) Dollar has been pegged to the USD at a fixed rate of EC$2.70 to US$1.00 since 1976(Eastern Caribbean Central Bank, 2021). The scope baseline, project schedule, lessons learned register, market conditions, exchange rates, client's cost estimating policies and templates and historical information were critical inputs into the estimation of costs. Only the final cost estimates were shared with the consultants in a summary form in the contract (Appendix 4) based on the deliverables in the second level of the work breakdown structure (Figure 6). However, the consultants

are aware expert judgement, analogous and bottom-up estimating, alternatives analysis and decision making were the tools and techniques used to determine cost estimates for the project. The cost estimate presented for each deliverable includes the direct labour, equipment, services, and information technology for both consultants. The level of precision, level of accuracy and basis of estimates which provides the additional details to support the determination of final cost estimates was not shared with the consultants. Parametric estimating was used to determine the cost estimates at the activity level presented in the WBS Dictionary (Chart 9) in consideration of the fixed cost estimate and delivery time stipulated by the client. Hence, each deliverable functions as a control account.

Chart 10. Summary Level Cost Estimates

Deliverables	Cost Estimate/USD
Inception Report	5,000.00
Preliminary version of environmental data assessment tool	5,000.00
Validation Workshop	2,500.00
Structure Diagnosis Report	2,500.00

The aggregation of estimated costs of control accounts in Chart 10 established an authorised cost baseline of USD 15,000 against which project performance can be monitored and controlled. It is important to note that prior to authorisation as the cost baseline, the client reconciled this USD 15,000 with the funding limit on the commitment of funds for the project. The cost baseline represents the time-phased project budget — excluding any management reserve to which the consultants are not privy. The cost baseline in addition to the management reserve constitute the project budget. Total and periodic funding requirements were derived from the cost baseline. Therefore, the payment will be made to the consultants in instalments upon certification of satisfactory performance in each deliverable.

4.3.2. Control Costs

A fixed price contract is "*an agreement that sets the fee that will be paid for a defined scope of work regardless of the cost or effort to deliver it*" (Project Management Institute, 2017a, p. 707). The firm fixed price (FFP) contract issued to the consultants specified the specific scope of work to be performed including discrete deliverables and acceptance terms; period of performance including a start and end date, and delivery dates for interim deliverables; and a price with interim milestone payments. The FFP contract does not include incentives. Neither economic price adjustments nor reimbursements are facilitated in this contract. Although the consultants bear the execution risk, the upfront well-known scope of the project facilitates the tight management of the project and its risks for the execution of duties below the cost baseline to generate high profitability. The client is required to review and respond to deliverables on a fixed time schedule and be available for regular internal project reviews.

"*Managing a fixed-price project is three parts knowledge, two parts experience, and one part art*" (Lowden & Thornton, 2015, para. 3).The higher risk/reward profile of the FFP contract requires consultants to be familiar and have a clear understanding of project scope and the nature fixed-price work; changes to be processed as contract modifications; and employment of project management rigor and discipline. Therefore, the consultants should promptly indicate — in writing— to client when a requested change is out of scope and requires a contract modification. The contract, TOR, scope baseline, work breakdown structure, cost baseline, and project schedule should be referenced as often as needed to ensure project remains within the scope of work and additional costs are not incurred.

To maintain the cost baseline throughout the project, the status of the project is monitored to update the project costs and manage changes to the cost baseline. The consultants are required to track the time devoted to this project to determine profit or loss. For this purpose, a consultant fee of USD55 is assigned to each hour. As

stipulated in the schedule management plan, earned value analysis will be used to internally compare the performance measurement baseline to the actual cost performance. At end of every week, the magnitude of the variation relative to the original cost baseline will be assessed using cost variance (CV), cost performance index (CPI) and percent complete in Microsoft Project. A negative CV and/or a CPI of less than 1.0 is unfavourable. Either of these results necessitates a financial review to identify the causes of cost overruns and implement mitigation measures. Unlike SV, CV does not improve as the contract nears completion. This work performance information at the control account level will be maintained in the consultants' internal work performance reports to enhance the execution of subsequent deliverables and similar projects.

4.4. Quality Management Plan

The degree to which a set of inherent characteristics fulfil requirements is referred to as quality (Dixon, 1987; Merriam-Webster, 2022). In practice, Plan Quality Management overlaps and interacts with the other Project Quality Management processes, but these processes will be presented as discrete processes with defined interfaces in this Quality Management Plan. The inputs used for its development include the scope baseline — particularly, the acceptance criteria in Chart 8 —; enterprise environmental factors (cultural perceptions, operating conditions of the project and its deliverables, the client's regulations and guidelines, organizational structure of the Government of Saint Lucia); and organizational process assets (lessons learned repository and the informal policies of the consultants' quality management system).

4.4.1. Quality Objectives

4.4.1.1. To ensure submissions are made with less than 5% defects by stipulated deadlines.

4.4.1.2. To enhance customer satisfaction by offering multi-channel communication/support at least 10 hours per day.

4.4.1.3. To actively address comments/reviews within three working-days.

4.4.2. Manage Quality

As part of the quality control process, the consultants will review each other's submissions to assess quality through the detection and correction of any defects before the deliverables are sent to the client. The time spent doing this will be reflected as appraisal costs and internal failure costs in cost management, respectively. The client will have one week to provide feedback on deliverables with tracked changes and comments. If defects are found by the client, then the external failure costs will comprise rework and loss of future business — if these detects persist.

The inception meeting, environmental data assessment tool training, meeting with the focal points and clients, time to develop the deliverables right and national workshop constitute prevention costs to build quality deliverables. The aforementioned provides evidence that managing quality is the responsibility of both the consultants and the client. If any of the requested changes during the manage control process significantly impact the scope, schedule, and cost baselines then a change request should be submitted by the requesting party for consideration through the Perform Integrated Change Control process.

Chart 11. **Cost of Quality**

Cost of Conformance	Prevention Costs	• Inception Meeting • Training • Client and Focal Point meetings • Time to develop deliverables right • National Workshop
	Appraisal Costs	• Peer review/inspections
Cost of Nonconformance	Internal Failure Costs	• Rework • Scrap
	External Failure Costs	• Warranty work • Loss of future business

Note. Adapted from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th ed., p. 283), by Project Management Institute, 2017, Project Management Institute, Inc. Copyright 2017 by Project Management Institute, Inc. Permission not sought.

Both consultants should remain committed to the incorporation of quality in processes and products. Furthermore, continual improvement, retention of management responsibility, establishment of long-term mutually beneficial partnership with clients, self-inspection, ownership of quality responsibility and maintenance of customer satisfaction must continue to constitute the quality management approaches employed by the consultants. Quality metrics that can be

used to describe how the Control Quality process will verify compliance to the project or product attribute include percentage of tasks completed on time, cost performance including CV and CPI, number of defects identified by client rectified in a timely manner, response time, number of pages/ sections/ paragraphs with defects, and a measure of the customer's satisfaction. The verified quality metrics from the Control Quality process should be used to indicate the overall project quality status to the client. The work breakdown structure and the acceptance criteria can be used to generate a checklist to verify the performance of the set of required steps. Lessons learned and best practices should be incorporated into deliverables and relayed to client in meetings or via email as part of quality reporting and quality improvement.

4.4.3. Control Quality

After the rectification of any identified defects, the client will assess the completeness, compliance, and fitness for use of the deliverable before it is accepted as the final submission. Once the client accepts the submission as the final version of the deliverable, this will provide formal evidence that all requisite guidelines have been followed and the client's acceptance criteria have been satisfied. Upon submission of each verified deliverable and other relevant work performance information to the client's Accounts Unit, the corresponding payment will be made to the consultants.

4.5. Resource Management Plan

4.5.1. Identification of Resources

Figure 9. Resource Breakdown Structure

The equipment, software and materials resources required at the activity-level are summarised in Chart 9.

4.5.2. Acquisition of Resources

4.5.2.1. Human Resources

The Human Resources for this Project were predetermined by the client using a combination of expert judgement and analogous estimating. As per the terms and

conditions of the duly signed Contract, the consultants are not allowed to hire sub-contractors to perform any obligations under the Contract.

4.5.2.1.1. Client Representative

Given the environmental data-focus of the Project, the client is represented by a Statistician from its Environment Statistics Unit.

4.5.2.1.2. Consultants

The team of two consultants —with at least three years relevant experience in knowledge management, data analysis, environment, or sustainable development management in Small Island Developing States — were hired through a Direct Award process. This Project is a component of a Programme executed by the client. Therefore, these consultants were pre-identified based on performance in and in-depth knowledge of a previous component of said Programme

4.5.2.1.3. Focal Points

Two focal points will be designated from the Department of Sustainable Development (DSD) — the lead agency managing environmental data in Saint Lucia — via written request to the Head of the Department from the client.

4.5.2.2. Equipment and Software

The requisite equipment and software needed for each activity is assigned in Chart 9. Any equipment and/or software not included in Chart 9 accounts for the needs associated with the implementation of this Project Management Plan. The equipment and software to be used by the Consultants will be provided by the Consultants. The equipment and software to be used by the Client Representative and the Focal Points will be provided by their respective employers.

4.5.2.3. Materials

Both the Client Representative and Focal Points will facilitate access to these materials from their organizational process assets and through formal requests to the respective data-producing agencies.

4.5.3. Roles and Responsibilities

Chart 12. Responsible, Accountable, Consult and Inform (RACI) Chart

RACI Chart	Human Resources		
Activity	**Client Representative**	**Consultants**	**Focal Points**
1.1.1. Inception Meeting	R	A	I
1.1.2. Training	R, A	C	C
1.1.3. Designation of Technical Focal Points	R	C	A
1.1.4. Workplan	A	R	I
1.1.5. Methodology	A	R	I
1.2.1. Desk Research	I	R, A	C
1.2.2. Interviews	I	R, A	C
1.2.3. On-site review	I	R, A	C
1.2.4. Focal Point Meetings	C	A	R
1.2.5. Data Analysis	A	R	C
1.3.1. Agenda	R, A	C	C
1.3.2. Formal Invitation	A	I	R
1.3.3. Participant Registration	R, A	I	I
1.3.4. Meeting Recording	R, A	I	I
1.4.1. Data analysis	A	R	C
1.4.2. Proposal of relevant set of data and indicators	A	R	C
	R= Responsible	A= Accountable	C= Consult I= Inform

4.5.3.1. Client Representative

This Client Representative has a supervisory role in this Project and serves as the primary liaison between the Consultants and the client. The onus is on this Statistician to ensure that the Consultants are provided with all the materials listed in Figure 9 to ensure the successful completion of the Project. The Client Representative is also responsible for formally requesting the designation of the focal points from the selected data-producing agencies. The Human Resources of this Project make up a virtual team as the client is in Africa; the Focal Points and one of the Consultants are in Saint Lucia. The other Consultant is in Guyana. Therefore, the Client must manage time zone differences to effectively maintain communication, track progress and productivity. The Statistician will review and disseminate deliverables with other members of the Unit to provide feedback and authorize payments to the Consultants.

4.5.3.2. Consultants

The Consultants are responsible for the execution of relevant tasks to successfully deliver the project deliverables according to the acceptance criteria detailed in Charts 8 and 9 within three months. The Consultants are expected to provide and use their own equipment and software itemized in Figure 9 and any other need that may arise.

4.5.3.3. Focal Points

As nominees from the DSD, the focal points are expected to serve as the liaison between the data-producing agencies and the rest of the Human Resources. Focal Points will also assist with the acquisition of the requisite materials in Figure 9. Other roles include validation of environmental data assessment tool, contribution to the completion of the environmental data assessment tool and the structure diagnosis report and coordination of the national workshop.

4.5.4. Project Organisation

The Client Representative has a supervisory role so both the Consultants and Focal Points report to the Client Representative. Irrespective of this, the primary supervisor for the Focal Points remains the Head of the Department of Sustainable Development. The Focal Points and Consultants provide support to each other as needed. The Consultants are partners so the roles and responsibilities in this Project are evenly distributed.

4.5.5. Resource Control

Each Consultant will provide and use their own equipment and software. Electronic copies of the materials will be uploaded to a shared folder on Google Drive to permit access when the need arises. The Client Representative and the Focal Points will use equipment and software provided by their respective employers. A combination of video and audio conferencing, email and WhatsApp chat will be used to build a harmonious environment for team development, build rapport and confidence within the virtual team. Materials will be shared among the Human Resources via email. Both Consultants must be kept on copy to email correspondence from/between the client and focal points to ensure both Consultants are kept abreast simultaneously. If any of the Consultants are excluded from correspondence in error, then the email trail should be forwarded and the contact information within updated to avoid a repeat of this.

4.5.6. Training and Team Development

Both Consultants have graduate degrees in the relevant fields for this Project. The Focal Points are also Technical Officers with the relevant experience and qualifications. The Client will provide training to the Consultants and Focal Points to optimize the use and understanding of the environmental data assessment tool. The Project will conclude with a two-day national online workshop with a focus on generating climate change and disaster indicators for policy decision-making in Saint

Lucia. All attendees including the Consultants and Focal Points will be awarded certificates of completion as evidence of steps to enhance their capacities.

4.5.7. Recognition Plan

Recognizing and rewarding desirable behaviour will be done informally via email and chat; and formally through payment, recommendations, references, and the certificate referenced in Section 4.5.6.

4.6. Communications Management Plan

4.6.1. Project Stakeholders

The Project Stakeholders are:

(i) Client (Sponsor)
(ii) Consultants
(iii) Focal Points
(iv) National data producing agencies
(v) Potential donors
(vi) Public
(vii) Academia
(viii) Researchers
(ix) Civil Society
(x) Environmental Advocates
(xi) Policy Makers (Government and Opposition)
(xii) Regional integration organisations
(xiii) Private Sector

The internal stakeholders are (i) to (iii) and the rest are external stakeholders. However, the primary stakeholders are (i) to (iv) so this Communications Management Plan focuses on the information needs of these primary stakeholders in consideration of the available organisational assets and needs of this project.

4.6.2. Communication Model and Methods

This Project uses an interactive communication model so receivers are expected to acknowledge and provide appropriate feedback/responses to confirm communication has been successful. Due to the colocation of the primary stakeholders, cross-cultural communication is a critical part of this Project. Therefore, both the sender's and receiver's current emotional state knowledge, background, personality, culture, and biases may influence how the message is received and interpreted and may contribute to noise — interference or barriers — that can compromise the understanding of the message. Thus, a combination of

interactive, push and pull communication(Project Management Institute, 2017a)in the global language of English — via interpersonal and small group communication (Chart 13) — will be used to mitigate the impacts of this. Also, this combination of communication methods facilitates a degree of flexibility if the membership of the primary stakeholder community changes or their needs/expectations change.

Chart 13. **Communication Methods and Artifacts**

Type of Communication	Methods and Artifacts
Interactive	A. WhatsApp messages B. Videoconferencing C. Presentations D. Team briefings/ group meetings E. Consultation groups F. Focus groups G. Phone conversations
Push	H. Email I. Draft deliverables J. Final deliverables K. Memos L. Letters to Agencies
Pull	M. Knowledge repositories/ databases

Note. This key used to identify communication methods and artifacts will be used throughout this Communications Management Plan.

4.6.3. Communication Requirements

Chart 14 provides an overview of the communication artifacts and methods that will be used to transfer information among the primary stakeholders. Press releases, social media and knowledge repositories will be used, at the discretion of or authorisation from the client, to share information with selected secondary stakeholders in a subsequent phase of the Programme. Due to the primary status of stakeholders (iii) and (iv), the information will be shared with (xi) policy makers and

(xii) regional integration organisations, by extension. The expected frequency and mode for the distribution of required information is summarised in Chart 15.

Chart 14. **Communication Between Stakeholders**

Senders	Receivers			
	Client	**Consultants**	**Focal Points**	**National data producing agencies**
Client		A, B, C, D, E, F, H, J, M	B, C, D, E, F, H, L	C, E, F, L
Consultants	A, B, C, D, E, F, H, I, J	A, B, D, E, G, H, I, J, M	A, B, C, D, G, H, I	E, F, G, H
Focal Points	B, C, D, H, M	A, B, C, D, G, H, I, M	A, D, G, H, I	B, C, D, E, F, G, H, K
National data producing agencies		G, H, M	B, C, D, E, F, G, H, K, M	E, F, M

Note. Be guided by the key used to identify communication methods and artifacts in Chart 13.

Chart 15. Communication Matrix

Information	Sender	Frequency	Mode	Receiver
Deliverables (draft)	Consultants	As needed	H, M	Consultants
				Focal Points
			H	Client
Deliverables (Final/Approved)	Consultants	As per agreed deadlines	H	Client
	Client	Within 1 week of submission of final deliverable	H	Consultants
Work requests	Client	As needed	A, B, D, E, F, H	Consultants
	Consultants	As needed		Client
	Consultants	As needed	A, B, D, E, F, H, I	Focal Points
	Consultants	As needed	E, F, G, H	National data producing agencies
	Focal Points	As needed	B, C, D, E, F, G, H, K	
Request for review	Consultants	As needed	A, B, C, D, G, H, I	Focal Points
	Consultants	As needed	B, D, E, H, I	Client
Time, usage, hours	Consultants	Weekly	H, M	Consultants
Project status	Consultants	As needed	A, B, D, G, H, M	Consultants
	Consultants	Weekly and as per agreed deadlines	B, C, D, E, H, I	Client Focal Points
	Focal Points	As needed	B, C, D, E, F, G, H, K	National data producing agencies
	Client	As needed	A, B, C, D, E, F, H, J, M	Consultants
General information (including data, policies, national reports etc)	Focal Points	As needed	A, B, C, D, G, H, I, M	Consultants
			B, C, D, E, F, G, H, K	National data producing agencies
	National data producing agencies	As needed	G, H, M	Consultants
			B, C, D, E, F, G, H, K, M	Focal Points
	Consultants		A, B, C, D, E, F, H, I, J	Client
	Client		A, B, C, D, E, F, H, J, L, M	Consultants Focal Points

Note. Be guided by the key used to identify communication methods and artifacts in Chart 13.

4.6.4. Glossary of Common Terminology

Core indicator – basic minimum set of environment statistics which all countries, at any stage of development, are recommended to consider collecting.

Data producers – an organisation that produces environment, climate change and disaster data/statistics.

Environmental data – large amounts of unprocessed observations and measurements about the environment.

Environmental data assessment tool – used to assess the national relevance, importance, availability, and sources of the individual environment statistics; and identify relevant quantitative and qualitative data gaps(United Nations Statistics Division & Expert Group on Environment Statistics, 2022). It sets the basis from which countries may construct and/or strengthen their environment statistics programmes.

Environmental indicators – selected environment statistics based on their ability to illustrate important phenomena or dynamics.

Environmental information- quantitative and qualitative facts describing the state of the environment and its changes expressed as data, statistics, and indicators.

Environmental information system - enables the use and dissemination of environmental data for the assessment of climate and environmental impacts, monitoring emissions of greenhouse gases and other environmental pollutants, measurement of economic effects of changing environmental conditions and development of policies and measures to regulate and improve the environmental performance of businesses, sectors, and administrative units(United Nations Climate Technology Centre and Network, 2022).

Environmental statistics- structured, synthesized, and aggregated environmental data.

4.6.5. Escalation Processes

Due to the established close working relationships among the internal stakeholders of this Project — including the Client, the highest authority — the inability of the team to escalate decisions or issues for quick and clear resolutions is not a foreseeable problem. However, in instances when the Consultants are not receiving the requisite support and feedback from the national data producing agencies and/or focal points, it is the sole responsibility of the client to address these issues through the appropriate diplomatic channels.

The Consultants shall neither seek nor accept instructions from any authority external to the Client in connection with the performance of its obligations under the contract. Should any authority external to the Client seek to impose any instructions on the Client regarding performance under the contract, the Consultants shall promptly notify the Client.

4.6.6. Constraints

The Client is entitled to all intellectual property and other proprietary rights regarding products, ideas, know-how, documents, and other materials the Consultants developed for the Client under the contract, and which bear a direct relation to or are produced/prepared/collected in consequence of, or during, the performance of the contract. However, if any such intellectual property or other propriety rights include any intellectual property or other proprietary rights of the Consultants that pre-existed the performance by the Consultants under the contract or that the Consultants may have developed or acquired independently, the Client does not and shall not claim any ownership interest thereto but the Consultants grants the Client a perpetual

license to use such intellectual property or other proprietary rights solely for the purposes of and in accordance with the requirements of the contract.

Information and data that is considered proprietary by either the Client or the Consultants or any other stakeholder that is delivered or disclosed by one of them to the other during the performance of the contract, and that is designated as confidential shall be held in confidence. Care and discretion shall be used to avoid disclosure, publication, or dissemination of the sender's information. The sender's information shall be used solely for the purpose for which it was disclosed. The recipient may disclose the confidential information to any other party with the sender's prior written consent, as well as to the recipient's colleagues who have a need to know such confidential information solely for performing obligations under the contract.

4.6.7. Updates to the Communications Management Plan

If there are significant negative schedule and cost variances, the methods of communication should be assessed for their effectiveness. The outcomes of this assessment in conjunction with the negative schedule and cost variances may highlight the need for adjustment, action, or intervention on communication activities through the integrated change control process.

4.7. Risk Management Plan

4.7.1. Risk Probability and Impact

Chart 16. Probability Scales

Scale	Very Low	Low	Medium	High	Very High
Percentage Probability	<10%	10-30%	31-50%	51-70%	>70%
Probability Score	0.1	0.3	0.5	0.7	0.9

Note. Adapted from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th ed., p.407), by Project Management Institute, 2017, Project Management Institute, Inc. Copyright 2017. Permission not sought.

Chart 17. Impact Scales

		+/- Impact on Project Objectives				
Scale		Negligible	Less than significant	Potentially significant	Significant	Very significant
Impact Score		0.1	0.3	0.5	0.7	0.9
Project Objectives	**Schedule**	1 to 5 days	6 to 10 days	11 to 20 days	21 to 30 days	>30 days
	Cost	<5% increase	5 - 10% increase	11- 20% increase	21-25% increase	>25% increase
	Scope	Barely noticeable scope change	Minor scope change	Major scope change	Scope reduction unacceptable to client	Extremely high scope change. Deliverables are effectively useless
	Quality	Minor impact on secondary functions	Minor impact on overall functionality	Some impact in key functional areas	Significant impact on overall functionality	Very significant impact on overall functionality

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The percentage probability of a risk will determine its probability score derived from Chart 16. Therefore, a risk with a percentage probability of less than 10% will be assigned a probability score of 0.1. The combination of impacts a risk has on the individual project objectives will determine its impact score from Chart 17. Therefore, a risk that will delay the schedule by 1 to 5 days (0.1); result in less than 5% cost increase (0.1); produce a barely noticeable scope change (0.1); and have a minor impact on secondary functions (0.1) will be assigned an impact score of 0.1. Thus, its impact is negligible. However, if a risk delays a schedule by 6 to 10 days (0.3); results in a 11 to 20% cost increase (0.5); and produces a minor scope change (0.3) with very significant impact on overall functionality (0.9), its impact score will be 0.5.

The product of the probability score and impact score produces a risk score in Chart 18. Thus, if the probability of the latter scenario is low (0.3), its risk score will be 0.15. This risk score is then used to determine the urgency of risk response planning from Chart 19. Each of the cells in Chart 18 has been given one of the five colours — red, orange, yellow, dark green and light green. The colours represent the urgency of risk response planning and determine the reporting levels as described in Chart 19. The dark green colour of the corresponding cell for the aforementioned risk indicates the urgency of this risk is low so it can be safely ignored.

Chart 18. Probability and Impact Matrix

			IMPACT				
			Very Significant	Significant	Potentially Significant	Less than significant	Negligible
		Scores	0.9	0.7	0.5	0.3	0.1
PROBABILITY	Very High	0.9	0.81	0.63	0.45	0.27	0.09
	High	0.7	0.63	0.49	0.35	0.21	0.07
	Medium	0.5	0.45	0.35	0.25	0.15	0.05
	Low	0.3	0.27	0.21	0.15	0.09	0.03
	Very Low	0.1	0.09	0.07	0.05	0.03	0.01

Note. Adapted from *Levels of a Risk Matrix,* by Vector Solutions, 2022, (https://www.vectorsolutions.com/resources/blogs/levels-of-a-risk-matrix/). Copyright 2022 by Vector Solutions. Permission not sought.

Chart 19. Urgency of Risk, Response Planning and Reporting Levels

Colour	Urgency of Risk	Risk Score	Response Planning and Reporting Levels
	Very high	≥ 0.8	• Highest priority • Prevention and mitigation strategies for very high risks must be framed in advance to prevent occurrence/mitigate their impacts at the earliest
	High	0.36≤ x ≤ 0.8	• High risks must also be optimally addressed but are not prioritized as highly as very high risks • The aim is to ensure that its impact is reduced to a level that is as minor as reasonably practicable.
	Medium	0.21< x ≤ 0.35	• Medium risks cannot be ignored • Medium risks may be excluded from the initial risk management strategies but become

Colour	Urgency of Risk	Risk Score	Response Planning and Reporting Levels
			increasingly significant as they arise
	Low	0.03< x ≤ 0.21	• Can be safely ignored • Most low and very low risks are nearly harmless • May not require any mediation at all
	Very low	≤ 0.03	

Note. The ranges for the Risk Score were extracted from Chart 17. Probability and Impact Matrix.

4.7.2. Risk Breakdown Structure

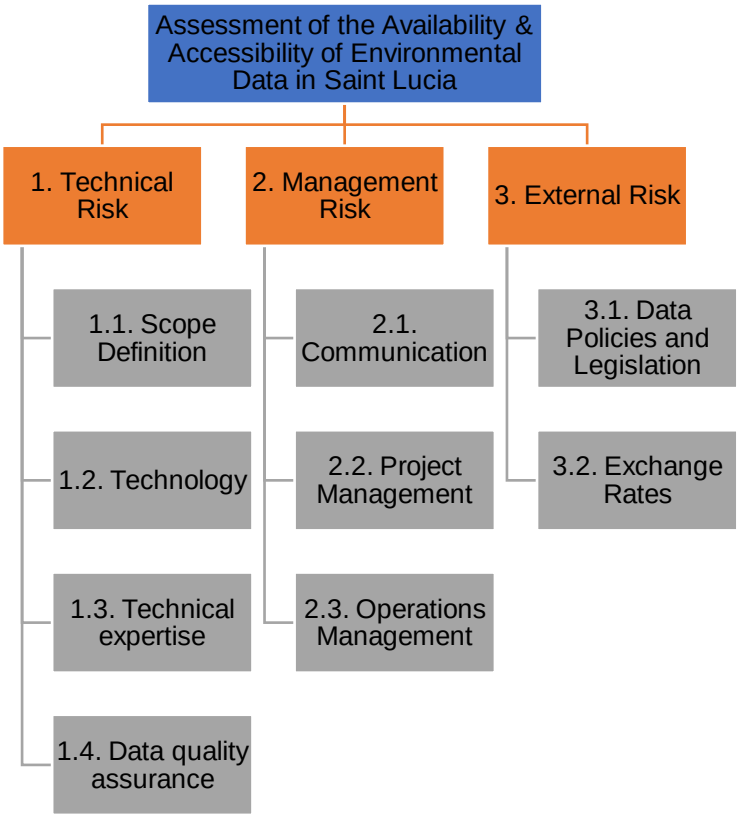

Figure 10. Risk Breakdown Structure

4.7.3. Risk Register

Chart 20. Risk Register for Technical Risks

RBS Code	Risk	Cause	Consequence	Probability	Impact	PxI	Owner	Strategy	Cost/USD
1.1	Scope Definition	• Lack of a clear and detailed scope • Absence of a TOR • Poor operations and project management • Differing stakeholder opinions	• Scope creep • Poor estimation of resource requirements • Schedule and cost inefficiencies	0.1	0.9	0.09	• Client • Consultants	• Implementation of a scope management plan • Clear definition of project scope in project charter which is referenced throughout project • Project implementation guided by an approved workplan, and methodology based on agreed project scope and TOR	$ 5,000.00
1.2	Technology	• Economic and IT restrictions	• Backlog of paper-based records • Lack of budget to upgrade records management systems • Small workforce to input and maintain data • Inaccurate assessment results	0.5	0.9	0.45	• Client	• Provision of training emphasising the importance of data collection and highlighting the benefits of data for operations, planning, research, and evaluation	Incurred by client
1.3	Technical expertise	• Data collection is not core to the agency function	• Inadequate coverage of the varying contexts of data collection • Small workforce to input and maintain data • Primary role of assigned officer is not data collection • Low data quality	0.7	0.9	0.63	• Client • Consultants • Focal Points	• Provision of relevant capacity building opportunities • Primary engagement with trained data contributors and curators from each data producing agency • Use of data-related key performance indicators and pre-defined	$7,500.00
1.4	Data quality assurance			0.7	0.9	0.63	• Client • Consultants • Focal Points		

RBS Code	Risk	Cause	Consequence	Probability	Impact	PxI	Owner	Strategy	Cost/USD
			• Inaccurate assessment • Lack of training in data collection • Lack of quality assurance processes • Inconsistent data collection standards					responses in assessment tool • Accommodation of multiple responses in assessment tool • Workshop to validate assessment results	

Chart 21. Risk Register for Management Risks

RBS Code	Risk	Cause	Consequence	Probability	Impact	PxI	Owner	Strategy	Cost/USD
2.1	Communication	Poor team communication due to time zone and cultural differences	• Ineffective communication • schedule delays • poor quality assurance	0.5	0.9	0.45	• Consultants • Client • Focal Points	Implementation of robust communications management and stakeholder engagement plans	$ 500.00
2.2	Project Management	Voluntary withdrawal of a Partner	• Loss of institutional memory • schedule delays • low implementation rates	0.5	0.9	0.45	Consultants	Letter of Agreement outlining the rights and obligations of the Partners in the consultancy	$ 0.00
		Failure of a Partner to perform duties	• Schedule delays • low implementation rates • poor financial and resource management	0.5	0.9	0.45			
2.3	Operations Management	High turnover of client staff	Loss of institutional memory; schedule delays; poor financial and resource management; poor quality assurance; limited technical capacity; low productivity; ineffective communication	0.5	0.9	0.45	Client	• Assignment of a client representative to serve as a liaison with stakeholders • Building of a core knowledge with technology to ensure efficient handover to new team members • Establishment of baseline communication standards to reinforce the exchange of information with colleagues	Incurred by the client based on officer's salary and number of hours required

RBS Code	Risk	Cause	Consequence	Probability	Impact	PxI	Owner	Strategy	Cost/USD
		Change in administration of Saint Lucia's government	• Decrease in governmental commitment	0.5	0.9	0.45	• Client • Focal Points	• Client negotiated project with Heads of Government • Assignment of focal points from the lead data producing agencies to sustain channels of communication	Incurred by Government of Saint Lucia based on officer's salary and number of hours required (in-kind contribution)

Chart 22. Risk Register for Management Risks

RBS Code	Risk	Cause	Consequence	Probability	Impact	PxI	Owner	Strategy	Cost/USD
3.1	Data Policies and Legislation	• Lack of environmental data policies • Inaccurate knowledge of policies • Existence of data protection policies • Changes to data collection policies and procedures	• Limited access to information • Inaccurate assessment • Use of outdated practices by agencies that are unaware	0.5	0.9	0.45	• Client • Consultants	• Apply knowledge of existing data policies and legislation such as the data sharing agreements between local data producers that expires with the 2030 Agenda for Sustainable Development • Use of diplomat channels to request formal access • Assignment of focal points in lead data producing agencies to serve as liaison with other data producing agencies	$ 0.00
3.3	Exchange Rates	• Political conditions • Trade movements • Stock exchange operations	• Currency fluctuations	0.1	0.9	0.09	• Client • Consultants	• Quotation of contract price in both USD and XCD using fixed exchange rate • Signage of contract with payments in XCD	$ 0.00

4.7.4. Updates to the Risk Management Plan

If there are significant negative schedule and cost variances, the risk management strategies should be assessed for their effectiveness. The outcomes of this assessment in conjunction with the negative schedule and cost variances may highlight the need for adjustment, action, or intervention on risk management strategies through the integrated change control process. Additionally, risks will continue to arise throughout the project, so the Project Risk Management processes should be conducted iteratively to track and address emergent risks in accordance with the defined risk thresholds. The results of these processes should be recorded in the risk register. In doing so, trends in both qualitative and quantitative analyses will become more apparent to better inform the planning of risk responses.

4.8. Procurement Management Plan

4.8.1. Procurement of Consultants

The client hired the consultants through direct award based on the consultants' credibility, qualifications, experience, expertise, areas of specialisation and references. The consultants have advanced university degrees in environmental sciences and natural resources management with at least three years relevant experience in the areas of knowledge management, data analysis, policy formulation, economics, statistics, environment, or sustainable development in the Caribbean region. Also, the consultants' performance in a previous project under the same programme exceeded the client's expectations.

The consultants are not privy to the procurement metrics used to manage the contract. The fixed price contract was issued at the end of project initiation, so the consultants are actively involved in planning to establish the total scope of the effort, define, and refine the objectives, and develop the course of action required to attain those objectives. The client is in Chile, so the payment was initially presented in the world's reserve currency - US Dollars. However, the payment schedule on the contract was issued in EC dollars as the consultants are in the Eastern Caribbean. This reduces the risk of currency fluctuations because these currencies are pegged to one another at a fixed rate.

The Terms of Reference (Appendix 4) attached to the contract outlines the tasks the consultants are required to perform as well as special coordination requirements, and a submission schedule. This is summarised in Chart 22.

Chart 23. **Summary of Terms of Reference**

Duties & Responsibilities	• Map the main producers of environmental, climate change and disaster information, data, and statistics available at the national level • Review the relevance, importance, availability, uses and sources of environmental, climate change and disaster information, data, and statistics • Produce a comprehensive national data availability and accessibility assessment report using an agreed environmental assessment tool • Maintain regular contact with data producers and stakeholders • Undertake at least one national consultation on the state of the environment, climate change and disaster information, data, and statistics to validate the consultancy • Produce a structure diagnosis report based on the results on the environmental data assessment tool and workshop • Review and provide the necessary support in the national validation of the proposed data-sharing protocols • Regularly report progress to client and participate in coordination meetings and activities, as needed
Expected Duration	3 months
Deliverables	• Inception Report *(within 30 days after the start of the consultancy)*
	• Preliminary version of environmental data assessment tool *(within 2 months after the start of the consultancy)*
	• National Workshop *(within 2 months after the start of the consultancy)*
	• Structure Diagnosis Report *(within 3 months after the start of the consultancy)*

4.8.2. Procurement of Other Goods and Services

During project execution, the consultants are responsible for procurement. Subcontracting is not permitted. The consultants already possess the requisite equipment and software (see Figure 9). The materials will be obtained from the client, focal points, web-based searches, or direct requests to the data producing agencies. Hence, there is currently no need for the consultants to procure any service or goods outside of the project team. However, if the need arises the consultants will mutually agree on the budget allocation, procurement strategy, statement of work, bid documents and source-selection criteria before any goods and/or services are procured.

4.9. Stakeholder Engagement Plan

4.9.1. Stakeholder Identification

The stakeholders are listed in Section 4.6.1. The Consultants are only required to engage with the other primary stakeholders — client (through the client representative), focal points and national data producing agencies. The register with identification information including *inter alia* name, organizational position, location, and contact details will be shared virtually as a document on the shared Google Drive.

4.9.2. Stakeholder Classification

4.9.2.1. Directions of Influence

Chart 24. Directions of Influence Analysis and Comments

Stakeholder	Direction of Influence	Comments
Client	Upward	As the project sponsor and implementing agency, the Client is responsible for the overall success of the project; champions the project from a business perspective and aids in the removal of obstacles that may impede its overall success. Additionally, the Client provides approval and funding for the project.
Consultants	Downward *(relative to other primary stakeholders)*	The Consultants are a team of specialists contributing their knowledge and skills in a temporary capacity.
	Sideward *(relative to one another)*	The Consultants are on the same team sharing information and some resources.
Focal Points	Outward	The focal points are representatives of the lead data producers and by extension, the Government of Saint Lucia.
National data producing agencies	Outward	The national data producing agencies are external stakeholders including government agencies, private sector agencies and civil society organisations.

4.9.2.2. Stakeholder Engagement Assessment Matrix

Chart 25. Stakeholder Engagement Assessment Matrix

Stakeholder	Engagement Assessment *C= Current engagement level D = desired engagement level*				
	Unaware	**Resistant**	**Neutral**	**Supportive**	**Leading**
Client					C, D
Consultants					C, D
Focal Points					C, D
National Data producing agencies	C			D	

4.9.2.3. Power-Interest Analysis

All primary stakeholders are high power-high interest. As the sponsor and implementing agency, the Client has both high power and high interest. The focal points represent the lead data producers and by extension, the Government of Saint Lucia. The focus of this Project is to assess the availability and accessibility of environmental data in Saint Lucia, so these lead data producers have a high interest and, high power, as the primary connection to the national data producing agencies. Furthermore, this assessment has been part of the Government of Saint Lucia's strategic plan to improve environmental management but due to the country's limited human and financial capacity, it is only feasible through this project. The national data producing agencies also have high interest due the opportunities to increase technical capacity and network. The success of the project will, in part, be determined by their willingness to provide the details of the available environmental data and validate the results of the environmental data assessment tool for the identification of relevant quantitative and qualitative data gaps to strengthen institutional capacity for the implementation and monitoring of international conventions, and Saint Lucia's environmental information systems; improve

coordination and sharing of existing knowledge; and generation new information on the state of the environment.

4.9.3. Stakeholder Engagement Strategy

Since all primary stakeholders have high interest and high power, collaboration is key. Therefore, all stakeholders will be informed and consulted through pragmatic collaboration.

The Client is responsible for sending invitation letters to the focal point agencies. These letters will describe the Project, its objectives and expected outcomes; and request the submission of suitable nominees to serve as Focal Points. If the Client does not receive a response by the deadline stipulated in the letter, the Consultants will follow up with the focal point agencies via phone and email. The working relationship between the Consultants and the focal points may be established via phone first but should be recorded in an email — copied to the client. With the permission of all Parties, a WhatsApp group will be formed between the Consultants and the focal points for group communication; to support and complement other forms of communication; to break down barriers; to facilitate real-time communication at a reduced cost and boost team morale. A separate WhatsApp group chat will be formed between the Consultants and Client for these same reasons. Throughout the Project, the Consultants shall maintain regular contact with the Client representative and focal points via WhatsApp, email, video conferencing and phone conservations as needed.

After the Focal Points have informed the national data producing agencies about the Project, its objectives and expected outcomes, the Consultants will send an introduction email to the agency. This introduction email will identify the Consultant and their role in the Project; and include a request for information about the availability and location of selected environmental indicator via a link to a Google form. If the agency does not respond within five (5) working days, the Consultant will

follow up on the request via phone call. This follow up phone call will provide a gentle reminder to the agency and will be used as opportunity to obtain responses through a phone interview using the same structure in the Google form. The structure of each Google form will be determined by the nature of the environmental indicator.

The engagement of national data producing agencies will be increased through focus and consultation groups, round table discussions and a national workshop. These methods will also be used to maintain the current engagement of level with the other primary stakeholders. Due to the resource intensive nature of these activities and to maximise the benefits, they will be conducted after the draft environmental data assessment tool has been completed and circulated with other stakeholders.

4.9.4. Updates to the Stakeholder Engagement Plan

If there are significant negative schedule and cost variances, the methods of engagement should be assessed for their effectiveness. The outcomes of this assessment in conjunction with the negative schedule and cost variances may highlight the need for adjustment, action, or intervention on engagement activities through the integrated change control process.

5. CONCLUSIONS

An assessment of the availability and accessibility of environmental data in each Caribbean Island is required to determine the scope, implications, and feasibility of a Regional Environmental Information System. A duo of consultants will be conducting this assessment in Saint Lucia. Therefore, as part of efforts to effectively manage this assessment, this Project Management Plan was developed in accordance with the standards and publications of the Project Management Institute.

5.1. The project charter to formally sanction and authorise the use of resources for the development of this Project Management Plan was developed by the student and approved by the lecturer — Carlos Brenes Mena — during the Graduation Seminar.

5.2. The Consultants are required to conduct this assessment solely in Saint Lucia via the submission of four deliverables within three months, so the scope management plan contained within identifies and defines the actions to achieve the project goal while avoiding scope creep.

5.3. In consideration of the predictive development approach of the project deliverables, the project schedule will be managed at the individual task level using the Critical Path Method. Hence, the schedule management plan includes *inter alia* the control thresholds, performance metrics and reporting formats for the timely development, monitoring and controlling of the project schedule.

5.4. The final cost estimates of the deliverables were developed by the client, so the consultants are operating under a firm fixed price contract. Hence, parametric estimating was used to determine the cost estimates at the activity level. As per the cost management plan, out of scope changes will require a contact modification and earned value analysis will be used to compare the

performance measurement baseline to the actual cost performance so the cost baseline is maintained throughout the project.

5.5. The quality management plan includes quality objectives that guide the monitoring and control of quality to ensure that the deliverables satisfy expectations for approval within time, cost, and scope constraints.

5.6. The project requires human, equipment, software, and materials resources. The categorisation, organisation, allocation, and management of these resources are outlined in the resource management plan.

5.7. The primary stakeholders of the environmental data assessment are the client, consultant, focal points, and national data producing agencies. During this assessment, only communication among the primary stakeholders is required. The communications management plan outlines the expected frequency and mode of interactive, push and pull communication between stakeholders to ensure effective communication and to facilitate a degree of flexibility if the membership of the primary stakeholder community changes or their needs/expectations change. The client has the highest authority and is entitled to all intellectual property and other proprietary rights developed under the contract.

5.8. Technical, management and external risks are identified in the risk management plan. As per the risk register, the urgency of these risks—determined by the risk score (the product of their probability and impact) — are either low or high. The low risks can be safely ignored but the high risks must be optimally addressed. The strategies and associated costs for managing said risks are summarised in the risk register.

5.9. Before the commencement of the environmental data assessment, the consultants were by the client hired through direct award. Throughout the

assessment, the consultants are responsible for procurement. Since the consultants already possess the requisite equipment and software; and the materials will be obtained from other primary stakeholders and web-based searches, there is currently no need for the consultants to procure any services or goods outside of the project team. Should the need arise, the procurement management plan highlights the need for mutual agreement on budget allocation, statement of work etc between the consultants.

5.10. The consultants are only required to engage with other primary stakeholders, so the stakeholder engagement plan focuses on the primary stakeholders. In consideration of the high power-high interest of all primary stakeholders, their directions of influence and desired engagement level the strategy is designed to ensure all stakeholders will be informed and consulted through pragmatic collaboration.

6. RECOMMENDATIONS

The following recommendations are directed to the client:

6.1. An implementation period of six months would have been more practical to liaise with the data producing agencies in Saint Lucia. The requisite information is stored in a combination of publicly accessible databases, websites, publications, national reports, office servers, individual records, and field notes so more time should have been allocated for the agencies to compile this data and navigate any existing red tape to provide accurate feedback on the accessibility and availability of the indicators. The request for this information would be an addition to the officers' daily duties. Unfortunately, irrespective of the environmental data management mandate of the data producing agencies there are none or insufficient officers assigned to this role. This additional time would be relevant to the completion of *Deliverable 2 Preliminary version of environmental data assessment tool*.

6.2. The current communications and stakeholder management plans can be expanded to include both the internal and external stakeholders in a subsequent phase of the programme. This will result in a robust communication strategy and campaign plan to help garner higher level support for the REIS, highlighting the value of system in supporting decision-making for policy makers and technical negotiating teams; increase outreach and awareness on the REIS through all forms of media and the public; and increase civil society and public participation in the collection and use of environmental information.

6.3. Under the current terms and conditions of the contract, the consultants are unable to subcontract. The authorisation to subcontract would permit the hiring of a Data Assistant. Under the general guidance and direct supervision of the consultants, the role of this Data Assistant would be to support the

completion of *Deliverable 2 Preliminary version of environmental data assessment tool* by collecting data from stakeholders and other sources, maintaining, and updating the tool.

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8. APPENDICES

Appendix1: FGP Charter

PROJECT CHARTER Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries.	
Date	**Project Name:**
November 14, 2021	Project Management Plan for an Assessment of the Availability and Accessibility of Environmental Data in Saint Lucia
Knowledge Areas / Processes	**Application Area (Sector / Activity)**
Knowledge areas Integration, Scope, Schedule, Cost, Quality, Resource, Communications, Risk, Procurement, Stakeholder **Process groups** Initiating, Planning	Environmental data management
Start date	**Finish date**
November 14, 2021	May 1, 2022
Project Objectives (general and specific)	

Specific objectives must be part of the general objective since by achieving the specific objectives is how the general objective is achieved. Specific objectives should be associated to FGP deliverables which, later on, will be reflected on the WBS.

General objective:

To create a Project Management Plan, in accordance with the standards of the Project Management Institute, to effectively manage an assessment of the availability and accessibility of environmental data in Saint Lucia.

Specific objectives:

1. To develop a project charter to formally sanction the project and authorise the Project Manager to apply organisational resources to project activities including the development of this project management plan.
2. To develop a scope management plan to identify and define the actions required to achieve the project goal and avoid scope creep.
3. To create a schedule management plan to establish the criteria and activities for the timely development, monitoring and controlling of the project schedule.
4. To create a cost management plan to define how the project cost will be estimated, budgeted, managed, monitored and controlled.
5. To produce a quality management plan to outline the project quality requirements to ensure outputs satisfy expectations for approval within time, cost and scope constraints.
6. To create a resource management plan to guide the categorisation, allocation, management and release of human and physical resources.
7. To develop a communication management plan to describe the planning, structuring, implementation and monitoring of communication for effective communication of project status and other key information.
8. To create a risk management plan to describe how risk management processes will be structured and performed to reduce the likelihood of risks.

9. To create a procurement management plan for the timely acquisition of products, services or results.
10. To create a stakeholder engagement plan to describe strategies and actions for the promotion of active stakeholder participation in decision making and execution.

Project purpose or justification (merit and expected results)

To date, Saint Lucia is one of two countries in the Caribbean that has made progress to the establishment of a comprehensive national environmental information system. The opportunities, gaps and strengths for the establishment of environmental information systems in small island developing states like Saint Lucia include *inter alia* political will, institutional arrangements, technology, compliance, monitoring and enforcement and resource mobilization. The likelihood or timing of the development of an environmental information system in each Caribbean island is unpredictable given the financial and capacity constraints, current macroeconomic conditions and redirection of funds to domestic COVID-19 responses. A more feasible option is the development of a Regional Environmental Information System to serve all Caribbean islands. This will faciliate, scenario development and forecasting for strategic planning and evidence-based policy development, enhanced environmental management, increased compliance and reporting to key Multilateral Environmental Agreements, and public participation in environmental management. The latter can only truly be achieved if citizens are provided access to, informed and educated on matters that can influence environmental behaviour. The long-term benefit is a data-driven culture for long-term success and value. Unfortunately, an evident cross-cutting theme is that much of the data is not periodicially and systematically collected and managed, is disperse and may be archived, and at times, protected by generating institutions. To fully determine the scope, implications and feasbililty of a Regional Environmental Information System an assessment of environmental data availability and accessibility in each Caribbean island using an agreed environmental data assessment tool is required. To ensure the timely delivery of this assessment report, an integrated project management plan is required. This plan will define how the project will be executed, monitored, controlled and closed.

Description of Product or Service to be generated by the Project – Project final deliverables
An integrated Project Management Plan for the assessment of the availability and accessibility of environmental data in Saint Lucia.

Assumptions

The project can be completed by one person in twelve weeks.

Constraints

Time: 12 weeks
Resources: 1 person (Project Manager)

Preliminary risks

1. If feedback from reviewer/supervisor is delayed, student will have insufficient time to provide quality revisions.
2. If student has emergencies beyond control, deliverables may be rushed to meet deadlines.
3. If the schedule for milestone completion is not followed, the project management plan may not be completed in twelve weeks.

Budget

Financial resources to print, bind and ship Final Graduation Project to Costa Rica.

Milestones and dates

Milestone	Start date	End date
Project Start	November 8, 2021	November 8, 2021
Project Charter	November 8, 2021	November 14, 2021
WBS	November 8, 2021	November 14, 2021
Corrections	November 15, 2021	November 21, 2021
FGP Schedule	November 15, 2021	November 21, 2021
Chapter I. Introduction	November 15, 2021	November 21, 2021
Corrections	November 22, 2021	November 28, 2021
Chatper II. Theoretical Framework	November 22, 2021	November 28, 2021
Corrections	November 29, 2021	December 5, 2021

Chapter III. Methodological Framework	November 29, 2021	December 5, 2021
Corrections	December 6, 2021	December 12, 2021
Abstract/Executive Summary	December 6, 2021	December 12, 2021
Bibliography	December 6, 2021	December 12, 2021
Signed Charter	December 6, 2021	December 12, 2021
Graduation Seminar Approval	December 6, 2021	December 12, 2021
Chapter IV: Development (Results)	February 24, 2022	April 29, 2022
a. Signed Charter	February 24, 2022	February 27, 2022
b. Scope Management Plan	February 28, 2022	March 6, 2022
c. Schedule Management Plan	March 7, 2022	March 13, 2022
d. Cost Management Plan	March 14, 2022	March 20, 2022
e. Quality Management Plan	March 21, 2022	March 27, 2022
f. Resource Management Plan	March 28, 2022	April 3, 2022
g. Communications Management Plan	April 4, 2022	April 10, 2022
h. Stakeholder Engagement Plan	April 11, 2022	April 17, 2022
i. Procurement Management Plan	April 18, 2022	April 24, 2022
j. Risk Management Plan	April 18, 2022	April 24, 2022
Chapter V: Conclusions	April 25, 2022	May 1, 2022
Chapter VI: Recommendations	April 25, 2022	May 1, 2022
Reading by reviewers	May 9, 2022	May 20, 2022
Adjustments and Modifications	May 23, 2022	May 27, 2022
Presentation to Board of Examiners	May 30, 2022	June 3, 2022

Relevant historical information

The National Environmental Information System (NEIS) referenced within was developed under a GEF-funded project through the UN Environment Programme executed by the Department of Sustainable Development from 2016 to 2020. The NEIS was launched in 2018 with 17 public and private agencies signed onto a Memorandum of Understanding as data contributors. The work plan for this project was guided by the terms and conditions outlined in a Project Cooperation Agreement (PCA) between UNEP and the Government of Saint Lucia. However, in some instances, knowledge areas were either developed through consultancies or in accordance with Government of Saint Lucia guidelines. For example, the communication management plan was developed through a consultancy but procurement was done in accordance with government guidelines. Said work plan was executed through a Project Management Unit which comprised of a Project Manager, Monitoring and Evaluating Officer, Project Assistant and Webmaster. Although an assessment of the availability and accessibility of environmental data was conducted through this project, another assessment is required using the framework of an agreed assessment tool that will be applied to other islands in the Caribbean.

Stakeholders

Direct stakeholders

- Project Manager: Danielle C. Gordon
- Tutor: Cristian Soto
- Lecturer: Carlos Brenes Mena

Indirect stakeholders

- Environmental Data Management Consultant: Teshia Jn Baptiste
- Academic Assistant
- Future MPM Groups
- Reviewers

Project Manager: Danielle C. Gordon	**Signature:** 
Authorized by:	**Signature:**

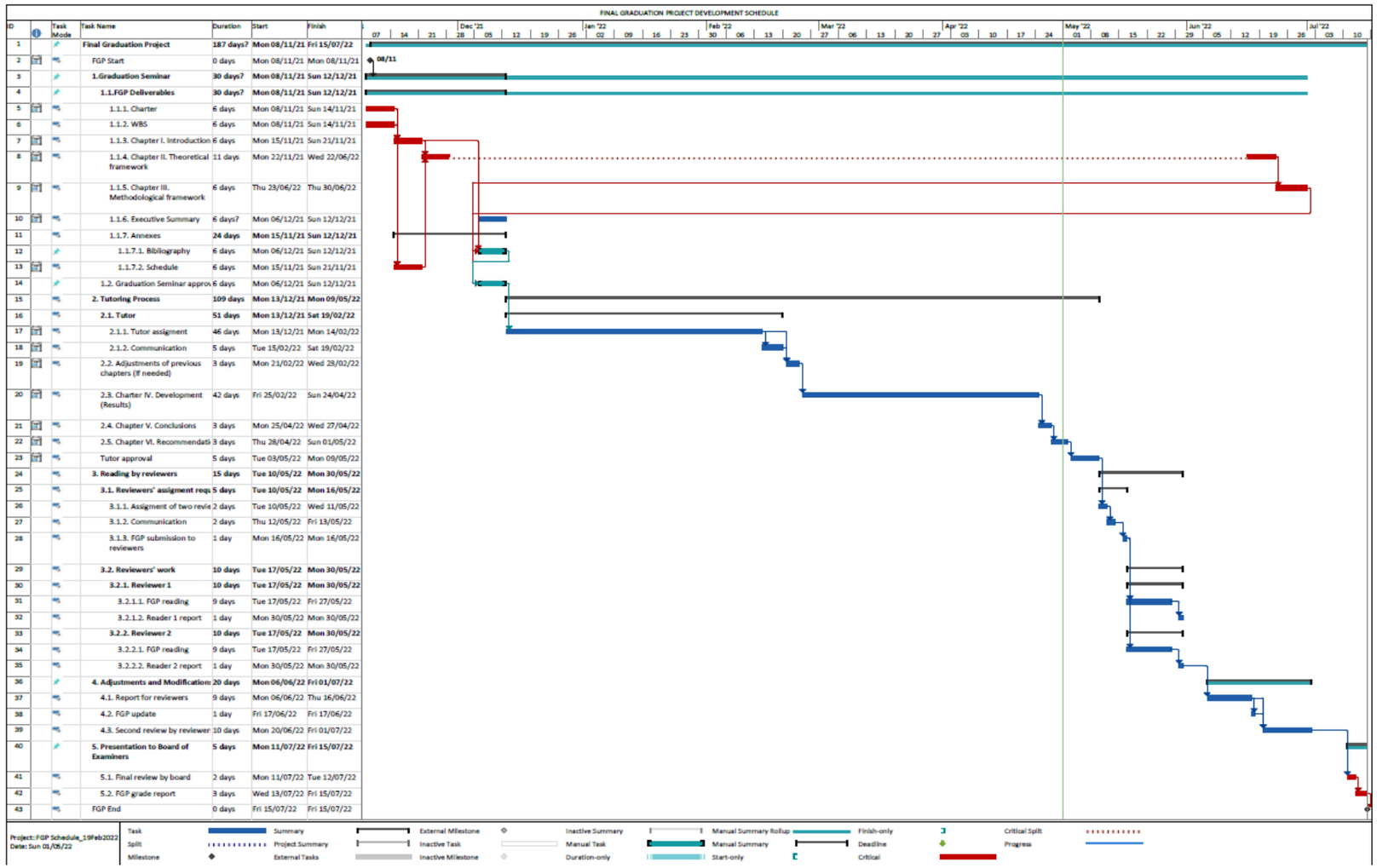
Appendix 2: FGP WBS

Final Graduation Project (FGP) WBS

1. Graduation Seminar
1.1. FGP Deliverables
1.1.1. Charter
1.1.2. WBS
1.1.3. Chapter I. Introduction
1.1.4. Chapter II. Theoretical Framework
1.1.5. Chapter III. Methodological Framework
1.1.6. Executive Summary
1.1.7. Appendices
1.1.7.1. Bibliography
1.1.7.2. Schedule
1.2. Graduation Seminar Approval
2. Tutoring Process
2.1. Tutor
2.1.1. Tutor assignment
2.1.2. Communication
2.2. Adjustments of previous chapters (if needed)
2.3. Chapter IV. Development (Results)
2.3.1. Signed Charter
2.3.2. Scope Management Plan
2.3.3. Schedule Management Plan
2.3.4. Cost Management Plan
2.3.5. Quality Management Plan
2.3.6. Resource Management Plan
2.3.7. Communications Management Plan
2.3.8. Stakeholder Engagement Plan

2.3.9. Procurement Management Plan
2.3.10. Risk Management Plan
2.4. Chapter V. Conclusions
2.5. Chapter VI. Recommendations
3. Reading by reviewers
3.1. Reviewers' assignment request
3.1.1. Assignment of two reviewers
3.1.2. Communication
3.1.3. FGP Submissions to reviewers
3.2. Reviewers' work
3.2.1. Reviewer 1
3.2.1.1. FGP Reading
3.2.1.2. Reader 1 report
3.2.2. Reviewer 2
3.2.2.1. FGP Reading
3.2.2.2. Reader 2 report
4. Adjustments and Modifications
4.1. Report for reviewers
4.2. FGP Update
4.3. Second review by reviewers
5. Presentation to Board of Examiners
5.1. Final review by board
5.2. FGP grade report

Appendix 3: FGP Schedule



ID	Task Mode	Task Name	Duration	Start	Finish
1		**Final Graduation Project**	**187 days?**	**Mon 08/11/21**	**Fri 15/07/22**
2		FGP Start	0 days	Mon 08/11/21	Mon 08/11/21
3		**1.Graduation Seminar**	**30 days?**	**Mon 08/11/21**	**Sun 12/12/21**
4		**1.1.FGP Deliverables**	**30 days?**	**Mon 08/11/21**	**Sun 12/12/21**
5		1.1.1. Charter	6 days	Mon 08/11/21	Sun 14/11/21
6		1.1.2. WBS	6 days	Mon 08/11/21	Sun 14/11/21
7		1.1.3. Chapter I. Introduction	6 days	Mon 15/11/21	Sun 21/11/21
8		1.1.4. Chapter II. Theoretical framework	11 days	Mon 22/11/21	Wed 22/06/22
9		1.1.5. Chapter III. Methodological framework	6 days	Thu 23/06/22	Thu 30/06/22
10		1.1.6. Executive Summary	6 days?	Mon 06/12/21	Sun 12/12/21
11		1.1.7. Annexes	**24 days**	**Mon 15/11/21**	**Sun 12/12/21**
12		1.1.7.1. Bibliography	6 days	Mon 06/12/21	Sun 12/12/21
13		1.1.7.2. Schedule	6 days	Mon 15/11/21	Sun 21/11/21
14		1.2. Graduation Seminar approv	6 days	Mon 06/12/21	Sun 12/12/21
15		**2. Tutoring Process**	**109 days**	**Mon 13/12/21**	**Mon 09/05/22**
16		**2.1. Tutor**	**51 days**	**Mon 13/12/21**	**Sat 19/02/22**
17		2.1.1. Tutor assigment	46 days	Mon 13/12/21	Mon 14/02/22
18		2.1.2. Communication	5 days	Tue 15/02/22	Sat 19/02/22
19		2.2. Adjustments of previous chapters (if needed)	3 days	Mon 21/02/22	Wed 23/02/22
20		2.3. Charter IV. Development (Results)	42 days	Fri 25/02/22	Sun 24/04/22
21		2.4. Chapter V. Conclusions	3 days	Mon 25/04/22	Wed 27/04/22
22		2.5. Chapter VI. Recommendati	3 days	Thu 28/04/22	Sun 01/05/22
23		Tutor approval	5 days	Tue 03/05/22	Mon 09/05/22
24		**3. Reading by reviewers**	**15 days**	**Tue 10/05/22**	**Mon 30/05/22**
25		**3.1. Reviewers' assigment requ**	**5 days**	**Tue 10/05/22**	**Mon 16/05/22**
26		3.1.1. Assigment of two revie	2 days	Tue 10/05/22	Wed 11/05/22
27		3.1.2. Communication	2 days	Thu 12/05/22	Fri 13/05/22
28		3.1.3. FGP submission to reviewers	1 day	Mon 16/05/22	Mon 16/05/22
29		**3.2. Reviewers' work**	**10 days**	**Tue 17/05/22**	**Mon 30/05/22**
30		**3.2.1. Reviewer 1**	**10 days**	**Tue 17/05/22**	**Mon 30/05/22**
31		3.2.1.1. FGP reading	9 days	Tue 17/05/22	Fri 27/05/22
32		3.2.1.2. Reader 1 report	1 day	Mon 30/05/22	Mon 30/05/22
33		**3.2.2. Reviewer 2**	**10 days**	**Tue 17/05/22**	**Mon 30/05/22**
34		3.2.2.1. FGP reading	9 days	Tue 17/05/22	Fri 27/05/22
35		3.2.2.2. Reader 2 report	1 day	Mon 30/05/22	Mon 30/05/22
36		**4. Adjustments and Modification**	**20 days**	**Mon 06/06/22**	**Fri 01/07/22**
37		4.1. Report for reviewers	9 days	Mon 06/06/22	Thu 16/06/22
38		4.2. FGP update	1 day	Fri 17/06/22	Fri 17/06/22
39		4.3. Second review by reviewer	10 days	Mon 20/06/22	Fri 01/07/22
40		**5. Presentation to Board of Examiners**	**5 days**	**Mon 11/07/22**	**Fri 15/07/22**
41		5.1. Final review by board	2 days	Mon 11/07/22	Tue 12/07/22
42		5.2. FGP grade report	3 days	Wed 13/07/22	Fri 15/07/22
43		FGP End	0 days	Fri 15/07/22	Fri 15/07/22

Appendix 4: Other relevant information

Other relevant information includes the *Terms of Reference*, *Contract*, and the *General Conditions of Contracts for the Services of Consultants* issued by the Client but due to the confidential nature of these documents, the author is unable to disclose here.

Appendix 5: Philological Dictum

ST. JOSEPH'S CONVENT
SECONDARY SCHOOL

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SJCSLU
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1st May 2022

Mr. Ramiro Fonseca Macrini, MBA
Dean of the Global School of Project Management
University for International Cooperation
San José
Costa Rica

Dear Mr. Macrini

I, Sister Rufina Donat, testify that the writing, spelling, and grammar used in the Final Graduation Project — *Project Management Plan to Assess the Availability and Accessibility of Environmental Data in Saint Lucia* — by Danielle Christian Gordon is correct.

My Bachelor of Arts in English and Master of Arts in Educational Leadership from the University of the West Indies (1995) and Barry University (2002), respectively, qualify me to make this assessment. Additionally, I have over 30 years of experience as an educator in English Language.

Sincerely

SISTER RUFINA DONAT
PRINCIPAL