UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR A FEASIBILITY STUDY FOR THE ESTABLISHMENT OF A BENTONITE CLAY MINE AND EXPORT PRODUCTION FACILITY, SPANISH LOOKOUT, CAYO DISTRICT, BELIZE C.A.

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

~Paulo Ceolho – The Alchemist~

Age and treachery will always outdo youth and exuberance.

~Adopted by Prof. Donovan, UWI, 2005~

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ABBREVIATIONS AND ACRONYMS

BELTRAIDE	Belize Trade and Investment Development Service
C.A.	Central America
EEF	Enterprise Environmental Factors
EIA	Environmental Impact Assessment
EPZ	Export Processing Zone
EVM	Earned value of money
FGP	Final Graduation Project
FS	Feasibility Study
GOB	Government of Belize
GPD	Geology and Petroleum Department
IRR	Internal Rates of Return
MEDITC	Ministry of Economic Development, Petroleum, Investment, Trade, and Commerce
MNR	Ministry of Natural Resources
MOF	Ministry of Finance
NEMO	National Emergency Management Organization
NPV	Net Present Value
OPA	Organizational Process Assets
PM Plan	Project Management Plan
PM	Project Management
PSC	Project Steering Committee
RBS	Resource Breakdown Structure
SIA	Social Impact Assessment
TA	Technical Advisor
TCA	Technical Cooperation Agreement
TOR	Terms of Reference
UCI	Universidad para la Cooperación Internacional
UNDP	United Nations Development Program
WBS	Work Breakdown Structure

EXECUTIVE SUMMARY (ABSTRACT)

The promotion and development of the mineral industry in Belize falls under the mandate and administration of the Geology and Petroleum Department (GPD). Extraction is primarily focused on aggregates for industrial purposes, with some limited extraction of dolomite for agriculture, clays and slates for artisanal handicraft industry, and alluvial and in situ gold mining. Exploration and evaluation of minerals with commercial potential has been occurring since the early 1950s, examining occurrences of limestone, dolomites, barite, granites, porphyries, lead/zinc mineralization, alluvial gold deposits, and others. The most recent exploratory works examining minerals with commercial potential evaluated dolomites, limestones, gypsum, clays and siliciclastic sands. GET s.r.o. did assessments that yielded results for the favorable exploitation of clay deposits; ceramic clay and bentonite.

Although several deposits of commercial potential have been identified and various degrees of technical evaluation and testing have been conducted on these deposits, the mineral sector has not seen the development of these efforts into new industries. A significant factor identified by the GPD for this is the lack of a true feasibility assessment A true feasibility assessment would doubtlessly attract industry partners and investment

The Final Graduation Project (FGP) therefore was designed with the general objective to develop a comprehensive project management plan by December 2019 for conducting a thorough feasibility study (FS) for the establishment of a bentonite clay mine and export production facility in Spanish Lookout, Cayo District, Belize C.A. The specific objectives were: to create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans, to develop a scope management plan that encapsulates all the required work for the successful completion of the FS, to develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline, to develop a cost management plan for the management of the components of the FS within the approved project budget, to develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical and other quality requirements within the project's time, cost and scope constraints, to develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS, to develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components; to develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project, to develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS, and to develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.

To accomplish these objectives, the FGP applied elements from several different research methods such as qualitative systematic analysis, data collection, analytical and descriptive methods. Primary information sources from Government of Belize Agencies and GET Ltd. were employed, and secondary sources were gathered from relevant literature and the PMBOK® Guide Sixth Edition provided information. The varied research methods were chosen because of the technical nature of the FS. Consequently, to have a more robust project management plan an integrated research methodology was selected.

The plans were developed for the successful implementation, execution, management and attainment of all ten objectives. The plans are succinct, interlinked and interdependent. The conclusions drawn from the various plans showed that there must be strict adherence to the scope, schedule and cost to guarantee that the deliverables are completed in the timeline of the project of 507 days and within a budget of USD$126,500. Majority of the services/products to be delivered by the project will be done through outsourcing using Firm-fixed price contracts. The risks, including changes in mining designs and material properties below international market requirements, can be mitigated at a cost of USD$12,000. The use of the Smartstream PMIS system would be integral to managing and maintaining communication among stakeholders, including the five high-power, high-interest stakeholders (the PSC, PM, GPD Project Lead and TAs. The identified nine quality control and assurance activities, including CPI and variance analysis will ensure that the FS deliveries products that meet international standards.

The recommendations provided are directed primarily at the TAs, the PSC, the project sponsor and the executing agency. The use of the guidelines and key tools; reporting forms and templates, presented in this plan, and strict adherence to the assigned roles and responsibilities of team members and consultants, it is expected that a successful feasibility study will be undertaken. The small Management Reserve is a driver for the development of strict TORs for the consultants to be hired. The need to maintain a tight grip on costs and scope is further pushed by the decision to outsource most of the products/services. The use of fast tracking techniques can only be applied on procurement activities as the key activities within the FS project have a finish to start relationship. The HP-HI stakeholder composition of internal government resources requires strong communication management, assignment of officers and a keen understanding of the project limitations by line managers in the various government entities.

The feasibility study once completed would firmly establish the commercial viability of the bentonite deposit and would provide two key marketing tools that would be used to attract investors: the investment portfolio and the feasibility study report. Ultimately, the Project Management Plan for the feasibility study is to aid in the investment and establishment of the bentonite clay mine and export facility in Spanish Lookout, realized either through local, international or joint uptake of this opportunity.

1 INTRODUCTION

1.1 Background

Belize, or British Honduras as it was known prior to Independence in 1981, has been the interest and subject of numerous studies examining and evaluating precious, semi-precious and industrial minerals, with some of the earliest documented research conducted in the 1950s. In addition, several companies and individuals performed extensive assessments. These include Flores (1952); Andrews-Jones (1975), for the Anschutz Corporation; Souviron (1989), and Souviron (1991). The studies examined occurrences of limestone, dolomites, barite, granites, porphyries, lead/zinc mineralization, alluvial gold deposits, and others. One of the most recent notable assessment for industrial minerals was conducted by Holland (2003) for Belize Minerals Ltd. This assessment examined dolomites and limestones to be used for various applications. Another notable assessment was run by CEMEX Ltd. (2000) for gypsum, clays and siliciclastic sands for cement manufacturing. Equally significant appraisals were conducted by GET Ltd., (2008), and (2010), for occurrences of industrial minerals with commercial potential. The GET Ltd. assessments yielded results for the favorable exploitation of two deposits; a ceramic clay deposit in the Swasey-Bladen area, Stann Creek District and a bentonite clay deposit in Spanish Lookout, Cayo District, Belize C.A.

The aforementioned mining activities as well as all mining events are governed under the *Mines and Minerals Act, Chapter 226, Substantive Laws of Belize 2000*. Other relevant legislations that impacts mining activities are the *National Protected Areas System Act Chapter 215 and the Forest Act Chapter 213* (for mineral occurrences within protected areas), *The Environmental Protection Act Chapter 328* and other legislation related to export and trade.

The Geology and Petroleum Department (GPD) through the Inspector of Mines is responsible for the administration of the mineral sector, technical oversight and regulation, issuance of licenses and approvals for exploration and exploitation of

minerals as well as the promotion of the countries mineral resources. The Inspector of Mines is appointed per the Mines and Minerals Act (2000) and is a qualified technical public officer. The duties and responsibilities of the Inspector is carried out through the functions of the GPD and other technical staff. While the promotion of the country's mineral resources is one of the mandates of the GPD, limited human capacity restricts their function to regulating the extraction of materials for construction and infrastructure projects. This significantly constrains the full impact of the GPD.

Promotion of internal and international industries within the country is done through the Government of Belize (GOB) through the Ministry of Finance (MoF). MoF established the *Export Processing Zone Act Chapter 280* and other agencies such as BelizeINVEST and EXPORTBelize under the umbrella of Belize Trade and Investment Development Service (BELTRAIDE). The responsibility of business development and investment promotion is shared with the Ministry of Economic Development, Petroleum, Investment, Trade and Commerce (MEDITC). MEDITC actively promotes and encourages both local and international investments for the growth and development of non-traditional and non-agriculture investments for new and emerging industries.

The assessments conducted between the 1950s to present have identified several different mineral deposits of extremely high grades in adequate volumes that would sufficiently support the industrial development of those minerals for mining and export. The assessments have addressed the technical evaluation and testing, however, they have not addressed the other areas required for true feasibility that would lead to the development of a viable industry. This project takes a step beyond previous works conducted and establishes a Project Management Plan for the conducting of a full feasibility assessment on the Bentonite Clay Deposit identified by GET Ltd. in the Spanish Lookout area, located in western Belize.

1.2 Statement of the problem

The development of commercial extraction and exportation of industrial minerals in Belize has been limited due to several factors. These factors, however, do not include the quality or availability of the minerals. The limitation has been around issues such as the price in the commodities market, lack of knowledge of the commercial viability, environmental concerns and the legal requirements for establishing an EPZ for minerals. All things considered, one of the main limiting factors has been the lack of an adequate feasibility analysis of each deposit. Such a feasibility assessment would require going beyond technical evaluation and include areas of economic viability, environmental implications, legal requirements, social implications, market analysis, geopolitical issues, and country incentive packages.

To attract the interest of industry persons in the identified deposits, GPD needs to present a clear outline of the required steps to determine and develop the minerals. One such way to garner interest from both international market and local actors is through conducting a comprehensive feasibility study on each deposit to establish its true potential commerciality.

Conducting a feasibility study (FS) of this nature and magnitude is a multi-disciplined task and would not be achievable by any one organization or group. It requires the incorporation of various agencies (government and private sector) and different areas of study. A comprehensive plan for achieving this detailed study is imperative. Such a plan will yield acceptable assessment that will result in sound decisions for future initiatives.

The comprehensive feasibility study would incorporate all the relevant areas for determination of commerciality, viability, concurrence with local legislation and acceptance by the populace. The multi-sectoral study requires an overarching guidance document to ensure the interoperability of the various studies and ultimately the integration of all the studies for a final decision on whether investment

and development of the industry is feasible. It is anticipated that a study of this nature would be focused on three main pillars; economic concerns including market assessment, legal requirements including EPZ possibilities and environmental issues; the extraction of a non-renewable resource. A study of such magnitude requires a project management plan that will address the depth and breadth of the task eventually yielding results.

1.3 Purpose

The purpose of the project is for the elaboration of a project management plan that captures all ten knowledge areas for project management; project integration, scope, schedule, cost, quality, resource, communications, risk, procurement and stakeholder for the conducting of a comprehensive feasibility study. The Project Management Plan will provide guidance for the activities to be undertaken and the methods to be used in managing the processes for the determination of the commerciality and economic viability of a Bentonite Clay Industry, extraction and exportation, in the Spanish Lookout area, Belize C.A.

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1.4 General objective

To develop a comprehensive project management plan by December 2019 for conducting a comprehensive feasibility study (FS) for the establishment of a bentonite clay mine and export production facility in Spanish Lookout, Cayo District, Belize C.A.

1.5 Specific objectives

1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans.
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS.

3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline.
4. To develop a cost management plan for the management of the components of the FS within the approved project budget.
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical and other quality requirements within the project's time, cost and scope constraints.
6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.

2 THEORETICAL FRAMEWORK

The theoretical framework will explore the Enterprise Environmental Factors (EEF) and Organizational Process Assets (OPA) of the Geology and Petroleum Department (GPD) and how these are related or linked to the Final Graduation Project (FGP), its rationale, purpose and expected benefits. The theoretical framework will also examine the theories surrounding the project management and the Project Management Plan (PM Plan). The PM Plan will show the relationship to the FGP and further examine other theories related to it for the executing of a feasibility study on an extractive industry.

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

The Geology and Petroleum Department is a Government of Belize Department within the Ministry of Economic Development, Petroleum, Investment Trade and Commerce of the country of Belize, with the responsibility for the regulation of the petroleum and mineral industry. It was formed under a technical cooperation agreement (TCA) between GOB and the United Nations Development Program (UNDP) in 1984 as a Geology and Petroleum Unit in the Ministry of Natural Resources. It had been determined that there ought to be a Government agency responsible for petroleum and mineral exploration. The Unit was partially funded and headed by the United Nations Development Programme (UNDP). It was staffed with core UNDP hired sector experts (petroleum and mineral exploration) and nationals who were to understudy the experts with the intention of eventually taking over the administration of the Unit. The TCA ended in 1996 and the Unit was transitioned fully to the Government, in 1998 the Unit was upgraded to a Department and staffed accordingly.

The Petroleum Sector is governed by the *Petroleum Act, Chapter 225, Substantive Laws of Belize, Revised Edition 2000* and the associated Regulations: the *Petroleum*

Regulations 1992. The Mineral Sector is governed by the *Mines and Minerals Act, Chapter 226, Substantive Laws of Belize, Revised Edition 2000* and the associated Regulations: the *Mines and Minerals (General) Regulations,* and the *Mines and Minerals (Safety, Health and Environmental) Regulations*. The GPD operates under the other GOB Policies and Standards for both Human Resource Management; Public Service Regulations, General Workers Regulations, and Financial and Capital Resource Management: Financial and Stores Orders.

The GPD is charged with the mandate to oversee the non-renewables sector of the country and to administer *The Petroleum Act, Chapter 225,* and*, The Mines and Minerals Act, Chapter 226, Substantive Laws of Belize, Revised Edition 2000*, through the Inspector of Petroleum and the Inspector of Mines, respectively. The responsibility under each Act is for the technical oversight and regulation of the industries, for the generation of new data, to act as the repository for all national data related to petroleum, minerals, geophysical and geological data, and, for the promotion and development of the petroleum and mineral sectors. The Department's dual nature has led to the creation of two sub-units within its structure. One of the units is tasked with petroleum regulation while the other one manages mineral regulation.

The promotion of investment in the mineral sector is one of the core responsibilities and driving factors of the Mining Unit thus, maximizing the mineral wealth of Belize. To achieve this, the GPD must generate new data or new products or approaches to strategically target the mining industry and development partners. Preliminary GAP analysis on the lack of uptake of mineral opportunities within the country revealed a few issues:

- Lack of clarity in processes and permits required for mineral development.
- Lack of clarity in available incentive programs for the mineral sector; tax incentives (duty exemptions, removal of tariffs, etc), EPZ application in the extractive sector.

- Commerciality or viability of identified minerals in the international market; entrance price, quality, the sustainability of supply.
- Concerns over potential environmental issues with the creation of a new mine (open pit vs tunneling).

These issues are a direct hindrance in achieving the mission and vision for development growth and realizing the economic benefit to the country. The development of a comprehensive PM Plan for conducting a feasibility study that will address the areas of concern and provide a guidance document to mining companies will take the mineral sector one step closer to achieving its goal. The PM Plan will allow companies to adequately carry out a feasibility study taking into consideration all the national stakeholders, government and private sector, as well as the international concerns on marketability. The PM Plan provides a key mechanism for the integration of the results and for the further development of the mineral sector.

Mission and vision statements

Mission Statement

To promote and regulate oil and gas, and mineral exploration and production in a safe, environmentally and socially responsible manner with the assistance of international investors and other stakeholders in order to maximize the benefits from the country's petroleum resources for the economic and social development of Belize (GPD, 2019).

Vision Statement

A robust petroleum and mineral industry and the leading revenue earner contributing to the economic growth of Belize (GPD, 2019).

Organizational structure

The GPD operates with a Weak Matrix organization structure with two functional line managers namely the Director (Inspector of Petroleum) and the Deputy Director (Inspector of Mines) as shown in Figure 1. The reporting is done in a straight line hierarchal structure with the final reporting done to the GOB Executive Level; Chief Executive Officer (CEO) and Minister with responsibilities for petroleum and minerals, not shown on the GPDs organization chart, represented in Chart 1.

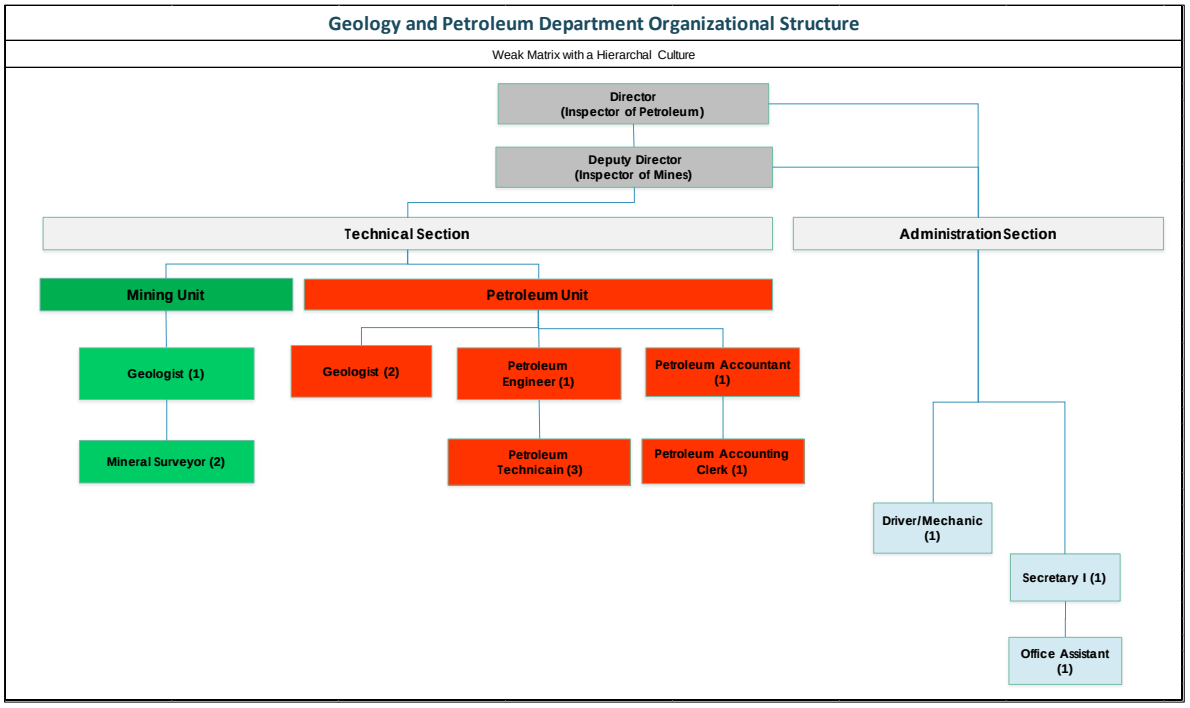

Figure1. GPD Organizational Structure (Source: GPD, 2019)

The FGP will have a positive impact and interaction with the Mining Unit section of the Department and the overall organization. The principal actors on the FGP will be the Deputy Director who has direct responsibility for minerals and the Geologist and Mineral Surveyor under the Mining Unit.

Products offered

The GPD has a dual function as per the two Acts that are administered by the Department. While both are for non-renewable resources and have similarities there

are also subtle differences between the regulatory function of the petroleum sector and the mining sector. The products or services offered by the Department in both sectors are highlighted in Chart 1: GPD Services and Products.

Chart 1 Services and Products provided by the GPD (Source: GPD, 2019)

GPD Services and Products		
No.	**Mineral Sector**	**Petroleum Sector**
1	Administrate the processing and issuance of Mineral Rights: Prospecting Licenses, Exploration Licenses, Mining Licenses, and Quarry Permits.	Administrate the processing and issuance of Petroleum Contracts.
2	Enforce compliance with the conditions of Mineral Rights.	Enforce compliance with the conditions of Petroleum Rights in accordance with international best practices in the industry.
3	Collect and assess revenues payable under the Mines and Minerals Act: royalties, fees, rentals, charges, etc.	Verify and Certify the volumes of crude oil and gas produced and saved for the calculation and collection of revenues payable under the Petroleum Act: royalties, production share, working interest, windfall profit tax; under the *Income and Business Tax Act Chapter 55 Substantive Laws of Belize Revised Edition 2000*: Income Tax; and, under the *Customs and Excise Tax Act Chapter 48*: Axle Tax.
4	Prepare and disseminate reports, maps, and other mineral-related data to the public	Prepare and disseminate reports, maps and other petroleum-related data to the public.
5	Promote the development of mineral resources and industry.	Promote the development of petroleum resources and industry.
6	Facilitate the exploration of minerals	Facilitate the exploration of petroleum.

GPD Services and Products		
7	Provide technical advice to the Minister and Chief Executive Officer on matters pertaining to minerals.	Provide technical advice to the Minister and Chief Executive Officer on matters pertaining to petroleum
8	Conduct mineral studies and assessment of mineral resources.	Conduct geological and geotechnical assessment of petroleum resources.
9		Supervise surface production facilities and operations
10		Monitor and evaluate reservoir performance and management for optimizing oil and gas recovery, including the use of enhanced recovery techniques.
11		Evaluate appraisal and development work programs and technical reports in relation to petroleum development and production.
12		Conduct auditing of petroleum operations, revenues and expenditures.
13		Evaluate oil and gas field economics.
14		Process landowners' share of royalties for payment.

The FGP ties squarely in with the products offered by the Mining Unit under the areas of mineral development, promotion, facilitation of exploration and ultimately it will also provide additional revenues to the Government if the mining venture is deemed to be feasible.

2.2 Project Management concepts

2.2.1 Project

According to the Project Management Body of Knowledge Guide (PMBOK® Guide) Sixth Edition, a project is defined as a temporary endeavor undertaken to create a unique product, service or result (Project Management Institute, 2017**,** p. 4). PMBOK® Guide further to states that the unique product, service or result fulfills an objective through the production of deliverables. The objective is the desired outcome toward which the work is directed, a strategic position to be attained, a result to be obtained, a product to be purchased, a purpose achieved or a service to be performed. A deliverable is any unique and verifiable product, result or capacity to perform a service that is required to be produced to complete a process, phase or project, and may be tangible or intangible.

The Open University (2016) provides three definitions for a project in their handbook: “a temporary organization to which resources are assigned to do work to bring about beneficial change” (as cited in Turner, 2006, p.1); “a unique, transient endeavor undertaken to achieve a desired outcome” (as cited in Association for Project Management (APM), 2006, p.150); and “a unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources” (as cited in Standard for project management BS 6079-2, 2000, p. 10).

Lo, Shen & Chen (2017) offer a definition for a project according to the International Project Management Association (IPMA, 2006). They defined a project as a series of operations with time and cost constraints that can realize a set of defined and deliverable objectives. Additionally, Lo, Shen & Chen (2017) also present a definition from the International Organization for Standardization (2012), where “a project is defined as a unique set of processes consisting of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective.

The FGP is for the development and articulation of a PM Plan for the conducting of a feasibility study for the establishment of a Bentonite clay mine extractive and export production facility. The product is defined as the PM Plan and subsidiary plans with clear deliverables and objectives, and a definitive start and end date.

2.2.2 Project management

The PMBOK® Guide Sixth Edition defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (Project Management Institute, 2017**,** p. 10). It goes further and expands that project management is accomplished through the appropriate application and integration of the project management processes identified for the project and that it enables the effective and efficient execution of projects by organizations. An effective project management involves other concept; notably problem resolution, risk response in a timely manner, optimization of resources and in particular the management of constraints; scope, quality, schedule, costs, and resources.

Lo, Shen & Chen (2017) describes project management (PM) from IPMA (2006); it is the planning, organizing, monitoring, and controlling of all aspects of a project, and the management and leadership of all involved to achieve the project objectives safely. And a definition from ISO (2012); defines PM as the application of tools, techniques, and competencies to a project. PM includes the integration of the various phases of the project life cycle (p. 1586).

Siles & Mondelo (2018) define PM, as “the use of a combination of tools and techniques, arising from good practices and international standards, to achieve project-specific objectives (outcomes, product, or service) within a planned period of time (schedule), cost (budget), scope, and quality (p14). They also point out that the concept of PM, also known as project administration or direction, is a discipline that serves to guide and integrate the processes necessary to initiate, plan, execute,

control, close projects and to complete all the work required to execute a project and fulfill the stipulated scope within defined cost and time constraints.

The FGP will cover all ten knowledge areas as defined by the PMBOK® Guide Sixth Edition (2017) and will utilize the various tools and techniques that are applicable under each of the respective knowledge areas.

2.2.3 Project life cycle

PMBOK® Guide Sixth Edition defines a project life cycle as a series of phases that a project passes through from its start to its completion (Project Management Institute, 2017, p. 19). It provides a basic framework that can be applied irrespective of the project or the specific project work. Likewise, the phases in a specific project may be sequential, overlapping or iterative. Figure two illustrates a generic project life cycle chart indicating how the phases interact with the process groups in each of the respective knowledge areas. Chart two provides an explanation of terms used in Figure two.

Equally significant, PMBOK indicates that project life cycles can be either predictive or adaptive. The concept of the development life cycle is derived based on one or more of the phases of the project that are associated or linked with the development of the product, result or service for which the project was developed.

The development life cycles can be predictive (scope, time and cost are determined early), iterative (scope defined early, time and cost are modified throughout life of phase), incremental (deliverables are produced through a series of iterations, each providing incremental gain), adaptive (agile, iterative or incremental in which detailed scope is defined before each iteration). In fact, the development life cycles can be hybrid (combination of predictive and adaptive life cycles).

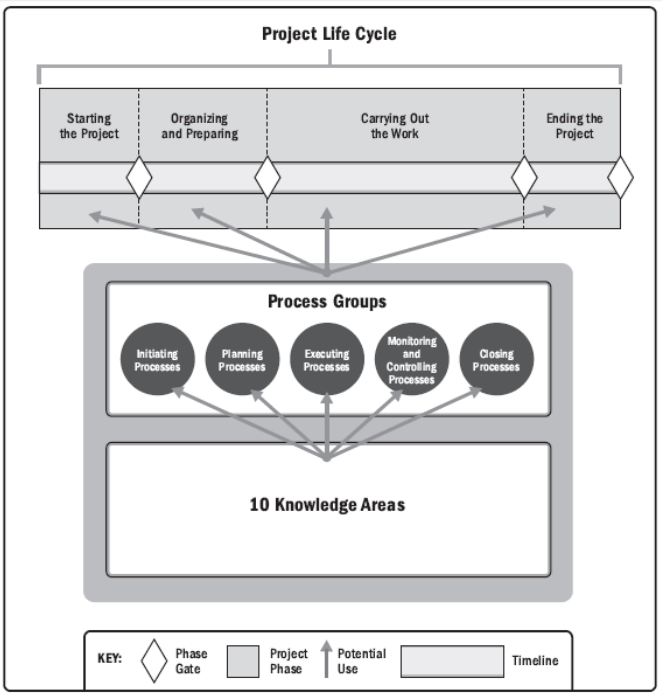

Chart 2 Terms in Figure 2 (Source: PMI, 2017)

Terms in Figure 2: Project Life Cycle	
Term	**Definition**
Phase Gate	Held at the end of each phase. Projects performance and progress are compared to project documents and business documents. It can be tied to a go/no-go decision for next phase or project or requirement for repeat.
Project Phase	A collection of logically related project activities that culminates in the completion of one or more deliverables.

Figure 2. Project Life Cycle (Source: PMI, 2017)

The interaction of the different process groups throughout the project life cycle is further illustrated in Figure three, where the initiation, planning, executing, monitoring and closing process groups can be seen to be either sequential or overlapping. It is understood that an iterative interaction of process groups can also take place.

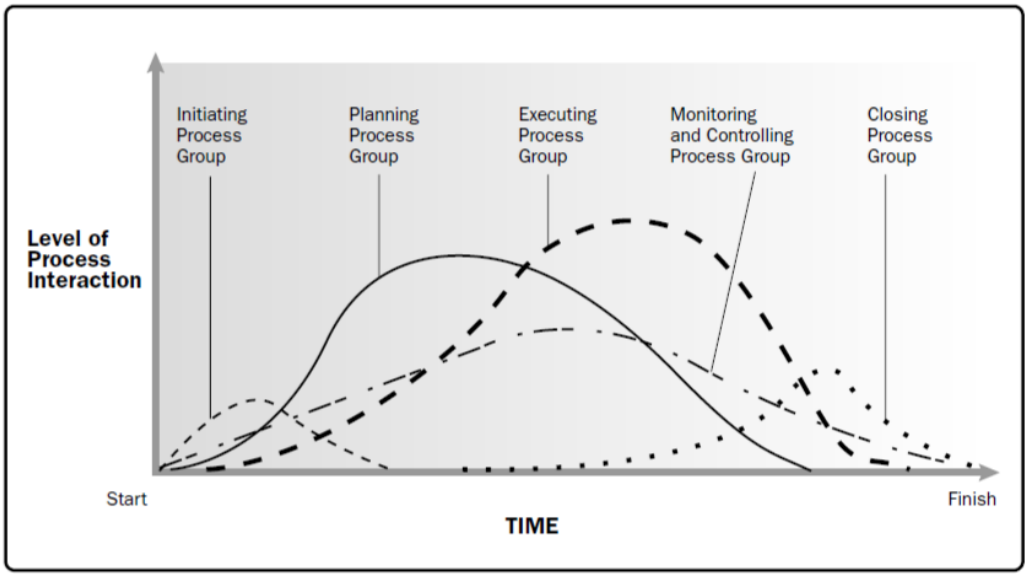

Figure 3. Process Groups interaction during a phase or project (Source: Project Management Institute, Inc. 2013)

The GPD does not have a specific Company/Enterprise project life cycle that it utilizes, neither does the wider GOB have a specific project life cycle model that is available. GOB agencies that execute projects utilize the EEF from the Donor Agency or Sponsor that evidently changes depending on which International Agency (IA) is granting funding. Presently, Inter-American Bank (IDB), Caribbean Development Bank (CDB), European Union (EU), United Nations (UN) systems and United States Agency for International Development (USAID).

2.2.4 Project management processes

PMBOK® Guide Sixth Edition outlines that the project life cycle is managed and executed by a series of PM activities known as PM processes (Project Management Institute, 2017**,** p. 22). Consequently, every process is responsible for producing one or more outputs derived from one or more inputs using the appropriate tools and techniques available for PM. The output can be either a deliverable or an outcome. For successful project management, PMBOK® Guide follows the principle of logically grouping the project management processes through the application and integration of the processes. Figure four shows these project management process groups and their use or aligned with a specific project objective.

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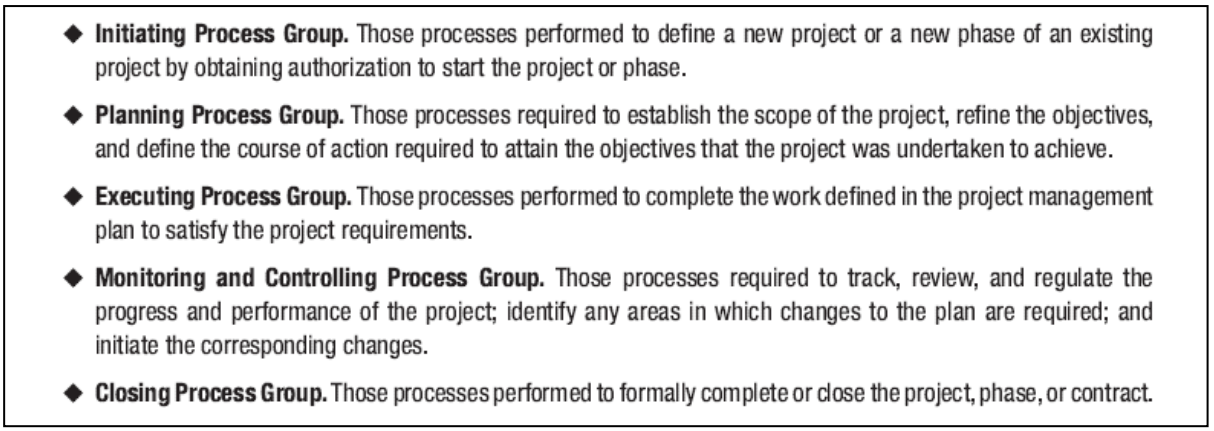


Figure 4. Project management process groups highlighting their function and specific objectives (Source: PMI, 2017)

Goncalves, Wangenheim, Hauck & Petri (2017, p. 200-201) highlight that project management process follows the five process groups from initiation to closure. The initiation process group addresses project goals, justifications, milestones, outcomes, as well as stakeholder engagement, with the main output being the project charter. The planning process group focuses on the elaboration of the project plan and subsidiary plans that cover the ten PM knowledge areas. The interaction of these process groups is illustrated in Figure five that indicates the initiation, the iterative process of planning, executing, and monitoring and control, and the closing process.

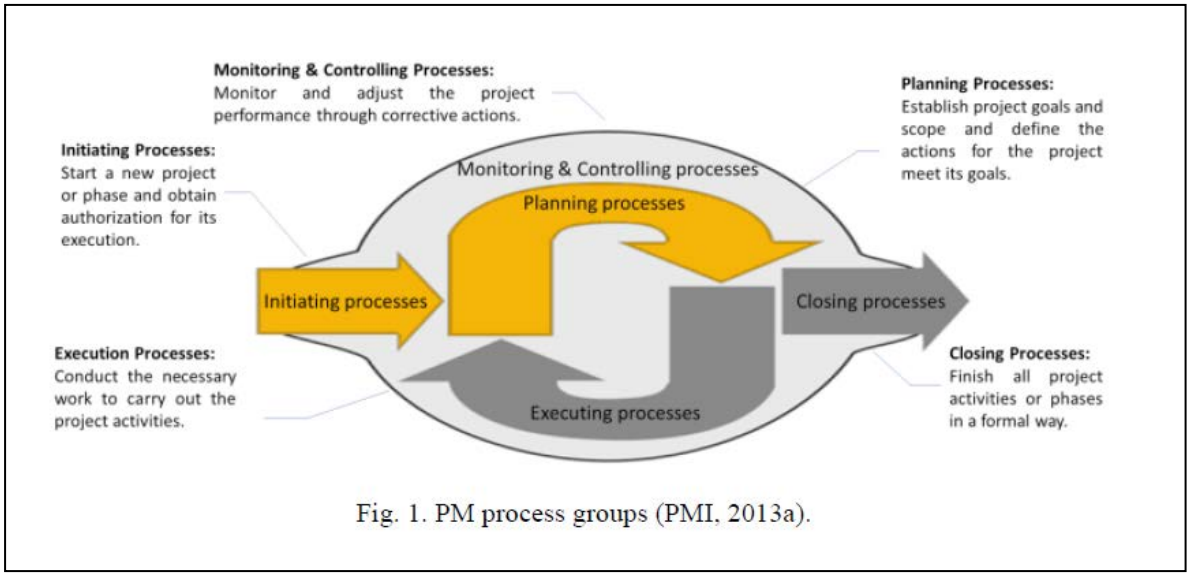


Fig. 1. PM process groups (PMI, 2013a).

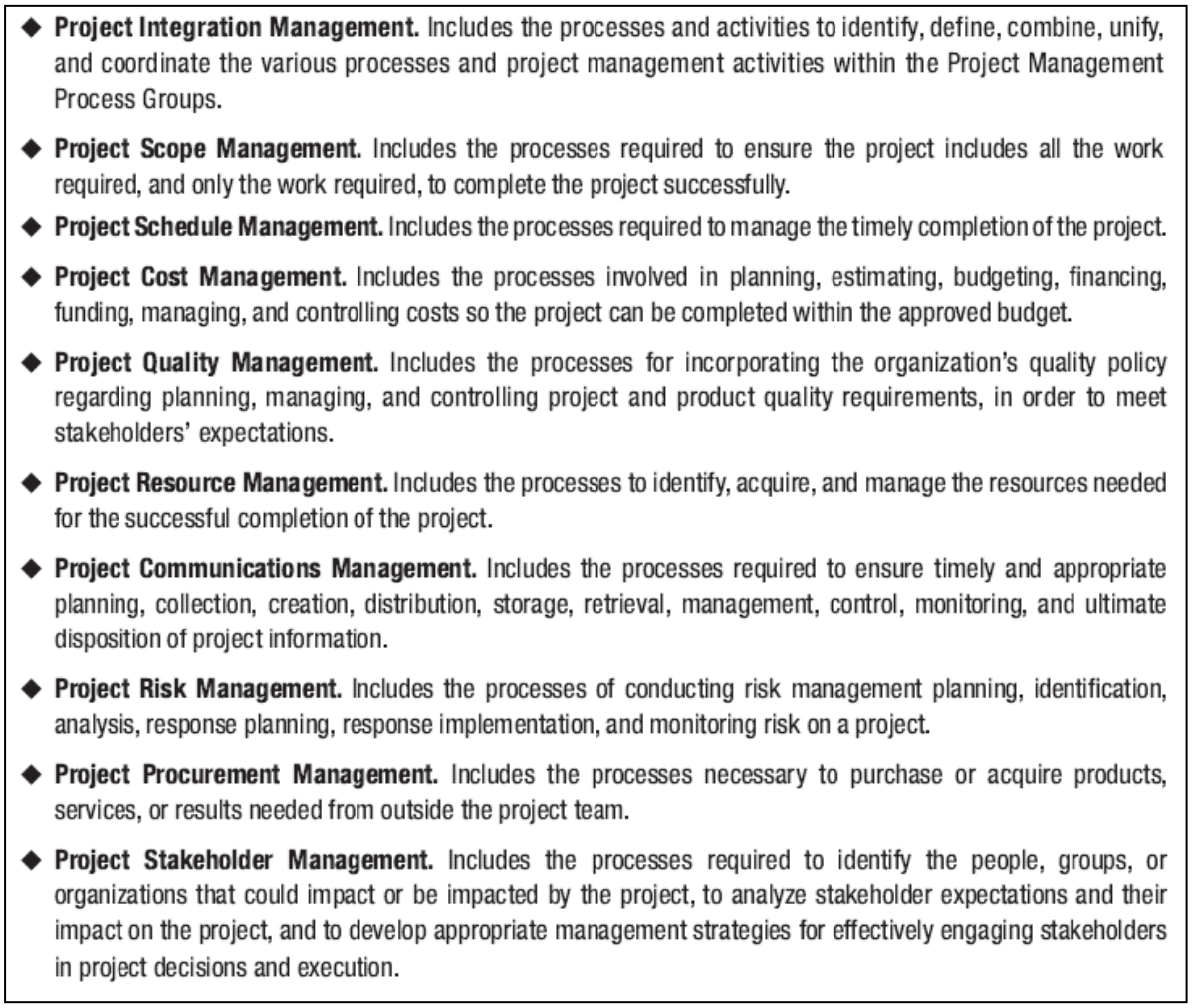
Figure 5. Interaction of the 5 Process Groups for Project management (Source: Goncalves, Wangenheim, Hauck & Petri, 2017)

The FGP for the PM Plan for the feasibility study will focus on the first two process groups for the articulation of the project and the elaboration of the PM Plans and subsequently, the subsidiary plans under each knowledge area.

2.2.5 Project management knowledge areas

The PMBOK® Guide Sixth Edition identifies a Knowledge Area as an identified area of project management defined by its knowledge requirement and described in terms of its component processes, practices, inputs, outputs, tools, and techniques,

(Project Management Institute, 2017, p. 23). Figure six displays the ten knowledge areas that have been identified in the PMBOK® Guide. Figure six shows the knowledge areas and outlines which processes are required in each knowledge area, as well as the expected outcome from each knowledge area.



- **Project Integration Management.** Includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.
- **Project Scope Management.** Includes the processes required to ensure the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Schedule Management.** Includes the processes required to manage the timely completion of the project.
- **Project Cost Management.** Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so the project can be completed within the approved budget.
- **Project Quality Management.** Includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements, in order to meet stakeholders' expectations.
- **Project Resource Management.** Includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project.
- **Project Communications Management.** Includes the processes required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and ultimate disposition of project information.
- **Project Risk Management.** Includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.
- **Project Procurement Management.** Includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.
- **Project Stakeholder Management.** Includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

Figure 6. Ten Knowledge areas showing the required process within each and the expected outcome from each. (Source: PMI, 2017)

The PMBOK® Guide Sixth Edition further disaggregates the ten knowledge areas through a mapping of the Project Management Process Group and the Knowledge Area (Project Management Institute, 2017, p. 25). Figure 7 displays this mapping of the knowledge areas to the process groups and highlights the expected outcome from each.

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	

Figure 7. Project Management Process Groups and Knowledge Areas mapping (Source: PMI, 2017)

The FGP for the creation and elaboration of a PM Plan for the conducting of a feasibility assessment for a Bentonite clay mine extraction and export production facility will cover all ten knowledge areas. Furthermore, it will produce subsidiary plans for each knowledge area, with a focus on the initiation and planning process groups.

2.3 Other applicable theory/concepts

2.3.1 Feasibility Study

There are varying definitions for what a feasibility study is and what it should entail. Unquestionably, many of the recognized definitions focus around a central concept of it being an assessment of the practicality or viability of a proposed plan, method or action. For instance, Roseke (2019) defines project feasibility study as a report that investigates the viability of the project. Likewise, Bridges (2018) defines a feasibility study as simply an assessment of the practicality of a proposed plan or method. On the other hand, Mukund (2018) and Mwanzoni Ltd. (2015) both offer more detailed definitions. Mukund puts forth that a feasibility study is used to determine the viability of an idea, such as ensuring a project is legally and technically feasible as well as economically justifiable. It emphasizes the need to know whether a project is worth the investment or is doable. As mentioned, Mwanzoni Ltd. (2015) affirms that a feasibility study is a formal project document that shows results of the analysis, research and evaluation of a proposed project and determines if the project is technically feasible, cost-effective and profitable. Both Mukund and Mwanzoni further assert that the primary goal of a feasibility study is to assess and prove the technical and economic viability of a business idea. As such, it allows for the exploring and analyzing of business opportunities and thus making a strategic decision on the necessity to initiate the project.

Feasibility studies therefore by nature of their definition cover and capture information on various aspects and sectors that require multidisciplinary teams to conduct a proper feasibility study. Roseke (2019) speaks to this as he posits that

feasibility studies are usually carried out by major engineering firms that have the multi-disciplinary expertise on all the major project issues like project design, economics, environmental, logistics, stakeholder, regulatory requirements, and so forth. Likewise, Makund (2018) also refers to the multifaceted nature of feasibility studies emphasizing that well-designed studies should offer a historical background of the business or project, such as a description of the product or service, accounting statements, details of operations and management, marketing research and policies, financial data, legal requirements, and tax obligations. He further adds that in general, the FS precedes technical development and project implementation.

The aspects to be covered under an FS can vary dependent on the nature of the industry and the type of FS that would be required. In any case, there are generally standard areas that FS's should cover. The following identifies those critical standard areas.

Makund (2018) identifies five areas that an FS should examine:

- Technical Feasibility: technical resources available to the organization, including hardware, software, and other technology requirements.
- Economic Feasibility: cost/benefit analysis of the project.
- Legal Feasibility: investigates whether any aspect of the proposed project conflicts with legal requirements like zoning laws, data protection acts, social media laws, etc.
- Operational Feasibility: analyze and determine whether or how well the organization's needs can be met by completing the project.
- Scheduling Feasibility: estimation of time required to complete the project.

Roske (2019) identifies six areas that an FS should contain:

- Design Summary: project design to a minimum level that allows executives or a board to make a final decision to proceed with the project, and typically contains prelim plant designs, manpower requirements, and project schedule

- Economics: the most important part of the FS (typically) in which a cost-benefit analysis is conducted that accounts for; estimating the project cost; estimating revenue; estimating operations and maintenance costs, and capital budgeting inclusive of Net Present Value (NPV), Internal Rates of Return (IRR) and payback period calculations.
- Geopolitical: political considerations.
- Environmental: environmental regulations, requirements, restrictions and mitigation, impact assessments.
- Historical: investigations on similar or previous projects of a similar nature, and evaluation of the lessons learned from those projects.
- Social: assessment where possible of the social footprint and potential impact including stakeholder engagement.

3 METHODOLOGICAL FRAMEWORK

3.1 Information sources

"Information can come from virtually anywhere — social media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages — and the type of information you need will change depending on the question you are trying to answer" (Kosrow, 2018, para. 1).

Ashikuzzaman (2018) defines an information source as a source of information for somebody.In other words, it is anything that might inform a person or provide knowledge on a specific subject or topic.

Information sources are numerous and can range from reference books, magazines, newspapers, or academic journals (peer-reviewed or scholarly journals) to books (Kosrow, 2018). McQuade Library (2018) highlights that the sources should be evaluated on the following grounds; relevance, timeliness, references/bibliography, reliability, validity, credibility, perspective, purpose, commercialism, intended audience, and sophistication, appropriateness or adequacy of use for the intended purpose. Likewise, Arora (n.d.) posits that the information should be screened for its quality, characteristics based on; timeliness, accuracy, relevance, adequacy, completeness, explicitness, impartiality, and whether it is worth its cost.

Information sources may be subdivided into two broad categories; documentary sources and non-documentary sources. Documentary sources is further subdivided into primary, secondary and tertiary sources, and while non-documentary sources subdivided into formal and informal sources. (Ashikuzzaman, 2018).

The FGP utilizes primary and secondary documentary sources of information for the articulation of the PM Plan and the subsidiary plans. It also relies on information both formal and informal from non-documentary sources.

3.1.1 Primary sources

Arora (n.d) explains primary information sources as information in its original form. More specifically, primary information is information has not been edited, interpreted, evaluated or translated in any manner which, can potentially alter the original information. Such sources represent original thinking and observations such as original research reporting on original scientific studies, experiments or observations. Another key concept identified by Arora (n.d,) is that primary information is created by persons (participants or recorders) who experienced the events or conditions being documented.

Similarly, Ashikuzzaman (2018) says that primary sources of information are the first published record of original research and development or description of a new application or new interpretation. A primary source is also a term used in several disciplines to describe source material that is closest to the person, information, period or idea being studied.

The Library of Congress (as cited by Sotheby's Institute of Art, 2018, para. 2) refers to primary sources of information as "*raw materials of history- original documents and objects which were created at the time under study. They are different from secondary sources, accounts or interpretations of events created by someone without firsthand experience*." Sotheby's list the following types of primary sources as; diaries, speeches, correspondences, interviews, manuscripts, government documents, new film, photographs, music, poetry, artworks, etc. In addition, primary sources of information in law is explained as a statement of the law itself from a government entity, such as the courts, legislative body, executive agency or body, the president or government. They include such documents as; Court Decisions, Text of legislative bills, Code of Regulations, Contracts, Wills, other legal documents, etc.

3.1.2 Secondary sources

Arora (n.d.) defines secondary information as information that is “removed” in some way from its original form through restatements, interpretations, translations or analysis of information from one or more primary sources. For example, secondary information sources can include: dictionaries, encyclopedias, biographies, books and textbooks, review articles, and historical studies.

Additionally, Ashikuzzaman (2018) explains secondary sources of information as those that have either been compiled from or refer to some primary source and have been modified or reorganized to serve a definite purpose for a group of users. In this case, the information has been repackaged in a more easily accessible and organized manner than the primary sources. Moreover, Ashikuzzaman divides secondary information into three types; Index Type (index, bibliography, indexing periodicals, abstracting periodicals), Survey Type (review, treatise, monograph), and Reference Type (encyclopedia, dictionary, handbook, manual, critical tables).

Finally, Sotheby’s Institute of Art (2018) defines secondary sources as accounts written after the fact with the benefit of hindsight and that also includes interpretations and evaluations of primary sources. In essence, secondary sources are not evidence but rather are the commentary on or discussion of evidence. Additionally, secondary sources in law is explained as materials that discuss, explain, interpret, and analyze what the law is or what it should be. Some types of secondary sources in law include: articles about law, books about law, law reference books, law reviews, and legal news.

For the purpose of this project, Chart 3 provides an outline of the primary and secondary sources that were used for each specific objective.

Chart 3 Information sources (Source: compiled by author, C. Moore, June 2019)

Objectives	Information sources	
	Primary	**Secondary**
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans	Documentation of GOB /regulatory agencies with responsibility for FS components, GOB laws, and regulations, GET Ltd., meetings, interviews	PMBOK guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals, Guide to Developers, BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guide.
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS	GOB laws and regulations, GPD OPAs, GET Ltd., and GOB /regulatory agencies with responsibility for FS components.	PMI Requirements Management practice guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, PMBOK guide, Government reports & publications, and periodicals & journals
3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for	Documentation of GOB /regulatory agencies with responsibility for FS	PMBOK Guide, PMI Practice Standard for Scheduling, previous research, historical data & information, handbooks, manuals,

Objectives	Information sources	
	Primary	**Secondary**
the completion of all required work within the approved project timeline.	components, GOB laws, and regulations, GET Ltd.	PM texts, Websites, Government reports & publications, and periodicals & journals
4. To develop a cost management plan for the management of the components of the FS within the approved project budget	GOB /regulatory agencies with responsibility for FS components, GOB laws and regulations, GOB Stores and Financial Orders	PMBOK Guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical, economic, environmental and other quality requirements within the project's time, cost and scope constraints.	GOB laws and regulations, GET Ltd., GOB /regulatory agencies with responsibility for FS components	ISO21500, PMBOK Guide, PMI Project Quality Management, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals, Guide to Developers, BETRAIDE InvestBELIZE portfolio.
6. To develop a resource management plan for timely identification, assignment,	GPD EEF/OPA, GOB /regulatory agencies with responsibility for FS components, Consultants	PMBOK Guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites,

Objectives	Information sources	
	Primary	**Secondary**
and acquisition of required resources for the required work to complete the FS.	that undertake FS component studies.	Government reports & publications, periodicals & journals, Guide to Developers, BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guide.
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.	GPD OPA/EEF, stakeholder requirements, GOB /regulatory agencies with responsibility for FS components, EPZ & BELTRAIDE guidelines, meetings, interviews	PMBOK Guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.	GOB laws and regulations, GET Ltd., GOB /regulatory agencies with responsibility for FS components, EPZ & BELTRAIDE guidelines	PMBOK Guide, PMI Project Standard for Project Risk Management, NEMO national disaster plans, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals, BETRAIDE

Objectives	Information sources	
	Primary	**Secondary**
		InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guide.
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.	GOB /regulatory agencies with responsibility for FS components, GOB laws and regulations, GOB Stores and Financial Orders	PMBOK Guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals, BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guide.
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.	GOB /regulatory agencies with responsibility for FS components, GPD, meetings, interviews, EPZ & BELTRAIDE guidelines	PMBOK Guide, previous research, historical data & information, handbooks, manuals, PM texts, Websites, Government reports & publications, periodicals & journals, MEDITC investment portfolio,

3.2 Research methods

Walwyn (2017) provides definitions for several key terms used in research. Of significance are the following explanations:

Research: research is an activity whose purpose is the generation of new knowledge by means of scientific methods. A more detailed definition is provided research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Research method: research method is the specific process or steps followed by researchers in undertaking research through experimental design, data collection, etc.

Research Methodology: research methodology is a body of knowledge, which attempts to explain or understand thereby developing a structure for how the research will be done. It includes the various steps that are generally adopted by a researcher in studying the research problem together with the associated logic, the what and why.

Research Design; research design is the overview or plan of the actual steps to be taken.

Additionally, Bhat (2019) defines research as a careful consideration of the study regarding a specific problem or concern or topic using scientific methods. Sociologist Earl Robert Babbie (as cited in Bhat, 2019, para. 1) defines research as "*a systematic inquiry to describe, explain, predict and control the observed phenomenon. Research involves inductive and deductive methods.* Bhat furthermore indicates that inductive approaches are more commonly associated with

qualitative research which analyzes observed phenomenon while deductive methods are associated with quantitative research and are used to verify the observed phenomenon.

Broadly speaking research methods can be divided into two main approaches as highlighted by Bhat (2019): qualitative and quantitative. There are several methods that fall under each approach. However, the approach and method chosen is highly dependent on the discipline or subject matter to be studied. With this in mind, the FGP will draw on a variety of research methods such as qualitative, analytical and descriptive, primary and secondary sources to identify, gather, retrieve and analyze the relevant data for the elaboration of the FGP.

3.2.1 Quantitative method

Bhat (2019) defines quantitative research as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical or computational techniques. It gathers data or information from existing sources which is then displayed in numerical format. Quantitative research is conducted using statistical methods through mathematical frameworks and theories to quantify the topic under question. Quantitative research templates are objective, elaborate and many times, are investigational in nature. The results achieved from this research method are logical, statistical and unbiased. Data collection happens using a structured method and conducted on larger samples that represent the entire population.

There are four different types of primary quantitative research methods; Survey Research (questionnaires, surveys, polls, etc); Correlational Research, Causal-Comparative Research, and Experimental Research (Bhat, 2019). These use several different sampling methods inclusive of probability sampling and non-probability sampling. Data analysis is carried out using several techniques inclusive of statistical analysis such as SWOT, conjoint, cross-tabulation, etc.

Quantitative research has some distinctive characteristics such as: the use of Structured Tools (surveys, polls, questionnaires, etc.); significant sample size (represents large population for topic area); use of close-ended questions; analysis of prior studies; and representation (tables, charts, graphs or other non-numerical forms). Ultimately, it provides a generalization of the results for the entire population.

3.2.2 Qualitative method

Bhat (2019) defines qualitative research as a market research method that focuses on obtaining data through open-ended and conversational communication. It is about determining not only the “what” but also the “why” of things. Qualitative methods allow for in-depth probing and questioning to gather data and understand the topic. Research is designed in a manner that reveals the behavior and perception of the target audience with reference to a topic. There are different types of qualitative research methods namely in-depth interviews, focus groups, ethnographic research, record keeping, content analysis, case study research, and observation. Essentially qualitative research is involved with characteristics and not measurement or numbers.

Some of the characteristics of qualitative research methods are: data is collected onsite; real-time data; data is gathered in multiple forms (interviews, observations, documents) rather than relying on single data source; research method works towards solving complex issues by breaking then down into meaningful inferences; and the data and information tend to be unfiltered.

3.2.3 Analytical method

Yang (n.d.) describes analytical research as a method that assists in establishing “why” a phenomenon is the way it is or how it came to be. It usually concerns itself with cause-effect relationships.

3.2.4 Descriptive method

Yang (n.d.) outlines that descriptive research attempts to determine, describe, or identify “what” is. It uses description, classification, measurement, and comparison to describe what phenomena exists.

3.2.5 Mixed method

Terrell and Edmonds (2017) defined mixed methods of research design as a procedure for collecting, analyzing, and “mixing” both quantitative and qualitative research methods in a single study to understand a research problem. The defining features of mixed methods are; it uses both quantitative and qualitative data (numeric scores, open-ended and closed-ended questions, etc); the data can be collected concurrently or sequentially (dependent on design); data type can be prioritized or considered equally; allows for a deeper understanding from one method to another in order to converge or confirm findings; and it is based on the wide expanse of generalization offered by quantitative methods with the detailed understanding and depth offered by qualitative research.

There are three types of mixed methods design: sequential explanatory, sequential exploratory, and convergent, Yang (n.d.). Their application is dependent on four factors: interaction (how different aspects of either quantitative or qualitative influence the process or results); priority (which is given greater emphasis or not); timing (sequencing of different aspects); and mixing (the point where the data is integrated into one answer).

For the Final Graduation Project, qualitative, analytical and descriptive research will be utilized. These have been described in Chart 4 and their relationship to each objective.

Chart 4 Research methods (Source: compiled by author, C. Moore, June 2019)

Objectives	**Research Method**		
	Qualitative	**Analytical**	**Descriptive**
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans	This method will provide the narrative description of project management and integration through data reviews, case study analysis, interviews (structured and unstructured), using multiple data sources.	Analysis of the facts and information gathered from primary sources and literature will be used for the elaboration of project management concepts and project integration.	Comparison, description, classification, and measurement of information and data gathered will be used for the articulation of project management concepts and project integration.
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS	This method will provide the narrative description of scope management and integration through data reviews, case study analysis, interviews (structured and unstructured),	Analysis of the facts and information gathered from primary sources and literature will be used for the elaboration of the scope and project integration.	Comparison, description, classification, and measurement of information and data gathered will be used for the definition of

Objectives	Research Method		
	Qualitative	**Analytical**	**Descriptive**
	using multiple data sources, including observations		scope and scope management concepts and project integration
3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline.	This method will provide the narrative description of schedule requirements, management, and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the elaboration and determination of the schedule of FS components and project integration.	Comparison, description, classification, and measurement of information and data gathered will be used for the definition of schedule and project integration
4. To develop a cost management plan for the management of the components of the FS within the approved project budget	This method will provide the narrative description of cost requirements, estimates, management and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the elaboration and determination of the cost estimates of FS	Comparison, description, classification, and measurement of information and data gathered will be used for the determination of

Objectives	Research Method		
	Qualitative	Analytical	Descriptive
		components and project integration.	costs and project integration
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical, economic, environmental and other quality requirements within the project's time, cost and scope constraints.	This method will provide a narrative description of quality requirements, quality metrics. quality management and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of quality requirements of FS components and project integration	Comparison, description, classification, and measurement of information and data gathered will be used for the determination of quality and project integration
6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.	This method will provide the narrative description of resource requirements, resource calendar, management and integration through data reviews, case	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of resource requirements of	Comparison, description, classification, and measurement of information and data gathered will be used for the determination of

Objectives	Research Method		
	Qualitative	**Analytical**	**Descriptive**
	study analysis, interviews, and observations	FS components and project integration	resource requirements and project integration
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.	This method will provide the narrative description of communication requirements, communication matrix, management and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of communication requirements for interoperability throughout FS components and project integration	Comparison, description, classification, and measurement of information and data gathered will be used for the determination of communication requirements and project integration
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.	This method will provide the narrative description of risk indicators, parameters, management and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of risk in each FS component, the determination of adequate	Comparison, description, classification, and measurement of information and data gathered will be used for

Objectives	Research Method		
	Qualitative	Analytical	Descriptive
		risk response and for project integration	the determination of risk and project integration
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.	This method will provide the narrative description of procurement requirements and policy, management and integration through data reviews, case study analysis, interviews, and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of procurement requirements of FS components and project integration	Comparison, description, classification and measurement of information and data gathered will be used for the determination of procurement requirements and project integration
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.	This method will provide the narrative description of stakeholder requirements, engagement, management and integration through data reviews, case study analysis, interviews and observations	Analysis of the facts and information gathered from primary sources and literature will be used for the examination of stakeholder requirements for interoperability	Comparison, description, classification and measurement of information and data gathered will be used for the determination of

Objectives	Research Method		
	Qualitative	Analytical	Descriptive
		throughout FS components and project integration	stakeholder requirements and project integration

3.3 Tools

The PMBOK® Guide Sixth Edition defines a tool as something tangible, for example, a template or software program, used in performing an activity to produce a product or a result. Intimately linked to this term is also the term technique, which PMI defines as a defined systematic procedure employed by a human resource to perform an activity. This activity potentially yields a product, a result or delivers a service, and may employ one or more tools (Project Management Institute, 2017**,** p. 724 -725).

Maserang (2012) outlines tools and techniques as activities, actions or software programs used or undertaken to accomplish each task from conception to completion throughout the project life cycle. There is an emerging trend for PM tools to evolve in their capabilities and user interface. This change indicates moving away from simple project tracking and reporting to more integrated project information portals.

Chart 5 displays the FGP's objectives and corresponding tools to be applied for each objective.

Chart 5 Tools (Source: compiled by author, C. Moore, June 2019)

Objectives	Tools
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans	Expert judgment, Data gathering/Data analysis, Meetings, Interviews, Project Charter Template
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS	Expert judgment, Data analysis/Alternative analysis, Meetings, Interviews, Benchmarking, Templates
3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline.	Expert judgment, Data analysis, Meetings, Critical path analysis (dependency/predecessor), Estimation (analogous, bottom-up, three-point), Resource optimization, MS Project
4. To develop a cost management plan for the management of the components of the FS within the approved project budget	Expert judgment, Data analysis, Meetings, Estimation (analogous, bottom-up), Benchmarking, Cost aggregation

Objectives	Tools
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical, economic, environmental and other quality requirements within the project's time, cost and scope constraints.	Expert judgment, Data analysis, Meetings, Benchmarking, Check sheets, Checklist, Root cause, Cost-benefit, Multi-criteria analysis
6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.	Expert judgment, Data analysis, Meetings, Estimation (analogous, bottom-up), Virtual teams, Resource calendar, Benchmarking, Check sheets, Checklist, Cost-benefit, Multi-criteria analysis
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.	Expert judgment, Data analysis, Meetings, Communications requirements analysis, Reporting requirements analysis
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.	Expert judgment, Data analysis, Meetings, SWOT analysis, Risk characterization, Risk mitigation strategies

Objectives	Tools
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.	Expert judgment, Data analysis, Meetings, Source selection criteria, Market analysis/research, Benchmarking,
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.	Expert judgment, Data gathering/Data analysis, Meetings, Questioners, Surveys, Stakeholder analysis, Communications requirements

3.4 Assumptions and constraints

The PMBOK® Guide Sixth Edition defines an assumption as a factor in the planning process that is considered to be true, real or certain, without proof or demonstration (Project Management Institute, 2017**,** p. 699).

Usami (2019) defines an assumption as a belief that you assume to be true in the future, he goes further and includes that assumptions are done based on your own knowledge, experience or the information that is available. The assumptions are in relation to the anticipated events or circumstances that are expected to occur during the project's life cycle.

PMBOK® Guide Sixth Edition defines a constraint as a limiting factor that affects the execution of a project, program, portfolio, or process (Project Management Institute, 2017**,** p. 701). It recognizes six project constraints; scope, quality, schedule, budget, resource, and risk, of these three are grouped and known as the triple constraint (scope, schedule, and budget).

Usami (2019) defines constraints as limitations imposed on the project, such as limitations on resources, time and costs. The project must operate within the boundaries created by these limitations. Constraints are divided into two types: Business constraints, and Technical constraints. Business constraints depend on the state of the organization, and technical constraints create restrictions on design choice or parameters.

For the Final Graduation Project, the assumptions as outlined in Chart 6 have been made based on the ten knowledge areas of project management. The project constraints are also listed in Chart 6.

Chart 6 Assumptions and constraints (Source: compiled by author, C. Moore, June 2019)

Objectives	Assumptions	Constraints
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans	1. All relevant base data and information is available to inform the development and articulation of the project charter. 2. Aspects and components required for a full FS are understood well enough to inform the project charter development. 3. The project charter will act as the principal guidance document for the implementation of the PM Plan for the FS. 4. The objectives adequately capture the areas required for the FS for a project of this nature. 5. The legislative and financial framework of the country supports the development of this nature.	1. Few or limited analogous industries to provide baseline data for an extractive and export industry. 2. Heavy reliance on international agencies for the definition of requirements.

Objectives	Assumptions	Constraints
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS	1. The GPD has enough knowledge and capacity to outline the work required for the FS, the WBS, and scope definition. 2. GET Ltd. will provide timely and efficient information for the requirements of a FS for this project. 3. There are adequate and competent individuals or entities available to carry out the works required for the FS. 4. The GOB/relevant agencies for components of the FS provided timely and adequate feedback. 5. BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guides are detailed enough to guide scope definition.	1. Few or limited analogous industries to provide baseline data for an extractive and export industry. 2. Heavy reliance on international agencies for definition of requirements.
3. To develop a schedule management plan that adequately provides for the time management	1. The project duration is adequate for the completion of all components of the FS and meeting the deliverables.	1. In order to attract private/industry partners FS project should be limited to no longer than nine months.

Objectives	Assumptions	Constraints
of activities and tasks for the completion of all required work within the approved project timeline.	2. Dependencies and predecessors are minimal allowing for parallel activities to occur without impact to the critical path. 3. Tools and software available are adequate for the creation of the schedule.	
4. To develop a cost management plan for the management of the components of the FS within the approved project budget	1. Interested private partner/industry partner has the financing available to undertake the FS. 2. Cost estimation techniques for works are adequate for the quantum of work required.	1. Lack of availability of local suppliers/ estimates for technical aspects of the FS. Heavy reliance on international agencies.
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical, economic, environmental and other quality requirements within the project's time, cost and scope constraints.	1. BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guides, and other relevant guides are detailed enough to guide quality requirements/metrics.	1. No national guidelines except for the Mines and Minerals Act for the extraction and exportation of mineral resources.

Objectives	Assumptions	Constraints
	2. Legislative framework detailed enough for industries to guide quality requirements/metrics. 3. Local legislative/environmental regulations and guidelines are not too restrictive to prevent industry meeting international requirements for export products of this nature.	
6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.	1. Budget allocations will be sufficient for resource acquisition. 2. Resource identification and acquisition will be done in a timely and efficient manner. 3. Duration estimation techniques for works are adequate for the quantum of work required.	1. Lack of availability of local suppliers for technical aspects of the FS. Heavy reliance on international agencies.
7. To develop a communication management plan for the timely planning, collection, storage,	1. Communication methods and techniques identified/selected are	1. The use of virtual teams limits means of communication/ issues with time difference, geographically distant.

Objectives	Assumptions	Constraints
dissemination, control and interoperability of project information across various FS components.	available to the project at a reasonable cost/time. 2. Communication matrix adequately targets all relevant stakeholders (i.e. all relevant stakeholders have been identified). 4. Standardization of communications adequate to capture technical aspects and incorporation across FS components.	2. Timely communication responses with GOB/quasi-government agencies hindered without dedicated contact person.
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.	1. Scope definition and problem statement are broad enough to highlight all potential project risks. 2. Stakeholder identification and analysis (power, influence, and impact) are comprehensive enough to identify project risks.	1. NEMO disaster structure focuses on adverse weather impacts. 2. Capacity of private/industry partners to implement risk response may be limited.

Objectives	Assumptions	Constraints
	3. Identified risk response/mitigation is of a magnitude and nature that can be managed by the private/industry partner.	
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.	1. Legislative framework and BETRAIDE InvestBELIZE portfolio, MEDITC investment portfolio, EPZ investment guides, and other relevant guides are detailed enough to guide procurement requirements/procedures. 2. Private/Industry partner's financial requirements are compatible with local legislation.	1. No clear procurement policy for the extractive industry.
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.	1. All relevant stakeholders are identified and adequate analysis (power, influence, impact, interest) has been done for stakeholder engagement. 2. Communication matrix for stakeholder engagement has adequately identified the means, frequency, and type of	1. An FS for a mining project has a diverse cross-section of stakeholders with opposed agendas (extractives vs environmental conservation). 2. Inclusion of numerous GOB/quasi-government agencies with no identified

Objectives	Assumptions	Constraints
	communication needed to satisfy stakeholder requirements.	liaison creates difficulties in stakeholder involvement and communication.

3.5 Deliverables

The PMBOK® Guide Sixth Edition defines a deliverable as any unique and verifiable product, result or capacity to perform a service that is required to complete a process, phase or project (Project Management Institute, 2017**,** p. 704).

In addition, it is defined as a product or an artifact that is quantifiable, as either an end item in itself or a component item (Project Management Institute, 2017**,** p. 715). Furthermore, the result is considered as an output from performing project management processes and activities (Project Management Institute, 2017**,** p. 720).

Morley (2019) explains project deliverables as tangible products generated from a project, thus lending themselves to being of many different kinds. Furthermore, she states that project deliverables can be intended for internal or external stakeholders or both and that the number of deliverables is project dependent. Moreover, deliverables include intellectual material among its different kinds of products.

Woods (2019) introduces the term “key deliverable” and defines it as a tangible or intangible item that is produced as a part of the project. The key deliverables are the most important outputs created as a part of a project. The assumption is that when key deliverables are completed the project objectives should have been met and the project is concluded.

Each of the FGP deliverables except for the project charter, which is the initiation document, will include a section on project integration management. This is required to ensure that the various aspects of the PM Plan are all compatible and the subsidiary plans are congruent and succinct. The deliverables in Chart 7 have been matched to each objective of the project which is to develop a Project Management Plan for a Feasibility Study for the establishment of a Bentonite Clay Mine and Export Production Facility, Spanish Lookout, Cayo District, Belize C.A.

Chart 7 Deliverables (Source: compiled by author, C. Moore, June 2019)

Objectives	Deliverables
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans.	Project Charter inclusive of; milestone, preliminary risks, constraints, assumptions, stakeholder list, and schedule.
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS.	Scope Management Plan inclusive of; requirements management plan, work breakdown structure (WBS), and requirements traceability matrix.
3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline.	Schedule Management Plan inclusive of; activity list, milestone list, activities duration estimate, and project calendar.
4. To develop a cost management plan for the management of the components of the FS within the approved project budget.	Cost Management Plan inclusive of; cost estimates and project funding requirements.
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical,	Quality Management Plan inclusive of quality metrics.

Objectives	Deliverables
economic, environmental and other quality requirements within the project's time, cost and scope constraints.	
6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.	Resource Management Plan inclusive of; resource requirements, resource breakdown structure (RBS), and resource calendar.
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.	Communications Management Plan inclusive of a project communications matrix.
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.	Risk Management Plan inclusive of a risk register.
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.	Procurement Management Plan inclusive of; procurement strategy, bid documents, and selection criteria.
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.	Stakeholder Management Plan inclusive of a stakeholder register.

4 RESULTS

4.1 Project Charter

The project charter was created for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans.

The elaboration of the plan was informed by documentation and reports housed within the national archives of the relevant sector Ministries, with additional resources gathered from consultations with key GOB personnel. The additional resources are other publications, development guidelines and portfolios. This data was reviewed and analyzed using primarily analytical and qualitative methods, to ascertain the nature and extent of the project. Expert judgement played an integral part in assessing the components to be captured under the project although few or limited analogous industries exist.

The Project Charter form a key input in the elaboration of the other plans and represents the data present at hand during the project formulation stage. It establishes a preliminary risk register, stakeholder register and provides guidance on the scope of the project as well as the expected deliverables with milestones that can act as metrics for tracking project performance.

Project Charter

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

AUGUST 2019

Revision Status:

Document Author:
Document Owner:

Project:
Project Manager:
Document Approver(s): All approvers are required. Records of each approver must be maintained.

Approver Name	Role

Document Reviewers: Records of each required reviewer must be maintained.

Reviewer Name	Role

NOTE: All reviewers in the list are considered required unless explicitly listed as optional.

Summary of Changes:

To request a change to this document, contact the document author or owner. Changes to this document are summarized in the following table:

Revision	Date	Created By	Short Description of Changes

4.1.1 Introduction

4.1.2 Purpose

The purpose of the project is to conduct a comprehensive feasibility study (FS) for the establishment of a bentonite clay mine and export production facility in Spanish Lookout, Cayo District, Belize C.A.

4.1.3 Background

The Geology and Petroleum Department is charged with the mandate to oversee the non-renewables sector of the country administer The Petroleum Act, Chapter 225, and, The Mines and Minerals Act, Chapter 226, Substantive Laws of Belize, through

the Inspector of Petroleum and the Inspector of Mines, respectively. The responsibility under each Act is for the technical oversight and regulation of the industries, for the generation of new data, to act as the repository for all national data related to petroleum, minerals, geophysical and geological data, and for the promotion and development of the petroleum and mineral sectors.

Numerous mineral assessments have been conducted in Belize from the early 1950s with an aim to identify, quantify and evaluate the commercial potential of precious, semi-precious and industrial mineral occurrences. The most recent notable assessments for industrial minerals were conducted by Belize Minerals Ltd. (Brian Holland, 2003) for dolomite, clays, and limestones for various applications, CEMEX Ltd. for gypsum, clays and siliciclastic sands for cement manufacturing and GET Ltd. for occurrences of industrial minerals with commercial potential. The latter assessment yielded results for the favorable exploitation of two deposits; a ceramic clay deposit in the Swasey-Bladen area, Stann Creek District and a bentonite clay deposit in Spanish Lookout, Cayo District, Belize C.A.

The Government of Belize through the Ministry of Finance established the Export Processing Zone (EPZ) Act and programmes such as BelizeINVEST and EXPORTBelize offered through BELTRAIDE to actively promote and encourage local and international investments. The ultimate goal was for the growth and development of non-traditional and non-agriculture investments for new and emerging industries. As a non-agriculture investment, industrial minerals have faced many challenges. Limiting factors for the development of industrial minerals has included the price in the commodities market, lack of adequate feasibility analysis and lack of knowledge of the commercial viability. For instance, the lack of development in the export sector is not because of low quality or unavailability of the minerals. In fact, it is the lack of exposure of their full potential and the need for further feasibility assessment beyond technical evaluation that is deficient.

4.1.4 Scope

The feasibility study analyzes the viability of a bentonite clay deposit from the perspective of commerciality and potential for the development of an export commodity. The feasibility study will cover the following key aspects such as:

- validation of previously determined technical specifications and extent of clay deposit;
- evaluation of legal requirements for qualification as an export processing zone (EPZ);
- examination of environmental impacts and mitigation;
- examination of social impacts and mitigation;
- evaluation of economic viability and requirements for bentonite clay deposits
- determination of commerciality of deposit; and
- provide a marketable analysis of potentially commercial investment in a mineral commodity.

4.1.5 Intended Audience

The results of the feasibility study will help to inform national positions on future investments in industrial developments. It will also provide investors with a go-no-go decision-making tool. It is therefore intended for both local and international parties. The targeted audience of the project is:

- Ministry of Economic Development, Petroleum, Investment, Trade and Commerce (MEDITC);
- BELTRAIDE (investment programmes BelizeINVEST and EXPORTBelize);
- various GOB Ministries/Agencies;
- local mineral exploration/exploitation companies (such as Belize Minerals Ltd.);
- industrial/commercial investment companies; and
- international mineral exploration companies

Additionally, the results of the feasibility can be shared with non-mineral companies that are interested in diversification of portfolio or those looking for new avenues for investment.

4.1.6 Overview

4.1.6.1 Project Title and Description

Project Title: Feasibility Study for the establishment of a Bentonite Clay Mine and Export Production Facility, Spanish Lookout, Cayo District, Belize C.A

Project Location: Spanish Lookout, Cayo District, western Belize C.A

Project Duration: Estimated project duration of 2 years

Project Cost: USD $126,500

Project Description: Feasibility study on the establishment and commerciality of an industrial production facility for the extraction and processing of a bentonite clay deposit for exportation.

4.1.6.2 Business Case

The identification of clay deposits with commercial potential was performed by GET Ltd. under a technical cooperation agreement between the Government of Belize (GOB) and the Czech Republic Government during the period 2007-2011. The liaison for the GOB was the Inspector of Mines, Geology and Petroleum Department (GPD). Further development of these mineral deposits has not been forthcoming. The primary reason is the mining sector in Belize is currently focused on the production of aggregates for construction and infrastructure projects. There exists one commercial gold operation. As a result, mineral development has been limited to the production of crushed dolomite. The limited extraction of clays for use as foundry minerals, liners, pottery or absorptives illustrates the deficient development of this industry.

A comprehensive feasibility study (FS) will provide the needed to make a go-no-go decision by any interested party. The FS covers a myriad of sectors, inclusive of technical assessments, economic analysis, market surveys, environmental studies, legal and regulatory requirements, geopolitical evaluation, and historical reviews of similar industries.

The conducting of a comprehensive feasibility study on one of the identified deposits will provide direction. For instance, activities can be undertaken, and methods employed in managing the processes for the determination of the commercial and economic viability of the establishment of a clay industry in Belize. This would be a critical step in attracting interest in this deposit by local and international industry partners. Furthermore, the results can potentially be used to promote the development and growth of this and similar extractive industries within the country, as the results could be an analog for other mineral deposits. The examination of the feasibility will raise awareness within the GOB for future country international investment opportunity packages promoted by agencies such as BELTRAIDE and the Ministry of Economic

Development, Petroleum, Investment, Trade and Commerce (MEDITC) and programmes such as BelizeINVEST and EXPORTBelize.

4.1.6.3 Pre-assigned Resources

The feasibility study covers a wide range of sectors and requires sector specialist and experts to deliver on the required components of analysis and interpretation. The project while spearheaded by the Geology and Petroleum Department is supported by the Government of Belize and will have the following requirements:

- approval for the use of pre-existing data from the national geological repository;
- approval of assigned senior staff to be members of the project team;
- approval of assigned senior staff from various agencies to sit on the Project Steering Committee (PSC), agencies such as the Department of the Environment, Ministry of Works, Ministry of Finance, Ministry of Economic Development, Petroleum, Investment, Trade and Commerce, and Ministry of Works; and
- geotechnical and geological studies of the bentonite clay deposit, Spanish Lookout area.
- Project Funds of USD $ 126,500 (Estimated Budget + 15%Contingency)

4.1.6.4 Main Requirements

In order to achieve the intended outcome for the feasibility study, the following are the main requirements:

- project Steering Committee (PSC) which includes the project manager and team, for the oversight of the feasibility study;
- technical expertise to validate the results of the GET 2009 study;
- consultants; engineers, environmentalists, legal advisors, economists, financial advisors; and
- market analysis.

4.1.6.5 Project Objectives, Assumptions, Risks and Constraints

4.1.6.5.1 Objectives

- to verify the results of the testing and evaluation done by GET 2009;

- to examine the commercial viability of the bentonite deposit;
- to conduct an Environmental Impact Assessment (EIA) for the establishment of the quarry;
- to conduct a Social Impact Assessment (SIA) of the proposed new industry;
- to determine the requirements and viability of establishing an Export Processing Zone (EPZ) for the extractive industry; and
- to conduct a market analysis of bentonite clays

4.1.6.5.2 Assumptions

- The size, quantity and material specifications of the bentonite deposit are adequate for the establishment of an extractive and export industry.
- Financial incentives packages are robust enough to be applied to an extractives industry.
- There is active interest and uptake from local or international industry partners, to make an investment in the establishment of the industry.
- Government investment agencies have an interest in the promotion and enabling of the extractive industry.

4.1.6.5.3 Risks

- Interest and availability of the members of the PSC (Government representatives).
- Funding risk; available funds are adequate to complete the required activities for the feasibility study.
- Geological risks; quantity and quality of deposit does not meet required specifications for the international market.

4.1.6.5.4 Constraints

- Expertise for testing and validation of the material specifications are not available within the country.
- No internal market or very limited internal market exists for bentonite products within the country.

4.1.6.6 Milestones

In order to meet the project execution and timely delivery of the outcomes the project will consist of the following major milestones:

- Formulation of the multi-sectoral Project Steering Committee (PSC).
- Establishment of Terms of Reference (TOR) for the consultancies.
- Successful completion of Bid Process; technical evaluation, market analysis, and legal requirement analysis.
- Completed and accepted reports; technical evaluation, market analysis, and legal requirement analysis.
- Road Map for obtaining EPZ status and fiscal incentives package for the extractive industry.
- Successful completion of Bid Process; environmental, social and economic assessments.
- Completed and accepted Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) reports.
- Signed and executed Environmental Compliance Plan (ECP) granting environmental clearance for mining.
- Completed and accepted Mining Plan and Quarry Design.
- Completed and accepted Economic Model.
- Investment Portfolio for the bentonite deposit.
- Compiled Feasibility Report.

4.1.6.7 Deliverables

The expected project deliverables are:

- D-1: Technical Validation Report on material specifications, quantity, and variability.
- D-2: Market Analysis Report on market location, requirements, and specifications.
- D-3: Report on legal requirements for establishing an EPZ along with a road map for the EPZ process.
- D-4: Environmental Impact Assessment Report.
- D-5: Social Impact Assessment Report
- D-6: Mining Plan and Quarry Design.

- D-7: Economic Model for deposit exploitation.
- D-8: Feasibility Study Report with an Investment Portfolio on the deposit.

4.1.7 Project Stakeholders

Key stakeholders hold direct or indirection interaction with the project and can exercise varying levels of power and influence. The project's key stakeholders have been listed in Chart 8 and ranked in Appendix C, Chart 10.

Chart 8 Listing of Project Stakeholders (Source: compiled by author, C. Moore, August 2019)

Name	Organization	Functional Area	Responsibility and Authority
Geology & Petroleum Department	Government	Mineral Sector Regulator	Project Sponsor Oversight of project implementation Oversight of project administration
Geology & Petroleum Department	Government	Inspector of Mines	Project Manager Oversight of project implementation Oversight of project administration
Ministry of Economic Development, Petroleum, Investment, Commerce and Industry	Government	Economic Development and Investment regulator	Responsible for economic development policies Investment promotion agency
BELTRAIDE	Quasi-government	Investment Officers	Responsible for fiscal incentives packages Investment promotion agency
Brain Holland	Belize Minerals Ltd.	Managing Director/Exploration Manger	Local mineral exploration company Technical advisor
Lennox Bradley	Ministry of Works (GOB)	Chief Engineer	Responsible for civil works
Belize Chamber of Commerce	Quasi-government	Private Sector	Responsible for representation and coordination of businesses and industry.
Tomas Pechar (Jr)	GET s.r.o.	Technical Advisor	Responsible for technical evaluations on minerals and geological resources.
Spanish Lookout Community	Spanish Lookout Community Elders	Local government	Responsible for the management and oversight within the areas belonging to the Spanish Lookout Community.
Ministry of Natural Resources	Government	National lands Administrator	Responsible for administration of National Lands/Private Lands management Responsible for Surveys Department

4.1.8 Appendix

Appendix A: Contract Type and Procurement Requirements

Contract Type:
Lump Sum (Fixed Price) Contract

Bid Evaluation:
Quality-Cost Based Assessment
Direct Contracting (Sole source)
Procurement Requirements:
Sole Bid
Technical and Financial Bid submission
Submission of Sub-contractors and Expert Consultants
Company Profile
Prior Experience
Performance Bond

Reporting Requirements:
Project Steering Committee (FS), stage and Qtr. reports

Appendix B: List of Risks/Risk Matrix

Chart 9 Preliminary Risk matrix (Source: compiled by author, C. Moore, August 2019)

Risk Category	Risk Description	Probability L/M/H	Impact L/M/H	Risk Response
Geological	Material properties do not meet or exceed internal market requirements	L	H	Evaluate alternative markets for lower grade bentonite deposits.
Natural Hazard	Schedule delays due to impacts from extreme weather conditions	H	M	Establish schedule of activities to coincide with months with lower potential for extreme weather. (Robust schedule and resource management plans).
Environmental	Compliance with national environmental legislation and International environmental criteria	L	M	Conducting Environmental Impact Assessment that highlights impacts and mitigation.
Funding	Cost overruns exceed available funding	M	H	Detailed cost estimation and the creation of a contingency fund. Active monitoring of costs and cost of comparable services.
Operational	Schedule delays and overruns from administration structure that includes PSC for review and approvals.	M	M	Include provisions for formal assignment of government personnel to PSC.
	Schedule delays and overruns from use of international consultants and their availability.	M	M	Detailed Resource, Schedule and Procurement Plans that provide an adequate timeline to conduct bid processes.
	Lack of participation from international consultants	L	H	Provide open and transparent bid process to encourage internal participation
Market	Projection of economic stimulus in international markets not adequate to attract international investment partners.	M	H	Review partnerships and MOU's with BELTRAIDE and other investment promotion agencies (Robust communication plan) to attract international investors.
	Specifications for bentonite in the international markets is above specifications of deposit.	L	H	Detailed market analysis survey to determine optional markets.

Risk Category	Risk Description	Probability L/M/H	Impact L/M/H	Risk Response
	Issues with potential EPZ creation for the extractive industry.	L	H	Liaise with MEDPITC and Ministry of Finance for policies to create EPZ for extractives.
Execution	Project delays, scope changes/creep, cost changes/overruns.	H	M	Active monitoring of the entire project by project team. Inclusion of Change Control Process. Adequately defined WBS and scope.

Appendix C List of Stakeholders/Stakeholder Matrix

Chart 10 Preliminary Stakeholder Matrix (Source: compiled by author, C. Moore, August 2019)

Main Sponsor	Government of Belize	Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A - Stakeholder Analysis						
ID	Stakeholder	Functional Area	Main Expectations	Influence	Impact	Power/Interest Matrix (Low - High)		
				Low-Med-High		Power	Interest	Justification/Explanation
1	Geology & Petroleum Department (Government of Belize)	Project Sponsor	-Viable industry that can contribute to national growth and development. -Foreign revenue earner	High	High	High	Med	The Government of Belize is the funder for the project and play a key role in determining If the project is conducted or not.
2	Inspector Of Mines	Project Manager	-Viable industry that can contribute to the development of the mineral sector of the country	High	High	High	High	Project is part of the GPD mandate for development of minerals.
3	Ministry of Economic Development, Petroleum, Investment, Trade, and Commerce	Economic Development and Investment regulator	Marketable project that can be shared with potential investors.	Med	Med	Med	Med	MEDITC is charged with the development and promotion of economic investment opportunities and policies
4	BELTRAIDE	Investment Officers	Marketable project that can be shared with potential investors.	Med	High	Low	Med	BELTRAIDE provides fiscal incentive packages as well as an investment promotion agency for the government.

Main Sponsor	Government of Belize	Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A - Stakeholder Analysis						
ID	Stakeholder	Functional Area	Main Expectations	Influence	Impact	Power/Interest Matrix (Low - High)		
				Low-Med-High		Power	Interest	Justification/Explanation
5	Brain Holland	Exploration Manager	-Project results are positive for the establishment of the industry. -Offered an opportunity to develop the resource	Med	Low	Low	High	Exploration company that would benefit from the results of a potentially viable industry to expand their business.
6	Lennox Bradley	Chief Engineer	Quarrying and extraction is carried out in accordance with national standards	Low	Low	Low	Low	While MOW carries out quarrying the administration of minerals extraction and development is carried out specifically by the GPD
7	Belize Chamber of Commerce	Private Sector	New business opportunity developed for the country	Low	Low	Low	Med	New ventures can expand the business community in the country, however as the project is a government lead initiative BCC has little control or influence.
8	Tomas Pechar (Jr) (GET)	Technical Advisor	GET is offered an opportunity to do further works on the development of the deposit	Low	Med	Low	High	Validation and project design of mineral deposits is a core part of business for GET. Government lead initiative GET has little control or influence

Main Sponsor	Government of Belize	Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A - Stakeholder Analysis						
ID	Stakeholder	Functional Area	Main Expectations	Influence	Impact	Power/Interest Matrix (Low - High)		
				Low-Med-High		Power	Interest	Justification/Explanation
9	Spanish Lookout Community	Local Government	-Development of new industry within their community. -Increased economic activity	Low	Med	Low	Med	Administration of minerals extraction and development is vested within the Government of Belize.
10	Ministry of Natural Resources	National Lands Administrator /Private Lands repository	Purchase and transfers of land provide government revenue	Low	Low	Low	Low	Primary concern is revenue generation for land transactions.

4.2 Scope Management Plan

Scope Management is the collection of processes that ensures that the project includes all the work required to complete it as well as eliminating unnecessary tasks. The Scope Management Plan details how the project scope will be defined, developed, and verified. It clearly defines who is responsible for managing the projects' scope and acts as a guide for managing and controlling the scope.

Project Scope Management follows a five-step process: collect requirements, define scope, create WBS, verify scope, and control scope. This was developed after the Project Charter, Stakeholder Register and Preliminary Risk Matrix were completed.

A Requirements Management Plan was developed as a part of defining the project scope and includes a Requirements Traceability Matrix. The Requirements Management Plan is used to document the necessary information required to effectively manage project requirements from definition, through traceability to delivery. It was created during the Planning Phase of the project and has an intended audience of the Project Manager, Project Team, Project Sponsor, the Project Steering Committee and stakeholders.

SCOPE MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

AUGUST 2019

4.2.1 Introduction

The Scope Management Plan provides the scope framework for this project. This plan documents the scope management approach; roles and responsibilities as they pertain to project scope; scope definition; verification and control measures; scope change

control; and the project's work breakdown structure. Any project communication which pertains to the project's scope should adhere to the Scope Management Plan.

The project's scope will follow the five iterative steps of Collect Requirements, Define Scope, Create WBS, Verify Scope, and Control Scope. This project is for the conducting of a feasibility study for the establishment of a Bentonite Clay Mine and Export Facility, Spanish Lookout, Cayo District, Belize C.A. This includes technical evaluation, market analysis, benchmarking and an examination of the legal requirements. Due to the technical nature of the project, a wide cross-section of consultants and external resources will be utilized in order to determine commerciality of the deposit and of establishing an extractive industry of this nature in central Belize.

4.2.2 Scope Management Approach

For the FS Study project, scope management will be the sole responsibility of the Project Manager. The scope for this project is defined by the Scope Statement, Work Breakdown Structure (WBS) and WBS Dictionary. The Project Manager, Sponsor, Project Steering Committee and the Stakeholders will establish and approve documentation for measuring project scope which includes deliverable quality checklists and work performance measurements. Proposed scope changes may be initiated by the Project Manager, Stakeholders, Project Steering Committee or any member of the project team. All change requests will be submitted to the Project Manager who will then evaluate the requested scope change. Upon acceptance of the scope change request, the Project Manager will submit the scope change request to the Project Steering Committee and Project Sponsor for acceptance. The Project Manager and Project Steering Committee are responsible for the approval of scope changes that are strictly technical in nature. The Project Steering Committee and the Project Sponsor are responsible for the approval of scope changes that will impact the schedule and cost. Upon approval of scope changes by the Project Steering Committee and Project Sponsor the Project Manager will update all project documents and communicate the scope change to all stakeholders. Based on feedback

and input from the Project Manager, the Project Steering Committee, Stakeholders, and the Project Sponsor are responsible for the acceptance of the final project deliverables.

4.2.3 Roles and Responsibilities

The Project Manager, Project Steering Committee, Project Sponsor and Project team will all play key roles in managing the scope of this project. As such, the project sponsor, manager, steering committee and team members must be aware of their responsibilities in order to ensure that work performed on the project is within the established scope throughout the entire duration of the project. Chart 11 below defines the roles and responsibilities for the scope management of the FS Study project.

Chart 11 Scope Management Roles and Responsibilities FS Project (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Scope Management Roles & Responsibilities		
Name	**Role**	**Responsibilities**
Ministry of Economic Development	Sponsor	➢ Approve or deny scope change requests as appropriate ➢ Evaluate need for scope change requests ➢ Accept project deliverables ➢ Provides policy direction and aides in conflict resolution of issues escalated beyond Project Steering Committee. ➢ Provides financial resources for project. ➢ Approves and provides additional funds for approved scope changes that impact cost.
Inspector of Mines	Project Manager	➢ Measure and verify project scope ➢ Facilitate scope change requests ➢ Facilitate impact assessments of scope change requests ➢ Organize and facilitate scheduled change control meetings ➢ Communicate outcomes of scope change requests ➢ Update project documents upon approval of all scope changes

		➢ Monitors project performance and metrics. ➢ Monitors project risk and implements risk responses for detected risks. ➢ Receives information from and reports to the Project Steering Committee. ➢ Escalates issues to the Project Steering Committee.
Project Steering Committee	Oversight Committee	➢ Senior government and non-government stakeholder representatives with a vested interest in project. ➢ Provides functional direction and defacto policy direction, supervision of the project and conflict resolution. ➢ Responsible for project oversight and general control. ➢ Resolves issues escalated by the Project Manager or Project Team. ➢ Approves and accepts project deliverables and scope changes, prioritizes project goals, implementation of work plans and achievement of milestones. ➢ Participate in impact assessments of scope change requests ➢ Organize and facilitate scheduled change control meetings
Project Team/ Technical Advisors	Team Members	➢ Participate in defining change resolutions ➢ Evaluate the need for scope changes and communicate them to the project manager as necessary ➢ Identifies issues to be escalated to Project Manager ➢ Provide guidance on technical matters and propose actions.
Stakeholders	Interested Members	➢ Participates in defining project requirements and expected benefits. ➢ Participate in defining change resolutions ➢ Evaluate the need for scope changes and communicate them to the project manager as necessary

4.2.4 Scope Definition

The scope of this project was defined through a comprehensive requirements collection process. First, a thorough analysis was performed on the existing data and repository held by the Geology and Petroleum Department. Annual reports, technical reports, financial reports from exploration companies were evaluated. The Project Charter was used as a base document to determine the preliminary scope definition. This information led to the development of a requirements management plan, requirements documentation and a requirements traceability matrix for an extractive industry.

The project description and deliverables were developed based on the requirements collection process and input from subject matter experts such as Belize Minerals Ltd., GET s.r.o., Investment Agencies, Environmental Agencies, and Government Regulatory Agencies. This process of expert judgment provided feedback on the most effective ways to meet the original requirements of providing a commercial viability analysis of an extractive and export industry.

4.2.5 Project Scope Statement

The project scope statement provides a detailed description of the project, deliverables, constraints, exclusions, assumptions, and acceptance criteria. Additionally, the scope statement includes what work should not be performed in order to eliminate any implied but unnecessary work which falls outside of the project's scope.

4.2.5.1 Product Scope Description

The FS Project will accomplish the following:

- Validation of previous technical evaluation of the deposit.
    - The results of the GET s.r.o (2009) study will be thoroughly analyzed to determine if the methodology, testing program, technical considerations and valuation of the deposit were in accordance with internationally accepted practices for mineral commodities evaluation and reserve

estimates.

- Remapping of the deposit will be conducted in order to determine the full extent of the deposit both from a surficial extent and sub-surface extent.
- Re-testing of samples to validate the material composition and characteristics.

- Conduct a thorough Market Analysis
  - Detailed potential market identification based on material characteristics and use will be conducted. This includes pricing schema for varying properties as well as an alternatives use evaluation.
  - Competitor analysis and benchmarking will be done to determine market requirements, requirements for new entrants in the bentonite supply market and reasonable operating and investment costs
- Evaluation of legal requirements for establishing a company and qualifying as an export processing zone (EPZ) entity.
  - Examination of the legal requirements for the registration of a company and any limitations that may exist based on parent company or shareholder nationality.
  - Examination of the legal requirements and limitations for the establishment of bank accounts and money transfer instruments, including repatriation of funds to parent company.
  - Determination of requirements for eligibility for establishing an export processing zone for the extractive industry.
  - Requirements, limitations, and eligibility for fiscal incentives through BELTRAIDE or other fiscal engines.
  - Evaluation of taxes and levies on exploration of mineral commodity
- Examination of environmental impacts and mitigation
  - Comprehensive environmental impact assessment that examines, flora, fauna, geological, hydrological, infrastructure and other parameters.
  - Evaluates the potential impacts and proposes the mitigation to lessen the impact of establishing an extractive industry.

- Examination of social impacts and mitigation
    - Comprehensive social impact assessment that evaluates the positive and negative implications of the proposed industry from a micro and macro socio-economic standpoint.
- Develop a Mining Plan and Quarry Design
    - Detailed analysis of reserve estimation, mining methodology, and equipment to be used for the extraction and processing of the clays.
    - Technical designs and layout of quarry with estimates of the investment capital required to commence extraction and the anticipated operating costs.
- Evaluation of economic viability and requirements for bentonite clay deposits
    - Economic modeling of the industry subject to various sensitivities and scenario testing to determine the commerciality of deposit.
- Provide a marketable analysis of a potentially commercial investment in a mineral commodity in the form of an investment portfolio that can be used to attract interest to Belize in this industry and other mineral developments.

4.2.5.2 Product Acceptance Criteria

This project includes the conducting of a feasibility study for the establishment of a bentonite clay mine for extraction and export. It includes all the components of the mining plan and quarry design, comparative analysis of markets and competitors, legal requirements for the establishment and for fiscal incentives. For the project to be deemed successful it has to be completed within a time frame of one and half years and within a cost of USD$125,000. It should also follow the acceptance criteria as outlined in the requirements traceability matrix.

4.2.5.3 Project Deliverables

The project will achieve seven main deliverables:

- D-1: Technical Validation Report on material specifications, quantity, and

variability.

- D-2: Market Analysis Report on market location, requirements, and specifications.
- D-3: Report on legal requirements for establishing an EPZ along with a road map for the EPZ process.
- D-3: Environmental Impact Assessment Report.
- D-4: Social Impact Assessment Report
- D-5: Mining Plan and Quarry Design.
- D-6: Economic Model for deposit exploitation.
- D-7: Integration Report with an Investment Portfolio on the deposit.

4.2.5.4 Project Exclusions

Work that is not included in the project is:

- Evaluation of other mineral deposits
- Inclusion of any provision for financing in the economic model on the extractive industry
- Geopolitical analysis as Belize is deemed as a stable democratic country

4.2.5.5 Project Constraints

The project will be subject to several constraints that are related to limits on resources for time, money, manpower, or equipment (capital):

- Limited expertise within the country for the testing of materials to determine the characteristics and properties of the clay.
- Limited expertise within the country for the design and elaboration of the mine plan and quarry design.
- Project Steering Committee consists primarily of senior government officials with other substantive posts and duties (time constraints on availability).

- Funding is from government resources that go through an annual budget cycle are relatively inflexible until the new budget period. For instance, if scope modifications are required it can potentially impact the cost.

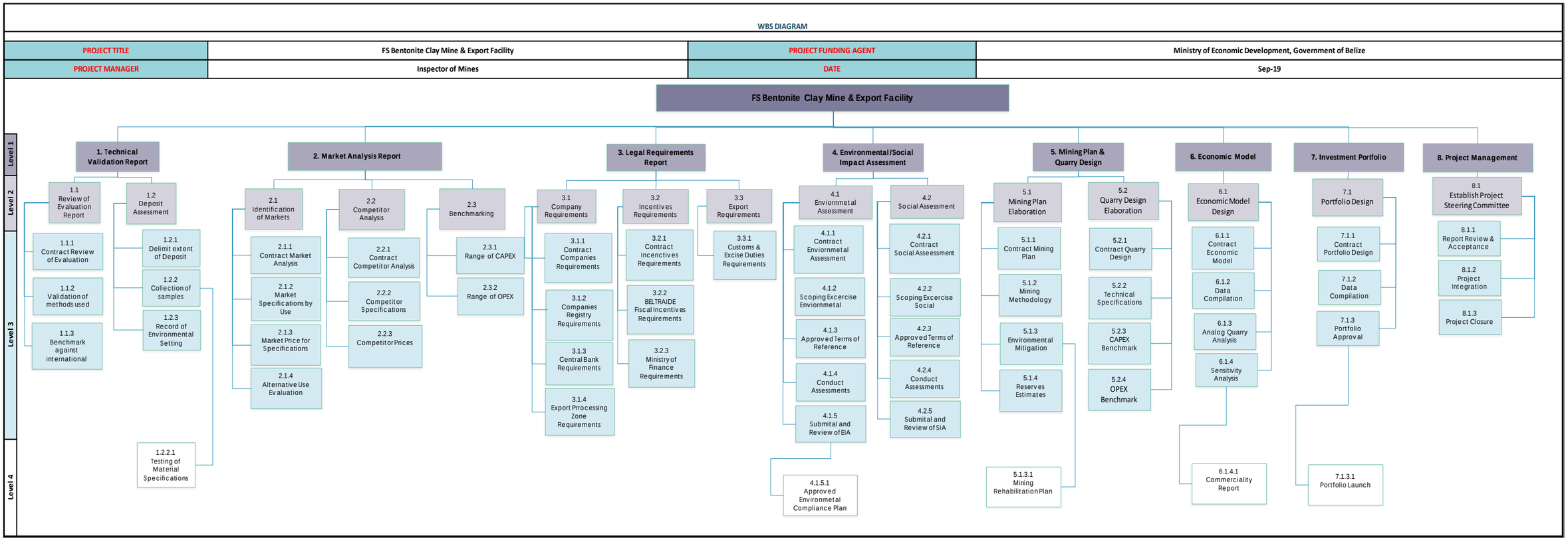
4.2.5.6 Project Assumptions

- Interest and uptake from local or international industry partners is present; this should lead to investment in the establishment of the industry.
- Government investment agencies have an interest in the promotion and enabling of the extractive industry.
- The size, quantity and material specifications of the bentonite deposit are adequate for the establishment of an extractive and export industry.
- Financial incentives packages are robust enough to be applied to an extractives industry.

4.2.6 Work Breakdown Structure

The FS Project has been subdivided into eight (8) subcomponents illustrated in Chart 12, and further subdivided into corresponding work packages for the effective management and completion of the project. This allows the Project Manager more effective management of the project's scope as the project team works on the necessary tasks for project completion. It also provides for a clear line of sight on what work is required for each task. The work breakdown structure (WBS) details these work packages and utilizes a five (5) day work week of forty (40) hours per week.

Chart 12 Work Breakdown Structure (Source: compiled by author, C. Moore, August 2019)



To clearly define the work necessary for project completion the WBS Dictionary is used. The WBS Dictionary as illustrated in Chart 13, includes an entry for each WBS element. The WBS Dictionary includes a detailed description of work for each element and the deliverables, budget and resource needs for that element. The project team will use the WBS Dictionary as a statement of work for each WBS element.

Chart 13 WBS Dictionary (Source: compiled by author, C. Moore, August 2019)

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
1	1.0	**Technical validation Report**			**$10,000**	
2	1.1	Review of Evaluation Report	Review and certification of results of previous evaluation and testing. Estimate of volume and characteristics of deposit	Report on validity of test results and reserve estimation	$6,000	Mining Consultant
3	1.1.1	Contract Review of Evaluation	Hire Consultant to carry our review and analysis	Assessment of results and report findings		Mining Consultant
3	1.1.2	Validation of Methods Used	Verifying that methodology used was adequate for resource estimation and material testing	Report on adequacy of methods		Mining Consultant
3	1.1.3	Benchmark Against International Standards	Verifying the test methods used are in keeping with international standards and norms for clay testing	Report on adequacy and international standards used for bentonite		International MSDS tech sheets
1	1.2	Deposit Assessment	Evaluation of the deposit and its properties and characteristics	Report of size and nature of the deposit	$1,500	Project Team
2	1.2.1	Delimit Extent Of Deposit	Determine the lateral and vertical extent of the deposit	Topographic Survey, Borehole analysis, reserve estimate on volume of material available		Borehole Rig Survey Equipment Mineral Surveyor
2	1.2.2	Collection of Samples	Drill boreholes and collect samples at various depth	Borehole analysis and sample repository		Project Team

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
3	1.2.2.1	Testing of material specifications	conduct standard tests to determine material properties, composition, and characteristics	Test results with chemical and physical parameters determined	$2,500	Certified Materials Laboratory
2	1.2.3	Record of Environmental Setting	Documentation of the physical state of the area to be used for extraction	Baseline environmental data for site.		Project Team
1	2.0	**Market Analysis Report**			**$5,000**	
2	2.1	Identification of Markets	Identification and examination of markets for sale of bentonite	Listing of potential purchasers and requirements	$3,000	Economist or Business Analyst
3	2.1.1	Contract Market Analysis	Hire Consultant to carry out data collection and analysis	Assessment of results and report findings		
3	2.1.2	Market Specifications by Use	Identification and examination of specific material characteristics for each use of product	Listing of potential uses of bentonite by specific qualities		
3	2.1.3	Market Price for Specifications	Identification and examination of prices for specific material characteristics for each use of product	Listing of market prices for bentonite by specific qualities and uses		
3	2.1.4	Alternative Use Evaluation	Identification of new and emerging markets or technological advances that utilize bentonite	Listing of new or emerging markets		
2	2.2	Competitor Analysis	Examination of other international producers of bentonite, types, specifications and uses o for the various products	Report on other producers of bentonite	$1,500	Business Analyst
3	2.2.1	Contract Competitor Analysis	Hire Consultant to carry out data collection and analysis	Assessment of results and report findings		
3	2.2.2	Competitor Specifications	Detailed examination of the different types and quality of bentonite produced internationally in the intended markets	Listing of material specifications by producer		

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
3	2.2.3	Competitor Prices	Detailed examination of the different types and quality of bentonite produced internationally and prices received for it	Listing of prices received by producer		
2	2.3	Benchmarking	Obtaining analog pricing for investment and operations	Analog prices that can aide in economic modeling	$500	Project Team
3	2.3.1	Range of CAPEX	Obtaining typical price range for establishing a quarry and export facility	Expected Capital Investment for the industry		
3	2.3.2	Range of OPEX	Obtaining typical price range for operating a quarry and export facility	Expected Operational expenditure for the industry		
1	3	**Legal Requirements Report**			**$5,000**	
2	3.1	Company Requirements	Detail requirements for establishing a company in Belize and the rules and procedures for operation and doing business.	Report on requirements, eligibility, limitations, and restrictions	$2,500	Lawyer or Investment Officer
3	3.1.1	Contract Company Requirements	Hire Consultant to carry out data collection and analysis	Assessment of results and report findings		Lawyer or Investment Officer
3	3.1.2	Companies Registry Requirements	Examination of the Companies Registry Act and other relevant legislation that provides for Company formation and types of companies/ shareholder requirements or other restrictions which would be applicable	Road map for establishing a company including limitations for establishment. Relevant application forms or documentation		Lawyer or Investment Officer

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
3	3.1.3	Central Bank Requirements	Examination of Central Bank rules and procedures for importation and exportation of funds	Road map for establishing company bank accounts and money transfers including limitations for exportation of proceeds. Relevant application forms or documentation		Lawyer or Investment Officer
3	3.1.4	Export Processing Zone Requirements	Examination of the Export Processing Zone Act and any other relevant legislation that provides for the creation of an EPZ or any restrictions which would be applicable	Road map for establishing an EPZ company including limitations. Relevant application forms or documentation		Lawyer or Investment Officer
2	3.2	Incentives Requirements			$2,000	Investment Officer
3	3.2.1	Contract Incentives Requirements	Hire Consultant to carry out data collection and analysis	Assessment of results and report findings		Investment Officer
3	3.2.2	BELTRAIDE Fiscal Incentives Requirements	Examination of the relevant legislation that provides for investment incentives to determine which would be applicable	Road map for eligibility for BELTRAIDE Fiscal Incentive packages including limitations. Relevant application forms or documentation		Investment Officer
3	3.2.3	Ministry of Finance Requirements	Examination of the relevant legislation that provides for investment incentives to determine which would be applicable	Road map for eligibility for MOF fiscal Incentives including limitations. Relevant application forms or documentation		Investment Officer
2	3.3	Export Requirements			$500	Project Team
3	3.3.1	Customs & Excise Duties Requirements	Examination of the duties and excise fees to determine what is applicable to the industry	Listing of relevant taxes and duties to be paid and requirements for filing.		Project Team

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
1	4	**Environmental/ Social Impact Assessment**			**$35,000**	
2	4.1	Environmental Assessment	Conduct an Environmental Impact Assessment	Completed EIA	$27,500	Environmental Consulting Group
3	4.1.1	Contract Environmental Assessment	Hire Consultant to carry assessments and conduct analysis	Assessment of results and report findings		
3	4.1.2	Scoping Exercise Environmental	Detailed submission or project proposal and checklist for industry	Project Proposal for industry including a checklist for submission		
3	4.1.3	Approved Terms of Reference	TOR to conduct EIA is reviewed by the Department of the Environment	Approved TOR for study		
3	4.1.4	Conduct Assessments	Conduction environmental assessments, fieldwork and analytical studies	EIA document finalized		
3	4.1.5	Submittal and Review of EIA	EIA document submitted and reviewed by the National Environmental Appraisal Committee	Favorable review and recommendation for environmental clearance		
4	4.1.5.1	Approved Environmental Compliance Plan	ECP drafted and vetted for the industry	ECP issued for the project		
2	4.2	Social Assessment	Conduct a Social Impact Assessment	Completed SIA	$7,500	Social Sector Expert
3	4.2.1	Contract Social Assessment	Hire Consultant to carry assessments and conduct analysis	Assessment of results and report findings		
3	4.2.2	Scoping Exercise Social	Detailed submission or project proposal and checklist for industry	Project Proposal for industry. Checklist		
3	4.2.3	Approved Terms of Reference	TOR to conduct SIA is reviewed by the Department of the Environment	Approved TOR for study		

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
3	4.2.4	Conduct Assessments	Conduction social assessments, fieldwork and analytical studies	SIA document finalized		
3	4.2.5	Submittal and Review of SIA	SIA document submitted and reviewed by the National Environmental Appraisal Committee	Favorable review and recommendation for environmental clearance		
1	5	**Mining Plan & Quarry Design**			**$25,000**	Mining Engineering Consultant or Firm
2	5.1	Mining Plan Elaboration	Detailed Mining plan that outlines extraction from commencement to mine closure	Mining Plan	$15,000	
3		Contract Mining Plan	Hire Consultant to develop mining plan do assessments and conduct analysis	Assessment of results and report findings		
3	5.1.1	Mining Methodology	Outline of mining techniques and practices to be used for the extraction of the material	Mining schedule and plan		
3	5.1.2	Environmental Mitigation	Details of operational health, safety and environmental precautions to be followed in mining	OSHA manual and guidelines for mine		
4	5.1.2.1	Mining Rehabilitation Plan	Detailed plan for the recovery or restoration of the mine at the end of commercial life	Rehabilitation plan with designs		
3	5.1.3	Reserves Estimates	Quantification of deposit estimates by grade and extraction profile	Estimate of volume of material that can be acquired at site for the duration of mine lifespan		
2	5.2	Quarry Design Elaboration	Detailed technical drawings and mine design	Quarry design with all technical specifications and drawings	$10,000	Mining Engineering Consultant or Firm

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
3	5.2.1	Contract Quarry Design	Hire Consultant to develop quarry design and produce technical drawings	Quarry design with all technical specifications and drawings		
3	5.2.2	Technical Specifications	Technical schematic drawings that detail mine development by stage	Technical drawings with dimensions for extraction plots		AutoCAD/ GIS
3	5.2.3	CAPEX Benchmark	Examination of investment capital required for the establishment of a quarry	Range of industry capital investments for start-up		
3	5.2.4	OPEX Benchmark	Examination of operational expenses required for a quarry	Range of industry daily operational cost		
1	6	**Economic Model**			**$10,000**	Economist or Mining Engineer
2	6.1	Economic Model Design	Development of a robust economic model for an extractive industry	Economic model		
3	6.1.1	Contract Economic Model	Hire Consultant to carry assessments and conduct analysis	Assessment of results and report findings		
3	6.1.2	Data Compilation	Collection of data and input parameters for build of economic model	baseline data and input data for economic model		
3	6.1.3	Analog Quarry Analysis	Collection of analog data for quarries to be used as verification/test of economic model	Baseline data for analog quarry/quarries		
3	6.1.4	Sensitivity Analysis	Scenario analysis for different sensitivities such as prices, extraction rates, taxes, incentives	Minimum of 6 scenarios to evaluate impacts on industry		
4	6.1.4.1	Commerciality Report	Analysis and incorporation of data and analysis to determine the rate of return (ROR), net present value (NPV) and cash flow projections.	Report on commercial viability of proposed industry.		
1	7	**Investment Portfolio**			**$5,000**	Designer/ Marketer or Investment Officer

WBS Dictionary						
Project Name: FS Bentonite Clay Mine & Export Facility						
Level	**WBS Code**	**Element Name**	**Description of Work**	**Deliverables**	**Budget**	**Resources**
2	7.1	Portfolio Design	Creation and design of investment portfolio that can be shared with interested industry partners	Design and layout options for portfolio		
3	7.1.1	Contract Portfolio Design	Hire Consultant to collect data and design portfolio	Investment Portfolio for bentonite deposit		
3	7.1.2	Data Compilation	Collection of data and input parameters for build of portfolio	Input data for portfolio		
3	7.1.3	Portfolio Approval	Review and acceptance of design and information to be presented in portfolio	Approved portfolio		
4	7.1.3.1	Portfolio Launch	Market ready investment package that is attractive and provides a level of detail to attract investor	Portfolio sent to various investment partners		
1	8	**Project Management**			**$15,000**	Stipends
2	8.1	Establish Project Steering Committee	Assignment of senior government and non-government personnel to PSC for the oversight of the project	PSC with approved Terms of References and mandate		Senior Government and Non-government officials
3	8.1.1	Report Review & Acceptance	Review, evaluation, and acceptance of project reports and deliverables, and that they are compliant with the requirements traceability matrix	Approved and accepted project documents and reports		Project Steering Committee/ Project Sponsor
3	8.1.2	Project Integration	Harmonization of all project aspects for overall project success	Project Document updates		Project Team
3	8.1.3	Project Closure	Closeout of all project activities and accounts. Documentation update.	Project Document updates		Project Team

4.2.7 Scope Verification

As this project progresses the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement, WBS and WBS Dictionary. Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager will update the Project Steering Committee and the Sponsor, and at the next PSC meeting formal acceptance of the deliverable will be done once it satisfies the criteria established in the Requirements Traceability matrix for completion. During this meeting the Project Manager will present the deliverable to the Project Sponsor for formal acceptance. The Project Sponsor will accept the deliverable by signing a project deliverable acceptance document. This will ensure that project work remains within the scope of the project on a consistent basis throughout the life of the project.

4.2.8 Scope Control

The Project Manager and the project team will work together to control the scope of the project. The project team will leverage the WBS Dictionary by using it as a statement of work for each WBS element. The project team will ensure that they perform only the work described in the WBS dictionary and generate the defined deliverables for each WBS element. The Project Manager will oversee the project team and the progression of the project to guarantee that the scope control process is satisfactorily followed.

If a change to the project scope is needed the process for recommending changes to the scope of the project must be carried out. Any project team member or sponsor or Project Steering Committee member can request changes to the project scope. All change requests must be submitted to the Project Manager using the project change request document. The Project Manager will review the suggested change to the scope of the project. The Project Manager can either deny the change request if it does not apply to the intent of the project or convene a change control meeting with the project team, Project Steering Committee and Sponsor to review the change request further and perform an impact assessment of the change. If the change request receives initial

approval by the Project Manager, PSC, and Sponsor, the Project Manager will then formally submit the change request to the Project Steering Committee. If the Project Steering Committee upon advice of the technical advisors approves the scope change, the Project Sponsor will then formally accept the change by signing the project change control document. Upon acceptance of the scope change the Project Manager will update all project documents and communicate the scope change to all project team members and stakeholder.

4.2.9 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Ministry of Economic Development
Chief Executive Officer

REQUIREMENTS MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

AUGUST 2019

4.2.10 Introduction

The purpose of the Requirements Management Plan is to set forth the plans and procedures for collecting documenting, analyzing and managing the project requirements. The term “requirements” refers to qualities, capabilities or conditions that must be present to satisfy a contractual obligation or other formally imposed specification for the FS project on establishing a Bentonite Clay Mine and Export Facility.

For the purpose of this project the requirements will be categorized in two ways. First is, the project requirements that consist mostly of non-technical requirements identified to meet the needs of the project. It additionally guarantees project completion and readiness an in the integration and determination of commerciality of the deposit. Second is, the product requirements which have been identified to meet the technical specifications of the product being produced as a result of the project. These consists of requirements to ensure that specifications are in compliance with international standards.

The inputs for the requirements management plan include the Project Charter, preliminary Stakeholder Register, applicable laws. Regulations and codes.

4.2.11 Requirements Management Approach

The approach that will be utilized for the requirements management will be divided into four areas: requirements identification, requirements analysis, requirements documentation, and ongoing requirements management.

4.2.11.1 Requirements Identification

To identify the requirements, the project team will facilitate various data collection methods namely: interviews, focus groups, facilitated workshops, group creativity techniques (brainstorming, nominal group techniques, multi-criteria decision analysis), questionnaires and surveys, benchmarking, observation and document analysis. These will be conducted among the project stakeholders along with the Project Steering Committee to ensure all requirements are captured.

4.2.11.2 Requirements Analysis

The project team will analyze requirements to determine if they should be classified in the project or product category. Additionally, this analysis examines the WBS and makes a determination where in the WBS the requirements will fit or what work activities correspond to particular requirements. Accountability and priority for each requirement

will also be determined as part of the analysis. Finally, metrics and acceptance criteria must be determined for all requirements in order to provide a baseline for understanding when a requirement has been fulfilled to an acceptable level.

4.2.11.3 Requirements Documentation

Once requirements have been identified, categorized and analyzed, they will be documented and assigned. They will be added to the project plan and the project team will determine what methodology the accountable personnel will use to track and report on the status of each requirement. All requirements will also be added to the project requirements checklist which must be completed before formal project closure is accepted by the project sponsor.

4.2.11.4 Ongoing Requirements Management

Throughout the project lifecycle, the project manager will monitor that all team members are reporting requirement status and raising any issues or concerns with their assigned requirements as appropriate. Through the project life any situations in which requirements must change or be altered, will be handled through the established change control process to propose any changes to requirements and receive approval from the project steering committee. Ongoing requirements management also includes receiving approval of all requirements by all vested parties as part of project closure.

4.2.12 Configuration Management

The Requirements Management Plan will utilize an integrated change control process that includes documentation/version control and change control:

4.2.12.1 Documentation and Version Control

All project documentation will be loaded into the Geology and Petroleum Management Information System Database as the central repository. Appropriate permissions will be granted to the project team for editing and revising documentation. Any proposed changes to project requirements must be reviewed through the integrated change control process and have written approval from the project sponsor and the project steering committee before any documentation changes are initiated. Once these proposed changes are approved and the documentation is edited, the project manager will be responsible for communicating the change to all project stakeholders.

4.2.12.2 Change Control

Any proposed changes in project requirements must be carefully considered before approval and implementation. Such changes are likely to impact project scope, time, and/or cost, perhaps significantly. Any proposed changes to project requirements will be reviewed through the integrated change control process which includes the project steering committee. The role of the PSC is to determine the impact of the proposed change on the project, seek clarification on the proposed change, and ensure any approved changes are added to the project documents. The project sponsor, who also sits on the PSC, is responsible for approving any changes in project scope, time, or cost and is an integral part of the change review and approval process.

4.2.13 Requirements Prioritization Process

The project manager will facilitate stakeholder meetings in order to establish priorities for all project requirements. This project will use a three-level scale in order to prioritize requirements. Chart 14 below illustrates these levels and defines how requirements will be grouped:

Chart 14 Requirements Prioritization (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Requirements Prioritization	
Priority Level	**Definition**
High	These are critical requirements and are required for project/product success for the progression to the next project phase.
Medium	These requirements support product/process operations but may be completed until the next deliverable/product is due.
Low	These requirements are quality and/or functional enhancements and are not desirable if time and resource do not permit

As the project moves forward and constraints or issues are identified, it may be necessary for the project team and stakeholders to meet to determine what requirements must be achieved, which can be re-baselined, or which can be omitted. These determinations will be made in a collaborative effort based on the priorities of the requirements and level they are assigned in accordance with Chart 14 above. As changes in requirements are made, all project documentation must be updated in the GPD Database and communicated to all project stakeholders.

4.2.14 Project Metrics

Project metrics for the project will be based on cost and quality requirements as outlined in the project charter. To achieve project success, the project must meet or exceed all established metrics.

Cost:

- Technical validation of deposit specifications: $10,000
- Market Analysis: $5,000
- Legal Requirements: $5,000
- EIA/SIA: $35,000
- Mining Plan & Quarry Design: $25,000
- Economic Model: $10,000
- Investment Portfolio: $5,000

Quality:

- Benchmarking of all parameters (specifications, CAPEX, OPEX, etc) must be done with acceptable international standards and norms, with data obtained from internationally accredited sources.

- Environmental, legal and social aspects must meet minimum national standards such as Environmental Protection Act & Regulations, be in accordance with the Business and Income Tax Act, Companies Registry Act, Mines and Minerals Act, etc.
- Mining Plan and Quarry Design must meet international industry standards for an extractive industry.
- Economic Models must be incorporate the regulatory requirements for taxes and levees and royalties.

4.2.14 Requirements Traceability Matrix

The purpose of the Requirements Traceability Matrix as illustrated in chart 15 ensures that all product requirements are completed in accordance with the project charter. This matrix provides a thread from all product requirements through design, implementation, and project team acceptance. Any approved changes in project scope or requirements will result in changes to the traceability matrix below. Based on the impact of the approved changes, the Project Manager will make the necessary changes to the matrix and communicate those changes to all project stakeholders.

Chart 15 Requirements Traceability Matrix (Source: compiled by author, C. Moore, August 2019)

REQUIREMENTS TRACEABILITY MATRIX								
Project Name:			FS Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.					
Project Manager Name:			Inspector of Mines					
Project Description:			Feasibility Study					
ID	**WBS ID**	**Item Description**	**Requirement Description**	**Product Design/Product Development requirements**	**Priority**	**Verification**	**Status**	**Additional Comments**
001	1.1	Review of GET s. r.o Evaluation Report	Thorough analysis of methodology used, test parameters, and conclusions as it relates to fitness for the various uses of bentonite	Consultant with knowledge of exploration and mineral development that can validate and benchmark against international standards	High	Report shows that methodology and criteria are consistent with international standards		
002	1.2.1	Delimit extent of Deposit	Determine size and extent of deposit	Survey of lateral extent and core analysis to determine depth of deposit	High	Meets or exceeds minimum size and volume required for establishing a quarry Acreage and volume of material can sustain minimum 10yr extraction		
003	1.2.2.1	Testing of material specifications	Certification of test results as it relates to quality and specifications	Laboratory that can test and evaluate if materials meets or exceeds international standards for bentonite clay composition and properties	High	Meets or exceeds international standards for bentonite clay composition and properties for use as an industrial mineral		
004	2.1.2`	Market Specifications by Use	Determine specific properties and composition for different uses of bentonite	Economist or Mineral dealer that can verify and identify materials and markets	Medium	Listing of specifications by category for bentonite use		

REQUIREMENTS TRACEABILITY MATRIX								
Project Name:			FS Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.					
Project Manager Name:			Inspector of Mines					
Project Description:			Feasibility Study					
ID	**WBS ID**	**Item Description**	**Requirement Description**	**Product Design/Product Development requirements**	**Priority**	**Verification**	**Status**	**Additional Comments**
005	2.1.3	Market Price for Specifications	Determine pricing for different properties and composition	Economist or Mineral dealer that can verify and identify materials and markets	Medium	Listing of prices for different specifications by category for bentonite use		
006	2.1.4	Alternative Use Evaluation	Determine various uses and markets for bentonite	Economist or Mineral dealer that can verify and identify material specifications within range of alternative market requirements	Medium	Listing of alternative uses and markets with specifications by category for bentonite use		
007	2.2	Competitor Analysis	Evaluate current producers of bentonite	Business analyst that can evaluate the commodities markets	Medium	Listing of current producers including product definition		
008	2.3	Benchmarking	Determine the normal range of CAPEX and OPEX for extractive industry	Consultant with knowledge of exploration and mineral development	Medium	Accepted range of rates from international accepted sources.		
009	3.1.2	Companies Registry Requirements	Determine the requirements for registration of extractive company for export	Legal person that can discern detailed requirements for the registration of company and limitations based on nationality/company type	Medium	Road map for company registration including application forms for company registration		

REQUIREMENTS TRACEABILITY MATRIX								
Project Name:			FS Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.					
Project Manager Name:			Inspector of Mines					
Project Description:			Feasibility Study					
ID	**WBS ID**	**Item Description**	**Requirement Description**	**Product Design/Product Development requirements**	**Priority**	**Verification**	**Status**	**Additional Comments**
010	3.1.3	Central Bank Requirements	Determine the requirements for registration of bank accounts and money transfers for extractive company for export	Legal person that can discern detailed requirements for the registration of company accounts and limitations based on nationality/company type and parent company registration	Medium	Road map for obtaining banking approvals including application forms for banking registration		
011	3.1.4	Export Processing Zone Requirements	Determine the requirements for qualification of EPZ status	Investment Officer than can detail requirements for EPZ application and qualifying criteria including limitations and restrictions	Medium	Road map for obtaining EPZ status including application forms.		
012	3.2	Incentives Requirements	Analysis and determination of the requirements	Investment Officer than can detail requirements for incentives programs including application and qualifying criteria including limitations and restrictions	Medium	Road map for obtaining incentive packages including application forms.		
013	3.3	Export Requirements	Determine the requirements for exportation of mineral commodity	Investment Officer or legal person than can detail export and taxation requirements	Low	Listing of export requirements and taxation rates		

REQUIREMENTS TRACEABILITY MATRIX								
Project Name:			FS Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.					
Project Manager Name:			Inspector of Mines					
Project Description:			Feasibility Study					
ID	**WBS ID**	**Item Description**	**Requirement Description**	**Product Design/Product Development requirements**	**Priority**	**Verification**	**Status**	**Additional Comments**
014	4.1	Environmental Assessment	Conduct an Environmental Assessment of the proposed industry	Environmental Consultant Group with multi-sectoral experts that can assess environmental impacts and mitigation	High	Acceptance and approval of the EIA by the National Environmental Appraisal Committee (NEAC)		
015	4.2	Social Assessment	Conduct a Social Assessment of the proposed industry	Social expert that can assess social impacts of the proposed industry	High	Acceptance and approval of the SIA by the National Environmental Appraisal Committee (NEAC)		
016	5.1	Mining Plan Elaboration	Develop and elaborate a mining plan for the extraction, development, and rehabilitation of the site	Mining Engineering consultant or firm with experience in mining requirements	Medium	Mining Plan that meets or exceeds international requirements and national legislation		
017	5.2	Quarry Design Elaboration	Detailed design of quarry and extraction methodology	Mining Engineering consultant or firm with experience in mine designs	Medium	Quarry Design that meets or exceeds international requirements and national legislation		
018	6.1	Economic Model Design	Economic Model for extractive industry	Mining Engineer or Economist with experience in mineral industry that can simulate scenarios of price and extraction rates	High	Economic model that can run various sensitivities and provide outputs that indicate commerciality or viability.		

REQUIREMENTS TRACEABILITY MATRIX								
Project Name:			FS Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.					
Project Manager Name:			Inspector of Mines					
Project Description:			Feasibility Study					
ID	**WBS ID**	**Item Description**	**Requirement Description**	**Product Design/Product Development requirements**	**Priority**	**Verification**	**Status**	**Additional Comments**
019	7.1	Portfolio Design	Create an elaborate investment portfolio that highlights the investment potential	Designer/Marketer or Investment Officer that has experience with reaching international markets	Medium	Investment portfolio that can be shared in an international mineral arena		
020	8.1	Establish Project Steering Committee	Formulation of the PSC for the oversight and management of the project.	Senior Government and Non-Government officials with expertise in industries, investments and project management	High	Assignment of officials by Line Ministries/Agency via formal appointment letters		
021	8.1.1	Report Review & Acceptance	Review and acceptance of various deliverables by the project steering committee and project sponsor	Deliverables D-1 to D-7	High	Completed and accepted deliverables by Project Steering Committee and Project Sponsor based on acceptance criteria in Quality Management plan		
022	8.1.3	Project Closure	Closeout of all project activities and accounts	Project completed within budget and schedule and within scope	High	Completed and accepted deliverables by Project Steering Committee and Project Sponsor based on acceptance criteria in Quality Management plan		

4.2.15 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Ministry of Economic Development
Chief Executive Officer

4.3 Schedule Management Plan

The Schedule Management Plan was derived from the Project Charter, the Scope Management Plan, and the Requirements Management Plan. An examination of the Milestones and the deliverables was used an indicator for scheduling and sequencing. The tools utilized were expert judgment, analogous examination, and other analytical techniques.

SCHEDULE MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

AUGUST 2019

4.3.1 Introduction

The project schedule is the roadmap that determines how the project will be executed, how activities are aligned and sequenced. Schedules are an important part of any project as they provide the project team, sponsor, and stakeholders a picture of the project's status at any given time. In essence, it is a snapshot of where the project should be at that given moment as well as a projection of what is to come. The purpose of the schedule

management plan is to define the approach the project team will use in creating the project schedule. This plan also includes how the team will monitor the project schedule and manage changes after the baseline schedule has been approved. This includes identifying, analyzing, documenting, prioritizing, approving or rejecting, and publishing all schedule-related changes. The project sponsor has the authority to approve schedule changes brought forward through the Change Control Process.

4.3.2 High-Level Workflows and Activities

This section identifies the list of Schedule Management processes, activities, and tasks that will be defined and implemented to establish and manage the project schedule. The identified Schedule Management processes include, but are not limited to:

- **Develop Project Schedule** – An integrated process consisting of defining activities, sequences, and required resources to complete the project deliverables.
- **Monitor and Control Schedule** – The process of monitoring and reporting on the progress of project activities as well as managing progress and changes to the schedule baseline to achieve project objectives. If necessary, based on factors such as project size and complexity, the process may be broken down into sub-processes such as:
  - **Schedule Activity and Progress Updates** – The process of establishing how and at what intervals project activity and progress updates will be collected during the project.
  - **Schedule Monitoring** – The process of establishing how to schedule progress updates are compared to the schedule baseline**.**
  - **Schedule Control** – The process of establishing the control tools and techniques for how the schedule will be managed and how changes will be addressed.
  - **Schedule Reporting** – The process of defining what schedule reporting metrics and reports are necessary for the project, at what intervals reporting should occur, and to what audiences.

4.3.3 Roles and responsibilities

The roles and responsibilities of the various persons involved in the activities of the Schedule Management process are displayed in chart 16. The chart offers details of all roles and responsibilities for successful completion of project.

Chart 16 Roles and Responsibilities for Schedule Management (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Schedule Management Roles & Responsibilities	
Role	**Responsibility**
Project Sponsor	➢ Approves Schedule Management Plan ➢ Reviews and approves final schedule baseline and schedule progress reports. ➢ Provides overall guidance and mentoring. ➢ Approves any significant changes that will impact the schedule through the change control process.
Project Steering Committee	➢ Reviews and recommends approval for final schedule baseline and schedule progress reports. ➢ Provides overall guidance and mentoring. ➢ Reviews and recommends approval for any significant changes that will impact the schedule through the change control process.
Project Manager	➢ Overall responsibility for schedule management. ➢ Leads the team in the development of the Schedule Management Plan and the Project Schedule. ➢ Leads the project team in Schedule Management related activities. ➢ Reviews, evaluates and provides feedback on schedule progress reports and time-risk recommendations from the Project Team. ➢ Provides regular status information in meetings with the Project Sponsor and Project Steering Committee. ➢ Responsible for reviewing all schedule change requests prior to submitting them to the Project Sponsor for approval.
Functional Managers (Government Agencies/ Line Ministries)	➢ Reviews and approves time estimates for staff reporting to them. ➢ Notifies the Project Manager of workload changes that may affect the schedule. ➢ Works with the Project Manager on resource schedule-related items for risks, issues, and possible changes.
Project Team Members	➢ Responsible for participating in work package definition, sequencing, and duration and resource estimating. ➢ Review and validate the proposed schedule and perform assigned activities once the schedule is approved. ➢ Notifies the Project Manager about possible schedule risks and issues. ➢ Assists with schedule estimating activities. ➢ Provides accurate time estimates for project work packages. ➢ Provides accurate progress reporting during the project.
Technical Advisors	➢ Reviews project schedule and schedule management status and progress documents.
Project Stakeholders	➢ Participate in reviews of the proposed schedule and assist in its validation.

4.3.4 Schedule Management Approach

4.3.4.1 Schedule Development

The project's schedule will be created using MS Project 2013 starting with the deliverables identified in the project's Work Breakdown Structure (WBS). Activity definition will identify the specific work packages to be performed for completion of each deliverable. In addition, activity sequencing will determine the order of work packages and assign relationships between project activities. Activity duration estimating will be used to calculate the number of work periods required to complete work packages. Finally, resource estimating will be used to assign resources to work packages in order to complete schedule development.

When the preliminary schedule has been developed, the project team and tentatively assigned resources review the project tasks. Ultimately, the project team and resources must agree to the proposed work package assignments, durations, and schedule. Once this is accomplished, the project sponsor reviews and approves the schedule. At this juncture the schedule is baselined.

4.3.4.2 Units of Measure and Level of Accuracy

Tasks are linked together and sequenced to identify the relationships between deliverables, sub-deliverables, activities, tasks, and subtasks by dependencies.
The identified dependencies used were:

- **Finish-to-Start (FS):** The initiation of the successor activity depends upon the completion of the predecessor activity.
- **Finish-to-Finish (FF):** The completion of the successor activity depends upon the completion of the predecessor activity.
- **Start-to-Finish (SF):** The completion of the successor activity depends upon the initiation of the predecessor activity.
- **Start-to-Start (SS):** The initiation of the successor activity depends upon the initiation of the predecessor activity.

The primary estimation techniques used by the project are analogous estimating and expert judgment. In the area of human resources, the measures utilized are hours, days, weeks, and months. No other fractions or portions of identified measures are used for the project. Lastly, to measure the project resource's activity durations, the level of accuracy for the project is considered plus or minus 10%.

4.3.5 Schedule Maintenance

Project team members report their work time and progress weekly on the basis of percent of work completed for that specific task. Monthly reports will also be submitted to the project manager indicating any variance from the planned schedule.

The Project Manager will prepare monthly reports that highlight overall project performance including schedule performance. The following reports are for documentation purposes: Project Steering Monthly Reports and Project Sponsor Monthly Reports.

4.3.6 Project Schedule Metrics

The project will use Schedule Variance (SV) and Schedule Performance Index (SPI) as the basis for measuring schedule performance. In addition, the project will track two additional data points in order to improve estimation accuracy. These are namely the following:

- **Percentage of Tasks on Time** – Measures the percentage of tasks that finish on or ahead of their planned finish date.
- **Percentage of Tasks on Budget (Effort)** – Measures the percentage of tasks that are completed within their allocated time budget.

4.3.7 Reporting Formats

Chart 17 displays the availability of scheduled reports and includes their specified time intervals accessibility during the project.

Chart 17 Reporting Formats Schedule Management (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Schedule Management Reporting Formats			
Report	**Frequency**	**Author**	**Reporting Responsibility**
Resource Task Lists and Work Packages	Weekly	Assigned Project Team Member	Generate individual resource task lists and work packages from the scheduling tool and make them available online to project team members.
Project Schedule Report	Monthly	Project Manager	Generate the schedule progress report for use in the project status meeting.
Technical Progress Report	Monthly	Technical Advisor	Generate update on performance of technical evaluations for use in project status meetings.
Project Master Schedule (Gantt chart)	Monthly	Project Manager	Generate the updated schedule Gantt chart for use in the project status meeting.
Sponsor Project Report/ Project Steering Committee Report	Monthly	Project Manager	Generate the Sponsor project status report for presentation to the Project Sponsor and Project Steering Committee

4.3.8 Schedule Control

The management and control of the project schedule will be done based on progress information provided in the reporting period. It will also be influenced by the current project risks (perceived and realized), and any open or ongoing issues. The project schedule will be reviewed and updated as outlined in the reporting formats and requirements. Actual start, finish, and completion percentages for each task will also be recorded. This will inform any corrective action required in order to maintain the project schedule.

The project manager is responsible for holding weekly schedule updates/reviews; determining impacts of schedule variances; submitting schedule change requests, and reporting schedule status in accordance with the project's communications plan. The project team is responsible for participating in weekly schedule updates or reviews; communicating all changes of actual start/finish dates to the project manager and participating in schedule variance resolution activities as required. The project sponsor and Project Steering Committee will maintain awareness of the project schedule status and review or approve any schedule change requests submitted by the Project Manager.

The techniques that will be used to maintain schedule control include critical path method, float and free-float, resource histogram and resource leveling. Chart 18 displays a list of schedule control techniques that will be utilized during the FS project.

Chart 18 Tools and Techniques for Schedule Control (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Schedule Control Tools & Techniques	
Technique	**Definition**
Performance Reviews	Performance reviews measure, compare, and analyze schedule performance, such as actual start and finish dates, percent complete, and remaining duration for the work in progress.
Critical Path Method	Critical Path is used to predict project duration by analyzing the sequence of activities (network path) that has the least amount of scheduling flexibility. Earlier dates are calculated by a forward pass using a specified start date. Later dates are calculated by a backward pass starting from a specified completion date.
Resource Histogram	A Resource Histogram is a vertical bar chart used to show resource consumption and availability by time period. Also called a resource-loading chart.
Variance Analysis	Variance Analysis is used to determine the causes of a variance, such as the difference between an expected result and an actual result.
Adjust Leads and Lags	**Lead**: A modification of a logical relationship that allows an acceleration of the successor activity. For example, when a task has a finish-to-start dependency with a 10-day lead, the successor activity can start as much as 10 days before the predecessor activity has finished. **Lag**: A modification of a logical relationship that directs a delay in the successor activity. For example, when a task has a finish-to-start dependency with a 10-day lag, the successor activity can't start until 10 days after the predecessor activity has finished. Adjusting leads and lags are used to find ways to bring lagging project activities into alignment with the plan.

4.3.9 Schedule Changes and Thresholds

If any member of the project team determines that a change to the schedule is necessary, the project manager and team will meet to review and evaluate the proposed change. The project manager and project team determine which tasks will be impacted. In addition, they will ascertain any variance as a result of the potential change and suggest alternatives or variance resolution activities that may be employed. Every possible effort will be taken to minimize the effect on scope, schedule, and resources. Contingent upon this evaluation, the Project Manager determines whether the proposed change exceeds

the established boundary conditions. Exceeding the established boundary conditions requires a schedule change request.

Submittal of a schedule change request to the project sponsor for approval is required if either of the two following conditions is true:

- The proposed change is estimated to reduce the duration of an individual work package by 10% or more or increase the duration of an individual work package by 10% or more.
- The change is estimated to reduce the duration of the overall baseline schedule by 10% or more or increase the duration of the overall baseline schedule by 10% or more.

Any change requests that do not meet these thresholds may be submitted to the project manager for approval.

Once the change request has been reviewed and approved the Project Manager is responsible for adjusting the schedule and communicating all changes and impacts to the project team, project sponsor, and stakeholders. The Project Manager must also ensure that all change requests are archived in the project records repository.

4.3.10 Scope Change

Changes in the project scope that have been approved by the project sponsor, will require the project team to evaluate the effect of the scope change on the current schedule. If the project manager determines that the scope change will significantly affect the current project schedule, a request to re-baseline the schedule may be made. This request is made in consideration of changes which need to be made as part of the new project scope. However, the Project Sponsor and Project Steering Committee must review and approve this request before the schedule can be re-baselined.

4.3.11 Resource Assignment and Activities Duration Estimate

A resource assignment and activities duration were created utilizing an activity list, resource calendar and the activity cost estimates detailed in the WBS Dictionary included

in the Scope Management Plan. The tools and techniques used expert judgment and analogous estimation. The activities estimate is illustrated in Chart 19.

Some base parameters were utilized. These are:

- Work Week: Mon- Fri, 5 days
- Weekends treated as non- work days
- Hours per day: 9
- Project Start: April 1, 2020
- Project End: March 30, 2022

The Project Schedule was then prepared as a Gantt chart using Microsoft Project 2013, shown in Chart 20. Task durations were used along with a dependency analysis of the task to determine the order in which the activities should occur.

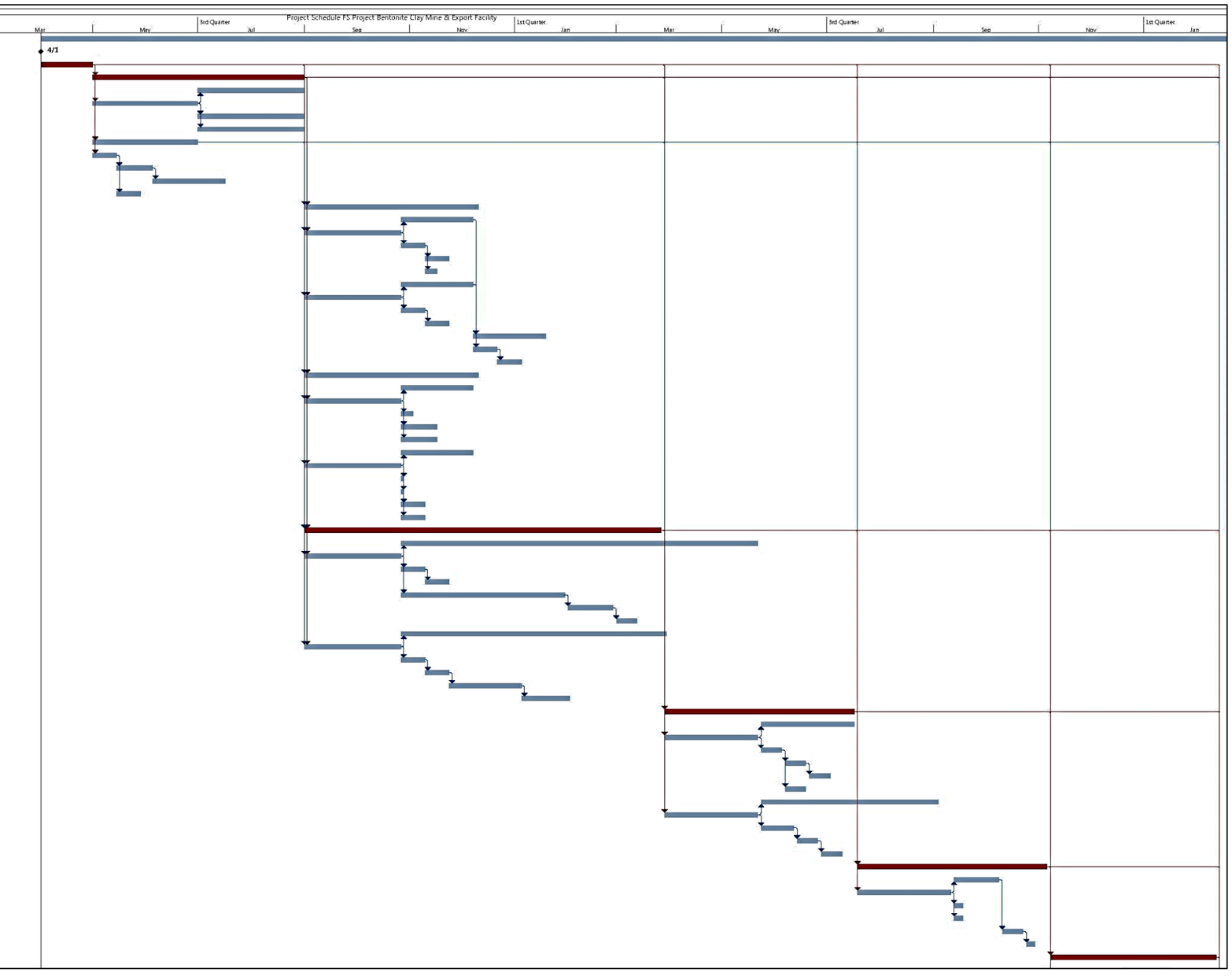
Chart 19 Activities Estimate (Schedule) (Source: compiled by author, C. Moore, August 2019)

FS Bentonite Clay Mine & Export Facility: Activities Estimate						
WBS	**Task Name**	**Duration**	**Start**	**Finish**	**Predecessor**	**Resource Names**
0	**FS Bentonite Clay Mine & Export Facility**	507 days	Wed Apr 1, '20	Thu Mar 10, '22		
8	**Project Management**	0 days	Wed Apr 1, '20	Wed Apr 1, '20		
8.1	Establish Project Steering Committee	22 days	Wed Apr 1, '20	Thu Apr 30, '20		Non-Government Official, Senior Government Official, Technical Advisor, Project Manager
1	**Technical Validation Report**	87 days	Fri May 1, '20	Mon Aug 31, '20	3	
1.1	Review of Evaluation Report	44 days	Wed Jul 1, '20	Mon Aug 31, '20	6	Mining Consultant, Mining Engineer, Technical Advisor
1.1.1	Contract Review of Evaluation	43 days	Fri May 1, '20	Tue Jun 30, '20	3	Project Sponsor, Project Steering Committee, Project Manager
1.1.2	Validation of Methods Used	44 days	Wed Jul 1, '20	Mon Aug 31, '20	6	Mining Consultant, Mining Engineer
1.1.3	Benchmark Against International Standards	44 days	Wed Jul 1, '20	Mon Aug 31, '20	6	Mining Consultant, Mining Engineer
1.2	Deposit Assessment	43 days	Fri May 1, '20	Tue Jun 30, '20	3	Mineral Surveyor, Project Team
1.2.1	Delimit Extent Of Deposit	10 days	Fri May 1, '20	Thu May 14, '20	3	Mineral Surveyor, Project Team
1.2.2	Collection of Samples	15 days	Fri May 15, '20	Thu Jun 4, '20	10	Mineral Surveyor, Project Team
1.2.2.1	Testing of material specifications	30 days	Fri Jun 5, '20	Thu Jul 16, '20	11	Certified Materials Lab, Project Manager
1.2.3	Record of Environmental Setting	10 days	Fri May 15, '20	Thu May 28, '20	10	Project Team
2	**Market Analysis Report**	73 days	Tue Sep 1, '20	Thu Dec 10, '20	3,4,9	
2.1	Identification of Markets	30 days	Tue Oct 27, '20	Mon Dec 7, '20	16	Business Analyst, Economist
2.1.1	Contract Market Analysis	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Project Sponsor, Project Steering Committee, Project Manager
2.1.2	Market Specifications by Use	10 days	Tue Oct 27, '20	Mon Nov 9, '20	16	Business Analyst, Economist
2.1.3	Market Price for Specifications	10 days	Tue Nov 10, '20	Mon Nov 23, '20	17	Business Analyst ,Economist
2.1.4	Alternative Use Evaluation	5 days	Tue Nov 10, '20	Mon Nov 16, '20	17	Mining Consultant
2.2	Competitor Analysis	30 days	Tue Oct 27, '20	Mon Dec 7, '20	21	Business Analyst
2.2.1	Contract Competitor Analysis	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Project Sponsor, Project Steering Committee, Project Manager
2.2.2	Competitor Specifications	10 days	Tue Oct 27, '20	Mon Nov 9, '20	21	Mining Consultant
2.2.3	Competitor Prices	10 days	Tue Nov 10, '20	Mon Nov 23, '20	22	Business Analyst
2.3	Benchmarking	30 days	Tue Dec 8, '20	Mon Jan 18, '21	15,20	Project Team
2.3.1	Range of CAPEX	10 days	Tue Dec 8, '20	Mon Dec 21, '20	20	Project Team
2.3.2	Range of OPEX	10 days	Tue Dec 22, '20	Mon Jan 4, '21	25	Project Team
3	**Legal Requirements Report**	73 days	Tue Sep 1, '20	Thu Dec 10, '20	3,4,9	
3.1	Company Requirements	30 days	Tue Oct 27, '20	Mon Dec 7, '20	29	Investment Officer, Lawyer
3.1.1	Contract Company Requirements	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Project Sponsor, Project Steering Committee, Project Manager
3.1.2	Companies Registry Requirements	5 days	Tue Oct 27, '20	Mon Nov 2, '20	29	Investment Officer, Lawyer
3.1.3	Central Bank Requirements	15 days	Tue Oct 27, '20	Mon Nov 16, '20	29	Investment Officer, Lawyer
3.1.4	Export Processing Zone Requirements	15 days	Tue Oct 27, '20	Mon Nov 16, '20	29	Investment Officer, Lawyer
3.2	Incentives Requirements	30 days	Tue Oct 27, '20	Mon Dec 7, '20	34	Investment Officer
3.2.1	Contract Incentives Requirements	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Investment Officer
3.2.2	BELTRAIDE Fiscal Incentives Requirements	1 day	Tue Oct 27, '20	Tue Oct 27, '20	34	Investment Officer
3.2.3	Ministry of Finance Requirements	1 day	Tue Oct 27, '20	Tue Oct 27, '20	34	Investment Officer
3.3	Export Requirements	10 days	Tue Oct 27, '20	Mon Nov 9, '20	34	Project Team
3.3.1	Customs & Excise Duties Requirements	10 days	Tue Oct 27, '20	Mon Nov 9, '20	34	Project Team
4	**Environmental/ Social Impact Assessment**	149 days	Tue Sep 1, '20	Fri Mar 26, '21	3,4,9	
4.1	Environmental Assessment	149 days	Tue Oct 27, '20	Fri May 21, '21	41	Environmental Consultant
4.1.1	Contract Environmental Assessment	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Project Manager, Project Sponsor, Project Steering Committee
4.1.2	Scoping Exercise Environmental	10 days	Tue Oct 27, '20	Mon Nov 9, '20	41	Environmental Consultant
4.1.3	Approved Terms of Reference	10 days	Tue Nov 10, '20	Mon Nov 23, '20	42	Department of Environment
4.1.4	Conduct Assessments	69 days	Tue Oct 27, '20	Fri Jan 29, '21	41	Environmental Consultant
4.1.5	Submittal and Review of EIA	20 days	Mon Feb 1, '21	Fri Feb 26, '21	44	Environmental Consultant
4.1.5.1	Approved Environmental Compliance Plan	10 days	Mon Mar 1, '21	Fri Mar 12, '21	45	Department of Environment
4.2	Social Assessment	110 days	Tue Oct 27, '20	Mon Mar 29, '21	48	Social Consultant
4.2.1	Contract Social Assessment	40 days	Tue Sep 1, '20	Mon Oct 26, '20	3,4,9	Project Manager, Project Sponsor, Project Steering Committee
4.2.2	Scoping Exercise Social	10 days	Tue Oct 27, '20	Mon Nov 9, '20	48	Social Consultant

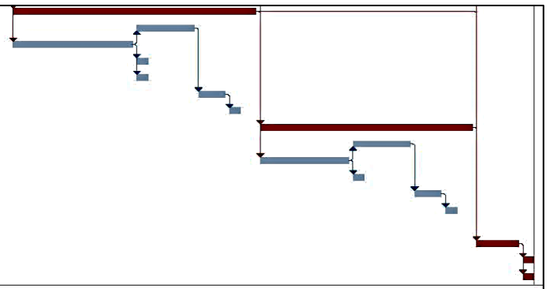
FS Bentonite Clay Mine & Export Facility: Activities Estimate						
WBS	**Task Name**	**Duration**	**Start**	**Finish**	**Predecessor**	**Resource Names**
4.2.3	Approved Terms of Reference	10 days	Tue Nov 10, '20	Mon Nov 23, '20	49	Department of Environment
4.2.4	Conduct Assessments	30 days	Tue Nov 24, '20	Mon Jan 4, '21	50	Social Consultant
4.2.5	Submittal and Review of SIA	20 days	Tue Jan 5, '21	Mon Feb 1, '21	51	Social Consultant
5	**Mining Plan & Quarry Design**	80 days	Mon Mar 29, '21	Fri Jul 16, '21	3,4,9,39	
5.1	Mining Plan Elaboration	40 days	Mon May 24, '21	Fri Jul 16, '21	55	Mining Consultant, Mining Engineer
5.1.1	Contract Mining Plan	40 days	Mon Mar 29, '21	Fri May 21, '21	3,4,9,39	Project Manager, Project Sponsor, Project Steering Committee
5.1.2	Mining Methodology	10 days	Mon May 24, '21	Fri Jun 4, '21	55	Mining Engineer
5.1.3	Environmental Mitigation	10 days	Mon Jun 7, '21	Fri Jun 18, '21	56	Mining Consultant
5.1.3.1	Mining Rehabilitation Plan	10 days	Mon Jun 21, '21	Fri Jul 2, '21	57	Mining Consultant, Mining Engineer
5.1.3	Reserves Estimates	10 days	Mon Jun 7, '21	Fri Jun 18, '21	56	Mining Engineer
5.2	Quarry Design Elaboration	75 days	Mon May 24, '21	Fri Sep 3, '21	61	Mining Engineer
5.2.1	Contract Quarry Design	40 days	Mon Mar 29, '21	Fri May 21, '21	3,4,9,39	Project Manager, Project Sponsor, Project Steering Committee
5.2.2	Technical Specifications	15 days	Mon May 24, '21	Fri Jun 11, '21	61	Mining Engineer
5.2.3	CAPEX Benchmark	10 days	Mon Jun 14, '21	Fri Jun 25, '21	62	Mining Consultant
5.2.4	OPEX Benchmark	10 days	Mon Jun 28, '21	Fri Jul 9, '21	63	Mining Consultant
6	**Economic Model**	80 days	Mon Jul 19, '21	Fri Nov 5, '21	3,4,39,9,53	
6.1	Economic Model Design	20 days	Mon Sep 13, '21	Fri Oct 8, '21	67	Economist
6.1.1	Contract Economic Model	40 days	Mon Jul 19, '21	Fri Sep 10, '21	3,4,53,39,9	Project Manager, Project Sponsor, Project Steering Committee
6.1.2	Data Compilation	5 days	Mon Sep 13, '21	Fri Sep 17, '21	67	Mining Consultant, Economist
6.1.3	Analog Quarry Analysis	5 days	Mon Sep 13, '21	Fri Sep 17, '21	67	Economist, Mining Consultant
6.1.4	Sensitivity Analysis	10 days	Mon Oct 11, '21	Fri Oct 22, '21	66	Economist
6.1.4.1	Commerciality Report	5 days	Mon Oct 25, '21	Fri Oct 29, '21	70	Economist, Mining Consultant
7	**Investment Portfolio**	70 days	Mon Nov 8, '21	Fri Feb 11, '22	3,4,39,9,53,65	
7.1	Portfolio Design	20 days	Mon Dec 20, '21	Fri Jan 14, '22	74	Designer/Marketer
7.1.1	Contract Portfolio Design	30 days	Mon Nov 8, '21	Fri Dec 17, '21	65,3,4,39,9,53	Project Manager ,Project Sponsor, Project Steering Committee
7.1.2	Data Compilation	5 days	Mon Dec 20, '21	Fri Dec 24, '21	74	Designer/Marketer, Mining Consultant
7.1.3	Portfolio Approval	10 days	Mon Jan 17, '22	Fri Jan 28, '22	73	Project Manager, Project Sponsor, Project Steering Committee
7.1.3.1	Portfolio Launch	5 days	Mon Jan 31, '22	Fri Feb 4, '22	76	Project Manager
8	**Project Management**	1 day	Wed Apr 1, '20	Wed Apr 1, '20		
8.1.1	Report Review & Acceptance	15 days	Mon Feb 14, '22	Fri Mar 4, '22	3,4,39,9,53,65,72	Project Manager, Project Sponsor, Project Steering Committee ,Project Team
8.1.2	Project Integration	5 days	Mon Mar 7, '22	Fri Mar 11, '22	79	Project Manager, Project Team
8.1.3	Project Closure	5 days	Mon Mar 7, '22	Fri Mar 11, '22	79	Project Manager, Project Team

Chart 20 Project Schedule (Source: compiled by author, C. Moore, August 2019)

ID	Task Mode	WBS	Task Name	Duration	Start	Finish	Predecessors
1		0	**FS Bentonite Clay Mine & Export**	507 days	Wed 4/1/20	Thu 3/10/22	
2		8	**Project Management**	0 days	Wed 4/1/20	Wed 4/1/20	
3		8.1	Establish Project Steering Committee	22 days	Wed 4/1/20	Thu 4/30/20	
4		1.0	**Technical Validation Report**	87 days	Fri 5/1/20	Mon 8/31/20	3
5		1.1	Review of Evaluation Report	44 days	Wed 7/1/20	Mon 8/31/20	6
6		1.1.1	Contract Review of Evaluation	43 days	Fri 5/1/20	Tue 6/30/20	3
7		1.1.2	Validation of Methods Used	44 days	Wed 7/1/20	Mon 8/31/20	6
8		1.1.3	Benchmark Against International	44 days	Wed 7/1/20	Mon 8/31/20	6
9		1.2	Deposit Assessment	43 days	Fri 5/1/20	Tue 6/30/20	3
10		1.2.1	Delimit Extent Of Deposit	10 days	Fri 5/1/20	Thu 5/14/20	3
11		1.2.2	Collection of Samples	15 days	Fri 5/15/20	Thu 6/4/20	10
12		1.2.2.1	Testing of material specifications	30 days	Fri 6/5/20	Thu 7/16/20	11
13		1.2.3	Record of Environmental Setting	10 days	Fri 5/15/20	Thu 5/28/20	10
14		2.0	**Market Analysis Report**	73 days	Tue 9/1/20	Thu 12/10/20	3,4,9
15		2.1	Identification of Markets	30 days	Tue 10/27/20	Mon 12/7/20	16
16		2.1.1	Contract Market Analysis	40 days	Tue 9/1/20	Mon 10/26/20	3,4,9
17		2.1.2	Market Specifications by Use	10 days	Tue 10/27/20	Mon 11/9/20	16
18		2.1.3	Market Price for Specifications	10 days	Tue 11/10/20	Mon 11/23/20	17
19		2.1.4	Alternative Use Evaluation	5 days	Tue 11/10/20	Mon 11/16/20	17
20		2.2	Competitor Analysis	30 days	Tue 10/27/20	Mon 12/7/20	21
21		2.2.1	Contract Competitor Analysis	40 days	Tue 9/1/20	Mon 10/26/20	3,4,9
22		2.2.2	Competitor Specifications	10 days	Tue 10/27/20	Mon 11/9/20	21
23		2.2.3	Competitor Prices	10 days	Tue 11/10/20	Mon 11/23/20	22
24		2.3	Benchmarking	30 days	Tue 12/8/20	Mon 1/18/21	15,20
25		2.3.1	Range of CAPEX	10 days	Tue 12/8/20	Mon 12/21/20	20
26		2.3.2	Range of OPEX	10 days	Tue 12/22/20	Mon 1/4/21	25
27		3	**Legal Requirements Report**	73 days	Tue 9/1/20	Thu 12/10/20	3,4,9
28		3.1	Company Requirements	30 days	Tue 10/27/20	Mon 12/7/20	29
29		3.1.1	Contract Company Requirements	40 days	Tue 9/1/20	Mon 10/26/20	3,4,9
30		3.1.2	Companies Registry Requirements	5 days	Tue 10/27/20	Mon 11/2/20	29
31		3.1.3	Central Bank Requirements	15 days	Tue 10/27/20	Mon 11/16/20	29
32		3.1.4	Export Processing Zone Requirements	15 days	Tue 10/27/20	Mon	29
33		3.2	Incentives Requirements	30 days	Tue 10/27/20	Mon 12/7/20	34
34		3.2.1	Contract Incentives Requirements	40 days	Tue 9/1/20	Mon 10/26/20	3,4,9
35		3.2.2	BELTRAIDE Fiscal Incentives	1 day	Tue 10/27/20	Tue 10/27/20	34
36		3.2.3	Ministry of Finance Requirements	1 day	Tue 10/27/20	Tue 10/27/20	34
37		3.3	Export Requirements	10 days	Tue 10/27/20	Mon 11/9/20	34
38		3.3.1	Customs & Excise Duties Requirements	10 days	Tue 10/27/20	Mon 11/9/20	34
39		4	**Environmental/ Social Impact**	149 days	Tue 9/1/20	Fri 3/26/21	3,4,9
40		4.1	Environmental Assessment	149 days	Tue 10/27/20	Fri 5/21/21	41
41		4.1.1	Contract Environmental Assessment	40 days	Tue 9/1/20	Mon	3,4,9
42		4.1.2	Scoping Exercise Environmental	10 days	Tue 10/27/20	Mon 11/9/20	41
43		4.1.3	Approved Terms of Reference	10 days	Tue 11/10/20	Mon 11/23/20	42
44		4.1.4	Conduct Assessments	69 days	Tue 10/27/20	Fri 1/29/21	41
45		4.1.5	Submital and Review of EIA	20 days	Mon 2/1/21	Fri 2/26/21	44
46		4.1.5.1	Approved Evironmental Compliance	10 days	Mon 3/1/21	Fri 3/12/21	45
47		4.2	Social Assessment	110 days	Tue 10/27/20	Mon 3/29/21	48
48		4.2.1	Contract Social Assessment	40 days	Tue 9/1/20	Mon 10/26/20	3,4,9
49		4.2.2	Scoping Exercise Social	10 days	Tue 10/27/20	Mon 11/9/20	48
50		4.2.3	Approved Terms of Reference	10 days	Tue 11/10/20	Mon 11/23/20	49
51		4.2.4	Conduct Assessments	30 days	Tue 11/24/20	Mon 1/4/21	50
52		4.2.5	Submital and Review of SIA	20 days	Tue 1/5/21	Mon 2/1/21	51
53		5	**Mining Plan & Quarry Design**	80 days	Mon 3/29/21	Fri 7/16/21	3,4,9,39
54		5.1	Mining Plan Elaboration	40 days	Mon 5/24/21	Fri 7/16/21	55
55		5.1.1	Contract Mining Plan	40 days	Mon 3/29/21	Fri 5/21/21	3,4,9,39
56		5.1.2	Mining Methodology	10 days	Mon 5/24/21	Fri 6/4/21	55
57		5.1.3	Environmnetal Mitigation	10 days	Mon 6/7/21	Fri 6/18/21	56
58		5.1.3.1	Mining Rehabilitation Plan	10 days	Mon 6/21/21	Fri 7/2/21	57
59		5.1.3	Reserves Estimates	10 days	Mon 6/7/21	Fri 6/18/21	56
60		5.2	Quarry Design Elaboration	75 days	Mon 5/24/21	Fri 9/3/21	61
61		5.2.1	Contract Quarry Design	40 days	Mon 3/29/21	Fri 5/21/21	3,4,9,39
62		5.2.2	Technical Specifications	15 days	Mon 5/24/21	Fri 6/11/21	61
63		5.2.3	CAPEX Benchmark	10 days	Mon 6/14/21	Fri 6/25/21	62
64		5.2.4	OPEX Benchmark	10 days	Mon 6/28/21	Fri 7/9/21	63
65		6	**Economic Model**	80 days	Mon 7/19/21	Fri 11/5/21	3,4,39,9,53
66		6.1	Economic Model Design	20 days	Mon 9/13/21	Fri 10/8/21	67
67		6.1.1	Contract Economic Model	40 days	Mon 7/19/21	Fri 9/10/21	3,4,53,39,9
68		6.1.2	Data Compilation	5 days	Mon 9/13/21	Fri 9/17/21	67
69		6.1.3	Analog Quarry Analysis	5 days	Mon 9/13/21	Fri 9/17/21	67
70		6.1.4	Sensitivity Analysis	10 days	Mon 10/11/21	Fri 10/22/21	66
71		6.1.4.1	Commerciality Report	5 days	Mon 10/25/21	Fri 10/29/21	70
72		7	**Investment Portfolio**	70 days	Mon 11/8/21	Fri 2/11/22	3,4,39,9,53,65



65		6	**Economic Model**	80 days	Mon 7/19/21	Fri 11/5/21	3,4,39,9,53	
66		6.1	Economic Model Design	20 days	Mon 9/13/21	Fri 10/8/21	67	
67		6.1.1	Contract Economic Model	40 days	Mon 7/19/21	Fri 9/10/21	3,4,53,39,9	
68		6.1.2	Data Compilation	5 days	Mon 9/13/21	Fri 9/17/21	67	
69		6.1.3	Analog Quarry Analysis	5 days	Mon 9/13/21	Fri 9/17/21	67	
70		6.1.4	Sensitivity Analysis	10 days	Mon 10/11/21	Fri 10/22/21	66	
71		6.1.4.1	Commerciality Report	5 days	Mon 10/25/21	Fri 10/29/21	70	
72		7	**Investment Portfolio**	70 days	Mon 11/8/21	Fri 2/11/22	3,4,39,9,53,65	
73		7.1	Portfolio Design	20 days	Mon 12/20/21	Fri 1/14/22	74	
74		7.1.1	Contract Portfolio Design	30 days	Mon 11/8/21	Fri 12/17/21	65,3,4,39,9,53	
75		7.1.2	Data Compilation	5 days	Mon 12/20/21	Fri 12/24/21	74	
76		7.1.3	Portfolio Approval	10 days	Mon 1/17/22	Fri 1/28/22	73	
77		7.1.3.1	Portfolio Launch	5 days	Mon 1/31/22	Fri 2/4/22	76	
78		8	**Project Management**	1 day	Wed 4/1/20	Wed 4/1/20		
79		8.1.1	Report Review & Acceptance	15 days	Mon 2/14/22	Fri 3/4/22	3,4,39,9,53,65,72	
80		8.1.2	Project Integration	5 days	Mon 3/7/22	Fri 3/11/22	79	
81		8.1.3	Project Closure	5 days	Mon 3/7/22	Fri 3/11/22	79	



Project: FS bentonite schedule5

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

Split | Summary | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | External Milestone | Critical | Progress

Page 1

4.3.12 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date: _____

Ministry of Economic Development
Chief Executive Officer

4.4 Cost Management Plan

The Cost Management Plan was completed after the development of the Project Charter, which has some indicative cost estimates, also the Schedule Management Plan which details the resources required and their duration, as well as the scope baseline from the Scope Management Plan.

The tools and techniques utilized were primarily analogous estimation and expert judgment. In fact, a high level of confidence in the cost estimates was derived from the analogous estimation.

COST MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

SEPTEMBER 2019

4.4.1 Introduction

The Project Manager will be responsible for managing and reporting on the project's cost throughout the duration of the project. During the monthly project status meeting, the Project Manager will meet with the Project Steering Committee (PSC) to present and review the project's cost performance for the preceding month. The performance will be

measured using earned value. The Project Manager is responsible for accounting for cost deviations and presenting the Project Sponsor with options for getting the project back on budget. The Project Sponsor has the authority to make changes to the project to bring it back within budget.

Managing cost also involves the processes of estimating, budgeting, and controlling costs. In fact, there are several cost components associated with this project as well as several metrics, cost variance considerations, and reporting which this plan outlines. Successful project completion requires adherence by key project members and stakeholders to working within the cost management plan and the overall project plan. To guarantee the successful completion of the following project within its allotted budget, the Cost Management Plan established the format and standards by which the project costs are measured, reported and controlled.

4.4.2 Cost Management Approach

Cost Management includes the processes required to complete the project within the approved budget. Costs for this project will be managed at the different levels of the Work Breakdown Structure (WBS) depending on the lowest point at which costs can be disaggregated. However, some project work will be performed by the Project team who are employees of the Government of Belize (GOB). Project resources such as tools, materials or equipment required for the project belong to GOB. Generally speaking, the costs incurred for the project such as expenses, salary, etc. are absorbed by the Government of Belize and not the project.

Cost Management has four processes of which three belong to the planning process group, and the fourth one to the monitoring and controlling process group. These processes are: plan cost management, estimate costs, determine budget, and control costs.

The Importance of the Cost Management Plan is that it indicates how to manage expenses and budget of a project. It additionally, monitors and controls the status of the project and measures budget performance. The Plan Cost Management Process is the first process

of this knowledge area. It also includes, how to determine budget, estimate costs and manage the expenses throughout the project. The Cost Management plan is the primary output of the plan cost management process. It describes how to manage the project costs and budget.

The Cost Management Plan includes:

- Units of Measurement: defines the quantity, capacity, amount, duration, etc. the determination of costs is based on these UOM's and therefore these need to be accurately and clearly defined;
- Levels of Precision: indicates how close to each other measured values are, degree of rounding or estimating;
- Control Thresholds: the stipulation of the maximum and minim cost variation standards that are allowable;
- Reporting Formats: establishing reporting protocols and norms, frequency, distribution and format style. Reporting frequency may vary from one stage to the next, this is critical in detecting variations from approved plans; and
- Performance Measurement Rules or Standards: method for measuring the level of performance and completion of activities and its earned value.

Cost management approaches utilized include Cost Accounts (CA's are created for the WBS and used to track costs), Earned Value calculations (measure and manage the financial performances), and examination of Cost Variance (monitored to determine if exceeding established thresholds).

Costs may be rounded to the nearest dollar and work hours rounded to the nearest whole hour.

4.4.3 Measuring Project Costs

The project will estimate all the costs of the work packages with the following techniques:

- Expert judgment: It is necessary to use persons with knowledge of other projects that can propose a cost for each activity. The use of a specialist in mining helped in providing good cost estimation.

- The team will consider the risks of the contingency reserve and management reserve to have a total cost in the baseline and project budget.
- The project will use the analogous estimating to determine costs because it will use the values and attributes in the scope, cost, budget, duration, and measures of scale of different projects to have a better approach to the reality of the budget.
- Meetings with stakeholders and advisors are used for data gathering and information verification.
- The examination of alternatives is also used in the cost management plan, where analysis of possible alternatives is done to see where synergies or symbiosis may exist that could reduce overall project cost.
- Inputs that feed this process include the project charter, organizational process assets, the schedule management plan, risk management plan, and enterprise environmental factors.

The performance of the project will be measured using Earned Value Management. The following four Earned Value metrics will be used to measure projects cost performance:

- Schedule Variance (SV)
- Cost Variance (CV)
- Schedule Performance Index (SPI)
- Cost Performance Index (CPI)
- Trend Analysis

Variance analysis will be used to determine if either cost or performance should be moved into a cautionary (yellow) or alert (red) phase. This is known as the project variance threshold as illustrated in Chart 21. A calculated variance of +/- 0.1 in the cost or schedule performance indexes will change the status to cautionary; as such, those values will be changed to yellow in the project status reports. A calculated variance of +/- 0.2 in the cost or schedule performance indexes will change the status to an alert stage; as such, those values will be changed to red in the project status reports.

Changes in the CPI or SPI will require action changes to a cautionary stage will require the Project Manager to report the reason for the change and changes to an alert stage

will require the Project Manager to report the reason for the exception and provide to management a detailed corrective plan to return the project's performance back to acceptable levels. Corrective actions will require a project change request approved by the Project Sponsor before it becomes part of the scope of the project.

Chart 21 Project Variance Threshold (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Project Variance Threshold						
Performance Measure	**Range of Variance** **Green- Normal, Yellow- Cautionary, Red- Alert**					
	<0.8	0.8 to 0.9	0.9 to 1	1 to 1.1	1.1 to 1.2	>1.2
Schedule Performance Index (SPI)						
Cost Performance Index (CPI)						

4.4.4 Activities Cost Estimates

Cost estimation for each project activity and tools, materials, equipment is prepared based on estimations for the overall project budget. Activity cost estimates refer to the quantitative process of assessing the possible costs to complete different activities involved. Activity cost estimating is executed using an activity list.

4.4.5 Project Budget

The process of budget preparation is best done in conjunction with the Scheduling as both of these processes are co-dependent. Their inter-dependency is referred to as the project budgeting process. This process allows the project manager and team to develop appropriate budgetary allocations while considering the different cost factors that are associated with the project activities, work packages, and their duration. This is the reason why determining the budget requires different tools and techniques such as reviewing historical data (analogous), investigating resource information, following project policies, use of expert judgment, data analysis such as reserve estimates (contingency and management), funding limit reconciliation and cost aggregation.

The project budget includes all the authorized funds and resources required or allocated for the project. In order to determine the budget a few key inputs are required. These are namely, cost management plan; resource plan; scope baseline; the cost estimates; schedule; identified risk; mitigation activities required for those risks; other organizational documents such as the business case and finally enterprise environmental factors. The cost aggregation process is part of determining the budget. This involves the aggregated estimated costs of different individual tasks or work packaged to an authorized and established cost baseline. The principal advantage of this process is that it helps determine the cost baseline, which the project needs to be controlled and monitored against. This process can be performed at the beginning of the project or at any chosen interval during the life of the project.

The determine budgets process produces the cost baseline (critical document for project monitoring and control), the funding requirements (identifies gaps or deficits or surplus, if they exist) and it provides inputs for the updating of the Risk Register, the Project Schedule and the Cost Estimates.

The budget for this project is detailed below

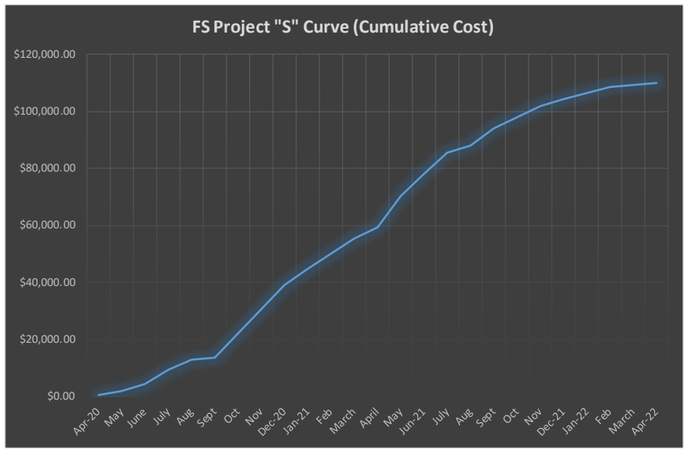
- Total Cost Estimate = $110,000 USD
- Project Cost Baseline = $121,000 USD
- Total Project Budget = $126,5000 USD (includes the Contingency Reserve of 10% which is $11,000 USD and the Management Reserve of 5% which is $5,500 USD)

A Contingency Reserve of 10% and a Management Reserve of 5% are utilized for the project because of the high rate of confidence in the estimates provided using expert judgment and analogous estimation. A summary of the activities' cost estimates, the resources required, and the method of estimation is detailed in the chart below. The project budget estimate as seen in Figure eight, was used to depict the cost baseline per month and cumulative costs (S-Curve) in the graphs below. Chart 22 presents details of the budget estimates including resources that are necessary for project completion.

Chart 22 FS Project Budget Chart: Coding, Total Cost, Total Project Cost & Reserves (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility Budget Estimate					
WBS Code	**Description**	**Resource Required**	**Estimated Cost**	**Method of Estimation**	**Confidence Level**
1	**Technical Validation Report**		**$10,000**		
1.1	Review of Evaluation Report	Mining Consultant, Mining Engineer, Technical Advisor	$6,000	Analogous	High
1.2	Deposit Assessment	Mineral Surveyor, Project Team	$1,500	Analogous	High
1.2.2.1	Testing of material specifications	Certified Materials Lab, Project Manager	$2,500	Analogous	High
2	**Market Analysis Report**		**$5,000**		
2.1	Identification of Markets	Business Analyst, Economist	$3,000	Expert Judgment	Medium
2.2	Competitor Analysis	Business Analyst	$1,500	Expert Judgment	Medium
2.3	Benchmarking	Project Team	$500	Analogous	High
3	**Legal Requirements Report**		**$5,000**		
3.1	Company Requirements	Investment Officer, Lawyer	$2,500	Expert Judgment	Medium
3.2	Incentives Requirements	Investment Officer	$2,000	Expert Judgment	Medium
3.3	Export Requirements	Project Team	$500	Analogous	High
4	**Environmental/ Social Impact Assessment**		**$35,000**		
4.1	Environmental Assessment	Environmental Consultant	$27,500	Analogous	High
4.2	Social Assessment	Social Consultant	$7,500	Analogous	High
5	**Mining Plan & Quarry Design**		**$25,000**		
5.1	Mining Plan Elaboration	Mining Consultant, Mining Engineer	$15,000	Analogous	High
5.2	Quarry Design Elaboration	Mining Engineer	$10,000	Analogous	High
6	**Economic Model**	Economist, Mining Consultant	**$10,000**	Expert Judgment	High
7	**Investment Portfolio**	Designer/Marketer	**$5,000**	Expert Judgment	Medium
8	**Project Management**	Project Steering Committee	**$15,000**	Expert Judgment	Medium
	Total Cost Estimate	**$110,000.00**		A Contingency Reserve of 10% and a Management Reserve of 5% are utilized for the project because of the high rate of confidence in the estimates provided by use of expert judgment and analogous comparison	
	Contingency Reserve (10%)	**$11,000.00**			
	Management Reserve (5%)	**$5,500.00**			
	Total Project Budget	**$126,500.00**			

FS Bentonite Clay Mine & Export Facility Budget Estimate																											
Budget Estimate				2020									2021												2022			
WBS Code	Description	Duration (days)	Estimated Cost	Apr-20	May	June	July	Aug	Sept	Oct	Nov	Dec-20	Jan-21	Feb	March	April	May	Jun-21	July	Aug	Sept	Oct	Nov	Dec-21	Jan-22	Feb	March	Apr-22
1	**Technical Validation Report**	87	**$10,000**																								
1.1	Review of Evaluation Report	44	$6,000				$3,000	$3,000																			
1.2	Deposit Assessment	43	$1,500		$750	$750																					
1.2.2.1	Testing of material specifications	30	$2,500			$1,250	$1,250																				
2	**Market Analysis Report**	73	**$5,000**																								
2.1	Identification of Markets	30	$3,000							$1,000	$1,000	$1,000															
2.2	Competitor Analysis	30	$1,500							$500	$500	$500															
2.3	Benchmarking	30	$500									$250	$250														
3	**Legal Requirements Report**	73	**$5,000**																								
3.1	Company Requirements	30	$2,500							$833.33	$833.33	$833.33															
3.2	Incentives Requirements	30	$2,000							$666.67	$666.67	$666.67															
3.3	Export Requirements	10	$500							$250	$250																
4	**Environmental/ Social Impact Assessment**	149	**$35,000**																								
4.1	Environmental Assessment	119	$27,500							$3,437.50	$3,437.50	$3,437.50	$3,437.50	$3,437.50	$3,437.50	$3,437.50	$3,437.50										
4.2	Social Assessment	70	$7,500							$1,250	$1,250	$1,250	$1,250	$1,250	$1,250												
5	**Mining Plan & Quarry Design**	80	**$25,000**																								
5.1	Mining Plan Elaboration	40	$15,000														$5,000	$5,000	$5,000								
5.2	Quarry Design Elaboration	75	$10,000														$2,000	$2,000	$2,000	$2,000	$2,000						
6.1	**Economic Model**	40	**$10,000**																		$3,333.33	$3,333.33	$3,333.33				
7	**Investment Portfolio**	40	**$5,000**																					$1,666.67	$1,666.67	$1,666.67	
8	**Project Management**	507	**$15,000**	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600
Total				$600.00	$1,350.00	$2,600.00	$4,850.00	$3,600.00	$600.00	$8,537.50	$8,537.50	$8,537.50	$5,537.50	$5,287.50	$5,287.50	$4,037.50	$11,037.50	$7,600.00	$7,600.00	$2,600.00	$5,933.33	$3,933.33	$3,933.33	$2,266.67	$2,266.67	$2,266.67	$600.00	$600.00
Cumulative Cost				$600.00	$1,950.00	$4,550.00	$9,400.00	$13,000.00	$13,600.00	$22,137.50	$30,675.00	$39,212.50	$44,750.00	$50,037.50	$55,325.00	$59,362.50	$70,400.00	$78,000.00	$85,600.00	$88,200.00	$94,133.33	$98,066.67	$102,000.00	$104,266.67	$106,533.33	$108,800.00	$109,400.00	$110,000.00



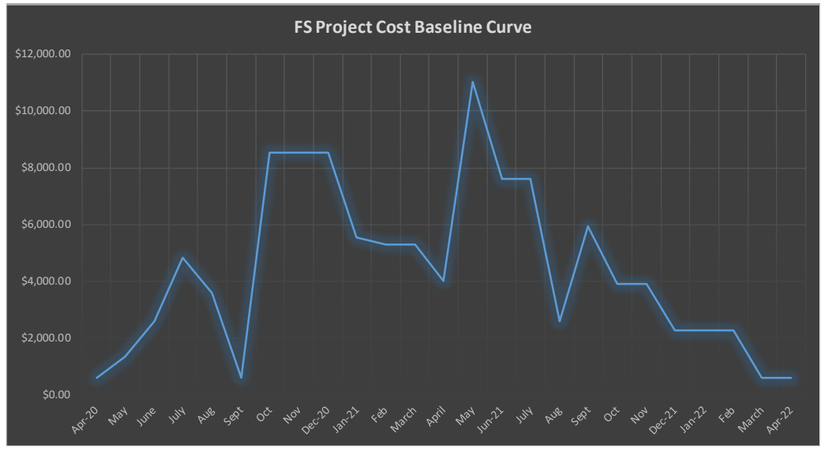


Figure 8. FS Project Budget Estimate, Cost Baseline Curve and Project "S" Curve (Source: compiled by author, C. Moore, September 2019)

4.4.6 Reporting Format

Reporting for cost management will be included in the monthly project status report. The Monthly Project Status Report will include a section labeled, “Cost Management”. This section will contain the Earned Value Metrics identified in the previous section. All cost variances outside of the thresholds identified in this Cost Management Plan will be reported including all planned corrective actions. Change Requests which are triggered based upon project cost overruns will be identified and tracked in this report.

4.4.7 Cost Variance Response Process

The Control Thresholds for this project is a CPI or SPI of less than 0.8 or greater than 1.2. If the project reaches one of these Control Thresholds a Cost Variance Corrective Action Plan is required. The Project Manager will present the Project Sponsor/Project Steering Committee with options for corrective actions within five (5) business days from the first report of cost variance. Likewise, within five (5) business days from when the Project Sponsor/Project Steering Committee selects a corrective action option, the Project Manager will present the Project Sponsor with a formal Cost Variance Corrective Action Plan. The Cost Variance Corrective Action Plan details the actions necessary to bring the project back within budget and the means by which the effectiveness of the actions in the plan will be measured. Upon acceptance of the Cost Variance Corrective Action Plan, it will become a part of the project plan and the project will be updated to reflect the corrective actions.

4.4.8 Cost Change Control Process

The Cost Change Management Process will follow a 5-step approach as outlined in the Change Management Plan. The steps are namely: 1. Request for Change; 2. Evaluation of Change Request; 3. Approval Stage; 4. Change Implementation and 5. Review and Documentation of Change.

The cost change request is first developed by the Project Manager will full disclosure of the reason for such deviation from the cost baseline and the recommended corrective

action to place the project back in line with the budget. This is subsequently submitted to the Project Steering Committee for analysis and evaluation of the change request. If the change request is denied, the process ends at this stage. On the other hand, if the cost change request is approved, the necessary actions are taken to effect change immediately. Changes can be made to the cost baseline, schedule or budget as deemed necessary. The final step is the review of the reasons for such deviations by the Project Team and documentation of the approved change request in the Project Management Plan. All relevant stakeholders are kept abreast of all approved changes.

4.4.9 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Ministry of Economic Development
Chief Executive Officer

4.5 Quality Management Plan

“Project Quality Management includes the processes for incorporating the organization’s quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders’ objectives” PMI 2017. The three quality management processes are i. Plan Quality Management, ii. Manage Quality and iii. Control Quality.

The Quality Management plan was done utilizing the Project Charter, the Scope Management Plan, the Requirements Traceability Matrix, and the OPAs and EEFs of the government as the primary inputs to its’ development.

QUALITY MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

SEPTEMBER 2019

4.5.1 Introduction

The Project Quality Management Plan documents the necessary information required to effectively manage the project quality from project planning to delivery. It defines a project's quality policies, procedures, criteria for and areas of application, and roles, responsibilities, and authorities.

The Project Quality Management Plan is created during the Planning Phase of the project. Its intended audience is the project manager, project team, project sponsor, project steering committee and any senior officers whose support is required to carry out the plan. The purpose of managing quality is to validate that the project deliverables are completed with an acceptable level of quality. Quality management assures the quality of the project deliverables and of the processes used to manage and create the deliverables

Quality Management Plan Objects (Chart 23) outlines the quality measures and evaluation methods used for both the project deliverables and project processes. Subsequently, Chart 24 outlines the key components of the quality management plan.

Chart 23 Quality Management Plan Objects (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Management Plan Objects		
Objects of Quality Review	**Quality Measure**	**Quality Evaluation Methods**
Project Deliverables	Deliverable Quality Standards Completeness and Correctness Criteria	Quality Control Activities
Project Processes	Process Quality Standards	Quality Assurance Activities

	Stakeholder Expectations	

The following is a brief explanation of each of the components of the quality management plan.

Chart 24 Quality Management Plan Key Components (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Management Plan Key Components	
Project Deliverables and Processes	The key project deliverables and processes subject to quality review.
Deliverable Quality Standards and **Completeness and Correctness Criteria**	The quality standards that are the "measures" used to determine a successful outcome for a deliverable. The completeness and correctness criteria describe when each deliverable is complete and correct as defined by the customer. Deliverables are evaluated against these criteria before they are formally approved.
Process Quality Standards and **Stakeholder Expectations**	The quality standards that are the "measures" used to determine if project work processes are being followed. Stakeholder expectations describe when a project process is effective as defined by the project stakeholders. An example is the expectation to be regularly informed monthly of project status.
Quality Control Activities	The quality control activities that monitor and verify that the project deliverables meet defined quality standards.
Quality Assurance Activities	The quality assurance activities that monitor and verify that the processes used to manage and create the deliverables are followed and are effective.

4.5.2 Quality Management Approach

Managing project quality requires an approved quality plan encompassing three major quality processes; quality assurance, quality control, and project acceptance criteria. The quality plan is developed and approved during the project planning phase to confirm major deliverables/milestone acceptance criteria and manage approved project processes.

4.5.2.1 Quality Assurance Activities

Quality assurance focuses on the processes being used to manage and deliver the solution to evaluate overall project performance on a regular basis. Quality assurance is

a method to ensure the project will satisfy the quality standards. Additionally, it defines and records quality reviews, tests performance, and customer acceptance.

4.5.2.2 Quality Control Activities

Quality control is performed continually to verify that project management and project deliverables are of high quality and meet quality standards. Quality control also helps uncover the causes of unsatisfactory results and establishes lessons learned to avoid similar issues in this and other projects.

4.5.2.3 Project Deliverables and Process Acceptance Criteria

Project team members and key stakeholders agree at the project planning stage on formal project processes and major deliverable acceptance criteria. This criterion is used to evaluate final deliverable results before the results are formally approved.

Established metrics are used to measure product and process quality throughout the project life cycle. The Project Manager in conjunction with the Project Steering Committee will be responsible for working with the project team to define these metrics, conduct measurements, and analyze results. These product and process measurements will be adopted as one criterion in determining the success of the project and must be reviewed by the project sponsor. Metrics will include:

- Schedule
- Resources
- Cost
- Process performance; bid evaluation, compliance with regulatory requirements
- Product performance
- Compliance with International Standards

Quality improvements can be identified by any member of the project team. Each recommendation will be reviewed to determine the cost versus benefit of implementing

the improvement and how the improvement will impact the product or processes. When an improvement is implemented the project manager will update all project documentation to include the improvement and an assigned team member will update the project documentation to include the improvement that has been implemented.

4.5.3 Quality Control

The focus of quality control is on the deliverables of the project. Quality control monitors project deliverables to verify that the deliverables are of acceptable quality and complete and correct.

The Project Manager will schedule regularly occurring project management and document reviews. In these reviews, an agenda item will include a review of products, any discrepancies and/or audit findings from the quality manager, and a discussion on product improvement initiatives

Chart 25 offers details for the following from the Quality Control Plan:

- The major deliverables of the project that will be tested for satisfactory quality level.
- The quality standards and the correctness and completeness criteria established for the project deliverable. Included are any organizational standards that need to be followed.
- The quality control activities that will be executed to monitor the quality of the deliverables.
- How often or when the quality control activity will be performed.

Chart 25 Project deliverables, quality standards and quality control activities (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Project Deliverables, Quality Standards and Quality Control Activities				
Project Deliverable		**Deliverable Quality Standards/ Completeness and Correctness Criteria**	**Quality Control Activity**	**Frequency /Interval**
D-1	Review of Evaluation Report	QC1. Conforms to expert commentary regarding	➢ Information mapping	Monthly Monthly

FS Bentonite Clay Mine & Export Facility: Project Deliverables, Quality Standards and Quality Control Activities				
Project Deliverable		**Deliverable Quality Standards/ Completeness and Correctness Criteria**	**Quality Control Activity**	**Frequency /Interval**
		technical specifications (95%). QC2. Conforms to international requirements and standards (95%). QC3. Conforms to industry best practices (90%).	➢ Technical Advisor review ➢ Core Team review ➢ Project Steering Committee review	Weekly Monthly
	Delimit extent of Deposit	QC2. Conforms to international requirements and standards (95%). QC3. Conforms to industry best practices (90%). QC4. Conforms to accepted standards for surveys (100%).	➢ Core Team review ➢ Technical Advisor review ➢ Chief Survey (MNR) review	Weekly Monthly Once per activity
	Testing of material specifications	QC2. Conforms to international requirements and standards (95%). QC3. Conforms to industry best practices (90%).	➢ Core Team review ➢ Technical Advisor review	Weekly Monthly
D-2	Market Specifications by Use	QC3. Conforms to industry best practices (90%). QC5. Aligned with open/free market conditions (100%).	➢ Core Team review ➢ Technical Advisor review	Weekly Monthly
	Market Price for Specifications	QC3. Conforms to industry best practices (90%). QC5. Aligned with open/free market conditions (100%).	➢ Core Team review ➢ Technical Advisor review	Weekly Monthly
	Alternative Use Evaluation	QC6. Aligned with industry best practices (90%)	➢ Core Team review ➢ Project Steering Committee review ➢ Technical Advisor review	Weekly Monthly Monthly
	Competitor Analysis	QC6. Aligned with industry best practices (90%)	➢ Core Team review ➢ Project Steering Committee review ➢ Technical Advisor review	Weekly Monthly Monthly
	Benchmarking	QC2. Conforms to international requirements and standards (95%).	➢ Core Team review ➢ Project Steering Committee review	Weekly Monthly

FS Bentonite Clay Mine & Export Facility: Project Deliverables, Quality Standards and Quality Control Activities				
Project Deliverable		**Deliverable Quality Standards/ Completeness and Correctness Criteria**	**Quality Control Activity**	**Frequency /Interval**
		QC3. Conforms to industry best practices (90%).	➢ Technical Advisor review	Monthly
D-3	Companies Registry Requirements	QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review ➢ Legal Advisor review	Weekly Monthly Once per deliverable
	Central Bank Requirements	QC2. Conforms to international requirements and standards (95%). QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review ➢ Legal Advisor review	Weekly Monthly Once per deliverable
	Export Processing Zone Requirements	QC2. Conforms to international requirements and standards (95%). QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review ➢ Legal Advisor review ➢ Investment Advisor review	Weekly Monthly Once per deliverable Once per deliverable
	Incentives Requirements	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%)	➢ Core Team review ➢ Legal Advisor review ➢ Investment Advisor review	Weekly Once per deliverable Once per deliverable
	Export Requirements	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%). QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Legal Advisor review ➢ Investment Advisor review	Weekly Once per deliverable Once per deliverable
D-4	Environmental Assessment	QC7. Conforms to National Legislation and requirements (100%). QC8. Aligned with guide to developers' national guidelines (90%)	➢ Core Team review ➢ Project Steering Committee review ➢ National Environmental Appraisal Committee review	Monthly Monthly Once per deliverable
D-5	Social Assessment	QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review	Monthly Monthly

FS Bentonite Clay Mine & Export Facility: Project Deliverables, Quality Standards and Quality Control Activities				
Project Deliverable		**Deliverable Quality Standards/ Completeness and Correctness Criteria**	**Quality Control Activity**	**Frequency /Interval**
			➢ National Environmental Appraisal Committee review	Once per deliverable
D-6	Mining Plan	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%). QC7. Conforms to National Legislation and requirements (100%). QC9. Aligned with ISO standards (80%).	➢ Core Team review ➢ Technical Advisor review	Monthly Once per deliverable
	Quarry Design	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%). QC7. Conforms to National Legislation and requirements (100%). QC9. Aligned with ISO standards (80%).	➢ Core Team review ➢ Technical Advisor review	Monthly Once per deliverable
D-7	Economic Model	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%).	➢ Core Team review ➢ Project Steering Committee review ➢ Technical Advisor review ➢ Economic Advisor review	Monthly Monthly Once per deliverable Once per deliverable
D-8	Investment Portfolio	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%). QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review ➢ Technical Advisor review ➢ Economic Advisor review ➢ Legal Advisor review	Monthly Monthly Once per deliverable Once per deliverable Once per deliverable

FS Bentonite Clay Mine & Export Facility: Project Deliverables, Quality Standards and Quality Control Activities				
Project Deliverable		**Deliverable Quality Standards/ Completeness and Correctness Criteria**	**Quality Control Activity**	**Frequency /Interval**
	Feasibility Study Report	QC2. Conforms to international requirements and standards (95%). QC6. Aligned with industry best practices (90%). QC7. Conforms to National Legislation and requirements (100%).	➢ Core Team review ➢ Project Steering Committee review ➢ Technical Advisor review ➢ Economic Advisor review ➢ Legal Advisor review	Monthly Monthly Once per deliverable Once per deliverable Once per deliverable

4.5.4 Quality Requirements / Standards

4.5.4.1 Product Quality

The product quality standards and requirements will be determined by the project team and project steering committee. These standards will primarily be based on the documented standards utilized by the Government of Belize and identified international best practice standards. There may be identified product-specific quality standards that are not currently part of the documented organizational standards. In such cases, the project steering committee will review these newly identified standards and make recommendations for their adoption. The project team will also document all newly identified quality standards into the FS project plan and ensure communication with all stakeholders.

4.5.4.2 Process Quality

The process quality standards and requirements will be determined by the project team and project steering committee. Many of these standards will be based on documented standards utilized by the Government of Belize and identified international best practice standards.

4.5.5 Quality Assurance

The focus of quality assurance is on the processes used in the project. Quality assurance assures that project processes are used effectively to produce quality project deliverables.

Chart 26 identifies the following quality assurance processes and activities:

- The project processes subject to quality assurance.
- The quality standards and stakeholder expectations for each process.
- The quality assurance activity, such as a quality audit or reviews that will be executed to monitor that project processes are properly followed. How often or when the quality assurance activity will be performed

Chart 26 Quality assurance processes and activities (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Assurance Processes and Activities			
Project Process	**Process Quality Standards/ Stakeholder Expectations**	**Quality Assurance Activity**	**Frequency/Interval**
QA1. Develop/ refine project charter	100% compliance with project documents	Audit charter updates by phase	Once per project phase
QA2. Develop/ refine project plan	100% compliance with project documents	Audit plan content and updates, project priorities, and task estimation	Once per project phase
QA3. Execute and control project per project plans	95% compliance with project documents	Audit the following project activities: ➢ Quality ➢ Communications ➢ Project progress ➢ Project Schedule, SPI analysis	 Weekly Monthly Monthly Monthly
QA4. Approve each project stage	100% compliance with project documents	Audit stage checkpoints	Once per project phase/ stage
QA5. Contract Award	100% compliance with OPA's & international tender	Open and Transparent Process:	Once per contract

FS Bentonite Clay Mine & Export Facility: Quality Assurance Processes and Activities			
Project Process	**Process Quality Standards/ Stakeholder Expectations**	**Quality Assurance Activity**	**Frequency/Interval**
		➢ Request for Bid ➢ Quality-Cost Based Evaluation	
QA6. Qualification of Consultants	95% conformance with Minimum qualifications as outlined in bid/tender package.	➢ Verification and Validation of qualifications of persons submitted. ➢ Review of past work and quality of submissions.	Once per contract
QA7. Project Risks	80% compliance with Risk management and project documents	Audit risk log for unresolved issues	Monthly
QA8. Project Costs	90% compliance with Cost management and project documents	➢ Audit costs ➢ EVM ➢ Cost variance analysis ➢ CPI analysis	Monthly
QA9. Close project with post-project review	100% compliance with project documents	Audit project reviews by phase	Once per project phase

The GPD Project Lead will act in the capacity of quality manager and provide day to day quality management; conduct weekly process audits; monitor process performance metrics; and make certain that all processes comply with project and organizational standards. If discrepancies are found, the quality manager will meet with the Project Manager and review the identified discrepancies.

The Project Manager will schedule regularly occurring project management and document reviews. In these reviews, an agenda item will include a review of project processes, any discrepancies and/or audit findings from the team member assigned quality duties, and a discussion on process improvement initiatives.

Process improvement is another aspect of quality assurance. Quality assurance reviews, findings, and assessments should always result in some form of process improvement and, ultimately product improvement. All process improvement efforts must be documented, implemented, and communicated to all stakeholders as changes are made.

4.5.6 Quality Team Roles and Responsibilities

Chart 27 displays the details of quality-related responsibilities of the project team and lists specific quality responsibilities.

Chart 27 Quality Control and Assurance Responsibility (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Maine & Export Facility: Quality Team Roles and Responsibilities		
Project Team Role	**Assigned Resource**	**Quality Control and Quality Assurance Responsibilities**
Project Steering Committee	PSC assigned team members	QC2, QC3 Assesses the conformance to standards and requirements QA4, QA9: Approve each project stage per project documents QA5: Assess contract award processes QA6: Assess competency and qualifications of consultants. QA7, QA8: Assess project performance as per management plans
Project Sponsor	Chief Executive Officer	QA1, QA2, QA3: Assess practice of project management activities QA4, QA9: Approve each project stage per project documents QA5: Assess contract award processes
Project Manager assisted by GPD Project Lead	Inspector of Mines	QA3: Assure practice of quality control measures and communications in project plan QA7: Assess risks and identify and evaluate emerging risks QC1, QC2, QC5: Assure conformance with requirements and reviews by Core Team, Advisors. QC1, QC2, QC5: Communicate prioritized changes per reviews from advisors QC3, QC5, QC6: Assure deliverables meet broad set project requirements.

FS Bentonite Clay Maine & Export Facility: Quality Team Roles and Responsibilities		
Project Team Role	**Assigned Resource**	**Quality Control and Quality Assurance Responsibilities**
		QA6: Assess competency and qualifications of consultants. QA8: Assess project costs and variance QA9: Ensure project deliverables and conformance with requirements management.
Technical Advisor	Assigned	QC1, QC2, QC3: Assess conformance to standards and requirements. QC5: Assess market analysis and selected reference markets. QC6: Assess alignment with industry practices and standards. QC9: Assess alignment with ISO standards for the mining industry. QA6: Assess competency and qualifications of consultants.
Legal Advisor	Assigned	QC2, QC7: Assess conformance with requirements and legislation QA5: Assess contract award processes
Economic Advisor	Assigned	QC6: Assess alignment with industry practices and standards
Investment Advisor	Assigned	QC2, QC7: Assess conformance with requirements and legislation QC6: Assess alignment with industry practices and standards
Chief Surveyor	Assigned	QC4: Assess conformance to survey standards.
National Environmental Appraisal Committee (NEAC)	GOB agencies	QC7: Assess conformance with legislation. QC8: Assess conformance with environmental guidelines.
Core Team Members	Assigned	QC2, QC3: Assess conformance to standards and requirements. QC6: Assess alignment with industry practices and standards

4.5.7 Quality Tools

Chart 28 highlights the tools to be used to support quality management implementation and the purpose or use of each tool.

Chart 28 Quality Tools (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Tools	
Tool Name	**Tool Purpose/Use**
Project Management/Report Templates	Document the project management deliverables to be produced by this project
Feasibility Study Checklist and Template	Prepare and finalize feasibility study in standard format.
ISO-73.020/ ISO-73.120/ ISO_TC 82/ ISO_TC 82_SC7	Mining and quarrying standards/ Reclamation and mine closure management.

4.5.8 Quality Control Measurements

This project will manage quality according to this quality management plan. The project manager will monitor quality and report exceptions to the sponsor and the project steering committee as part of monthly status reporting, or more frequently if conditions warrant.

Charts 29 and 30 feature the log to be used to itemize, document and track items reported through quality management activities.

Chart 29 Quality Assurance Log (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Assurance Log					
Exception ID Number	**Review Date**	**Process Reviewed**	**Findings**	**Resolution**	**Resolution Date**

Chart 30 Quality Control Log (Source: compiled by author, C. Moore, September 2019)

FS Bentonite Clay Mine & Export Facility: Quality Control Log					
Exception ID Number	**Review Date**	**Deliverable Reviewed**	**Findings**	**Resolution**	**Resolution Date**

4.5.9 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Ministry of Economic Development
Chief Executive Officer

4.5.10 Appendix: Feasibility Study Checklist and Template

QA Checklist for Feasibility Studies Guidelines

Feasibility study stakeholders and reviewers should use this checklist to establish that the quality of the final report follows corporate standards and meets stakeholder approval. The document entitled "[Title of Standards Document]" located in the [Document location] [folder/document] outlines the standards that all feasibility studies should follow.

What this Checklist Does

The QA checklist focuses on making sure that the feasibility study document:

- is formatted according to the organization's document standards;
- is unambiguous and concise in its problem description, impact discussion, and proposed solution; and
- contains all required sections and tackles all the issues that a feasibility study must address

What this Checklist Does Not Do

This QA checklist does not:

- ensure that the proposed solution is feasible, optimal or appropriate;
- verify the accuracy of assumptions, objectives, calculations, risks or other assertions made by the author(s); or
- provide an exhaustive list of criteria to assess all types of feasibility studies

Author and Reviewer Instructions

All personnel assigned as document authors for the feasibility study must complete the Doc. Section and Comments fields under the Author Feedback column of the checklist before submitting it to reviewers. All reviewers must assess how the study meets the standards outlined in the standards document and complete the Complies and Comments fields of the checklist under the Review Feedback column. Chart 31 displays an example of authors and reviewers memorandum.

Chart 31 Authors and Reviewers Memorandum (Source: compiled by author, C. Moore, September 2019)

Authors	Project Role

Reviewers	Start Date	Finish Date	Area Reviewed	Comments
Final Reviewer:				

Standard Table of Contents

The table of contents for the feasibility study should have at least six sections with corresponding subsections as indicated below. In section five, Alternatives Considered, ensure that the document assigns a separate heading for each alternative solution.

[Add any other criteria that pertains to the table of contents here]

1. Executive Summary
2. Introduction
   - 2.1 Purpose
   - 2.2 Intended Audience
   - 2.3 System Overview

2.4 Summary of Feasibility Study Drivers
2.5 Reference Documents
3. Motivation
3.1 Problem Overview
3.2 Organizational Impact
3.3 Business Impact
3.4 Application Portfolio Impact
3.5 Infrastructural Impact
4. Proposed Solution
4.1 Solution Description
4.2 Projected Improvements
4.3 Solution Impact
4.3.1. Organizational Impact
4.3.2. Business Impact
4.3.3. Infrastructural Impact
4.3.4. Application Portfolio Impact
4.4 Rationale for Recommendations
5. Alternatives Considered
6. Cost-Benefit Analysis

Document Requirements	Author Feedback		Reviewer Feedback		
	Doc. Section	Comments	Complies		Comments
	Page no./ Sec. no.		Yes	No	
1. Executive Summary The section is less than two pages and contains all the key points addressed in the study.	e.g page 5, or section 1	e.g. The exec. summary is currently longer than two pages because the project is highly complex		✓	e.g. The exec. summary can be shortened. Please see document for suggestions
2. Introduction The introduction has a high-level statement about the overall objectives and content of this document written in less than four paragraphs.	e.g page 8, or section 2	Exceeds four paragraph limit, again for complexity reasons	✓		Number of paragraphs is fine. We will revisit the paragraph limit issue since this happens too often.
2.1 Purpose The reasons for undertaking the study are described in short, concise terms.					
2.2 Intended Audience All stakeholders that will read, write, review, and implement the study are listed as either individuals or groups.					
2.3 System Overview The existing system(s) affected by the feasibility study are listed in point form and succinctly described.					
2.4 Summary of Feasibility Study Drivers A bulleted list of the drivers that influence the size and scope of this feasibility study is given. The summary focuses on identifying all business drivers, limitations, etc. and avoids a detailed discussion of each driver.					

Document Requirements	Author Feedback		Reviewer Feedback		
	Doc. Section	Comments	Complies		Comments
	Page no./ Sec. no.		Yes	No	
2.5 Reference Documents The information provided on all referenced documents is detailed and complete. Hyperlinks are provided whenever possible.					
3. Motivation This section is a more detailed treatment of the drivers outlined in subsection 2.4. It gives a more detailed review, and deeper context of, the drivers for the feasibility study.					
3.1 Problem Overview The impact that the problem has on the organization and opportunities is clearly articulated and supported with appropriate documentation.					
3.2 Organizational Impact The impact that the problem is having on the organization, the roles affected, organizational structure changes, and job role changes are identified and discussed.					
3.3 Business Impact A detailed treatment of impact the problem has on the business units involved is provided. The business roles, business scenarios, and use cases negatively affected by the problem are well documented.					
3.4 Application Portfolio Impact This section maintains a strong strategic perspective when addressing the impact the problem has on the enterprise's applications.					
3.5 Infrastructural Impact How the problem affects the organization's network, servers, development, enterprise architecture, etc. are addressed clearly. Subsections are appropriately used to discuss each component of the IT infrastructure.					
4. Proposed Solution How the solution can improve current systems is briefly restated. An overview of the solution's functionality and the impact the solution will have on the organization is provided.					

Document Requirements	Author Feedback		Reviewer Feedback		
	Doc. Section	Comments	Complies		Comments
	Page no./ Sec. no.		Yes	No	
4.1 Solution Description A conceptual view of the solution is provided. Architectural diagrams or other conceptual tools are used to describe the problem. Optionally, a contingency plan is also provided.					
4.2 Projected Improvements How the proposed solution will improve existing systems, processes or operations is identified. The section also identifies how the system actually measures up to the objectives listed in section 3.					
4.3 Solution Impact The section fully describes potential issues and the anticipated impact the factors outlined in section 3 affect each part of the organization.					
4.3.1. Organizational Impact All training, job changes, additional personnel needs, changes to the business continuity plan, etc. are highlighted and discussed in this section.					
4.3.2. Business Impact All changes, caused by the solution, to the operational procedures, reporting structures, data retention policies and requirements are fully addressed.					
4.3.3. Infrastructural Impact This subsection address security and data privacy, the need for new or upgraded equipment, or any facility modifications required to implement the solution.					
4.3.4. Application Portfolio Impact Methodology changes, integration challenges, new staffing skills, and system modifications that are required by the proposed solution are identified.					

Document Requirements	Author Feedback		Reviewer Feedback		
	Doc. Section	Comments	Complies		Comments
	Page no./ Sec. no.		Yes	No	
4.4 Rationale for Recommendations A detailed explanation that supports the implementation of the proposed solution over other possible solutions is provided. Citation of cost-benefit analysis numbers are included.					
5. Alternatives Considered The alternative solutions that were considered are compared to the proposed solution. The key differences, problems or benefits associated with each solution are clearly articulated.					
6. Cost-Benefit Analysis An approved cost-benefit analysis/ economic model/ spreadsheet has been used to perform the analysis.					

Figure 9. Feasibility Study Quality Assurance Checklist and Template (Source: Info Tech Research Group, n.d.)

4.6 Resource Management Plan

"Project Resource Management includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project" PMI 2017. The goal is to provide a succinct overview of requirements and their timely availability. The processes involved in the Plan Resource Management are:

i. Plan Resource Management
ii. Estimate Activities Resources
iii. Acquire Resources
iv. Develop Team
v. Manage Team
vi. Control Resources

The plan forms the basis against which the project can be referenced. Furthermore, it decomposes the project charter into a more elaborated document along with the project management plan and project documents such as the scope baseline and cost baseline.

This in effect provides a detailed and comprehensive account of the project from the perspective of the human and physical resources required in order to reach the intended delivery. It further elaborates the resources required, their location, availability and the anticipated duration of use. The plan can be used in conjunction with the critical path, lags and slack available within the project timeline to determine possible areas requiring intervention or modification based on resource availability.

RESOURCE MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

OCTOBER 2019

4.6.1 Introduction

The Project Resource Management Plan documents the necessary processes, assets, human and physical resources required to effectively manage the project. The Resource Management Plan is a tool that will aid in the management of the activities throughout the life of the project until closure. The Resource Management Plan includes:

- roles and responsibilities of team members throughout the project;
- project organization charts;
- resource Breakdown Structure (RBS);
- how resources will be acquired;
- timeline for resources/skillsets;
- training required to develop skills;
- how performance reviews will be conducted; and
- how the resources will be controlled.

The purpose of the Resource Management Plan is to achieve project success by making sure that the appropriate human and physical resources are acquired with the necessary requirements, skills, location, availability, and the anticipated duration of use.

4.6.2 Resource Management Approach

Identification of Resources: Through the elaboration of the Project Scope, Quality, Cost and Schedule Documents, and the Project Charter the location, quantity, and skill level required was estimated using both expert judgment and analogous methods from previous projects and the stakeholder group. The Project Charter establishes the use of Government personnel for the various tasks as it is a Government initiative. The Project Steering Committee (PSC) also comes from within the government senior officials but includes members from industry and relevant partner entities.

Acquiring Resources: Project team members and support staff are pre-assigned from the Project Charter and provided by the Government. Acquisition of technical (legal, engineering, economic, investment) advisor services for the Project Steering Committee and project guidance will be sourced from within the government as well as from the industry partners. Consulting services will be done using a Request for Proposal (RFP) method with a Quality-Cost Based evaluation of bids. Other services such as venue, printing, etc. will be done through normal government tendering process and lowest bid selection will be utilized. All approvals for expenditure (AFE's) will be approved by the Project Steering Committee.

Project Team Resource Management: The project team will primarily be staffed from within the Government. The Project Manager will be sourced from the Geology and Petroleum Department (GPD) and the external technical advisors will be procured using terms of references (TOR). Submissions will be made to the Project Manager and AFE's through the Project Steering Committee.

Training and Team Development: The project will include capacity building and development of the GPD and other government agencies. It will be embedded throughout

the delivery of the project. The consultants will be required to include knowledge transfer and mentorship in their bid submissions and will also be included in the RFP.

Resource Control: Adequate evaluation of the proposal submitted by the bidding consultants will be the purview of the Project Steering Committee in conjunction with the relevant technical advisors. This will entail an analysis of equipment type, quantity, and fitness for purpose.

Team Charter: The project team will follow the existing Hierarchal Structure of each of their various Departments with an interface with the Project Manager. All existing government policies and protocols will be utilized for project team members.

Functional Managers (FM): While not part of the project team, functional managers are responsible for providing resources for the project in accordance with the project staffing plan. Functional managers are responsible for working with the PM to determine skill sets required and resource assignments approval. Functional managers are also responsible for conducting performance appraisals of assigned resources based, in part, on the PM's feedback regarding project performance.

Team Performance Assessments: By conducting periodic assessments and evaluation of the project team the Project Manager can identify the appropriate training, mentoring, assistance or changes required to improve the performance of the team. These assessments and changes will stand to benefit the team and contribute to the success of the project. These changes have the potential to improve project team's cohesiveness, allowing project team members to exchange ideas and support each other. In the final analysis, this will improve the overall performance of the project.

Performance Reviews: The Project Manager will review each team member's assigned work activities at the onset of the project and communicate all expectations of work to be performed. The Project Manager is responsible to evaluate each team member throughout the duration of the project. The evaluation will be on performance and

effectiveness on completion of assigned work activities. Prior to releasing project resources, the Project Manager will meet with the appropriate functional manager and provide feedback on employee project performance. The functional managers will then perform a formal performance review of each team member.

Recognition and Rewards: Although the scope of this project does not allow for ample time to provide cross-training or potential for large monetary rewards there are several planned recognition and reward items for project team members.

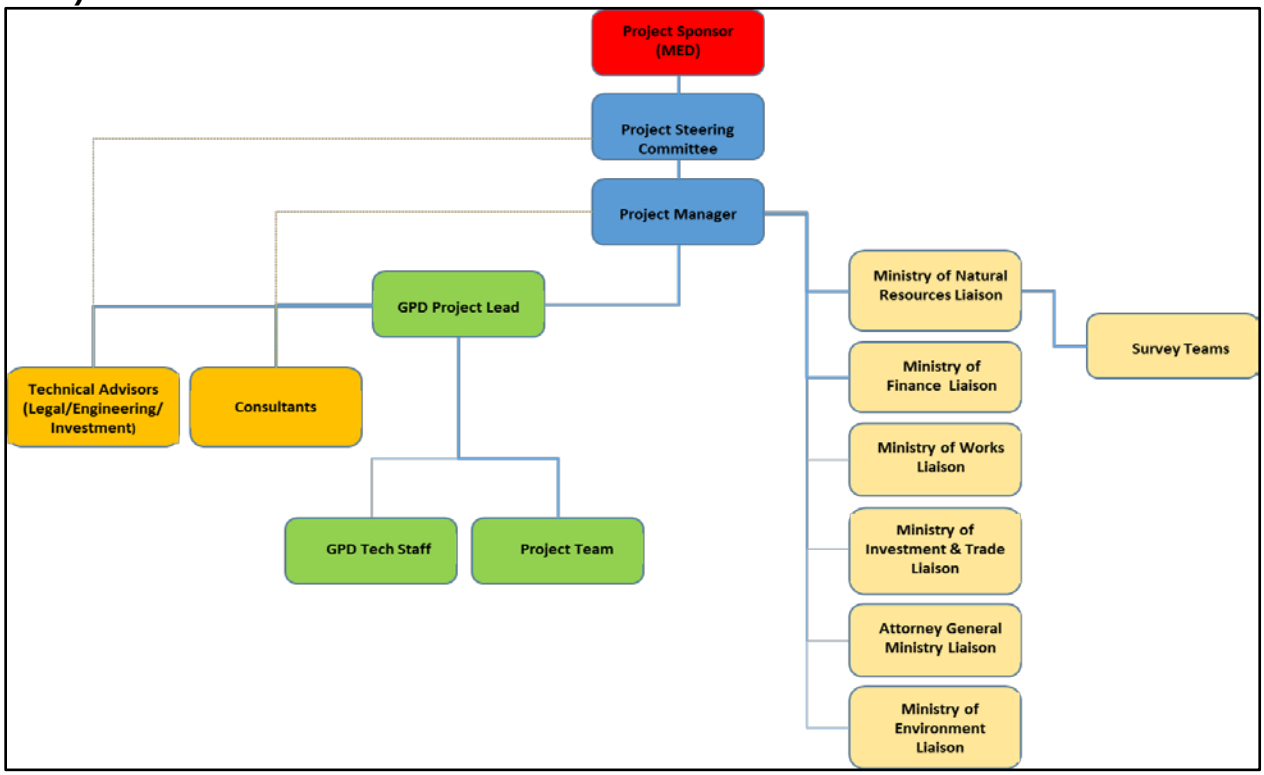
- Upon successful completion of the Project, a party will be held to celebrate the success of each team member. This party will coincide with the launch of the portfolio.
- Upon successful completion of the project, any team member who satisfactorily completed all assigned work packages on time will receive a certificate of thanks from the CEO and an additional stipend.

4.6.3 Project Organizational Charts

Project Organogram

The project organogram (shown in Chart 32) provides a graphical representation of the project team members and their role and reporting chains.

Chart 32 Project Organogram (Source: compiled by author, C. Moore, October 2019)



4.6.4 Resource Allocation

The resource allocation chart displayed in Chart 33 outlines the source, assignment and expected level of use for each identified resource.

Chart 33 Resource Allocation (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation			
Resource	**Resource Description**	**Source**	**Allocation**
Project Team	Project Manager	GPD Inspector of Mines	Pre-Assigned from Project Charter
	GPD Lead	Government GPD	Pre-Assigned from Ministry
	Mining Technical Staff	Government GPD	Pre-Assigned from Ministry
	Project Steering Committee	Government (multi-sectoral)	Once per month (Minimum)
	Technical Advisors (Mining)	External	As needed duration of the project
	Technical Advisors (Investment)	Government (MED)	As needed duration of project

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation			
Resource	**Resource Description**	**Source**	**Allocation**
	Technical Advisors (Legal)	Government (AG)	As needed duration of project
Support Team	Survey Team	Government (Ministry of Natural Resources)	May -July 2020 (10% of time)
	Planning Teams	Government (Ministry of Natural Resources)	May -July 2020 (10% of time)
	Legal Advisors	Government (Attorney General's Ministry)	As needed duration of project (5% of time)
	Finance Officers	Government (Ministry of Finance)	As needed duration of project (5% of time)
Facilities	Office Space	Government (Ministry of Natural Resources/GPD)	Full time as needed Pre-Assigned in Project Charter
	Conference/Meeting rooms	Government (various locations)	As needed duration of project
	Minerals Lab	External-Contract	
	Consultants Offices	External -(various locations)	Full Time for duration of contracts
Equipment	Office Equipment	External- Contract	As needed duration of project
	Printing Services	External - Service Provider	As needed duration of project
	Computer & Hardware	Government/ Contractors	Full Time as needed Pre-Assigned in Project Charter
Software Tools	GIS Software	Government (Ministry of Natural Resources/GPD)	May-Aug 2020 Pre-Assigned in Project Charter
	Autocad	Government (Ministry of Natural Resources/GPD)	May-Aug 2020 Pre-Assigned in Project Charter
	SmartStream Cloud Storage	Government GPD	Full Time as needed Pre-Assigned in Project Charter
	SmartStream (Financial Management)	Government (Ministry of Natural Resources/Finance)	Full Time as needed Pre-Assigned in Project Charter (<1% of time)
Consultants	Mining (Report Review)	External- Contract	Full Time, Jul-Aug 2020
	Mining (Mine & Quarry Plan)	External- Contract	Full Time, May-Sept 2021
	Mining (Economic Model)	External- Contract	Full Time, Sept-Nov 2021
	Designer/Marketer	External- Contract	Full Time, Dec 2021 - Feb 2022
	Economist (Market Analysis)	External- Contract	Full Time, Oct-Dec 2020
	Economist (Economic Model)	External- Contract	Full Time, Sept-Nov 2021
	Investment Officer	External- Contract	Full Time, Oct-Dec 2020
	Business Analyst	External- Contract	Full Time, Oct-Dec 2020

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation			
Resource	**Resource Description**	**Source**	**Allocation**
	Environmental Consulting Group	External- Contract	Full Time, Oct 2020 - May 2021
	Social Consultant	External- Contract	Full Time, Oct 2020 - Mar 2021
	Lawyer	External- Contract	Full Time, Oct-Dec 2020

4.6.5 Roles and Responsibilities

The Responsible, Accountable, Consult, Inform (RACI) chart shown in Chart 34 below displays the relationship between project tasks and team members. Any proposed changes to project responsibilities must be reviewed and approved by the project manager. Changes will be proposed in accordance with the project's change control process. As changes are made all project documents will be updated and redistributed accordingly.

The responsibility assignment matrix (presented in the RACI chart) is used to aid in communicating roles and responsibilities and reporting chains for the project team. The RACI chart is also used in conjunction with the organizational chart and the resource breakdown structures to show how responsibilities are assigned.

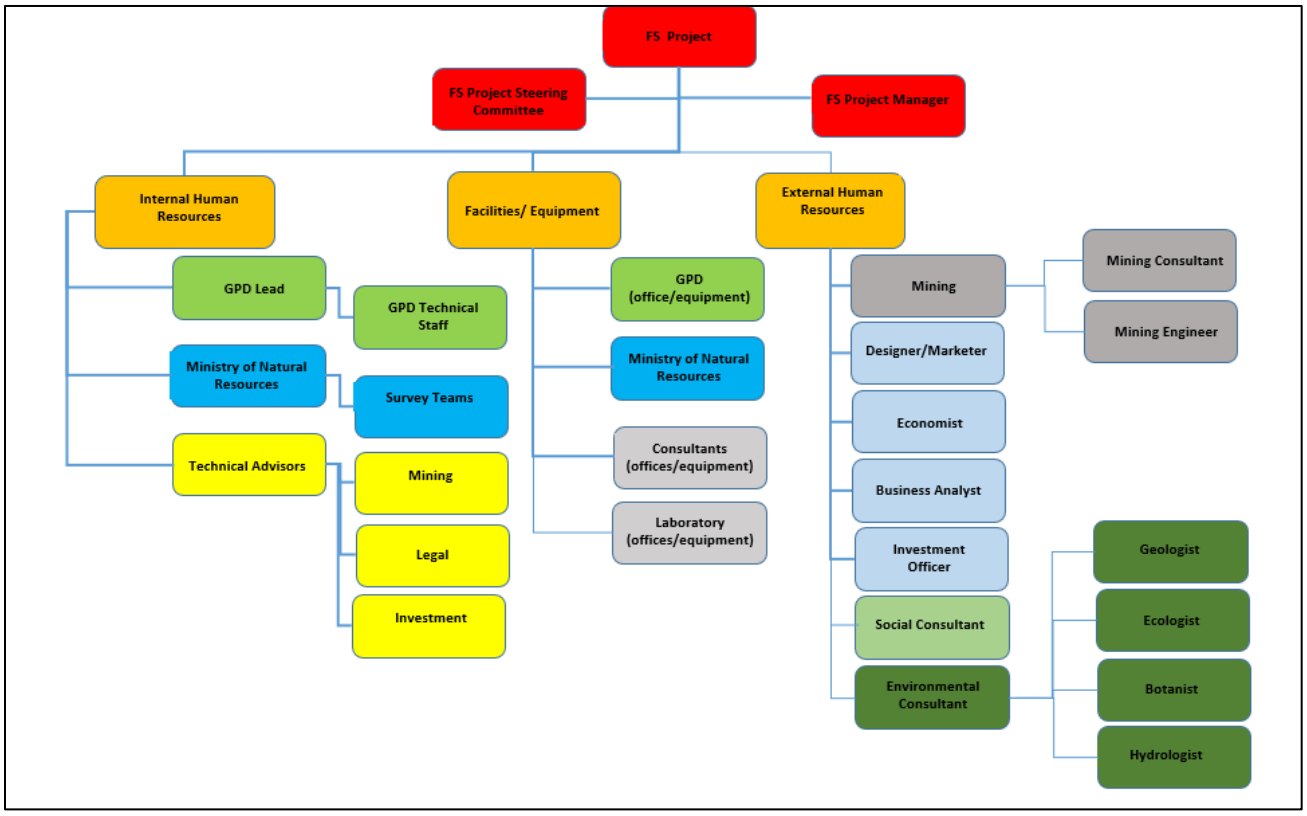
Chart 34 Resource RACI Matrix (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: RACI Chart																				
WBS	**Activity**	**Project Sponsor**	**Project Manager**	**Project Steering Com.**	**GPD Lead**	**GPD Tech. Staff**	**Survey Teams**	**Planning Teams**	**Tech. Adv. (Legal)**	**Tech. Adv. (Eng.)**	**Tech. Adv. (Inv.)**	**Bus. Analyst**	**Econ.**	**Mining Engin.**	**Mining Cons.**	**Environ. Cons.**	**Social Cons.**	**Designer/ Marketer**	**Lawyer**	**Invest. Officer**
8	Project Management																			
	Project Initiation	**A**	**R**		**C**	**C**			**C**	**C**	**C**									
8.1	Establish PSC	**R**	**A**		**C**	**I**	**I**	**I**	**I**	**I**	**I**									
	Establish RFP/ Bid documents	**A**	**R**	**R**	**R**	**C**	**I**	**I**	**C**	**C**	**C**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	
	Evaluation of RFP/ Bids	**A**	**R**	**R**	**R**	**C**			**C**	**C**	**C**									
	Award of Consultancies	**A**	**R**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	
8.1.1	Review & Acceptance of Submissions	**R**	**R**	**A**	**C**	**C**			**C**	**C**	**C**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	
8.1.2	Project Integration	**I**	**A**	**I**	**R**	**I**			**C**	**C**	**C**									
8.1.3	Project Closure	**R**	**A**	**C**	**C**	**I**	**I**	**I**	**I**	**I**	**I**									
1	Tech. validation of GET Report	**I**	**R**	**C**	**C**	**C**			**I**	**C**	**I**			**A**	**A**					
1.2	Deposit Assessment	**I**	**R**	**C**	**C**	**C**	**A**	**R**		**C**										
1.2.1	Delimit Extent Of Deposit	**I**	**R**	**C**	**C**	**C**	**A**	**R**		**C**										
1.2.2	Collection of Samples	**I**	**R**	**I**	**R**	**A**	**C**	**C**		**C**										
1.2.2.1	Testing of material specifications	**I**	**R**	**I**	**A**	**R**				**C**										
1.2.3	Record of Environmental Setting	**I**	**R**	**I**	**R**	**A**	**C**	**C**		**C**										
2	Market Analysis Report	**I**	**R**	**C**	**R**	**C**	**I**	**I**	**I**	**C**	**C**	**A**	**C**							
2.2	Competitor Analysis	**I**	**R**	**C**	**R**	**C**	**I**	**I**	**I**	**C**	**C**	**A**	**C**							
2.3	Benchmarking	**I**	**R**	**C**	**R**	**A**	**I**	**I**	**I**	**C**	**I**									
3	Legal Requirements Report	**I**	**R**	**C**	**C**	**I**			**C**	**I**	**C**								**A**	**C**
3.1.2	Companies Registry Requirements	**I**	**R**	**C**	**I**	**I**			**C**	**I**	**C**								**A**	**C**
3.1.3	Central Bank Requirements	**I**	**R**	**C**	**I**	**I**			**C**	**I**	**C**								**A**	**C**
3.1.4	EPZ Requirements	**I**	**R**	**C**	**I**	**I**			**C**	**I**	**C**								**C**	**A**
3.2.2	BELTRAIDE Fiscal Incentives Requirements	**I**	**R**	**C**	**I**	**I**			**C**	**I**	**C**								**C**	**A**
3.2.3	MOF Requirements	**I**	**R**	**C**	**I**	**I**			**C**	**I**	**C**								**C**	**A**
3.3	Export Requirements	**I**	**R**	**C**	**C**	**A**			**C**	**I**	**C**									
3.3.1	Customs & Excise Duties Req.	**I**	**R**	**C**	**C**	**A**			**C**	**I**	**C**									
4.1	Environmental Assessment	**I**	**R**	**C**	**C**	**I**			**I**	**I**	**I**					**A**				
4.2	Social Assessment	**I**	**R**	**C**	**C**	**I**			**I**	**I**	**I**						**A**			
5.1	Mining Plan Elaboration	**I**	**R**	**C**	**C**	**I**			**I**	**I**	**I**			**C**	**A**					
5.2	Quarry Design Elaboration	**I**	**R**	**C**	**C**	**I**			**I**	**I**	**I**			**A**	**C**					
6	Economic Model	**I**	**R**	**C**	**C**	**I**			**I**	**C**	**C**		**A**	**C**	**C**					
7	Investment Portfolio	**I**	**R**	**C**	**C**	**C**			**C**	**C**	**C**			**C**	**C**			**A**		
7.1	Portfolio Design	**C**	**R**	**C**	**C**	**C**			**C**	**C**	**C**			**C**	**C**			**A**		
7.1.2	Data Compilation	**I**	**R**	**C**	**C**	**C**			**C**	**C**	**C**			**A**	**C**			**R**		
7.1.3	Portfolio Approval	**A**	**R**	**C**	**C**	**I**			**I**	**I**	**I**			**I**	**I**			**I**		
7.1.3.1	Portfolio Launch	**C**	**A**	**R**	**I**	**I**			**I**	**I**	**I**			**I**	**I**			**R**		**I**

4.6.6 Resource Breakdown Structure

The resource breakdown structure displayed in Chart 35 is a graphical representation of resources required for the project and are further differentiated by category and type.

Chart 35 Resource Breakdown Structure (RBS) (Source: compiled by author, C. Moore, October 2019)



4.6.7 Resource Calendar & Resource Histogram

4.6.7.1 Resource Calendars

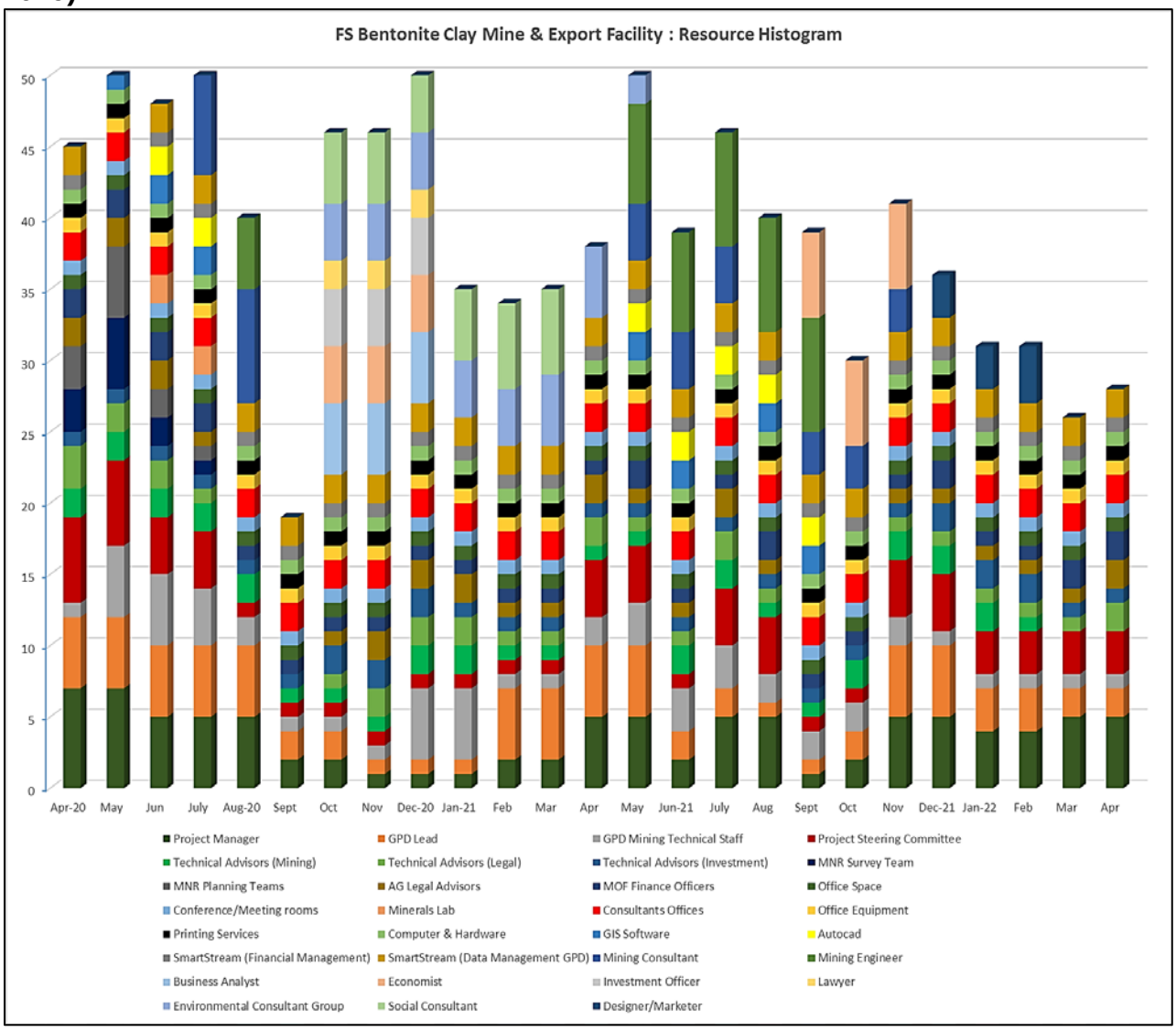
Resource calendars are a tool for the tracking and allocation of personnel and equipment. They are usually displayed in a graphical representation that captures what work will be done and by whom and when the work is to be completed. It also highlights days of non-work (vacation, holidays, sick days). A resource calendar will be developed at

commencement of the project and will be used in conjunction with the schedule management plan.

4.6.7.2 Resource Histogram

The Resource Histogram illustrated in Chart 36 shows the required specific tasks; time and resources. It also includes the expected effort required for the completion of the task. The resource histogram will be used in conjunction with the resource calendar and the schedule management plan.

Chart 36 Resource Histogram (Source: compiled by author, C. Moore, October 2019)



4.6.8 Resource Acquisition Decision Criteria

The FS project has several different resources that are required for the successful completion of the project, the determination or decision criteria for the differing resources is varied, and the general criteria used are as follows:

Project Steering Committee: members are selected based on their organizational position in key sector government agencies.

Government Project Team Members: members are nominated to act on the project team by their supervisors/functional managers.

Technical Advisors/Consultants: a multi-criteria selection criterion is applied to the selection of the advisors and the contractors. Evaluation of the RFP and Bid is done on a quality- cost-based assessment. Other criteria used are familiarity and experience with similar projects. In the case of consultants, location of their base of operations, familiarity with extraction methods in the material type, history of performance and the availability of key personnel were also factored.

4.6.9 Team Development

Team development is performed at the beginning of the project and at times during the project life. The project has three distinct teams, (i) the Project Steering Committee, (ii) the Project Team [GPD, Ministry of Natural Resources (Survey and Planning Teams), Ministry of Finance, Technical Advisors (Legal, Investment and Engineering), Project Manager] and the Consultants. These teams all interact in one larger group to accomplish the project goals, it is, however, important to understand that these sub-teams exist within the project.

4.6.10 Team Development Phases

4.6.10.1 Project Steering Committee

This team is composed of senior government officials and representatives from the private sector. The expectation is that these individuals have collaborated in previous projects therefore, little need to get acquainted (**Forming Stage**) with each other. This should lead to an almost immediate move into addressing the issues (**Storming and Norming Stage**) to be addressed in the Project Charter. Guidance from MED and the Project Manager will be crucial in establishing smooth and productive meetings. This team will **Perform** for the duration of the project once clear and definitive directions are given for their functions and roles. The team will **Adjourn** at the close of the project, and act as the final acceptor of project delivery.

4.6.10.2 Project Team & Consultants

Based on the diverse composition, it is expected that the team will pass through all phases of team development. **Forming**: will occur at the onset as these individuals may not have worked together in the past. There might be the tendency for working in silos (GPD, Planning teams or Survey Team) due to the familiarity of team members from each respective ministry. In order to successfully overcome this stage, the GPD Lead and Project Manager will need to spend time articulating and detailing the requirements of the project and the expectations as well as highlighting the interlinkage of the various activities. The expectations are that will this will continue through the **Norming** stage. However due to the technical nature of the activities and the prior training of team members, this is not expected to be disruptive. **Performing** will occur for the different activities as they are specific to the team members and the cross-cutting areas will be managed by the technical advisor (engineering, investment or legal). **Adjourning** will occur at different times as the specific activities end. For example, the planning team will adjourn after the design of lots phase while the GPD and others will continue.

4.6.10.3 Communication/ Meeting & Virtual Teams

Communication will be done through a variety of mediums in keeping with the communications plan. The Project Steering Committee will communicate formally through monthly meetings and record-keeping of decisions using minutes. Information will be circulated via email and hard copy, with project document updates being signed off by Project Steering Committee, Project Sponsor and Project Manager.

The Project Team will have periodic meetings and use virtual communications for faster and more efficient communication as team members are in different locations. To track and document this, a record log will be kept by the GPD Lead and Project Manager. If found necessary, reports will be provided to the PSC and documented on the Smart Stream Database.

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4.6.10.4 Individual and Team Assessments

Metrics designed along the established milestones from the Scope and Schedule Management Plan will be used to determine if the teams are meeting the required timelines. The individual works will be measured against the national established norms for surveys and plans. The planning and survey teams will be measured against national legislation for the legal components, and Financial and Stores Orders for the financial matters. Likewise, the Mines and Minerals Act and Regulations will be evaluated for criterion for mining plans and quarry designs, and the Environmental Protection Act and Regulations for environmental compliance.

4.6.11 Resources Control

4.6.11.1 Control Project Resource

For this project to be successful, different techniques and tools will be used to control the resources. This process will be conducted throughout the project with the objective of

ensuring that resources are available in a timely manner for project implementation. To put this process into practice, several elements will be used as input data:

- The **Project Charter** which gives basic information about the project;
- The **Resource Management Plan** that will outline what resources will be needed and how they will be managed;
- The **allocation** of material resources;
- The **Project Schedule** which foresees the period of execution of project activities and which is, therefore, necessary for us to know when such a resource is needed and when it is no longer needed;
- **Risk Register**, accounting for internal and external risks;
- Regulation from the State and/or from the Project Sponsor. Those documents provide information about when or how to distribute resources taking into account that the implementation will be made in two places; and
- **Activity and Resource Estimate** that gives the list of resources needed for the implementation of the project and that will be used for comparison throughout the project.

Tools and techniques that will be used during this process are:

- **Analysis of alternatives**: Depending on the data and information collected, alternatives will be analyzed with a view to choosing the best way to correct the differences in the use of resources.
- Performance review.
- **Tracking Resource Expenditures**: The manager will be able to control the expenses of the project. The information gathered during this project would provide analog data for future projects.
- **Authorization for Expenditure**: The guarantee that the resources are used and disengaged according to the needs of the project plan will be done by requiring the approval of AFE's from the Project Steering Committee. This ensures further accountability.

- **Notification to Relevant Stakeholders:** Always considering that the project has different parts involved. The notifications are important and must be made in time to prevent delays.

The information gathered will enable the distribution of resources to be reviewed if necessary

4.6.11.2 Net Change

Management of actual changes as they occur, knowing that tracking this information can have a great impact on the project. Chart 37 below will be used to annotate resource use occurring during the project and document changes if any. Changes made will require to be updated on all other relevant documents of the project.

Chart 37 Resource Plan Allocation Net Change Template (Source: compiled by author, October 2019)

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation Net Change						
Resource	**Resource Description**	**Source**	**Allocation**	**Resources Required**	**Net Change**	**Explanation**
Project Team	Project Manager	GPD Inspector of Mines	Pre-Assigned from Project Charter			
	GPD Lead	Government GPD	Pre-Assigned from Ministry			
	Mining Technical Staff	Government GPD	Pre-Assigned from Ministry			
	Project Steering Committee	Government (multi-sectoral)	Once per month (Minimum)			
	Technical Advisors (Mining)	External	As needed duration of project			
	Technical Advisors (Investment)	Government (MED)	As needed duration of project			
	Technical Advisors (Legal)	Government (AG)	As needed duration of project			

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation Net Change						
Resource	**Resource Description**	**Source**	**Allocation**	**Resources Required**	**Net Change**	**Explanation**
Support Team	Survey Team	Government (Ministry of Natural Resources)	May -July 2020 (10% of time)			
	Planning Teams	Government (Ministry of Natural Resources)	May -July 2020 (10% of time)			
	Legal Advisors	Government (Attorney General's Ministry)	As needed duration of project (5% of time)			
	Finance Officers	Government (Ministry of Finance)	As needed duration of project (5% of time)			
Facilities	Office Space	Government (Ministry of Natural Resources/GPD)	Full time as needed Pre-Assigned in Project Charter			
	Conference/ Meeting Rooms	Government (various locations)	As needed duration of project			
	Minerals Lab	External-Contract				
	Consultants Offices	External - (various locations)	Full Time for duration of contracts			
Equipment	Office Equipment	External- Contract	As needed duration of project			
	Printing Services	External - Service Provider	As needed duration of project			
	Computer & Hardware	Government/ Contractors	Full Time as needed Pre-Assigned in Project Charter			
Software Tools	GIS Software	Government (Ministry of Natural Resources/GPD)	May-Aug 2020 Pre-Assigned in Project Charter			
	Autocad	Government (Ministry of Natural Resources/GPD)	May-Aug 2020 Pre-Assigned in Project Charter			
	SmartStream Cloud Storage	Government GPD	Full Time as needed Pre-Assigned in Project Charter			

FS Bentonite Clay Mine & Export Facility: Resource Plan Allocation Net Change						
Resource	**Resource Description**	**Source**	**Allocation**	**Resources Required**	**Net Change**	**Explanation**
	SmartStream (Financial Management)	Government (Ministry of Natural Resources/Finance)	Full Time as needed Pre-Assigned in Project Charter (<1% of time)			
Consultants	Mining (Report Review)	External- Contract	Full Time, Jul-Aug 2020			
	Mining (Mine & Quarry Plan)	External- Contract	Full Time, May-Sept 2021			
	Mining (Economic Model)	External- Contract	Full Time, Sept-Nov 2021			
	Designer/Marketer	External- Contract	Full Time, Dec 2021 - Feb 2022			
	Economist (Market Analysis)	External- Contract	Full Time, Oct-Dec 2020			
	Economist (Economic Model)	External- Contract	Full Time, Sept-Nov 2021			
	Investment Officer	External- Contract	Full Time, Oct-Dec 2020			
	Business Analyst	External- Contract	Full Time, Oct-Dec 2020			
	Environmental Consulting Group	External- Contract	Full Time, Oct 2020 - May 2021			
	Social Consultant	External- Contract	Full Time, Oct 2020 - Mar 2021			
	Lawyer	External- Contract	Full Time, Oct-Dec 2020			

4.6.12 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Chief Executive Officer
Ministry of Economic Development

4.7 Communication Management Plan

"Project Communications Management includes the processes necessary to ensure that the information needs of the project and its stakeholders are met through the development of artifacts and implementation of activities designed to achieve effective information exchange" PMBOK 2017. The primary focus of project communications is to inform and engaging stakeholders by providing them with updates in a timely and effective manner and undertaking all the tasks, actions and activities required to ensure that the communication flow is maintained and proper documentation is kept. The Communication Plan covers three aspects:

vii. Plan Communications Management
viii. Manage Communications
ix. Monitor Communications

COMMUNICATION MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

OCTOBER 2019

4.7.1 Introduction

This Communications Management Plan sets the communications framework for this project. It serves as a guide for communications throughout the life of the project and is updated as communication needs change. This plan identifies and defines the roles of the persons involved in this project. It also includes a communications matrix that maps the communication requirements of this project. The plan provides an analysis of the best or more appropriate forms of engagement with each stakeholder, and in particular how to engage high power-high influence stakeholders and it outlines the strategies to be utilized in this engagement. The plan provides guidance for how communications are to emanate from the project and the structure and form of these communications.

4.7.2 Communications Management Approach

The Project Manager (PM) will take a proactive role and be the primary conduit of information flow and sharing in ensuring effective communications throughout the FS Project. This will be augmented by assistance from the GPD Lead on matters related to infrastructure works, plans, and legislative reviews. The communications requirements are documented in the Stakeholder Requirements Communications Matrix shown in Chart 38 and the Communications Matrix found below. The Stakeholder Requirements Communications Matrix will be used as the guide for what each stakeholder information requirement is, what information is being communicated, the frequency and the modality of communication.

Project plans, updates or changes will require the approval of the Project Steering Committee and will be captured in the Project Management Information System (PMIS). Changes or updates required due to changes in personnel, scope, budget, consultant limitations, etc. will be routed through the PM to the Project Steering Committee. The project manager is responsible for managing all proposed and approved changes to the communications management plan. Once the change is approved, the Project Manager will update the plan and supporting documentation and distribute the updates to the project team and all stakeholders. This methodology is consistent with the project's Scope Management Plan, Requirements Management and the Project Charter and ensures that all stakeholders remain informed of any changes.

4.7.3 Roles and Responsibilities

4.7.3.1 Project Sponsor

The Project Sponsor is the champion of the project and has authorized the project by signing the project charter. This person is responsible for the funding of the project and is ultimately responsible for its success. Since the Project Sponsor is at the executive level communications should be presented in summary format unless the Project Sponsor requests more detailed communication. The Project Sponsor is responsible for approving

the information to be shared with general stakeholders, and for all formal documents and executive communications sent to other areas or Ministries of Government.

4.7.3.2 Project Manager

The Project Manager is responsible for Communication Management on the project, including, ensuring all scheduled communications are sent, providing ad hoc communications as needed, and communicating with the Project Steering Committee. The Project Manager has overall responsibility for the execution of the project. The Project Manager manages the day to day resources, provides project guidance and monitors and reports on the project's metrics as defined in the Project Management Plan. As the person responsible for the execution of the project, the Project Manager is the primary communicator for the project distributing information according to the Communications Management Plan.

4.7.3.3 Project Steering Committee (PSC)

The Project Steering Committee provides strategic oversight for changes that impact the project, they ensure that changes within the project are affected in such a way that it benefits the overall project and deliverables. The PSC requires communication on matters which will change the scope of the project and its deliverables.

The PSC also reviews technical specifications and authorizes changes within the organization's infrastructure. Technical design documents, user impact analysis, and implementation strategies are typical of the types of communication this group requires.

4.7.3.4 GPD Lead

The GPD Lead manages day to day resources, provides project guidance and monitors and reports on the projects metrics as defined in the Project Management Plan, Project Charter and Requirements Traceability Matrix as it relates to works, plans, designs, and

legislative reviews, the GPD Lead is the primary communicator for the project during these phases.

4.7.3.5 Advisors (Technical/Legal/Economic/Investment)

Responsible for ensuring that all technical/legal/economic aspects of the project are addressed and that the project is implemented in a technically and legally sound manner, responsible for reviewing technical designs and developing documentation. The advisors require close communications with the Project Manager, GPD Lead, Project Team, and Consultants.

4.7.3.6 Project Team

The Project Team is comprised of all persons who have a role performing work on the project. The project team needs to have a clear understanding of the work to be completed and the framework in which the project is to be executed. The Project Team is responsible for completing the work for the project playing a key role in creating the Project Plan including defining its schedule and work packages. The Project Team requires a detailed level of communication which is achieved through day to day interactions with the Project Manager and other team members along with weekly team meetings.

4.7.3.7 Key Stakeholders

Normally Stakeholders include all individuals and organizations who are impacted by the project. For this project, they are defined as a subset known as Key Stakeholders. These are the stakeholders with whom there exists communication but are not included in the other roles defined in this section. The Key Stakeholders include executive management with an interest in the project and key users identified for participation in the project.

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4.7.4 Communications Management Constraints

All project communication activities will occur within the project's approved budget, schedule, and resource allocations as outlined in the Project Charter and approved by the Project Steering Committee. The PM and the GPD Lead are responsible for ensuring that communication activities are performed by the project team and without external resources. Communication activities will occur in accordance with the frequencies and modality detailed in the Stakeholder Requirements Communication Matrix and the Communications Matrix. Since the project team members except for the technical advisors are sourced from within government, their time and duties are shared with normal duties. This represents a constraint in human resources and must be monitored and addressed by the PM. Communications with GET s.r.o. are limited primarily to electronic means as they are geographically removed from the project and in another time zone. Any deviation of these timelines may result in excessive costs or schedule delays and must be approved by the Project Sponsor.

4.7.5 Stakeholder Communication Requirements

As part of identifying all project stakeholders, the Project Manager will communicate with each stakeholder in order to determine their preferred frequency and method of communication. This feedback will be maintained by the Project Manager in the project's Stakeholder Register. Standard project communications will occur in accordance with the Communication Matrix; however, depending on the identified stakeholder communication requirements, individual communication is acceptable and within the constraints outlined for this project.

In addition to identifying communication preferences, stakeholder communication requirements must identify the project's communication channels and ensure that stakeholders have access to these channels. If project information is communicated via secured means or through internal company resources, all stakeholders, internal and external, must have the necessary access to receive project communications.

Once all stakeholders have been identified and communication requirements are established, the project team will maintain this information in the project's Stakeholder Register and use this, along with the project communication matrix as the basis for all communications.

4.7.5.1 Stakeholder Communication Requirements Matrix

The Stakeholder Communications Requirements Matrix shown and detailed in Chart 38 outlines the specific communication information that is required by each stakeholder as well the timeline/frequency and possible trigger mechanism for the communication, it outlines the level of detail required for that stakeholder. It must be used in conjunction with the Communications Matrix.

Chart 38 FS Project Stakeholder Communications Requirements Matrix (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Stakeholder Communications Requirements Matrix						
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**#**	**Stakeholder Information Requirements**	**Timeframe / Frequency/Trigger**
1	Ministry of Economic Development	Sponsors	Provide resources to enable project, provide high-level requirements and overall approval for project and results.	1	Receive written project updates	Monthly
				2	Provide input to requirements	Prior to completion of significant project milestone/ functionality (as directed by Project Manager)
				3	Receive plans and provide feedback	Upon completion of significant project milestone/ functionality (as directed by Project Manager)
2	Project Steering Committee	Project Board (Advisory)	Responsible for project overview, administration for expenditure.	4	Receive written project updates	Monthly
				5	Provide input to requirements	Prior to completion of significant project milestone/ functionality (as directed by Project Manager)
				6	Receive plans and provide feedback	Upon completion of significant project milestone/ functionality (as directed by Project Manager)
3	Project Manager	Project Management	Responsible for overall project administration and delivery.	7	Receive update on project progress	Daily, Weekly and ad hoc as needed
				8	Provide updated schedule to team members	Weekly
				9	Direct communications with Consultants	Ad hoc as needed
				10	Direct communications with Tech Teams/Advisors	Ad hoc as needed
4	Geology and Petroleum Department (GPD) Lead	Responsible Manager	Provide day-to-day project direction and requirements	11	Receive update on project progress	Daily during infrastructure works, Weekly and ad hoc as needed
				12	Provide input to requirements	Weekly and ad hoc as needed
				13	Direct communications with Consultants	Ad hoc as needed
				14	Direct communications with tech team	Weekly and ad hoc as needed
5	Department of Mines (Geology and Petroleum GPD)	Tech Team Members (Backup and support)	Assist in planning and implementation of activities	15	Provide and receive updates on project progress	Weekly
				16	Direct communications with Consultants and Tech team	Daily, Weekly and ad hoc as needed
				17	Provide input to plans and deliverables	After completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
		Records Management Section	Coordinate with tech teams, technical advisors and contractors	18	Provide and receive updates on project progress	Weekly
				19	Direct communications with tech team and advisors	Weekly and ad hoc as needed
6	Technical Advisors (Economic/ Mining/ Investment / Legal and Engineering)	Technical Advice	Provides technical guidance and analysis.	20	Provide and receive updates on project progress	Weekly for duration of contract
				21	Provide input to requirements	Weekly and ad hoc as needed for duration of contract
				22	Direct communications with tech team	Weekly and ad hoc as needed for duration of contract
7	Ministry of Natural Resources; Department of Lands and Surveys, Planning Department	Tech Team Members (Backup and support)	The delineated deposit acceptance	23	Receive written project updates	Bi-Monthly and ad hoc as requested
				24	Provide input to requirements	Prior to completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
				25	Receive plans and provide feedback	After completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)

FS Bentonite Clay Mine & Export Facility: Stakeholder Communications Requirements Matrix						
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**#**	**Stakeholder Information Requirements**	**Timeframe / Frequency/Trigger**
8	Consultants	Technical Services	Carry out various aspects (mining, economic, legal, investment, export, promotion, etc.)	26	Direct communications with tech team	Daily during consultant works, Weekly and ad hoc as needed
				27	Develop plans, models, and reports.	Daily during consultant works, Weekly and ad hoc as needed
				28	Review plans, demos and provide feedback	Prior to completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
				29	Provide input to rehabilitation plans	After completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
9	Ministry of Finance	Financial Incentives	Design and Manage Financial investments programs	30	Receive update on project progress	After completion of significant project milestone/ functionality (as directed by Project Manager)
				31	Provide input to requirements	Weekly and ad hoc as needed
10	Ministry of Works	Infrastructure Works	Advise on physical infrastructure works and earth movement. Responsibly for government-funded infrastructure, also a major user of construction mineral and operates as a large mining operator.	32	Receive updates on project progress	Prior to completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
				33	Provide input to rehabilitation plans	After completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
				34	Receive plans, demos and provide feedback	Prior to completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
				35	Direct communications with tech team	Weekly and ad hoc as needed
11	Attorney General's Ministry	Legal Services	Responsible for legal drafting and advice	36	Provide and receive updates on project progress	Prior to completion of significant project milestone/ functionality (as directed by Project Manager)
				37	Direct communications with technical advisors	Weekly and ad hoc as needed
12	Local Community (Spanish Lookout Community)	User Representatives	Acceptance of mining proposals	38	Receive update on project progress	Prior to completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
13	Mining Industry (Mining Operators)	User Representatives	Review of plans and mining methodology	39	Receive updates on project progress	Ad hoc as needed
				40	Provide input to plans	After completion of significant project milestone/ functionality (as directed by Responsible Manager and Project Manager)
14	Citizens of Belize/General Public	User Representatives	Final beneficiaries of new industry and economic growth.	41	Receive update on project progress	After completion of significant project milestone/ functionality (as directed by Project Manager)
15	Belize Chamber of Commerce	User Representatives	Promoting mineral industry sector as a part of their opportunities for growth in the private sector.	42	Receive update on project progress	Receive update on project progress
16	BELTRAIDE	Fiscal incentives	Responsible for fiscal incentives packages	43	Provide and receive updates on project progress	Provide and receive updates on project progress
			Investment promotion agency	44	Direct communications with technical advisors	Direct communications with technical advisors
17	Belize Minerals Ltd.	Technical Advisor	Responsible for advice on mineral exploration	45	Receive update on project progress	Receive update on project progress
			Review of plans and mining methodology	46	Provide and receive updates on project progress	Provide and receive updates on project progress
			Provides technical guidance and analysis.	47	Direct communications with technical advisors	Direct communications with technical advisors
18	GET s.r.o	Technical Advisor/ Geological Evaluation Company	Responsible for advice on mineral exploration	48	Receive update on project progress	Receive update on project progress
			Review of plans and mining methodology	49	Provide and receive updates on project progress	Provide and receive updates on project progress
			Provides technical guidance and analysis.	50	Direct communications with technical advisors	Direct communications with technical advisors

4.7.6 Communication Methods and Technologies

The project team will determine the communication methods and technologies based on several factors to include stakeholder communication requirements, available technologies (internal and external), and organizational policies and standards.

4.7.6.1 Project Management Information System (PMIS)

A PMIS is an information system consisting of the tools and techniques used to gather, integrate, and disseminate the outputs of project management processes. It is used to support all aspects of the project from initiating through closing and can include both manual and automated systems (PMBOK 5th Edition, 2013).

The rules governing the PMIS for the project are:

- All Project Management Plan related documents will be accessible in the PMIS, including the Project Charter, Resource Plan, Communications Plan, Change Request, approved contract templates, etc.
- All documents such as minutes, deliverables, templates, plans, surveys, source documents, reference materials, etc. will be stored in PMIS in both electronic form (where available) and manual/hard copy.
- Documents that reside outside of the PMIS are not considered as a part of the project.
- All documents should use version control features; such as version numbers, maintaining a single, current document with retraceable modifications and tracking of authors.
- All document changes or additions will be notified to the GPD lead and Project Manager daily.
- All document changes or additions will be summarized for GPD Lead and Project Manage weekly.
- All final document changes and additions will be notified to the Project Steering Committee bi-monthly.

The PMIS for the project will include tools/features such as:

- Document Repository
- Charts and graphs (customizable)
- Scheduling and calendar for resources and timeline
- Access authorization/restriction based on roles and functions
- Collaboration
- Web access
- Project Dashboards

4.7.6.2 Project Communication Tools & Methods

The project will cover a wide range of varying communications dependent on the stakeholder and the message to be delivered (see Stakeholder Communications Requirements Matrix and Communications Matrix).
It will utilize:

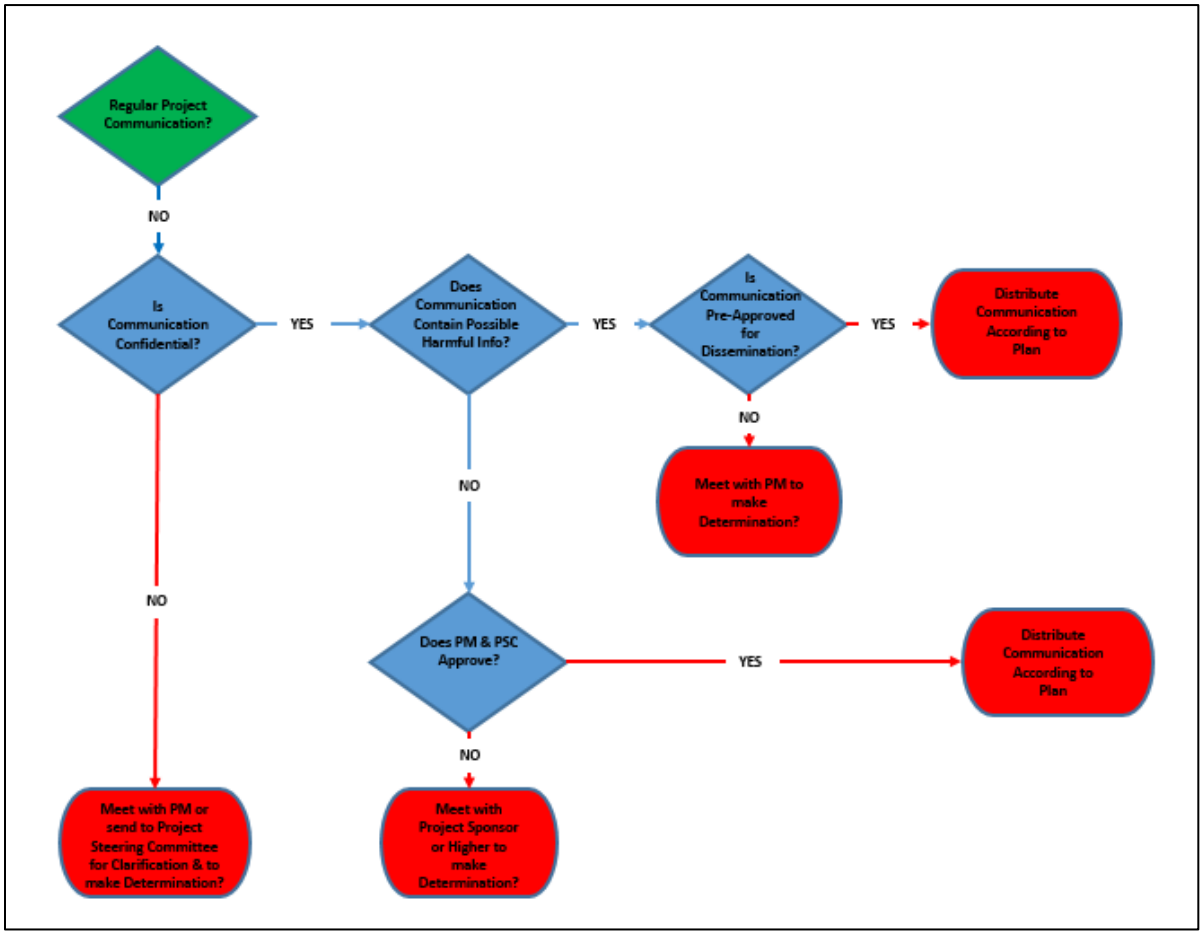
Pull and Interactive Communications with the Project Sponsor, Project Steering Committee, Project Team, and Consultants.
Push Communications will be used with the general public, Chamber of Commerce and support Ministries (MOF, MNR).
Pull Communications will be used with the Ministry of Works and Technical/Economic/Legal/Investment Advisors.

Changes will be made iteratively based on the feedback from the Monitoring Process.

4.7.6.3 Communication Flowchart

The communication flowchart shown in Chart 39 below, was created to aid in project communication. This flowchart provides a framework for the project team to follow for this project. However, there may be occasions or situations which fall outside of the communication flowchart where additional clarification is necessary. In these situations, the Project Manager is responsible for discussing the communication with the Project Sponsor and deciding how to proceed.

Chart 39 Communication/Information Flow Chart (Source: compiled by author, C. Moore, October 2019)



4.7.6.4 Communication Channels

The number of stakeholders incorporated in this Communications Plan as identified in the Stakeholder Analysis Communications matrix is eighteen (18), therefore the number of communication channels based on the PMI formula n(n-1)/2, (PMBOK, 2017), where n is the number of stakeholders inclusive of the PM is 18(18-1)/2 = 153. With this large number of communication channels between stakeholders it is critical that the protocols established in this Communications Plan are adhered to and the PM and GPD lead monitor and manage communications carefully.

4.7.7 Communications Matrix

The Communications Matrix shown in Chart 40, outlines the type of communication required, the intended audience, the medium and the expected deliverable from that communication. It should be used in conjunction with the Stakeholder Communications Requirements matrix.

Chart 40 Communication matrix for the FS Project (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Communication Matrix							
Comm. Type	**Objective of Communication**	**Medium**	**Frequency**	**Audience**	**Owner**	**Deliverable**	**Format**
Kickoff Meeting	Introduce the project team and the project. Review project objectives and management approach.	Face to Face	Once	➢ Project Sponsor ➢ Project Manager ➢ Project Steering Committee ➢ GPD Lead ➢ Project Team ➢ Stakeholders	Project Manager	Agenda Meeting Minutes	Soft copy archived on project PMIS and project web site/ SmartStream Cloud
Project Team Meetings	Review status of the project with the team.	➢ Face to Face ➢ Conference Call ➢ Virtual Meetings	Weekly	➢ Project Team ➢ Technical Advisors	Project Manager GPD Lead	Agenda Meeting Minutes Project Schedule	Soft copy archived on project PMIS and project web site/ SmartStream Cloud

FS Bentonite Clay Mine & Export Facility: Communication Matrix							
Comm. Type	**Objective of Communication**	**Medium**	**Frequency**	**Audience**	**Owner**	**Deliverable**	**Format**
Technical Design Meetings	Discuss and develop technical design solutions for the project.	Face to Face	As Needed	➢ Project Team ➢ Technical Advisors ➢ Consultants	Project Manager GPD Lead	Agenda Meeting Minutes Project Schedule Plans and Designs	* Soft copy archived on project PMIS and project web site/ SmartStream Cloud Hard Copies at GPD
Monthly Project Status Meetings	Report on the status of the project to management.	Face to Face	Monthly	➢ Project Sponsor ➢ Project Manager ➢ Project Steering Committee ➢ Project Team ➢ GPD Lead	Project Manager	Slide updates Meeting Minutes Project Schedule Project Cost Approved AFE's	Soft copy archived on project PMIS and project web site/ SmartStream Cloud Hard Copies at GPD
Project Status Reports	Report the status of the project including activities, progress, costs, and issues.	Email Report Virtual Meetings	Monthly	➢ Project Sponsor ➢ Stakeholders ➢ Project Team ➢ Technical Advisors	Project Manager GPD Lead	Project Status Report Project Schedule Project Cost	Soft copy archived on project PMIS and project web site/ SmartStream Cloud Hard Copies at GPD

4.7.8 Guidelines for Meetings

Meeting Agenda

Meeting Agenda will be distributed five (5) business days in advance of the meeting. The Agenda should identify the presenter for each topic along with a time limit for that topic. The first item on the agenda should be a review of action items from the previous meeting.

Meeting Minutes

Meeting minutes will be distributed within five (5) business days following the meeting. Meeting minutes will include the status of all items from the agenda along with new action items and the Parking Lot list.

Action Items

Action Items are recorded in both the meeting agenda and minutes. Action items will include both the action item along with the owner of the action item. Meetings will start with a review of the status of all action items from previous meetings and end with a review of all new action items resulting from the meeting. The review of the new action items will include identifying the owner for each action item. These will be recorded in an Action Matrix which will be distributed with the meeting minutes.

Meeting Chair-Person

The Chair-Person is responsible for distributing the meeting agenda, facilitating the meeting and distributing the meeting minutes. The Chair-Person will ensure that the meeting starts and ends on time and that all presenters adhere to their allocated time frames.

Note Taker

The Note Taker is responsible for documenting the status of all meeting items, maintaining a Parking Lot item list, Action Matrix and taking notes of anything else of importance during the meeting. The Note Taker will give a copy of their notes to the Chair-Person at the end of the meeting as the Chair Person will use the notes to create the Meeting Minutes.

Parking Lot

The Parking Lot is a tool used by the facilitator to record and defer items that aren't on the meeting agenda; however, merit further discussion at a later time or through another forum. A parking lot record should identify an owner for the item as that person will be responsible for ensuring follow-up. The Parking Lot list is to be included in the meeting minutes.

4.7.9 Management of Communication process

4.7.9.1 Project Communication

Distribution and documentation of communications while being logged and tracked in the PMIS utilizing a standardized transmission sheet displayed in Chart 41.

Chart 41 FS Project Communication Sheet (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Communication Sheet	
Communication Name/Type*	
Information Requirement Met	
Information Providers	
Information Recipients	
Collection Timeframe/	
Frequency/Trigger	
Type	
Facilitator/Preparer	
Method of Delivery	
Distribution/ Storage	
*Note: Communication Name/Type includes monthly briefing, weekly status report, daily status meeting, daily progress report, etc.	

4.7.9.2 Communication Issue Log

For the FS Project to be a success, the project manager will effectively use various tools and methodologies to communicate and manage the project. Two of the most important characteristics of a successful project are documentation and accountability. Project documentation is used to formally capture and communicate important project

information, so it is available to stakeholders who need it. The documentation must be carefully managed and updated as any changes occur in order to prevent gaps and/or overlaps in project work. Likewise, accountability must be established so that the project team and stakeholders understand who is responsible for the work to be performed. If tasks are not specifically assigned and managed, they will sit idle and may significantly impact the overall project performance.

The communications issue log as shown in Chart 42, will be used throughout the project's lifecycle to capture any issues brought forward, communicate the issues to the project team and stakeholders, establish categories and priorities of all issues, assign responsibility to each issue, and ensure that each issue is resolved with minimal impact to the project's performance. Like most other project documentation, the issue log will be reviewed by the project team regularly to ensure issues are being resolved. The document will be updated and communicated to all project stakeholders as updates are made.

Chart 42 FS Project Communications Issue Log (Source: compiled by author, C. Moore, October 2019)

FS Project: Communications Issue Log								
Project: Bentonite Clay Mine & Export Facility						Date:		
Issue	**Description**	**Priority (H,M,L)**	**Category**	**Reported by**	**Assigned to**	**Status Closed/Active**	**Date resolved**	**Resolution/ Comments**
1								
2								
3								

4.7.9.3 Communication Escalation Process

Timely and efficient communication that is adequately approved and conveying the right message is a critical component for successful project completion. It is therefore also critical that any conflicts, disputes, discrepancies or misinformation regarding the project and project communications are resolved in a timely manner that ensures the project schedule is maintained, also that the communications are correct and distributed to the

right persons in a manner that prevents any ongoing difficulties. In order to manage this, the FS Project will use the escalation framework as shown on Chart 43 which defines the priority levels, the level of authority required to make the decision and the timeframes for resolution. It should be noted however that any communications including sensitive and/or confidential data or information will require escalation to the Project Steering Committee or the Project Sponsor or higher prior to external distribution.

Chart 43 FS Projection Communication Escalation Process (Source: compiled by author, October 2019)

FS Project: Communication Escalation Process			
Priority	**Definition**	**Decision Authority**	**Timeframe for Resolution**
Priority 1	Major impact to project or project deliverable. If not resolved quickly there will be a significant adverse impact to the quality of the project and impacts to scope, budget and/or schedule.	Project Sponsor	Within 1 business day
Priority 2	Medium impact to project or project operations which may result in some adverse impact to scope, budget and/or schedule	Project Steering Committee	Within 2 business day
Priority 3	Slight impact which may cause some minor scheduling difficulties with the project but no impact on project operations or budget.	Project Manager	Within 2 business days
Priority 4	Insignificant impact to project but there may be a better solution.	GPD Lead	Work continues and any recommendations are submitted via the project change control process

4.7.10 Monitoring Communication

Monitoring of the project communications is the process of monitoring and where necessary controlling communications, done throughout the entire life of the project. This ensures that the information needs of project stakeholders are met. The process must be in keeping with the procedures established in the Communication/Information Flowchart and must be in accordance with the Stakeholder Communications Requirements Matrix and the Communication Matrix. The basic functionality of the Monitor/Control Communications process is to guarantee that the right people are getting the correct

information in a timely manner. If this is not achieved then an iterative process of change has to be undertaken through the change process procedure.

4.7.10.1 Work Performance Information

In order to monitor the effectiveness of the communications under the project, a comparison of how the project communication is performing against what was planned vs what has been implemented will be done. This analysis will also provide for feedback on the variations between implemented communication and the planned communication. In other words, it will test both the effectiveness and the clarity of the message between the sender and receiver. This will be done through several avenues namely:

- **PM/GPD Lead Review**: informal review of project communications done on a regular basis to test for conformance with procedures and clarity.
- **Communication Audits**: routine and random audit of the PMIS to evaluate data capture and storage, data completeness, as well as audit of the SmartStream cloud service and remote login, to view traffic and use of data.
- **Feedback:** the use of interactive communication method with a feedback loop is invaluable for the determination of clear and well-understood communications. Surveys of the mining industry persons and the general public will also aide in evaluating the penetration of the information and its clarity or fit for purpose.
- **Communication Plan Adjustments:** flexibility to adjust the medium or frequency of communication distribution is required for effectiveness. Observations on the acceptance and use of the various mediums of communication will also be done.

The work performance information will be captured and reported to the Project Steering Committee in several report formats (see Communications Matrix for frequency):

- Status Reports/Monthly Reports
- Progress Reports
- Progress Forecasts
- Comparison of PID established baseline to actual.

4.7.10.2 Communication Practices

The following communication practices will be utilized by the Project to ensure effective project communication:

- All project communications will be copied to the Project Manager.
- All project communications related to infrastructure works or legislative works will be copied to the GPD Lead.
- All project Collateral will be stored in the PMIS and hard copies stored at the GPD Data Repository.
- All meetings will have an assigned minute-taker that will also record decisions taken.
- All minutes will be added to the PMIS and circulated to the Project Steering Committee.

4.7.10.3 Change Request

Any adjustments, actions or interventions on communication activities defined in the communications management plan are done through the change request form as indicated on Chart 44 below. The process of change requests allows for all documented communication changes to be considered in an integrated manner while addressing project risks in hopes that they are aligned to the overall project objectives or plans. All change requests will follow the Communications Escalating Process if necessary and will require the approval of the Project Sponsor, the will be captured and transmitted through the PMIS.

Chart 44 FS Project Change Request Form (Source: compiled by author, C. Moore, October 2019)

FS Project: Change Request Form			
1.) SUBMITTER - GENERAL INFORMATION			
Change Request CR#	*[CR001]*		
Type of CR	☐ Enhancement	☐ Defect	
Project Sub Component			
Submitter Name			

Brief Description of Request				
Date Submitted				
Date Required				
Priority	☐ Low	☐ Medium	☐ High	☐ Mandatory
Reason for Change				
Other Items Impacted				
Assumptions and Notes				
Comments				
Attachments or References	☐ Yes	☐ No		
	Link:			
Approval Signature			Date Signed	

4.7.10.4 Project Management Plan Updates/ Documents Updates

Changes to Project Management Plan or Project Charter will go through the established change control process and will require the approval of the Project Sponsor. Updates to this Communication Management Plan, the Stakeholder Communications Requirements Matrix or the Communications Matrix will be made where the efficacy of communication will be had or where the stakeholder needs have been amended or shifted. Similarly, updates to the Issue Log, Lessons Learnt Register and the Stakeholder Register will be made in keeping with new or emerging information, provided that these changes are approved by the Project Steering Committee and captured in the PMIS.

4.7.11 Glossary of Communication Terminology

Chart 45 Glossary of Communication Terms (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Glossary of Communication Terms		
No.	**Term**	**Definition**
1	Communication	The effective sending and receiving of information. Ideally, the information received should match the information sent. It is the responsibility of the sender to ensure this takes place.
2	Stakeholder	Individuals or groups involved in the project or whose interests may be affected by the project's execution or outcome.
3	Communications Management Plan	Portion of the overall Project Management Plan which details how project communications will be conducted, who will participate in communications, frequency of communications, and methods of communications.
4	Resource Management Plan	Document that provides guidance on how team resources will be categorized, allocated, managed, and released.
5	Manage Communication	Process of ensuring timely and appropriate collection, creation, distribution, storage, retrieval, management, monitoring and the ultimate disposition of the project information.

FS Bentonite Clay Mine & Export Facility: Glossary of Communication Terms		
No.	**Term**	**Definition**
6	Project Management Information System (PMIS)	A project management information system (PMIS) is the coherent organization of the information required for an organization to execute projects successfully. A PMIS is typically one or more software applications and a methodical process for collecting and using project information. These electronic systems help plan, execute, and close project management goals. The selection of a PMIS will be shaped by the project environment. This includes the consideration of available resources and the capabilities of the core project stakeholders.
7	Escalation	The process which details how conflicts and issues will be passed up the management chain for resolution as well as the timeframe to achieve resolution.
8	Communications Issue Log:	The communications issue log is one example of project documentation and accountability. This issue log will be used throughout the project's lifecycle to capture any issues brought forward, communicate the issues to the project team and stakeholders, establish categories and priorities of all issues, assign responsibility to each issue, and ensure that each issue is resolved with minimal impact to the project's performance
9	Project Charter	Document that captures and records the basic information needed to correctly direct and manage the project.

4.7.12 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Ministry of Economic Development
Chief Executive Officer

4.8 Risk Management Plan

"Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation and monitoring risk on a project" PMBOK (2017). The risk management process has three primary objectives; to reduce the probability (likelihood) and/or impact (effect) of negative risks (threats), to increase the probability and/or impact of positive risks (opportunities), this is done to optimize the chances of project success and the delivery of the objectives of the project. It identifies risks and both the levels; individual project risk and overall project risks. It highlights areas needed for monitoring and areas requiring intervention to

limit (mitigate) impacts to the project and bring risks to within acceptable ranges that can be managed by the project management team or organization. Project Risk Management involves seven processes:

i. Plan Risk Management
ii. Identify Risks
iii. Perform Qualitative Risk Analysis
iv. Perform Quantitative Risk Analysis
v. Plan Risk Response
vi. Implement Risk Responses
vii. Monitor Risk

Specific objectives of this project's Risk Management Plan include:

- Ensure critical risks impacting scope, schedule, budget, project performance, and/or change management are proactively identified, communicated, mitigated, and escalated in a timely manner.
- Facilitate attention to key risks impacting the project and individual teams.
- Produce meaningful information that allows project management to focus efforts on the "right" (e.g., high likelihood and high impact) risks with an effective coordination of effort.
- Ensure appropriate stakeholders are informed and, if applicable, participate in the mitigation.
- Record an audit trail of discussions and mitigation of project risks.

The Risk Manager is responsible for the Risk Management Plan, its effective implementation throughout the project, trends and metric analysis, and training project personnel on risk management. The Risk Manager is also responsible for creating and maintaining the Risk Register (or Log) unless this task is delegated to a team member
In implementing the plan, the appointed risk manager is responsible for ensuring periodic overall risk assessment and reviewing it with the team and stakeholders.

- Work and communicate progress on most severe risks first.
- Set realistic due dates and then work to meet the dates.
- Mitigate risks at the appropriate level (i.e., project, team, sub-team).

- Keep stakeholders informed on current risk status.
- Document the planned risk mitigation history and actual mitigation of a risk. This documentation serves as a key input to root cause analysis, key learning, metrics, and risk analysis.
- For high impact, impending risks, a rapid decision turnaround may be required, as determined by the Risk/Project Manager. In such cases, available applicable team members will make the decision.

RISK MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A

OCTOBER 2019

4.8.1 Introduction

The purpose of the risk management plan is to establish the framework in which the project team will identify risks and develop strategies to mitigate or avoid those risks. However, before risks can be identified and managed, there are preliminary project elements that must be completed. These elements are outlined in the risk management approach.

Before risk management begins it is imperative that a foundation is established for providing structured project information, thus, the following project elements were completed and defined prior to developing this Risk Management Plan:

- Define work scope, schedule, resources, and cost elements
    - Develop project WBS/WBS dictionary
    - Develop a master schedule and detailed schedules
    - Estimate project cost and finalize the budget
    - Identify required and available resources
    - Establish performance measurement metrics

- Define minimum and maximum baseline thresholds
    - Schedule
    - Resources
    - Cost
- Baseline reporting requirements
    - Format
    - Frequency of distribution
    - Distribution list
- Define Risk Management Roles and Responsibilities
    - Project Manager chairs the risk assessment meetings
    - Project team participates in risk assessment meetings and members serve as meeting recorder and timekeeper
    - Key stakeholders participate in risk assessment meetings
    - Project Sponsor may participate in risk assessment meetings

4.8.2 Top Three Risks

The top three high probability and high impact risks to this project are:

- **Changes variations in mining plan and quarry design**: Final Design dependent on survey of mineral deposit, environmental and social concerns which would result in schedule delays and cost variation, possible scope creep.
- **Material specifications and properties below international market requirements**: Limitations in material properties and specifications which would result in the project failure in terms of meeting the objective of a mineral deposit worthy of development of a new industry.
- **Project does not qualify for BELTRAIDE, MOF fiscal incentives or EPZ status**: Existing law and regulations do not have explicit provision for incentives for the extractive industry. This would limit the attractiveness of the project to international or national investors and therefore reduce the overall viability/feasibility of the project.

4.8.3 Risk Management Approach

The development of the Risk Management Plan was done through a methodical and inclusionary approach in which the project team with the assistance of the Technical Advisors and the Project Steering Committee (PSC) identified and evaluated the various risks, both those identified in the scoping process in the Project Charter and new or alternate risks. The risks were evaluated through a probability and impact scoring matrix and then prioritized for either observation, monitoring and/or mitigation. Status updates including risks identified will be reported on a monthly basis to the Project Steering Committee routed through the Project Manager and the GPD project lead.

Project plans, updates or changes that are needed as a result of the risk responses or identification of new or emerging risks will require the approval of the Project Steering Committee and will be captured in the Project Management Information System (PMIS), GPD. Changes or updates required due to changes in personnel, scope, budget, equipment limitations, etc. will be routed through the PM to the Project Steering Committee. The Project Manager is responsible for managing all proposed and approved changes to the Risk Management Plan, the GPD project lead is assigned to assist in the oversight of risk management. Once the change is approved, the project manager will update the plan and supporting documentation and will distribute the updates to the project team and all stakeholders. This methodology is consistent with a change management approach and the Project Charter and ensures that all stakeholders remain informed of any changes.

4.8.4 Risk Identification

The risks associated with the FS Project were identified using a series of approaches starting with the examination of the risks identified in the Project Charter. This served as the preliminary risks list. Then, the assumptions in the Project Charter were evaluated following an Assumption Analysis process. The results of this were then moved into the risk log.

Three other sources of risk identification were utilized:

- Expert Judgment: interviews with sector specialists from within government and outside of government were conducted to identify and evaluate potential risks.
- Risk Assessment Meeting: meeting with key team members, stakeholders, and the Project Steering Committee identified and ranked risks.
- Analog Data: information from historical data inclusive of rates and estimates from other extractive sector operators was incorporated and used to identify common risks as well any potential strategies to mitigate risks associated with extractive works.

The results of these processes were entered into the risk register and evaluated.

4.8.5 Risk Qualification and Prioritization

In order to determine the severity of the risks identified by the team, a probability and impact factor was assigned to each risk. This process allowed the Project Manager to prioritize risks based on the effect they may have on the project. The Project Manager utilized a probability-impact matrix to facilitate the team in moving each risk to the appropriate place on the chart. Risks that are more likely to occur and have a significant impact on the project will be the highest priority risks while those which are more unlikely or have a low impact will be a much lower priority. This was done with a probability – impact matrix.

The probability assessment involves estimating the likelihood of a risk occurring. The impact assessment estimates the effects of a risk event on a project objective. These impacts can be both positive and negative; i.e., opportunities and threats. The project objectives are numerous, e.g. the schedule, cost, quality, safety, and scope. For each identified risk, the impact and probability are assessed. Interviews and meetings with experienced project participants, stakeholders, and experts in the subject are the basis for the impact and probability scales.

All the impact indicators in the table need to reflect the risk context of the work and the risk appetite of the GPD. These indicators will be defined according to the context of individual projects and programs and set out in the risk management plan.

The scoring (grading) of the risks in the Risk Register is facilitated using a Risk Scoring Matrix, known as the Probability and Impact Matrix, which has as its foundation, the probability scale definition show in Chart 46 and the impact scales, shown in Chart 47. Risks are first analyzed and evaluated in terms of probability (likelihood) of occurrence and the impact (seriousness) should they occur. The probability of the risk occurring is assessed and given a rating of Very Low (VL), Low (L), Moderate (M), High (H), or Very High (VH) likelihood. Separately, the impact on the project if the risk were to occur is given a rating of Very Low (VL), Low (L), Moderate (M), High (H), or Very High (VH), using a probability and impact scales (PxI) as illustrated in Chart 48. Using these ratings in conjunction with the Risk Scoring Matrix, the risks can be graded to provide a measure of the project's risk exposure for each.

4.8.5.1 Probability

The chance of occurrence of each risk can be classified under one of the following probabilities as outlined in Chart 46:

Chart 46 Probability Scale Definition (Risk) (Source: compiled by the author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Probability Scale Definition		
Likelihood		Description
Relative	Numerical	
Very Low	0.1	Highly unlikely to occur.
Low	0.3	Will most likely not occur
Moderate	0.5	Possible to occur
High	0.7	Likely to occur
Very High	0.9	Highly likely to occur

4.8.5.2 Impact

The impact that a risk will have on the project can be classified under one of the five degree of impacts. This is illustrated in Chart 47 below.

Chart 47 Impact Scale Definition (Risk) (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Impact Scale Definition					
Objective	**Relative / Numerical Scale**				
	Very Low / 0.05	**Low / 0.1**	**Moderate / 0.2**	**High / 0.4**	**Very High /0.8**
Cost	Insignificant change in cost	< 1-2% increase	2 - 4% increase	4 - 8% increase	> 8% increase
Time	Insignificant change in schedule	< 1 up to 2 week slip	2-3 week slip	3-4 week slip	> 4 week slip
Scope	Barely noticeable scope decrease	Minor areas affected	Major areas affected	Unacceptable reduction	Project end item effectively useless
Quality	Barely noticeable quality degradation	Only a minor reduction of quality	Quality reduction requires sponsor approval	Unacceptable quality reduction	Project end item effectively useless

4.8.5.3 Probability and Impact Scales PxI

Chart 48 illustrates the classification schema for the probability and impact scales used for ranking risks.

Chart 48 Probability and Impact Scales PxI (Risk) (Source: Compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Probability and Impact Scales											
Probability				**Impact**			**PxI**			
Scale	**Score**	**Range**	**Description**	**Scale**	**Score**	**Description**	**Score**	**Range**	**Description**	**Classification**
1	0.1	Very Low (VLO)	less than 10 percent chances of occurrence	1	0.05	Insignificant: Risks which do not pose any significant threat and which can be left unmediated without any fear	0.18 to 0.72	From 18 to 25	High (HI)	
2	0.3	Low (LO)	10 to 30 percent chances of occurrence	2	0.1	Marginal: Any risks which will have just a mild impact on the project, still these must be addressed in time	0.06 to 0.17	From 11 to 17	Moderate (MED)	
3	0.5	Moderate (MED)	30 to 50 percent chances of occurrence	3	0.2	Moderate: Risks which will cause some problems, but nothing too significant	0.01 to 0.05	From 1 to 10	Low (LO)	
4	0.7	High (HI)	50 to 70 percent chances of occurrence	4	0.4	Critical: Risks which can significantly jeopardize some aspects of the project, but which will not completely ruin the project				
5	0.9	Very High (VHI)	70 to 100 percent chances of occurrence	5	0.8	Catastrophic: A risk that can prove detrimental for the whole project				

Chart 49 outlines the Risk analysis and the potential impact of each risk category on the technical performance, cost, schedule and scope of the FS project.

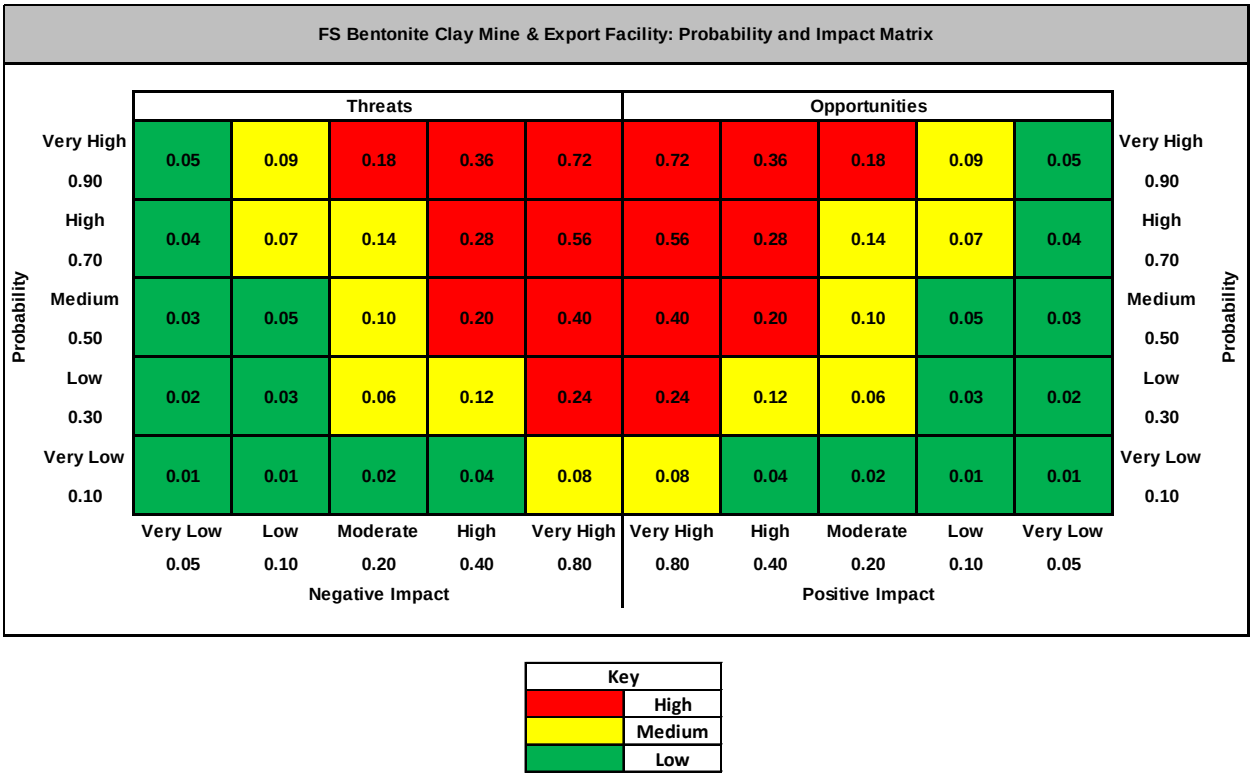
Chart 49. Probability and Impact Scales Definition (Risk) (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Risk Probability and Impact Scales Definition									
Scale	**Probability**	**Probability Score**	**Description**	**Technical Performance**	**Cost**	**Schedule**	**Scope**	**Quality**	**Impact Score**
Very Low (VLO)	<10%	0.1	A risk event that, if it occurs, will have little or no impact on achieving outcome objectives. Highly unlikely to occur	Requires minor (no impact to cost and or/schedule) performance trades within the threshold- objective range; No impact on program success.	Project budget not affected. Cost increase can be managed within plan. Budget impacted by less than 1%	Schedule not affected; Schedule adjustments can be managed within plan. Able to meet key milestones with no schedule float.	Temporary defects, causing minor short term consequences	Barely noticeable quality degradation	**0.05**
Low (LO)	10 to <30%	0.3	A risk event that, if it occurs, will have a minor impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below goals but well above minimum acceptable levels. Will most likely not occur	Performance below goal but within acceptable limits; No changes required. Does not meet an objective requirement.	Project budget impacted by greater than 1% but less than 2%.	Minor schedule slip. Non critical path activities late; Impact to critical path up to 2 week slip.	Product performance shortfall in area of tertiary (minor) importance	Only a minor reduction of quality	**0.1**
Moderate (MED)	30 to <50%	0.5	A risk event that, if it occurs, will have a moderate impact on achieving desired results, to the extent that one or more of its stated outcome objectives will fall below goals but above minimum acceptable levels. Possible to occur	Performance below goal; Moderate (cause noticeable cost and/or schedule increases-not more than 5% on the project) changes required; Does not meet a threshold requirement.	Project budget impacted by greater than 2% but less that 4%. Does not require significant use of project cost and/or schedule reserves.	Moderate schedule slip 2-3 weeks schedule slip	Product performance shortfall in area of secondary importance	Quality reduction requires sponsor approval as important areas are affected.	**0.2**
High (HI)	50 to <70%	0.7	A risk event that, if it occurs, will have significant impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below acceptable levels. Likely to occur	Performance unacceptable; Significant (high cost and/or schedule increases-more than 5% on the project) changes required; Does not meet a threshold requirement	Project budget impacted by greater than 4% but less than 8%	Increases critical path schedule by_ 3- 4 weeks	Minor product performance shortfall in area of primary (critical) importance	Unacceptable quality reduction	**0.4**
Very High (VHI)	>70%	0.9	A risk event that, if it occurs, will have a severe impact on achieving desired results, to the extent that one or more of its critical outcome objectives will not be achieved. Highly likely to occur	Performance unacceptable; Does not meet a Key performance requirement	Project budget impacted by greater than 8%	Key program event or milestone delayed by more than 4 weeks	Significant failure of product to meet one of its primary (critical) purposes	Project end item effectively useless	**0.8**

4.8.5.4 Probability and Impact Matrix

Chart 50 illustrates the probability and impact matrix used to classify risks based on the impact they will have on the project and the probability of their occurrence. The scale used for classifying risks along these two risk measurement metrics is given in the Probability and Impact Scales table.

Chart 50 Probability and Impact Matrix (Risk) (Source: compiled by author, C. Moore, October 2019)



4.8.5.5 Classifying and Prioritizing Risk

Each risk is placed in the matrix and is given an overall “risk ranking.” Risks that have severe negative consequences and are highly likely to occur receive the highest rank; risks with both low impact and low likelihood receive the lowest rank. The impact and likelihood ratings are combined to help identify which risks pose the greatest overall threats. These risks are then considered top priorities to address.

Based on each risk score on these two scales it can be placed in one of the intersecting cells. After all the risks have been allocated a place on this risk management probability and impact matrix, the entries on this matrix are interpreted as follows:

Each of the cells on the 5×5 matrix has been given one of the three colors; red, yellow and green. The significance of the colors is:

- **Red (High Risk)**: All risks that fall in the red cells are of utmost importance. Prevention and mitigation strategies for all these risks must be framed much in advance to prevent their occurrence or to fight them back as soon as they surface up.
- **Yellow (Medium Risk)**: These are the risks that again must be optimally addressed; however, they do not enjoy top priority like the risks in red cells. These are also significant risks and it's advisable to have them included in the risk management strategies.
- **Green (Low Risk)**: These are risks that have the least likelihood of occurrence and the lowest impact and can be left out during the formulation of risk management strategies, as these are low priority risks. Remediation on these risks should be done where the cost of remediation is low or negligible.

4.8.5.6 Interpretation Likelihood and Consequence

Chart 51 illustrates the consequence of a risk correlated with its likelihood of occurrence. It further classifies the risks, highlighting the risk severity and potential impact of the project and the project success.

Chart 51 Interpretation of Risk Likelihood and Consequence (Source: compiled by author, C. Moore October 2019)

	Consequences				
Likelihood	**Insignificant**	**Marginal**	**Moderate**	**Critical**	**Catastrophic**
Very High	Low 9	Medium 14	High 18	High 22	High 25
High	Low 7	Medium 12	Medium 17	High 21	High 24
Medium	Low 5	Low 10	Medium 15	High 19	High 23
Low	Low 3	Low 6	Medium 11	Medium 16	High 20
Very Low	Low 1	Low 2	Low 4	Low 8	Medium 13

4.8.5.7 Recommended Corrective Action

Chart 52 outlines the actions required for any particular risk level identified through the assessment process.

Chart 52 Corrective Action for Risks (Source: compiled by author C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Risks Corrective Action	
Risk Level	**Action Required**
High Risk 18 - 25	• This rating level is not acceptable • Report immediately to Senior Management; • Consider alternative activity unless appropriate controls are implemented • Develop specific Treatment/Action Plan for immediate implementation to address high risks • Allocate actions and budget for implementation within one month ▪ Report to Senior Management on effectiveness of control
Medium Risk 11-17	• Develop and implement a specific Treatment/Action Plan for medium risks • Consider alternative activity unless appropriate controls are implemented • Allocate actions and budget to minimize risk; monitor implementation ▪ Report to Senior Management on effectiveness of control
Low Risk 1 - 10	• Accept and Monitor low-priority risks ▪ Manage via routine procedures where possible; Monitor via normal internal reporting mechanisms

4.8.6 Risk Monitoring

The Project Manager is responsible for the monitoring and reporting of the project risks and will be assisted by the GPD Project Lead. Monthly reports inclusive of any new or merging risks, risk responses, and effectiveness of risk responses will be presented to the Project Steering Committee.

The risks identified and ranked very high and high in the risk register will be added to the project schedule and monitored by either the Project Manager and/or the GPD Project Lead depending on the area in which those risks fall. The monthly Project Steering Committee meetings will be used to assess the effectiveness of risk response strategies and the need to alter or add additional risk responses. The risk monitoring will be continuous throughout the life of the project and includes the identification and monitoring of the trigger conditions for each risk to help determine if a risk is likely to occur or is being approached, the results are documented in the risk log.

4.8.7 Risk Mitigation and Avoidance

Risk avoidance strategies and responses to each identified risk have been developed. As more risks are identified, they will be qualified, and the team will develop avoidance and mitigation strategies. These risks will also be added to the Risk Register and the project plan to ensure they are monitored at the appropriate times and are responded to accordingly.

The risks for this project will be managed and controlled within the constraints of time, scope, quality, and cost. All identified risks will be evaluated in order to determine how they affect these constraints. The Project Manager, the GPD Project Lead, with the assistance of the project team, will determine the best way to respond to each risk to ensure compliance with these constraints.

Mitigation and avoidance strategies have been identified for the high priority risks (high, medium and low risks) as identified in the risk prioritization sections. The strategies include adjustments to the project plan and the inclusion of mechanisms for effective project management that limit or reduce the potential impacts.

4.8.8 Risk Breakdown Structure (RBS)

The Risk Breakdown Structure shown on Chart 53 is a hierarchical representation of the potential sources of risk. It is presented in a categorized manner and assists in the determination of where risks may arise.

Chart 53 Risk Breakdown Structure (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Risk Breakdown Structure (RBS)			
RBS Level 0	**RBS Level 1**	**RBS Level 2**	**RBS Level 3**
0. All sources of project risk	1. Technical Risk	1.1 Requirements Definition	1.1.1 Scope definition exceeds available financing
			1.1.2 Site conditions require larger testing program than expected
		1.2 Estimates and Assumptions	1.2.1 Possibility of a cost overrun during the different phases due to low or inadequate estimated costs
			1.2.2 Required works exceed budget costs for project
			1.2.3 Management reserves inadequate to conduct the additional works required
		1.3 Technical processes	1.3.1 Changes in typical quarry design may be required due to environmental or social factors.
			1.3.2 Delays might occur during the mining plan and quarry design development caused by delays in approval of final designs and change requests.
			1.3.3 Detailed Design approvals and consents might be delayed.
		1.4 Geological/ Technical Specifications	1.4.1 Material properties may be below international market requirements.
		1.5 Skilled/Trained Personnel	1.5.1 Delayed consultancies in order to find adequately skilled contractors/groups
		1.6 Equipment Failure	1.6.1 Work delays occur so that repairs may be facilitated or substitute machinery can be found to finish surveys and sample collection
			1.6.2 Additional cost to source alternate equipment
		1.7 Consultants Performance/ Availability	1.7.1 Consultants perform below required standard due to contract type (lump sum contract)
			1.7.2 Consultant adherence to terms and conditions of contract
			1.7.3 Core technical team unavailable at the required time results in delays in schedule
			1.7.4 Schedule delays and overruns from use of international consultants and their availability
		1.8 Technical Capacity of Project Team	1.8.1 Lack of technical capacity in GPD for oversight can cause delays as training required

FS Bentonite Clay Mine & Export Facility: Risk Breakdown Structure (RBS)			
RBS Level 0	**RBS Level 1**	**RBS Level 2**	**RBS Level 3**
	2. Management Risk	2.1 Permits/Approvals	2.1.1 Delay in obtaining export permits or approvals for sample testing.
			2.1.2 Delays in obtaining Environmental approvals
		2.2 Health and Safety	2.2.1 Environment and work conditions determined unsafe for personnel doing testing
			2.2.2 Injuries sustained by personnel.
		2.3 Communication	2.3.1 Communication across multiple government Departments through hierarchical system can cause delays
		2.4 Organization	2.4.1 Weak Matrix organizational structure may present issues with time allocation for project activities by Government personnel.
		2.5 Execution	2.5.1 Project experiences delays, scope changes/creep, cost changes/overruns from administrative structure that includes the need to obtain PSC approval.
	3. External Risk	3.1 Environmental/weather	3.1.1 Schedule delays due to impacts from extreme weather events
			3.1.2 Personnel used on project dispatched to assist with recovery/cleanup campaign
		3.2 Incentives programs for mineral industry	3.2.1 Issues with obtaining incentives package from BELTRAIDE for extractive industry
			3.2.2 Issues with obtaining fiscal incentives from MOF for extractive industry
			3.2.3 Issues with obtaining EPZ status for extractive industry.
		3.3 Material deficiency in project area	3.3.1 Insufficient materials within project site
		3.4 Stakeholder Acceptance	3.4.1 Resistance/objection from community persons
			3.4.2 Resistance/objection from investor community
	4. Commercial Risk	4.1 Sourcing Consultants	4.1.1 Lack of participation from international consultants
		4.2 International Investors Acceptance	4.2.1 Projection of economic stimulus/investment incentives in international markets not adequate to attract international investment partners.
		4.3 Low Economic Indicators	4.3.1 Projection of Rate of Return (ROR) not adequate to attract international partners

4.8.9 Risk Register

The Risk Register shown on Chart 54 details of all the identified risks for the project. The register breaks down each risk to show the cause, consequence, probability, impact, trigger, owner, strategy, and cost. Each of the elements is described below:

- **RBS Code**: The RBS code links each risk to the Risk Breakdown structure.

- **Cause**: A cause is a definite event or several circumstances inherent in a project or its environment that may give rise to an uncertainty and can trigger risks.
- **Risk**: A risk is an uncertainty that may affect the achievement of the project goals. Many times risks are considered only negative, however, positive risks may occur. Negative risks are called threats while positive risks are called opportunities. Positive risks can present opportunities for improvement in the project as much as negative risks can cause faults and failures.
- **Consequence**: A consequence is the result of an identified risk occurring. Consequences may range from slight delays in schedule or increased costs to project failure, including abandoning the project.
- **Probability**: Probability is the numerical value assigned to each risk to measure the likelihood of the risk occurring. Probability measures from 0.1 - very unlikely to occur to 0.9 very likely will happen.
- **Impact**: Impact is also a numerical value assigned to each risk which measures how much the associated risk would affect the outcome of the project. The grades range from <10% which is very low to >70% which is very high.
- **PxI**: Probability times impact is the probability assigned multiplied by the impact assigned.
- **Trigger**: Trigger is event or circumstance that activates the causes that result in the risk occurring.
- **Owner**: Owner is the entity with whom the risk would be assigned.
- **Strategy**: Strategy is the action that will be taken to mitigate the risk should it occur or to pass on the risk to another entity.
- **Cost**: the estimated value of the impact should the risk occur.

Based on the identified risks and timeframes in the risk register, each risk has been added to the project plan. At the appropriate time in the plan—prior to when the risk is most likely to occur, the Project Manager will assign a risk manager to ensure adherence to the agreed-upon mitigation strategy. Each risk manager will provide the status of their assigned risk at the weekly project team meeting for their risk's planned timeframe.

The Risk Register will be maintained as an appendix to this Risk Management Plan.

Chart 54 Risk Register (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Risk Register												
RBS Code	**Cause**	**Risk**	**Consequence**	**Probability**	**Impact**	**P x I**	**Classification**	**Trigger**	**Owner**	**Strategy**	**Cost to Project**	**Cost (additional Comments)**
1.3	Final Design dependent on survey of mineral deposit, environmental and social concerns.	Changes/variations in design and plan	Schedule delays and cost variation, possible scope creep	0.7	0.4	0.28		Design changes totaling in excess of 25% of the project cost and/or incurred delays affect the critical path.	Project Steering Committee	**Risk Mitigation**: Hire additional mining engineer with specialization in environmental engineering to aide in review and design layout.	$1,500	Consultant cost of $1,500
1.4	Limitations in Material properties and specifications	Material specifications and properties below international market requirements	Project fails to meet objectives	0.3	0.8	0.24		Comparison of Test Results and benchmarks indicate material specifications below international requirements	Project Steering Committee	**Risk Mitigation:** Refocus studies to a more robust analysis of alternate use based on the specific material properties and composition.	$2,500	Consultant Cost of $2,500 to perform more robust alternative use study
3.2	Existing law and regulations do not have explicit provision for extractive industry	Project does not qualify for BELTRAIDE, MOF fiscal incentives or EPZ status	Project fails to meet objectives as lower project attractiveness reduces viability	0.3	0.8	0.24		Results of requirements report indicate that mineral industry does not qualify	Project Sponsor/ Project Steering Committee	**Risk Mitigation**: Hire additional legal expert to draft amendments to relevant legislation to include extractive industry in incentives program. **Risk Mitigation**: Lobby relevant line Ministries to support inclusion of extractive industry in incentive programs.	$4,000	Consultant Cost of $4000 to perform legal drafting services No Additional Cost as project sponsor is senior government official.
1.1	Fixed and/or Limited Budget	Scope definition too large for available project funds	Some activities will not be accomplished unless additional funds can be identified	0.5	0.4	0.20		Bid submissions from consultants exceed planned or budgeted amounts	Project Sponsor	**Risk Mitigation:** Write additional project document to seek funding from Donor Agencies	$1,000	Consultant cost of $1,000
1.7	Limitations of consultants that meet selection criteria	Consultants perform below required levels	Schedule delays, additional cost	0.7	0.2	0.14		Comparison of progress against Project Schedule; works behind schedule by greater than 25%	Project Steering Committee Consultantsr	**Risk Mitigation;** Develop and implement strict selection critieria and requirements guidelines. **Risk Mitigation**: Utilize contract with strict performance criteria and guidelines, inclusive of penalty clauses for non-performance.	$0	No additional cost as contract drafting services covered under RBS Code 1.6

FS Bentonite Clay Mine & Export Facility: Risk Register												
RBS Code	**Cause**	**Risk**	**Consequence**	**Probability**	**Impact**	**P x I**	**Classification**	**Trigger**	**Owner**	**Strategy**	**Cost to Project**	**Cost (additional Comments)**
3.1	Major unforeseen weather events or natural disasters.	Schedule delays due to impacts from extreme weather events. Personnel used on project dispatched to assist with recovery/cleanup campaign.	Schedule delays and loss of resources	0.7	0.2	0.14		Precipitation in excess of anticipated levels with delays in works of greater than 3 week/ personnel removal from project of greater than 2 week	Project Manager/ Relevant Agency Heads	**Risk Mitigation**: Establish disaster management plan; include time buffer in schedule for delays due to weather	$0	No additional cost to project, include time buffer in schedule management plan
1.2	Fixed and/or Limited Budget	Unknown site circumstances or requirements for consultancies may cause scope of works to exceed available budget allocated	Activities may not be completed to a satisfactory level	0.3	0.4	0.12		Bid submissions from consultants exceed planned or budgeted amounts	Project Sponsor	**Risk Mitigation:** Write additional project document to seek funding from Donor Agencies to cover any works **Risk Mitigation**: Ensure that Cost Management plan has adequate Management Reserve.	$0	No additional cost as project document writing covered under RBS Code 1.1
1.8	Limitations in available persons with technical capacity in Government	GPD Personnel inexperienced in conduction of feasibility and other studies	Schedule delays in order for staff to be trained on techniques	0.3	0.4	0.12		Activities oversight delayed by two weeks or more	GPD Project Lead	**Risk Mitigation**: Utilization of Technical Advisor in overseeing activities while capacity building is underway.	$0	No additional cost as technical advisor is included in initial project budget.
4.1	Lack of interest from International Consultants	Inadequate RFP and Bids for conducting the works required for the review of the technical report and the mining plan and quarry design	Schedule delays and need to re-advertise for works	0.3	0.4	0.12		Number or quality of RFPs and Bids inadequate to make a selection	Project Manager/ Project Steering Committee	**Risk Mitigation:** Identify and approach potential service providers from network of international investors	$0	No additional cost to project.
4.2	Investment incentives for extractive industry low or inadequate	Inability to attract interest from international mining and mineral community	Projection of economic stimulus/investment incentives in international markets not adequate to attract international investment partners.	0.3	0.4	0.12		Review of ROR and economic model indicate long payback period. Number of interests in the deposit for the establishment of the industry low	Project Manager/ Project Steering Committee	**Risk Mitigation**: Engage Ministry of Finance, Ministry of Investment and BELTRAIDE from commencement of project to promote investment opportunity. **Risk Mitigation:** Ensure TOR for economic model include sufficient provisions for sensitivity analysis to indicate level of incentives required to improve ROR to attractive levels.	$0	No additional cost to project as Ministry of Finance, Ministry of Investment and BELTRAIDE are identified stakeholders.

FS Bentonite Clay Mine & Export Facility: Risk Register												
RBS Code	**Cause**	**Risk**	**Consequence**	**Probability**	**Impact**	**P x I**	**Classification**	**Trigger**	**Owner**	**Strategy**	**Cost to Project**	**Cost (additional Comments)**
4.3	Low projected Rate of Return (ROR)	Inability to attract interest from international mining and mineral community	Projection of ROR and economic conditions not adequate to attract international investment partners.	0.3	0.4	0.12		Review of ROR and economic model indicate long payback period and low profitability. Number of interests in the deposit for the establishment of the industry low	Project Manager/ Project Steering Committee	**Risk Mitigation**: Lobby line Ministries for greater incentives to improve profitability.	$0	No additional cost to project as Ministry of Finance, Ministry of Investment and BELTRAIDE are identified stakeholders.
2.5	Bureaucratic process for PSC review and approval	Project experiences delays, scope changes/creep, cost changes/overruns from administrative structure that includes the need to obtain PSC approval	Schedule delays	0.5	0.2	0.1		Slippage in schedule activities of greater than two weeks	Project Manager	**Risk Mitigation**: Include strict conditions in TOR for participation. **Risk Mitigation**: Use of senior government personnel that understand the importance of their duties	$0	No additional cost as persons are government staff.
3.3	Material volume within project site insufficient to support long term development	Insufficient materials within the project site to conduct development of resource	Additional costs to source alternate location of materials; cost overruns, additional time required to source additional material	0.1	0.8	0.08		Results of initial survey of proposed mining area and volumetric calculations of material availability indicate shortfall	Project Manager/ GPD Project Lead	**Risk Mitigation**: Identify and earmark additional or optional sites to which project may be transferred in the event this occurs	$2,000	Site identification and preliminary testing cost
1.6	Equipment Failure	Equipment Failure/Breakdown during operations	Schedule delays if alternate equipment cannot be sourced or repairs done in a timely manner	0.3	0.2	0.06		Comparison of progress against Project Schedule; works behind schedule by greater than 25% or equipment replacement/repair exceeds two weeks	Support Teams	**Risk Mitigation**: Identification of alternate locations of equipment needed. **Risk Mitigation**: Monitored by GPD Lead/ Contractor to have qualified mechanic as part of staff compliment.	$0	Cost to be determined at time of occurrence and the need to contract alternate equipment
2.2	Industrial Site safety issues	Injury to Contractors employees or hazardous working conditions	Schedule delays, work stoppage and cost implications	0.3	0.2	0.06		Results of HSE Personnel reports/ site incident	Contractor/ HSE Personnel	**Risk Transfer**: Contractors to obtain third party insurance to cover compensation for injuries can be applied. **Risk Transfer:** Contractor to pay employee Social Security so that employees can claim Social Security Benefits in the event of injury	$0	Insurance Costs of $1,500 premium (to be covered by each contractor)
3.4	Mistrust of Public of Government Initiatives	Lack of buy-in from communities and mining industry operators	Resistance of project implementation	0.3	0.2	0.06		Results of social assessment indicate community resistance	Project Manager/ GPD Project Lead	**Risk Mitigation**: Include budget for public awareness and plan public meetings, brochures and other educational ventures to sensitize the public of the initiative	$1,000	Printed Material and awareness campaign cost of $1000

FS Bentonite Clay Mine & Export Facility: Risk Register												
RBS Code	**Cause**	**Risk**	**Consequence**	**Probability**	**Impact**	**P x I**	**Classification**	**Trigger**	**Owner**	**Strategy**	**Cost to Project**	**Cost (additional Comments)**
2.3	Weak Matrix Organizational structure exists in Government institutions	Lack of adequate coordination across Government agencies	Schedule delays	0.5	0.1	0.05		Slippage in schedule activities of greater than one week	Relevant Agency Heads	**Risk Mitigation**: Identify point persons in related agencies to facilitate necessary processes.	$0	No additional cost as point persons are government staff.
2.4	Weak Matrix Organizational structure exists in Government Institutions	Lack of adequate allocated time to project activities by Government employees	Schedule delays	0.5	0.1	0.05		Slippage in schedule activities of greater than one week	Project Manager/ GPD Project Lead/ Relevant Agency Heads	**Risk Escalation**: escalate to respective Functional Line Managers if tasks are behind schedule.	$0	No additional cost as Functional Managers are government staff.
1.5	Limitations in available persons with technical capacity to carry out studies and analysis	Human resource limitations of Consultants to carry out activities	Schedule delays	0.1	0.4	0.04		Comparison of progress against Project Schedule; works behind schedule by greater than 25%	Project Steering Committee Project Manager	**Risk Mitigation:** Develop and implement strict selection criteria and requirements guidelines for contractor suitability and selection. **Risk Mitigation**: GPD Tech team to approach investor partners for referrals to contractors who can perform works.	$0	No additional cost to project
2.1	Lack of familiarity with regulatory requirements	Delays in obtaining relevant permits and approvals	Schedule delays	0.1	0.2	0.02		Permits and Approvals exceed three weeks beyond normal processing time	Project Manager	**Risk Mitigation:** Liaise with permitting agencies prior to conducting sample collection or performing studies to familiarize project team with requirements, including creating a guide with regulatory requirements	$0	No additional cost to project
Risk Mitigation Cost											**$12,000**	

4.8.10 Control Risk

Activities involved in Risk Control shall include:

- Validate risk mitigation strategies and alternatives.
- Take corrective action when actual events occur.
- Assess impact on the project of actions taken (cost, time and resources).
- Identify new risks resulting from risk mitigation actions.
- Ensure the Project Plan (including Risk Management Plan) is maintained.
- Ensure change control addresses risks associated with the proposed change.
- Revise risk management documents to capture results of mitigation actions.
- Update Risk Register.
- Communicate risk management status and risk response follow-through as appropriate.
- Establish communications as appropriate.

It is expected that most decisions are made at the Team Lead level. The Risk Management Team shall escalate only those risks that significantly impact the project's scope, budget, schedule, change management, technical performance, and business performance objectives. Additionally, the Risk Management Team shall escalate those risks determined to require cross-organization involvement, are controversial or require senior management involvement and/or decisions.

The Risk Management Team meeting will be conducted and facilitated by the GPD Lead. During the Risk Management Team meeting new and past due risks shall be discussed. The risk originators present the new risk and provide the necessary detail. The risk owners provide updates for all other risks. In addition to the Risk Management Team meeting, the Risk Manager and the Risk Management Team will brief the Project Manager on a regular basis regarding the status of risks.

The Risk Management Team shall generate standard reports as part of the risk management process. In preparation for the Risk Management meeting, the Risk Management Team prepares an updated Risk Register listing the risks for review (i.e., new, open, and ready-to-complete risks). After the Risk Management Team meets, the

GPD Lead will notify the risk originators and risk owners of the results of the meetings (i.e., status of new risks submitted, new risk assignments, and risks approved for closure) through the Risk Management Meeting Report.

At the completion of the project, the successful transition of any open risks, and capturing and harvesting lessons learned are important for Project Maintenance and Support and future project work. There is a need to:

i. Validate the completion of identified risks. For any open risks assess whether there are ongoing operational risks that warrant communication of these risks to the operational transition team. Document remaining open risks and provide access to final report.
ii. Produce final risk management metrics and evaluate process effectiveness against established benchmarks.

Capture risk factors and risk mitigation plans for inclusion in Risk Reference Models.

4.8.11 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Chief Executive Officer
Ministry of Economic Development

4.9 Procurement Management Plan

“Project Procurement Management includes the processes necessary to purchase or acquire products, services or results needed from outside the project team. Project Procurement Management includes the management and control processes required to develop and administer agreements such as contracts, purchase orders, memoranda of agreements (MOA), or internal service level agreements (SLAs)” PMI 2017. It is aimed at

providing all the requirements of the project in a timely and systematic manner. The processes involved in Project Procurement Management are Plan Procurement Management, Conduct Procurement, and Control Procurement.

The plan forms the basis against which the project is staffed and supplied with resources or services, thus it is highly dependent on the Resource Plan, Schedule and Scope Plans and the Quality Management Plan. This however does not imply that it is not informed by the other knowledge areas. The Resource Plan decomposes the project charter into a more robust document that along with the project management plan and project documents such as the scope baseline and cost baseline. It provides a detailed and comprehensive account of the project from the perspective of the human and physical resources required in order to reach the intended delivery, which are vital inputs for the Procurement Plan.

PROCUREMENT MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

OCTOBER 2019

4.9.1 Introduction

This Procurement Management Plan sets the procurement framework for this project. It serves as a guide for managing procurement throughout the life of the project and is updated as acquisition needs change. This plan identifies and defines the items to be procured, the types of contracts to be used in support of this project, the contract approval process, and decision criteria. The importance of coordinating procurement activities, establishing firm contract deliverables, and metrics in measuring procurement activities is included. Other items included in the procurement management plan include procurement risks and procurement risk management considerations; how costs will be

determined; how standard procurement documentation will be used; and what the procurement constraints consist of.

4.9.2 Procurement Management Approach

The Project Manager will provide oversight and management for all procurement activities under this project. The Project Manager will work with the project team to identify all items to be procured for the successful completion of the project. The GPD Project Lead will then review the procurement list prior to submitting it to the Project Steering Committee (PSC) for review and approval prior to the contracting process start. Due to the highly specialized nature of the items to be procured a determination was established from the project initiation. Essentially, all services will be outsourced so no detailed make or buy analysis will be done.

Standard templates will be utilized for the contracting process. The Caribbean Development Bank (CDB) methodology will be used in conjunction with the Government of Belize Stores Orders which outlines procurement rules and guidelines.

4.9.3 Procurement Definition

Chart 55 details the procurement items and/or services have been determined to be essential for project completion and success and have been outlined based on the method of procurement, process for acquisition, method of evaluation, duration required and method of estimation of cost.

Chart 55 Procurement Reference Guide (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Procurement Definition Guide										
WBS	**Task Name**	**Duration**	**Start**	**Finish**	**Cost (USD)**	**Method of Estimation**	**Description**	**Procurement Method**	**Procurement Process**	**Evaluation Method**
1	**Technical Validation Report**	87 days	Fri 5/1/20	Mon 8/31/20						
1.1.1	Contract Review of Evaluation	43 days	Fri 5/1/20	Tue 6/30/20	$6,000	Analogous	Thorough analysis of methodology used, test parameters, and conclusions as it relates to fitness for the various uses of bentonite	Fixed Price	Request for Proposal (RFP)	Quality and Cost-based
1.2	Deposit Assessment	43 days	Fri 5/1/20	Tue 6/30/20	$1,500	Analogous	Determine size and extent of deposit	Direct Contracting	Pricing based on Specifications	Expert Judgement
1.2.2.1	Testing of material specifications	30 days	Fri 6/5/20	Thu 7/16/20	$2,500	Analogous	Certification of test results as it relates to quality and specifications	Direct Contracting	Pricing based on Specifications	Expert Judgement
2	**Market Analysis Report**	73 days	Tue 9/1/20	Thu 12/10/20						
2.1.1	Contract Market Analysis	40 days	Tue 9/1/20	Mon 10/26/20	$3,000	Expert Judgement	Determine specific properties and composition for different uses of bentonite, prices for different properties and composition, alternative uses.	Fixed Price	Request for Proposal (RFP)	Quality and Cost-based
2.2.1	Contract Competitor Analysis	40 days	Tue 9/1/20	Mon 10/26/20	$1,500	Expert Judgement	Evaluate current producers of bentonite	Fixed Price	Request for Proposal (RFP)	Quality and Cost-based
3	**Legal Requirements Report**	73 days	Tue 9/1/20	Thu 12/10/20					Request for Proposal (RFP)	Quality and Cost-based
3.1.1	Contract Company Requirements	40 days	Tue 9/1/20	Mon 10/26/20	$2,500	Expert Judgement	Determine the requirements for registration of extractive company for export, including Central bank and EPZ requirements	Fixed Price	Request for Proposal (RFP)	Quality and Cost-based
3.2.1	Contract Incentives Requirements	40 days	Tue 9/1/20	Mon 10/26/20	$2,000	Expert Judgement	Analysis and determination of the requirements for qualification and registration for incentives program	Fixed Price	Request for Proposal (RFP)	Quality and Cost-based
4	**Environmental Impact Assessment**	149 days	Tue 9/1/20	Fri 3/26/21						
4.1.1	Contract Environmental Assessment	40 days	Tue 9/1/20	Mon 10/26/20	$27,500	Analogous	Conduct an Environmental Assessment of the proposed industry	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based
4.2	**Social Assessment**	110 days	Tue 10/27/20	Mon 3/29/21						
4.2.1	Contract Social Assessment	40 days	Tue 9/1/20	Mon 10/26/20	$7,500	Analogous	Conduct a Social Assessment of the proposed industry	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based
5	**Mining Plan & Quarry Design**	80 days	Mon 3/29/21	Fri 7/16/21						
5.1.1	Contract Mining Plan	40 days	Mon 3/29/21	Fri 5/21/21	$15,000	Analogous	Develop and elaborate a mining plan for the extraction, development, and rehabilitation of the site	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based

FS Bentonite Clay Mine & Export Facility: Procurement Definition Guide										
WBS	**Task Name**	**Duration**	**Start**	**Finish**	**Cost (USD)**	**Method of Estimation**	**Description**	**Procurement Method**	**Procurement Process**	**Evaluation Method**
5.2.1	Contract Quarry Design	40 days	Mon 3/29/21	Fri 5/21/21	$10,000	Analogous	Detailed design of quarry and extraction methodology	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based
6	**Economic Model**	80 days	Mon 7/19/21	Fri 11/5/21						
6.1.1	Contract Economic Model	40 days	Mon 7/19/21	Fri 9/10/21	$10,000	Expert Judgement	Economic Model for extractive industry	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based
7	**Investment Portfolio**	70 days	Mon 11/8/21	Fri 2/11/22						
7.1.1	Contract Portfolio Design	30 days	Mon 11/8/21	Fri 12/17/21	$5,000	Expert Judgement	Create an elaborate investment portfolio that highlights the investment potential	Competitive Bidding	Request for Proposal (RFP)	Quality and Cost-based

4.9.4 Type of Contract to be Used

All items and services to be procured for this project will be solicited under Fixed-price contracts more specifically Firm-fixed price (FFP) contract, utilizing lump sum payments. The project team will define the item types, quantities, services and required delivery dates. The GPD Project Lead will then solicit bids from various vendors in order to procure the items within the required time frame and at a reasonable cost under the firm fixed price contract once the vendor is selected. The contracts will be awarded once per activity as outlined in the Procurement Guide and will be for the duration of that specific activity.

4.9.5 Procurement Risks

All procurement activities carry some potential for risk which must be managed to ensure project success. While all risks will be managed in accordance with the project's risk management plan, there are specific risks which pertain specifically to procurement which must be considered:

- Unrealistic schedule and cost expectations for vendors
- Potential delays in securing international consultants
- Scheduling conflicts of core technical team for consultants
- Questionable past performance for vendors
- Potential that final product or service does not meet the required specifications

These risks are not all-inclusive and the standard risk management process of identifying, documenting, analyzing, mitigating, and managing risks will be used.

4.9.6 Procurement Risk Management

As previously stated, project risks will be managed in accordance with the project's risk management plan. However, for risks related specifically to procurement, there must be additional consideration and involvement. Project procurement efforts involve external organizations and potentially affect current and future business relationships as well as internal supply chain and vendor management operations. Because of the sensitivity of these relationships and operations, the project team will include the Project Sponsor,

representative from the Project Steering Committee and a Finance Officer (FO) from the Ministry in all project meetings and status reviews that relate to contracting.

Additionally, any decisions regarding procurement actions must be routed through the Project Manager and the PSC prior to approval by the Project Sponsor Any issues concerning procurement actions or any newly identified risks will immediately be communicated to the PSC, GPD Project Lead and the Project Sponsor.

4.9.7 Cost Determination

For this project, we will issue an Expression of Interest (EOI) and then a Request for Proposal (RFP) from shortlisted vendors in order to solicit proposals from various vendors that describe how they will meet our requirements and the cost of doing so. All proposals will include the vendors' technical proposal, cost estimates, and outline of the key or core technical personnel that will be assigned to the project. The vendors will outline how the work will be accomplished, who will perform the work, vendors' experience in providing these goods, customer testimonials, backgrounds and resumes of employees performing the work, and a line-item breakdown of all costs involved. Additionally, the vendors will be required to submit work breakdown structures (WBSs) and work schedules to show their understanding of the work to be performed and their ability to meet the project schedule.

All information must be included in each proposal as the proposals will be used as the foundation of our selection criteria. Proposals that omit solicited information or contain incomplete information will be discarded from consideration. The selection criteria utilized will be a Quality-cost based approach, with a weighted average used in favor of technical qualifications. The evaluation criteria will be outlined in the RFP sent to potential vendors.

4.9.8 Standardized Procurement Documentation

The procurement management process consists of several steps as well as ongoing management of all procurement activities and contracts. In this dynamic and sensitive environment, the goal must be to simplify procurement management by all necessary

means in order to facilitate the successful completion of contracts and the project. To aid in simplifying these tasks, standard documentation will be used for all steps of the procurement management process. These steps provide adequate levels of detail which allow for easier comparison of proposals, more accurate pricing, more detailed responses, and more effective management of contracts and vendors.

The GPD maintains a repository on the SmartStream cloud shared drive and PMIS which contains standard project management and procurement documentation that will be used for this project. The following standard documents will be used for project procurement activities:

- Expression of Interest Template to include
    - Background
    - Brief statement of work
    - Requirements for submission
    - Source selection criteria
- Standard Request for Proposal (RFP) Template to include
    - Background/Company Profile
    - Proposal process and timelines
    - Proposal guidelines
    - Proposal formats and media
    - Source selection criteria
    - Pricing forms
    - Statement of Work (SOW)
    - Terms and Conditions
- Internal source selection evaluation forms
- Non-disclosure agreement
- Letter of intent
- Firm fixed-price contract
- Procurement audit form
- Procurement performance evaluation form
- Lessons learned form

4.9.9 Procurement Constraints

There are several constraints that must be considered as part of the project's procurement management plan. These constraints will be included in the RFP and communicated to all vendors to determine their ability to operate within these constraints. These constraints apply to several areas which include schedule, cost, scope, resources, and technology:

- **Schedule**: Project schedule has limited flexibility and the procurement activities, contract administration, and contract fulfillment must be completed within the established project schedule as far as is practicable.
- **Cost**: Project budget has contingency and management reserves built-in; however, these reserves may not be applied to procurement activities. Reserves are only to be used in the event of an approved change in project scope or at management's discretion.
- **Scope**: All procurement activities and contract awards must support the approved project scope statement. Any procurement activities or contract awards which specify work which is not in direct support of the project's scope statement will be considered out of scope and disapproved.
- **Resources**: All procurement activities must be performed and managed with current personnel. No additional personnel will be hired or re-allocated to support the procurement activities on this project.
- **Technology**: Data types and formats will be included in the statement of work as part of the RFP. While proposals may include suggested alternative data formats the minimum requirements stipulate din the RFP must be provided.

4.9.10 Contract Approval Process

Determinations for the procurement of goods or services from outside the project were made from the project initiation and the contract approval process starts when that good or service is required. The GPD Project Lead upon review by the PSC and approval from the Project Sponsor will send out solicitations to vendors. Once solicitations are complete, and proposals have been received by all vendors the approval process begins. The first step of this process is to conduct a review of all vendor proposals to determine

which meet the criteria established by the project team and the PSC. Purchases less than $1,000 only require the approval of the Project Manager; whereas, purchases greater than $1,000 must be approved by the Project Steering Committee. For these larger purchases, the contract will be tabled at the PSC monthly meeting and a determination on which contractor will be awarded the contract will be made. For these PSC meetings a representative from the project team, the relevant technical advisor and an FO will be invited.

4.9.11 Decision Criteria

The criteria for the selection and award of procurement contracts under this project will be based on the following decision criteria:

- Ability of the vendor to provide all items by the required delivery date
- Quality
- Cost
- Expected delivery date
- Technical competence (core technical team)
- Past performance

These criteria will be measured by the PSC, Technical Advisors, GPD Project Lead and the Project Manager. The ultimate decision will be made based on these criteria as well as available resources. The evolution will be done in accordance with the evaluation criteria outlined in the RFP and stipulated in the Internal source selection form.

4.9.12 Vendor Management

The Project Manager is ultimately responsible for managing vendors. In order to ensure the timely delivery and high quality of products from vendors the Project Manager, the GPD Project lead and the technical advisor will meet bi-monthly (or on a needs basis) with each vendor to discuss the progress for each procured item or service. The meetings can be in person, virtual meetings or by teleconference. The purpose of these meetings will be to review all documented specifications for each product or service as well as to review the findings or results to date. This forum will provide an opportunity to review

each item's development or the service provided in order to ensure it complies with the requirements established in the project specifications. It also serves as an opportunity to ask questions or modify contracts or requirements ahead of time in order to prevent delays in delivery and schedule. The Project Manager will be responsible for scheduling this meeting on a bi-monthly basis until all items are delivered and are determined to be acceptable.

Vendor management will also entail the collection, collation, and documentation of the contract documents including but not limited to:

- EOI/RFP submissions
- Contract award/acceptance
- Interim reports/progress reports
- Payment details
- Final reports/deliverables and acceptance forms

4.9.13 Performance Metrics for Procurement Activities

The metrics shown in Chart 56 establishes the mechanism for recording vendor performance for project procurement activities. Each metric is rated on a 1-3 scale as indicated below:

Chart 56 Procurement Performance Evaluation Form (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Procurement Metrics							
Vendor	**Product Quality**	**On Time Delivery**	**Documentation Quality**	**Development Costs**	**Development Time**	**Cost per Unit**	**Transactional Efficiency**
Vendor #1							
Vendor #2							

1 – Unsatisfactory
2 – Acceptable
3 - Exceptional

4.9.14 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Chief Executive Officer
Ministry of Economic Development

4.10 Stakeholder Management Plan

“Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.” PMI 2017.

Project Stakeholder Management utilizes four processes:

i. Identify Stakeholders
ii. Plan Stakeholder Engagement
iii. Manage Stakeholder Engagement
iv. Monitor Stakeholder Engagement.

The Stakeholder Management Plan formulation relied heavily on the initial stakeholder identification and analysis carried out during the formulation of the Project Charter. The Communications Management Plan, Scope Management Plan, and the Requirements Traceability Matrix also played as key inputs to the articulation of the Stakeholder Management Plan.

STAKEHOLDER MANAGEMENT PLAN

Feasibility Study Bentonite Clay Mine & Export Facility, Spanish Lookout, Belize C.A.

OCTOBER 2019

4.10.1 Introduction

A Stakeholder Engagement Strategy approach was taken to identify and classify project stakeholders, determine stakeholder power, interest, and influence and, analyze the management approach and communication methodology for project stakeholders. This allowed for the identification of key influential stakeholders to solicit input for project planning and gain support as the project progresses. This benefits the project by minimizing the likelihood of encountering roadblocks or potential delays in accessing the resources required to complete the project.

Early identification and communication with stakeholders is imperative to guarantee the success of the project by gaining support and input for the project. For example, stakeholders that will be affected by the project are identified early in the process. Initiating early and frequent communication safeguards stakeholder management, that is more effectively managed. This is consequently, balanced all other variables while accomplishing all project tasks

4.10.2 Identify Stakeholders

The Project Team conducted a brainstorming session to identify stakeholders for the project. The brainstorming session included the primary Project Team, the Project Steering Committee, the Technical Advisors and the Project Sponsor. Identification of expectations and requirements as well as their influence, impact, power, and interest were analyzed. This provided an input for further analysis of the stakeholders. The detailed analysis of stakeholders' influence, impact, power and interest is outlined in Chart 57.

Chart 57 Stakeholder Register and Analysis (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Stakeholder Register												
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**Main Expectations**	**Major Requirements**	**Influence/Impact (Low-High)**		**Power/Interest Matrix (Low - High)**			**Communication Requirements**	**Engagement Strategies**
						Influence	**Impact**	**Power**	**Interest**	**Justification/Explanation**		
1	Ministry of Economic Development	Sponsors	Provide resources to enable project, provide high-level requirements and overall approval for project and results.	Viable industry that can contribute to national growth and development. Foreign revenue earner	Adequate and effective use of project resources for project completion within scope, on time and within budget	High	High	High	Medium	The Government of Belize is the funder for the project and play a key role in determining If the project is conducted or not.	Face to Face Conference Call/ Skype/ other virtual methods Emails Hard Copy Reports	Invite to PSC meetings (Monthly) Personal contact maintained Participate in project closure
2	Project Steering Committee	Project Board (Advisory)	Responsible for project overview and administration for expenditure.	Viable industry that can contribute to the development of the mineral sector of the country	Adequate and effective use of project resources for project completion within scope, on time and within budget	High	High	High	Medium	Senior Government reps that can steer project and make project successful or not	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	PSC meetings (Monthly) Personal contact maintained Participate in project closure
3	Inspector of Mines (GPD)	Project Management	Responsible for overall project administration and delivery.	Viable industry that can contribute to the development of the mineral sector of the country	Adequate and effective use of project resources for project completion within scope, on time and within budget	High	High	High	High	Project is part of the GPD mandate for development of minerals.	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	PSC meetings (Monthly) Personal contact maintained Participate in project closure
4	Geology and Petroleum Department (GPD) Lead	Responsible Manager	Provide day-to-day project direction and requirements	Viable industry that can contribute to the development of the mineral sector of the country	Adequate and effective use of project resources for project completion within scope, on time and within budget	Medium	High	Medium	High	Project is part of the GPD mandate for development of minerals.	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	PSC meetings (Monthly) Personal contact maintained Participate in project closure
5	Department of Mines (Geology and Petroleum GPD)	Tech Team Members (Backup and support)	Assist in planning and implementation of activities	Viable industry that can contribute to the development of the mineral sector of the country	Adequate and effective use of project resources for project completion within scope, on time and within budget	Medium	Medium	Medium	High	Project is part of the GPD mandate for development of minerals.	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Weekly progress meetings Personal contact maintained Participate in project closure
6	Department of Mines (Geology and Petroleum GPD)	Records Management Section	Coordinate with tech teams, technical advisors and contractors	Project that utilizes the SmartCloud web storage and access portal	Additional reports and documents that expand the knowledge on the mineral potential of the deposit	Low	Low	Low	Medium	Database management and update of project documents	Project online data repository Emails Electronic copies of all documents Hard Copy Reports	Weekly progress meetings

FS Bentonite Clay Mine & Export Facility: Stakeholder Register												
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**Main Expectations**	**Major Requirements**	**Influence/Impact (Low-High)**		**Power/Interest Matrix (Low - High)**			**Communication Requirements**	**Engagement Strategies**
						Influence	**Impact**	**Power**	**Interest**	**Justification/Explanation**		
7	Ministry of Investment, Trade and Commerce	Investment regulator	Marketable project that can be shared with potential investors.	Viable industry that can contribute to national growth and development. Foreign revenue earner	Study that highlights a viable investment option in Belize	Medium	Medium	Medium	Medium	MEDITC is charged with the development and promotion of economic investment opportunism and policies	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch
8	Technical Advisors (Economic/ Mining/ Investment / Legal and Engineering)	Technical Advice	Provides technical guidance and analysis.	Conducting the study following the requirements of international standards	Study that highlights a viable investment option in Belize	High	High	Medium	High	Technical advisors provide the capacity back up and verification for project activities and deliverables	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	PSC meetings (Monthly) Personal contact maintained Participate in project closure
9	Ministry of Natural Resources; Department of Lands and Surveys, Planning Department	Tech Team Members (Backup and support)	The delineated deposit acceptance	Conduct surveys in accordance with National Guidelines Purchase and transfers of land provide government revenue	Delineated area of extraction	Low	Low	Low	Low	Primary concern is revenue generation for land transactions.	Face to Face	Personal Contact Reports submitted as needed
10	Consultants	Technical Services	Carry out various aspects (mining, economic, legal, investment, export, promotion, environmental, social, etc)	Conducting the study following the requirements of international standards	Study that highlights a viable investment option in Belize	Medium	Medium	Low	Medium	Consultants provide the capacity needed to complete the project activities and deliverables	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Personal Contact Reports submitted as needed
11	Ministry of Finance	Financial Incentives	Design and Manage Financial investments programs	Development of new industry Increased economic activity	Study that highlights a viable investment option in Belize	Medium	Medium	Medium	Medium	MOF is responsible for waivers of tax and import duties	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch
12	Ministry of Works	Infrastructure Works	Advise on physical infrastructure works and earth movement. Responsibly for government-funded infrastructure, also a major user of construction mineral	Quarrying and extraction is carried out in accordance with national standards	Study that highlights a viable investment option in Belize	Low	Low	Low	Low	While MOW carries out quarrying the administration of minerals extraction and development is carried out specifically by the GPD	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch

FS Bentonite Clay Mine & Export Facility: Stakeholder Register												
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**Main Expectations**	**Major Requirements**	**Influence/Impact (Low-High)**		**Power/Interest Matrix (Low - High)**			**Communication Requirements**	**Engagement Strategies**
						Influence	**Impact**	**Power**	**Interest**	**Justification/Explanation**		
			and operates as a large mining operator.									
13	Attorney General's Ministry	Legal Services	Responsible for legal drafting and advice	Development of new industry Increased economic activity	Study that highlights a viable investment option in Belize	Low	Low	Low	Low	AG Ministry provides drafting and approval of all legislative documents	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch
14	Local Community (Spanish Lookout Community)	User Representatives	Acceptance of mining proposals	Development of new industry within their community. Increased economic activity	Study that highlights a viable investment option in Belize	Low	Medium	Low	Medium	Administration of minerals extraction and development is vested within the Government of Belize.	Face to Face Hard copy Reports	Invited to stakeholder launch Receives updates as needed
15	Mining Industry (Mining Operators)	User Representatives	Review of plans and mining methodology	Development of new industry Increased economic activity	Study that highlights a viable investment option in Belize	Low	Low	Low	Medium	Mining operators	Face to Face Hard copy Reports	Invited to stakeholder launch Receives updates as needed
16	Citizens of Belize/General Public	User Representatives	Final beneficiaries of new industry and economic growth.	Development of new industry Increased economic activity	Study that highlights a viable investment option in Belize	Low	Low	Low	Low	Citizens benefit from any economic growth	Hard Copy Reports Information updates	Invited to stakeholder launch Receives updates as needed
17	Belize Chamber of Commerce	User Representatives	Promoting mineral industry sector as a part of their opportunities for growth in the private sector.	New business opportunity developed for the country	Study that highlights a viable investment option in Belize	Low	Low	Low	Medium	New ventures can expand the business community in the country, however as the project is a government lead initiative BCC has little control or influence.	Hard Copy Reports Information updates	Invited to stakeholder launch Receives updates as needed
18	BELTRAIDE	Fiscal incentives	Responsible for fiscal incentives packages Investment promotion agency	Marketable project that can be shared with potential investors.	Study that highlights a viable investment option in Belize	Medium	High	Low	Medium	BELTRAIDE provides the fiscal incentive packages as well as are an investment promotion agency for the government.	Hard Copy Reports Information updates	Invited to stakeholder launch Receives updates as needed
19	Belize Minerals Ltd.	Technical Advisor	Responsible for advice on mineral exploration Review of plans and mining methodology Provides technical guidance and analysis.	Project results are positive for the establishment of the industry. Offered an opportunity to develop resource	Study that highlights a viable investment option in Belize	Medium	Low	Low	High	Exploration company that would benefit from the results of a potentially viable industry to expand their business.	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch

FS Bentonite Clay Mine & Export Facility: Stakeholder Register												
No.	**Stakeholder Name(s)**	**Role**	**Responsibility**	**Main Expectations**	**Major Requirements**	**Influence/Impact (Low-High)**		**Power/Interest Matrix (Low - High)**			**Communication Requirements**	**Engagement Strategies**
						Influence	**Impact**	**Power**	**Interest**	**Justification/Explanation**		
20	GET s.r.o	Technical Advisor/ Geological Evaluation Company	Responsible for advice on mineral exploration Review of plans and mining methodology Provides technical guidance and analysis.	GET is offered opportunity to do further works on the development of the deposit	Study that highlights a viable investment option in Belize	Low	Medium	Low	High	Validation and project design of mineral deposits is a core part of business for GET. Government lead initiative GET has little control or influence	Face to Face Conference Call/ Skype/ other virtual methods Project online data repository Emails Hard Copy Reports	Receive updates from PSC meetings (Monthly) Personal contact maintained Participate in project investment launch

4.10.3 Key Stakeholders

As a follow up to Identify Stakeholders, the project team will identify key stakeholders who have the most influence on the project or who may be impacted the most by it. These key stakeholders are those who also require the most communication and management which will be determined as stakeholders are analyzed. Once identified, the Project Manager will develop a plan to obtain their feedback on the level of participation they desire, frequency and type of communication, and any concerns or conflicting interests they have.

For example, based on feedback gathered by the Project Manager, the determination may be made to involve key stakeholders on steering committees, focus groups, gate reviews, or other project meetings or milestones. Detailed communication with key stakeholders is necessary to ensure all concerns are identified and addressed and that resources for the project remain available.

4.10.4 Stakeholder identification and consultation methods

There are a variety of engagement techniques used to build relationships with stakeholders, gather information from stakeholders, consult with stakeholders, and disseminate project information to stakeholders. When selecting an appropriate consultation technique, culturally appropriate consultation methods, and the purpose of engaging with a stakeholder group should be considered. Chart 58 below outlines the engagement techniques to be used with stakeholders throughout the project:

Chart 58 Engagement/Consultation Methods for Stakeholders (Source: compiled by author, C. Moore, October 2019)

FS Bentonite Clay mine & Export Facility: Engagement Techniques	
Engagement Technique	**Appropriate application of the technique**
Correspondences (Phone, Emails)	Distribute information to Government officials, Local Government, and organizations/agencies Invite stakeholders to meetings and follow-up
One-on-one meetings	Seeking views and opinions Enable stakeholder to speak freely about sensitive issues Build personal relationships Record meetings
Formal meetings	Present the Project information to a group of stakeholders

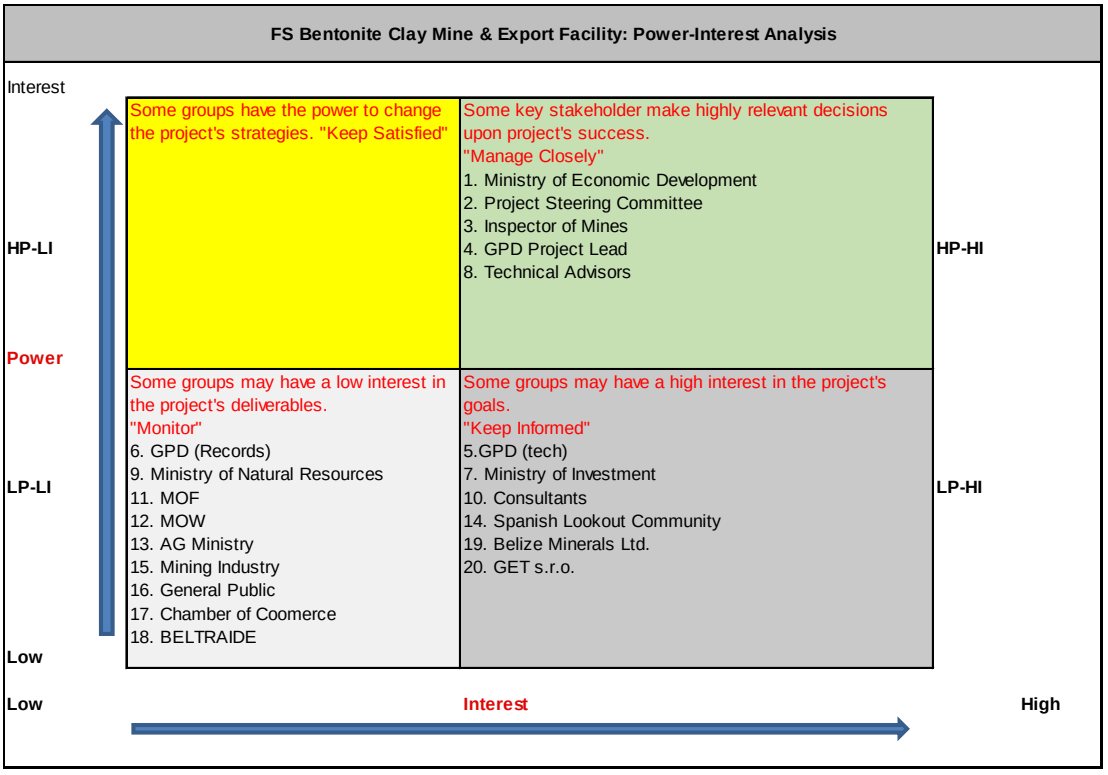
FS Bentonite Clay mine & Export Facility: Engagement Techniques	
Engagement Technique	**Appropriate application of the technique**
	Allow group to comment – opinions and views Build impersonal relation with high-level stakeholders Disseminate technical information Record discussions
Public meetings	Present Project information to a large group of stakeholders, especially communities Allow the group to provide their views and opinions Build relationship with the communities, especially those impacted Distribute non-technical information Facilitate meetings with presentations, PowerPoint, posters, etc. Record discussions, comments, questions.
Focus group meetings	Present Project information to a group of stakeholders Allow stakeholders to provide their views on targeted baseline information Build relationships with communities Record responses
Project website/ SmartCloud Web Storage	Present project information and progress updates Disclose EIA, SIA, and other relevant project documentation
Project leaflet	Brief project information to provide regular update Site-specific project information.

4.10.5 Stakeholder Analysis

Once all the project stakeholders were identified, the project team categorized and analyzed each stakeholder. The analysis determined the stakeholders' level of power or influence, planned the management approach for each stakeholder, and determined the appropriate levels of communication and participation each stakeholder will have in the project.

The project team categorized stakeholders based on their organization or department. Once all stakeholders were categorized, the project team utilized a power/interest matrix, illustrated in Chart 59, to demonstrate the potential impact each stakeholder may have on the project. Based on this analysis a stakeholder analysis matrix was created which illustrates the concerns, level of involvement, and management strategy for each stakeholder, detailed in Chart 57.

Chart 59 Power/Interest Analysis of Stakeholders (Source: compiled by author, C Moore, October 2019)



The power/interest analysis provides guidance for the project team on which stakeholders to engage in a particular manner. Stakeholders in the HP-HI (upper right-hand quadrant) should be managed closely; these also are the key stakeholders and must be involved at all levels of project planning and change management. They require a constant two-way information flow and constant engagement and consultation. The stakeholders in the lower right-hand quadrant (LP-HI) should be kept informed with a constant stream of information and updates on project status and progress.

The stakeholder analysis matrix will be used to capture stakeholder concerns, level of involvement, and management strategy based on the stakeholder analysis and power/interest matrix above. The stakeholder analysis matrix will be reviewed and updated throughout the project's duration in order to capture any new concerns or stakeholder management strategy efforts.

Chart 60 below shows the assessment of stakeholders' current status and desired status as it relates to their knowledge and involvement in the project.

Chart 60 Stakeholder Assessment Matrix (Source: compiled by author C Moore, October 2019)

FS Bentonite Clay Mine & Export Facility: Stakeholder Assessment Matrix							
No.	**Stakeholder Name(s)**	**Role**	**Unaware**	**Resistant**	**Neutral**	**Supportive**	**Leading**
1	Ministry of Economic Development	Sponsors					**C D**
2	Project Steering Committee	Project Board (Advisory)					**C D**
3	Inspector of Mines (GPD)	Project Management					**C D**
4	Geology and Petroleum Department (GPD) Lead	Responsible Manager					**C D**
5	Department of Mines (Geology and Petroleum GPD)	Tech Team Members (Backup and support)				**C D**	
6	Department of Mines (Geology and Petroleum GPD)	Records Management Section			**C**	**D**	
7	Ministry of Investment, Trade, and Commerce	Investment regulator			**C**	**D**	
8	Technical Advisors (Economic/ Mining/ Investment / Legal and Engineering)	Technical Advice				**C D**	
9	Ministry of Natural Resources; Department of Lands and Surveys, Planning Department	Tech Team Members (Backup and support)			**C**	**D**	
10	Consultants	Technical Services	**C**			**D**	
11	Ministry of Finance	Financial Incentives			**C**	**D**	
12	Ministry of Works	Infrastructure Works			**C D**		
13	Attorney General's Ministry	Legal Services			**C**	**D**	
14	Local Community (Spanish Lookout Community)	User Representatives	**C**			**D**	

FS Bentonite Clay Mine & Export Facility: Stakeholder Assessment Matrix							
No.	**Stakeholder Name(s)**	**Role**	**Unaware**	**Resistant**	**Neutral**	**Supportive**	**Leading**
15	Mining Industry (Mining Operators)	User Representatives	**C**			**D**	
16	Citizens of Belize/General Public	User Representatives	**C**			**D**	
17	Belize Chamber of Commerce	User Representatives	**C**			**D**	
18	BELTRAIDE	Fiscal incentives			**C**	**D**	
19	Belize Minerals Ltd.	Technical Advisor				**C D**	
20	GET s.r.o	Technical Advisor/ Geological Evaluation Company				**C**	**D**

Key: C – Current Status, D- Desired Status

4.10.6 Stakeholder Engagement

The Project Manager will be the primary responsible person for engaging stakeholders throughout the life cycle of the project. The GPD Project Lead will assist in this process. The Stakeholder Register provides an assessment of stakeholders, their requirements, the required means and frequency of communication. This will be done in conjunction with the Communication Plan to firmly establish the level of engagement at each of the project phases.

A gap analysis of each stakeholders' current state and desired state, from a project perspective, provides further guidance for the engagement of stakeholders. The desired and current state of all stakeholders is determined, and this gives the backdrop for stakeholder monitoring and evaluation, establishing if communication and other engagement strategies are effective in converting stakeholders to the desired state.

Engagement strategies that will be utilized on a needs basis include:

- **Stakeholder consultation**- plan out the consultation process (remove ad hoc consultations where possible), document the process, provide feedback or follow up communication.
- **Information Disclosure**- utilization of push communications with early and continuous dissemination of information, in accordance with Communication Plan inclusive of reporting on results.
- **Grievance mechanism-** provides a medium through with concerns, grievances or issues can be raised and addressed.
- **Partnerships**- encourage and provide room for lateral partnerships and synergies across line ministries and intra-government agencies that aide in reduction of duplication.

The stakeholder engagement, monitoring, and updates is an iterative process that will be continuously reviewed and improved throughout the life of the project. This will guarantee that the stakeholder register is constantly updated, the Communication Plan is effective and that the project is meeting or exceeding stakeholder expectations.

4.10.7 Sponsor Acceptance

Approved by the Project Sponsor:

_____ Date:_____

Chief Executive Officer
Ministry of Economic Development

5 CONCLUSIONS

1. The Project Charter was developed as a collaborative effort between the Geology and Petroleum Department, Belize Minerals Ltd, GET s.r.o and other government agencies to satisfy the need for the development of the extractive industry. It provided the justification and direction for the development of the project management plan for the conducting of the Feasibility Study. The initial scope, schedule and cost baselines were established through this process, as well as an initial risk identification and stakeholder analysis.

2. The Scope Management Plan detailed the product scope description and the work required for the successful completion of the FS. It identified eight key accomplishments needed for the FS validation of previous studies: market analysis; evaluation of legal requirements; examination of environmental impacts; examination of social impacts; development of mining plan and quarry design; evaluation of the economic viability; and provision of an assessment of the market viability. These key accomplishments translated into seven deliverables for the project, including an economic model for deposit exploitation, and an investment portfolio.

   The Scope Management Plan further detailed a Requirements Management Plan that outlines both the non-technical and technical requirements and specifications of the products being produced as a result of the project. The requirements traceability matrix detailed the product description, product development, and verification method of completion of the item. The requirements traceability matrix was an integral input for the development of the Cost Management Plan, Quality Management Plan and the Schedule Management Plan.

3. The Schedule Management Plan outlined the duration of the FS Project as 507 working days (taking into account a 5-day work week), which puts the project start at April 1, 2020 and project close at March 30, 2022. It provides for the evaluation of the maintenance of the schedule through various methods including variance analysis and

critical path methods. It identified the activities along the critical path which are namely,, establishing the project steering committee, conducting the technical validation of the previous reports, conducting the environmental/social impact assessment, the mining plan elaboration, the economic model design, the portfolio design, and the review and acceptance of reports.

4. The Cost Management Plan was developed utilizing cost estimation primarily through expert judgement and analogous estimation. These two methods were used with a high level of confidence in the results, hence a Contingency Reserve of only 10%, equivalent to USD$11,000 and a Management Reserve of only 5%, equivalent to USD$5,500 was established. The Total Project Budget is USD$126,500 with a cost baseline of USD$121,000. The Project Cost Baseline Curve and Project “S” Curve were created to be used in cost variance analysis for the control and management of cost. It was also shown that the two main periods of spending correspond to the conducting of the Environmental Assessment and the development of the Mining Plan and Quarry Design.

5. The Quality Management Plan establishes quality measures and quality evaluation methods for both the project deliverables and project processes using nine quality control activities and nine quality assurance activities. Quality Control activities include: conformance to international and national standards and requirements, alignment with industry best practices, and conformance with national legislation. Quality Assurance activities include: audits of the project activities, plans, project updates, risks and project reviews; verification of qualifications; and variance and CPI analysis.

6. The Resource Management Plan was heavily informed by the Project Charter and the Scope Management Plan, which pre-determined that most of the services required under the project would be outsourced. The project team and PSC consist of primarily government officials across various ministries. This composition requires the inter-governmental coordination through appointments and management through functional line managers. The services provided by external contractors include: technical validation, environmental and social impact assessments, mine plan and quarry

design, economic modeling, and investment portfolio development.

7. The Communication Management Plan analysis of the required frequency for communication with stakeholders and project team members determined that weekly and monthly communication would be the most effective. Monthly meetings should contain a formal monthly report to the PSC and the Project Sponsor that includes reports on project progress, cost, schedule and risks. The use of the SmartStream PMIS system within the GPD as a document repository and access portal for information sharing will be implemented. The primary means of project documentation will be through meeting minutes that record information shared, decisions taken, and steps to be taken. The lessons learnt register will be updated from the information gathered in the minutes. External contractors will provide monthly status reports for the duration of the contract prior to submission of final reports. The Project Sponsor is the conduit for all official transmissions within the government.

8. For the development of the Risk Management Plan, a key input was the initial risk analysis performed for establishment of the Project Charter. This initial risk analysis was further augmented with a robust engagement of the technical advisors, PSC and project team. The comprehensive risk analysis determined the top four high probability and high impact risks to be: changes/variations in the mining plan and quarry design which could result in schedule delays; cost overruns and possible scope creep; material specifications and properties below international market requirements which could result in project failure as the commercial viability would be severely reduced; extraction projects do not qualify for BELTRAIDE or MOF fiscal incentives or EPZ status which could result in project failure as the commercial viability and attractiveness would be severely reduced ; and fixed/limited budget which could result in the need for a scope change, reduction/removal of activities undertaken. A strategy for the management of the risks was developed utilizing risk mitigation, risk transfer and risk escalation. The overall risk management cost is estimated to be USD$12,000.

9. The Procurement Management Plan was heavily influenced by the Project Charter and the Scope Management Plan. Most of the services will be sourced external to the project team under Firm-fixed price contracts (FFP). The procurement method will be using Request for Proposals (RFP) and the evaluation method will be through a quality-cost based criteria.

10. The Stakeholder Management Plan identified five high-power, high-interest (HP-HI) stakeholders, namely, the Ministry of Economic Development (Project Sponsor), the PSC, the Inspector of Mines (PM), the GPD Project Lead (project team), and the Technical Advisors (project team). Stakeholder engagement will be primarily through formal meetings, focus meetings, and web portal engagement through the PMIS.

6 RECOMMENDATIONS

The overall objective was to develop a comprehensive PM Plan for executing the feasibility study (FS) for the establishment of a bentonite clay mine and export facility, in Spanish Lookout, Cayo District, Belize, C.A. Albeit the project will involve several agencies both within the government and external to the government, it can be treated as an internal project and as such the recommendations made herein are directed at the executing agency for the project (the Geology and Petroleum Department), the Technical Advisors, The Project Steering Committee, and the Ministry of Economic Development and Petroleum (Project Sponsor).

1. The FS is a crucial step in the development of the resource and may be the missing requirement for the exploitation of some of the country's mineral resources. The baselines established in the project charter and the initial justification for the FS must be kept at the forefront of all decisions and proposed changes to the project. These decisions or changes should not jeopardize the overall objective of conducting the study to determine the commerciality or viability of the bentonite deposit.

2. The Requirements Traceability Matrix in the Scope Management Plan provides a key management and control tool for the evaluation of deliverables, quality, and completeness for the attainment of a successful FS Study. The verification methods outlined should be used as a guide for the acceptance of products delivered.

3. The Schedule Management Plan has established several activities that lie along the critical path which are some of the key activities to ensure project success. The PSC and the Project Manager must therefore pay keen attention to these activities as any delays in these activities will result in overall project slippage and possible schedule overrun. Since these activities have a finish to start relationship, they cannot be crashed to remedy any slippage; however, the procurement process may be fast tracked through a modification in the procurement method used for contracting in some of the activities to bring the project back on schedule.

4. The Cost Management Plan provides for a reserve of 15% for variation to the total cost estimate. The 15% reserve is equivalent to USD$16,500 for a project that spans 2 ½ years. With such a small reserve and the inflexibility of government spending within budget periods, this requires the PM and the PSC to be particularly keen when developing TOR's for the works to be contracted to guarantee project success. An RFP process that states the available budget is recommended so that bidders' scope of works are tailored to the available budget. The approval of scope changes should be limited to the strictest extent with changes allowed only for activities that would critically impact the project's success. The use of cost variance tracking and reporting by the PM at each monthly PSC meeting is critical so that costs can be controlled.

5. The Quality Management Plan clearly outlines the role and responsibility of each of the key stakeholders in quality control (QC) and quality assurance (QA). Each team member must be fully cognizant of which QC and QA activities fall within their team's role and must carry out what is required, diligently and efficiently because poor quality can be the cause for rework, delays, and even project failure. The template for the Feasibility Study Report should be utilized to collate the information gathered from all the various activities conducted during the project. This report should be used in conjunction with the investment portfolio as it provides a more detailed report for investors on the commercial viability of the deposit.

6. The Resource Management Plan highlights that most of the project team and PSC consist of government employees which means that their time allocation to the project will be critical. Adherence to the TOR for team members and clear instructions and directions from line managers is required to limit delays in the completion of tasks and decision making. The external contractors must be managed closely with strict performance and reporting clauses included in the contracts. The Resource Management Plan must be managed in close conjunction with the Scope Management, Schedule Management, Communication Management and Cost Management Plans.

7. Communication is critical to project success and as such the PM should ensure that the monthly reports are detailed yet succinct and focused on key metrics such as progress, cost variance, schedule variance, risk management or escalation, and documentation from contractors. The maintenance and regular updates to the lesson learnt register and document upload to the PMIS must be done at minimum, once per month. The use of the portal log on system is highly recommended for fast and efficient dissemination of project information.

8. The Risk Management Plan has identified the top four risks that could severely impact the project or cause project failure and has provided a risk strategy for the mitigation of these at a cost of USD$9,000. Since the risk mitigation cost is well within the reserve estimate, it is recommended that the project scope be changed to include the actions identified for the risk mitigation for the top three risks from the onset of the project. There is no need to include the fourth top risk (limited/fixed budget) because this only needs to be addressed when the trigger is realized. The risk strategies that have zero cost should be implemented during the project and the other risks addressed only if the need arises. This can be achieved as the overall cost of the risk strategy is less than the reserve amount.

9. The Procurement Management Plan must be used in conjunction with the Requirements Traceability Matrix, the Scope Management Plan, the Schedule Management Plan, and the Quality Management Plan. Keen attention must be paid to the development of the TOR's which will be used for the RFPs. Solid TOR's will aid in cost and scope control. The PSC must be proactive in the review and decision-making process for contract award to limit schedule delays. Schedule delays can be mitigated through fast tracking of the procurement process, if the need arises, to bring the project back on schedule and within cost.

10. The HP-HI stakeholder makeup outlined by the Stakeholder Engagement Plan is indicative of an internal project; therefore, stakeholder engagement should be managed carefully along the lines on inter-governmental communication. Stakeholder engagement is required for smooth and efficient project implementation.

It is highly recommended that the PM stays in constant communication with the government counterparts to guarantee participation at the PSC level and at the project level. The maintenance and update of the PMIS will provide the web portal access to the stakeholders and is crucial to limit schedule delays.

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8 APPENDICES

Appendix 1: Final Graduation Project (FGP) Charter

<table>
<tr><th colspan="2">Final Graduation Project (FGP) Charter</th></tr>
<tr><td>Date</td><td>Project Name:</td></tr>
<tr><td>May 13, 2019</td><td>A Project Management Plan for a Feasibility Study for the establishment of a Bentonite Clay Mine and Export Production Facility, Spanish Lookout, Cayo District, Belize C.A.</td></tr>
<tr><td>Knowledge Areas / Processes</td><td>Application Area (Sector / Activity)</td></tr>
<tr><td>Knowledge areas:
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 Communication Management
viii. Project Risk Management
ix. Project Procurement Management
x. Project Stakeholder Management

Process groups:
Initiating/Planning/Monitoring & Controlling</td><td>Industrial Production Facility/Mining/Extractive Industry</td></tr>
<tr><td>Start Date</td><td>Finish Date</td></tr>
<tr><td>May 13, 2019</td><td>December 3, 2019</td></tr>
<tr><td colspan="2">Project Objectives (general and specific)</td></tr>
<tr><td colspan="2">General Objective:
To develop a comprehensive project management plan by December 2019 for conducting a comprehensive feasibility study (FS) for the establishment of a bentonite clay mine and export production facility in Spanish Lookout, Cayo District, Belize C.A.

Specific Objectives:
1. To create a project charter for the formal authorization of the project, provide authorization to the Project Manager for the application of organizational resources to the project and provide guidance for the development and elaboration of the project management plan along with the subsidiary plans.
2. To develop a scope management plan that encapsulates all the required work for the successful completion of the FS.
3. To develop a schedule management plan that adequately provides for the time management of activities and tasks for the completion of all required work within the approved project timeline.
4. To develop a cost management plan for the management of the components of the FS within the approved project budget.
5. To develop a quality management plan to ensure that the components of the FS satisfactorily meet the technical, economical, environmental and other quality requirements within the project’s time, cost and scope constraints.</td></tr>
</table>

6. To develop a resource management plan for timely identification, assignment, and acquisition of required resources for the required work to complete the FS.
7. To develop a communication management plan for the timely planning, collection, storage, dissemination, control and interoperability of project information across various FS components.
8. To develop a risk management plan to identify, examine and quantify risks and to develop appropriate mechanisms for the management and reduction of risks to the project.
9. To develop a procurement management plan for the acquisition of goods, services or results required for the components of the FS.
10. To develop a stakeholder management plan for the identification, classification, engagement, and management of the project stakeholders.

Project purpose or justification (merit and expected results)

The elaboration of a project management plan for the conducting of a comprehensive feasibility study on one of the identified deposits will provide guidance for the activities to be undertaken and the methods to be employed in managing the processes for the determination of the commercial and economic viability of the establishment of a clay industry in Belize. This would be a critical step in attracting interest in these deposits by industry partners as a clearly articulated pathway for evaluation will be provided. This will provide the Geology and Petroleum Department with a product to help market and promote the development of an identified potentially commercial mineral deposit.

The identification of clay deposits with commercial potential was done by GET s.r.o. under a technical cooperation agreement between the Government of Belize (GOB) and the Czech Republic Government during the period 2007-2011. The liaison for the GOB was the Inspector of Mines, Geology and Petroleum Department (GPD). The further development of these mineral deposits has not been forthcoming. The mining sector in Belize is currently focused on the production of aggregates for construction and infrastructure projects with one commercial gold operation. Mineral development has been limited to the production of crushed dolomite. The extraction of clays for use as foundry minerals, liners, pottery or absorptives has been explored but in very limited ways.

A comprehensive feasibility study will provide the needed to make a go-no-go decision by any interested party. The FS will need to cover a myriad of different sectors, inclusive of; technical assessments, economic analysis, market surveys, environmental studies, legal and regulatory requirements, geopolitical evaluation and historical reviews of similar industries. The diversity in sector experts and studies required for a proper FS requires an overarching plan for the successful completion of the study, it is from this viewpoint that a strong PM Plan is required to ensure that all the components of the FS are carried out on time, within scope and within budget and hence ensure a successful FS is done that can provide a true picture of the feasibility of setting up this industry.

Furthermore, the results can be used to promote the development and growth of this and similar extractive industries within the country, as the results could be analogued for other mineral deposits. The examination of the feasibility will raise awareness within the GOB for future country international investment opportunity packages promoted by agencies such as BELTRAIDE and the Ministry of Economic Development, Petroleum, Investment, Trade and Commerce (MEDITC) and programmes such as BelizeINVEST and EXPORTBelize.

Description of Product or Service to be generated by the Project – Project final deliverables
The FGP will develop a Project Management Plan (PMP) for the carrying out of a feasibility study for the establishment of a bentonite extractive and export industry in the Spanish Lookout area, Belize C.A. The subsidiary plans to be developed under the PMP are i. Project Scope Management Plan, ii. Project Schedule Management Plan, iii. Project Cost Management Plan, iv. Project Quality Management Plan, v. Project Resource Management Plan, vi. Project Communication Management Plan, vii. Project Risk Management Plan, viii. Project Procurement Management and ix. Project Stakeholder Management Plan.
Assumptions
▪ Technical support in a timely and effective manner will be received from GET Ltd. for the duration of the FGP. ▪ Technical support and feedback in a timely and effective manner will be received from the various GOB Ministries/Agencies [Natural Resources, MEDITC, BELTRAIDE, etc]. Support needed for information supply and feedback/acceptance of the adequacy of the FGP. ▪ Previous evaluations are of adequate quality and level of detail for the articulation of the FGP. ▪ Requested modifications by professor/tutor are not significant enough to warrant scope or schedule change for the FGP. ▪ Timely, adequate and effective feedback from UCI (professor, tutor, reviewer, etc) for the completion of all FGP deliverables. ▪ The timeframe for the FGP is adequate to complete all the specific objectives. ▪ The author of the FGP has the requisite capacities to carry out the activities needed for the preparation of a PMP.
Constraints
▪ Resources available for the conducting of the PM Plan (software, tools, and equipment, cost limitations, timeframe for completion). ▪ Communication and transmission of data and information in a timely manner with GET Ltd. and their personnel (primary information source) as they are located in the Czech Republic which is geographically distant and in a different time zone. ▪ Limited time available for the development of the PMP.
Preliminary Risks
▪ Data sets are too sparse or inadequate for the successful completion of the PM Plan, which would require scope change and schedule delays. ▪ Support from various GOB Ministries/Agencies [Natural Resources, MEDITC, BELTRAIDE, etc] is not forthcoming which would result in schedule delays, data gaps (impact on quality) and additional cost for data acquisition. ▪ Delays in feedback from UCI (professor, tutor, reviewer, etc) resulting in schedule delays for the FGP and missed deadlines. ▪ Requested modifications from professor/tutor are great and require scope change which would result in schedule delays and additional cost. ▪ Availability of funds for the conducting of activities for the PM Plan is in a timely manner, lack of access would result in schedule delays, impact on quality and scope and missed deadlines.
Budget
The budget for the FGP is USD $1,700 broken down as follows:

No.	Item	Cost
1	Technical Assessment & Fieldwork	$500.00
2	Administration (Data collection, analysis & communication)	$600.00
3	Printing, Binding & Dissemination (including shipping to UCI)	$350.00
4	Miscellaneous costs (including contingency)	$250.00

Milestones and Dates

Milestone	Start Date	End Date
FGP Charter	May 13, 2019	May 19, 2019
FGP Work Breakdown Structure (WBS)	May 13, 2019	May 19, 2019
Chapter I: Project Introduction	May 20, 2019	May 26, 2019
FGP Schedule	May 20, 2019	May 26, 2019
Chapter II: Project Theoretical Framework	May 27, 2019	June 2, 2019
Chapter III: Project Methodological Framework	June 3, 2019	June 9, 2019
Project Executive Summary	June 10, 2019	June 16, 2019
Annexes-Bibliography, Attachments, Schedule	June 10, 2019	June 16, 2019
Approved signed FGP Charter	June 10, 2019	June 16, 2019
Assignment of Tutor	July 29, 2019	August 4, 2019
Adjustments to previous Chapters	July 29, 2019	August 4, 2019
Chapter IV: Development (Results)		
i. PMP- Project Charter	September 23, 2019	September 29, 2019
ii. PMP- Scope Management Plan	September 30,2019	October 6, 2019
iii. PMP- Schedule Management Plan	September 30,2019	October 6, 2019
iv. PMP- Cost Management Plan	September 30,2019	October 6, 2019
v. PMP- Quality Management Plan	October 7, 2019	October 12, 2019
vi. PMP- Resource Management Plan	October 7, 2019	October 12, 2019
vii. PMP- Communication Management Plan	October 7, 2019	October 12, 2019
viii. PMP- Risk Management Plan	October 13, 2019	October 17, 2019
ix. PMP- Procurement Management Plan	October 13, 2019	October 17, 2019
x. PMP- Stakeholder Management Plan	October 13, 2019	October 17, 2019
Chapter V: Conclusions	October 18, 2019	October 20, 2019
Chapter VI: Recommendations	October 18, 2019	October 20, 2019
Approval - Tutor	October 21, 2019	October 27, 2019
Assignment of two Reviewers	October 28, 2019	October 30, 2019
Submission FGP- Reviewers	October 31, 2019	November 1, 2019
Review and Feedback Report- Reviewers	November 4, 2019	November 12, 2019
Corrections/Adjustments FGP	November 13, 2019	November 17, 2019
Second Review -Reviewers	November 18, 2019	November 21, 2019
Presentation FGP- Board of Examiners	November 22, 2019	November 27, 2019
FGP Grade Report	November 28, 2019	December 3, 2019

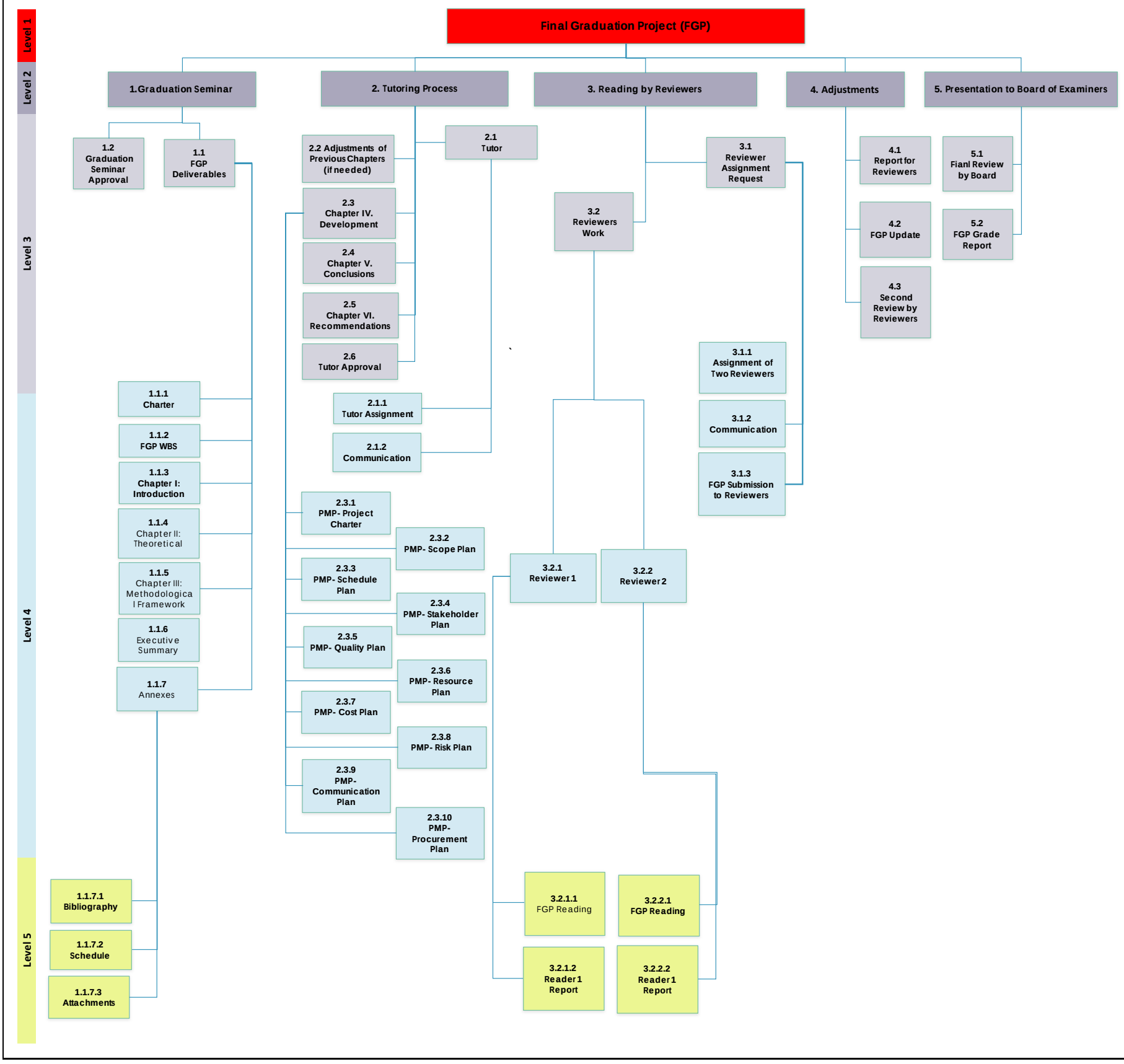
Relevant Historical Information
The Geology and Petroleum Department is charged with the mandate to oversee the non-renewables sector of country administer The Petroleum Act, Chapter 225, and, The Mines and Minerals Act, Chapter 226, Substan Laws of Belize, through the Inspector of Petroleum and the Inspector of Mines, respectively. The responsibility un each Act is for the technical oversight and regulation of the industries, for the generation of new data, to act as repository for all national data related to petroleum, minerals, geophysical and geological data, and, for promotion and development of the petroleum and mineral sectors. The Government of Belize through the Ministry of Finance; through the establishment of the Export Processing Z (EPZ) Act and programmes such as BelizeINVEST and EXPORTBelize offered through BELTRAIDE acti promote and encourage investments both local and international for the growth and development of non-traditi and non-agriculture investments for new and emerging industries. Numerous mineral assessments have been conducted in Belize from the early 1950s with an aim to identify, qua and evaluate the commercial potential of precious, semi-precious and industrial mineral occurrences. The m recent notable assessments for industrial minerals have been conducted by Belize Minerals Ltd. (Brian Holland dolomite, clays, and limestones for various applications, CEMEX Ltd. for gypsum, clays and siliciclastic sands cement manufacturing and GET Ltd. for occurrences of industrial minerals with commercial potential. The l assessment yielded results for the favorable exploitation of two deposits; a ceramic clay deposit in Swasey-Bla area, Stann Creek District and a bentonite clay deposit in Spanish Lookout, Cayo District, Belize C.A. Limiting factors for the further development in these industrial minerals has included the price in the commod market, lack of adequate feasibility analysis and lack of knowledge of the commercial viability. The lack of development of the industrial mineral sector for export is not because of low quality or availability of minerals but rather due to the lack of exposure of their potential and the need for further feasibility assessm beyond technical evaluation.
Stakeholders
Direct Stakeholders: Belize Minerals Ltd. BELTRAIDE GET Ltd. Geology and Petroleum Department Ministry of Natural Resources Ministry of Economic Development, Petroleum, Investment, Trade, and Commerce Project Manager UCI FGP Tutor/ Professor/Reviewers/Board of Examiners Indirect Stakeholders: Belize Chamber of Commerce Spanish Lookout Community UCI Academic Assistant Various GOB Ministries/Agencies

Project Manager: Craig-Elliott Moore	Signature:
Authorized by:	Signature:

Appendix 2: Final Graduation Project Work Breakdown Structure (FGP WBS)

Final Graduation Project Work Breakdown Structure (FGP-WBS)

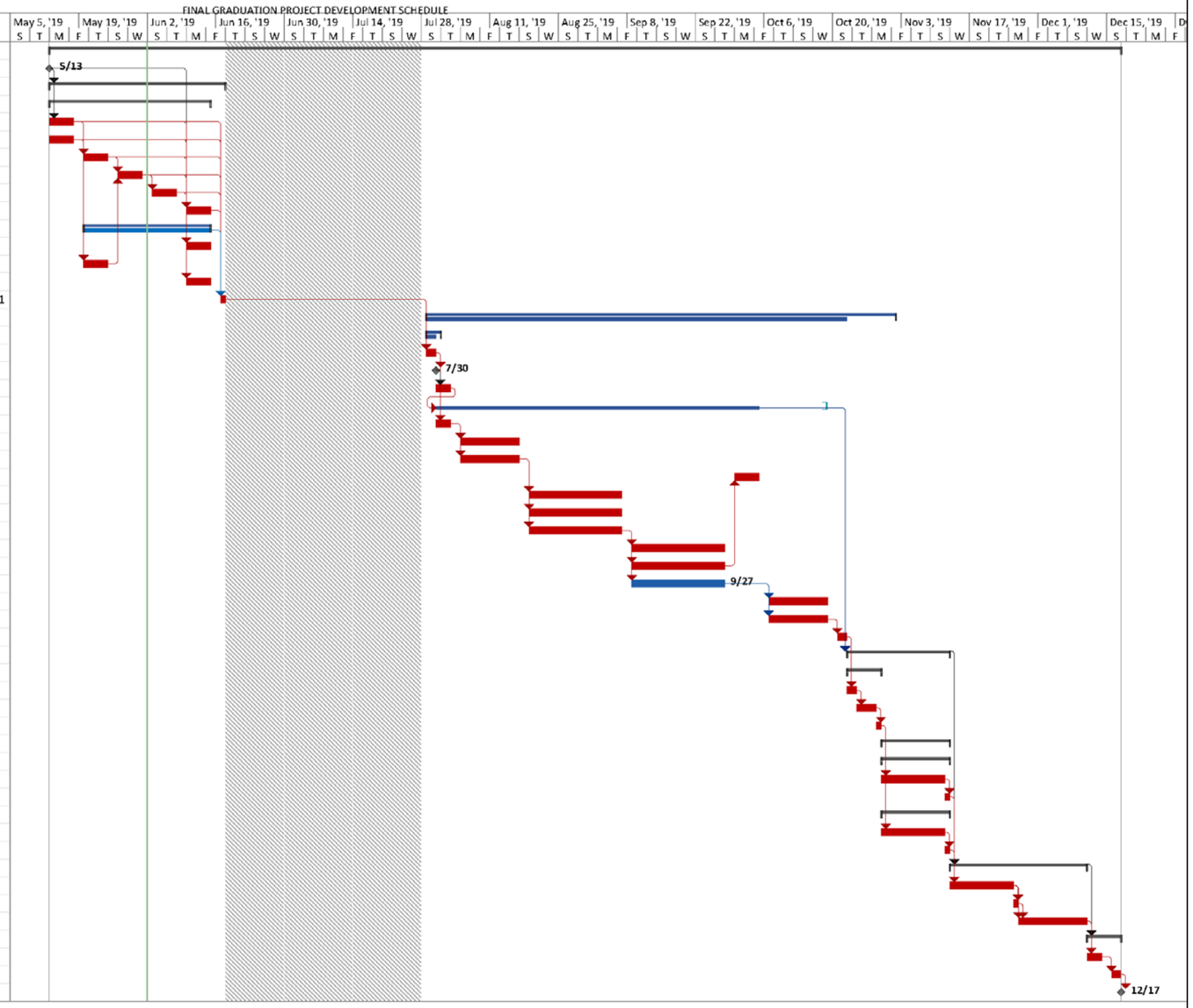
PROJECT TITLE	Project Management Plan for conducting a Feasibility Study for the establishment of a Bentonite Clay Mine and Export Production Facility, Spanish Lookout, Cayo District, Belize C.A.		
PROJECT MANAGER	Craig Moore	DATE	May 31, 2019



Appendix 3: FGP Schedule

FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Final Graduation Project**	**128 days**	**Mon 5/13/19**	**Tue 12/17/19**	
2	FGP Start	0 days	Mon 5/13/19	Mon 5/13/19	
3	**1 Graduation Seminar**	**26 days**	**Mon 5/13/19**	**Mon 6/17/19**	**2**
4	**1.1 FGP Deliverables**	**25 days**	**Mon 5/13/19**	**Fri 6/14/19**	
5	1.1.1 FGP Charter	5 days	Mon 5/13/19	Fri 5/17/19	2
6	1.1.2 FGP WBS	5 days	Mon 5/13/19	Fri 5/17/19	
7	1.1.3 Chapter I: Introduction	5 days	Mon 5/20/19	Fri 5/24/19	5,6
8	1.1.4 Chapter II: Theoretical	5 days	Mon 5/27/19	Fri 5/31/19	7,13
9	1.1.5 Chapter III: Methodological	5 days	Mon 6/3/19	Fri 6/7/19	8
10	1.1.6 Executive Summary	5 days	Mon 6/10/19	Fri 6/14/19	2,5,6,7,8,9
11	**1.1.7 Annexes**	**20 days**	**Mon 5/20/19**	**Fri 6/14/19**	
12	1.1.7.1 Bibliography	5 days	Mon 6/10/19	Fri 6/14/19	9
13	1.1.7.2 Schedule	5 days	Mon 5/20/19	Fri 5/24/19	6,5
14	1.1.7.3 Attachments	5 days	Mon 6/10/19	Fri 6/14/19	9
15	1.2 Graduation Seminar Approval	1 day	Mon 6/17/19	Mon 6/17/19	9,5,6,7,8,10,11
16	**2 Tutoring process**	**70 days**	**Mon 7/29/19**	**Fri 11/1/19**	
17	**2.1 Tutor**	**3 days**	**Mon 7/29/19**	**Wed 7/31/19**	
18	2.1.1 Tutor Assignment	2 days	Mon 7/29/19	Tue 7/30/19	15
19	2.1.2 Communication	0 days	Tue 7/30/19	Tue 7/30/19	18
20	2.2 Adjustments of Previous Chapters	3 days	Wed 7/31/19	Fri 8/2/19	19,18
21	**2.3 Charter IV: Development**			**Fri 10/18/19**	**20**
22	2.3.1 PMP-Project Charter	3 days	Wed 7/31/19	Fri 8/2/19	18
23	2.3.2 PMP- Scope Plan	10 days	Mon 8/5/19	Fri 8/16/19	22
24	2.3.3 PMP- Schedule Plan	10 days	Mon 8/5/19	Fri 8/16/19	22
25	2.3.4 PMP- Stakeholder Plan	5 days	Mon 9/30/19	Fri 10/4/19	30
26	2.3.5 PMP- Quality Plan	15 days	Mon 8/19/19	Fri 9/6/19	24
27	2.3.6 PMP- Resource Plan	15 days	Mon 8/19/19	Fri 9/6/19	24
28	2.3.7 PMP- Cost Plan	15 days	Mon 8/19/19	Fri 9/6/19	24
29	2.3.8 PMP- Risk Plan	15 days	Mon 9/9/19	Fri 9/27/19	28
30	2.3.9 PMP- Communication Plan	15 days	Mon 9/9/19	Fri 9/27/19	28
31	2.3.10 PMP- Procurement Plan	15 days	Mon 9/9/19	Fri 9/27/19	28
32	2.4 Chapter V: Conclusions	10 days	Mon 10/7/19	Fri 10/18/19	31
33	2.5 Chapter VI: Recommendations	10 days	Mon 10/7/19	Fri 10/18/19	31
34	2.6 Tutor Approval	2 days	Mon 10/21/19	Tue 10/22/19	33
35	**3 Reading by Reviewers**	**15 days**	**Wed 10/23/19**	**Tue 11/12/19**	**21**
36	**3.1 Reviewer Assigment Request**	**5 days**	**Wed 10/23/19**	**Tue 10/29/19**	
37	3.1.1 Assigment of Two Reviewers	2 days	Wed 10/23/19	Thu 10/24/19	34
38	3.1.2 Communication	2 days	Fri 10/25/19	Mon 10/28/19	37
39	3.1.3 FGP Submission to Reviewers	1 day	Tue 10/29/19	Tue 10/29/19	38
40	**3.2 Reviewers Work**	**10 days**	**Wed 10/30/19**	**Tue 11/12/19**	
41	**3.2.1 Reviewer 1**	**10 days**	**Wed 10/30/19**	**Tue 11/12/19**	
42	3.2.1.1 FGP Reading	9 days	Wed 10/30/19	Mon 11/11/19	39
43	3.2.1.2 Reader 1 Report	1 day	Tue 11/12/19	Tue 11/12/19	42
44	**3.2.2 Reviewer 2**	**10 days**	**Wed 10/30/19**	**Tue 11/12/19**	
45	3.2.2.1 FGP Reading	9 days	Wed 10/30/19	Mon 11/11/19	39
46	3.2.2.2 Reader 2 Report	1 day	Tue 11/12/19	Tue 11/12/19	45
47	**4 Adjustments**	**20 days**	**Wed 11/13/19**	**Tue 12/10/19**	**35**
48	4.1 Report for Reviewers	9 days	Wed 11/13/19	Mon 11/25/19	43,46
49	4.2 FGP Update	1 day	Tue 11/26/19	Tue 11/26/19	48
50	4.3 Second Review by Reviewers	10 days	Wed 11/27/19	Tue 12/10/19	49,48
51	**5 Presentation to Board of Examiners**	**5 days**	**Wed 12/11/19**	**Tue 12/17/19**	**47**
52	5.1 Final Review by Board	3 days	Wed 12/11/19	Fri 12/13/19	50
53	5.2 FGP Grade Report	2 days	Mon 12/16/19	Tue 12/17/19	52
54	FGP End	0 days	Tue 12/17/19	Tue 12/17/19	53



Project: PM Plan BNT BZ

Task | Milestone | Project Summary | Critical | UCI Course & Holiday

Split | Summary | External Milestone | Critical Split

Page 1

Appendix 4: Other relevant information

I. Cooperation Agreement between GOB and Czech Republic Government

Embassy
of the Czech Republic

N°. 06/01/05/[illegible]

The Embassy of the Czech Republic in San José, Costa Rica, presents its compliments to the Ministry of Foreign Affairs and Foreign Trade of Belize and has honour to inform that the Czech geologic company GET Ltd. was entitled by the Czech Ministry of Trade to perform in the states of CARICOM Jamaica and Belize the development project of an evaluation of the resources of industrial minerals on the basis of decision of the Government of the Czech Republic No.664 from 1st June of 2005. The project in Belize has already started. Evaluation of two resources and preparation of their mining has been made in 2007.

Embassy of the Czech Republic avails itself to renew to the Ministry of Foreign Affairs and Foreign Trade of Belize assurances of its highest considerations.

San José, January 11, 2008

Ministry of Foreign Affairs
and Foreign Trade

B e l m o p a n

BELIZE

Appendix 5: Revision Dictum

San Ignacio

Belize

TO WHOM IT MAY CONCERN

I am an associate Professor of Education at Galen University, Belize with a bachelor's degree in English Education; master's degree in curriculum & instruction (major in Teaching English & Literature) and a Doctor in Philosophy (major in Linguistics & Teacher Education). I have 39 years of combined teaching experience at elementary, secondary and university levels. In addition, for the last five years I have been marking English placement essays administered by Belize's Ministry of Education.

I have reviewed Craig-Elliott Martin Moore's Final Graduation Project for grammatical and mechanical errors. Lengthy sentences were reconstructed to make more fluent. Additionally, effective transitional words were added, and some repetitious words were changed to create a more interesting read.

Ultimately, the paper is solid and convincing in its methodological approach. It covers in depth the project management principles and sound analysis was applied to the project.

Sincerely,

Aline E Harrison PhD.

Appendix 6: Philologist Credentials

Aline E. Harrison, PhD.
63 Burns Avenue, San Ignacio, Belize
Phone number: 501-629-9170
Email: aline.harrison@gmail.com

Modified Curriculum Vitae

EDUCATION

August 2008	Ph.D. in Curriculum & Instruction University of South Florida, Tampa, Florida Concentration: Literacy, ESL, Teacher Training & Technology
May 1996- Dec. 1997	University of North Florida, Jacksonville, Florida M. Ed. Curriculum & Instruction, Concentration in Literature and Teaching English as a Second or Other Language (TESOL)
August 1991- May 1993	University College of Belize, Belize B. Ed. Concentration in Secondary English Education
August 1988- June 1991	Belize Teachers' Training College, Belize Diploma in Elementary/Middle School Education
July 1984	First Class Teachers Certificate in Elementary/Middle School Ministry of Education, Belize
June 1981	Sacred Heart College, San Ignacio High School Diploma

PROFESSIONAL EXPERIENCE

January 2016 – present	Associate Professor & Education Programs Coordinator in Faculty of Education, Galen University, San Ignacio, Belize
August 2013 – December 2015	Assistant Professor in Curriculum & Instruction/Bilingual Education & Reading, New Mexico Highlands University Las Vegas, NM 87701
August 2011 – July 2013	Interim Provost & Professor Galen University, San Ignacio, Belize
January 2011 – May 2011	English Composition Lecturer, Sacred Heart Junior College San Ignacio, Belize
August 2008 – December 2010	Assistant Professor, Bilingual/Elementary Education New Mexico Highlands University Santa Fe Center, Santa Fe, NM 87508
August 2002 -2008	Adjunct Linguistics Lecturer/Graduate Assistant, College of Education University of South Florida Tampa, Florida, 33620

August 1999 - 2001	ESL/EAP Instructor and Intern Supervisor, Regional Language Center University of Belize, Belize
July – Aug 1999 & 2000	Summer Adjunct Lecturer, Language Arts Belize Teachers' Training College, Belize
January 1998 - August 1999	Adjunct Lecturer, Advanced Teaching English as a Second Language (TESOL), Technical Writing and Belizean Literature University of Belize, Belize
August 1994 - September 1999	Teacher of English and Literature Saint John's College, Belize
October 1998 - May 2000	Adjunct Lecturer, Technical Writing and Composition Writing Belize Technical College, Belize
Nov. 7-13, 1998	Guest Lecturer, English as a Second Language Classroom Management, Planning and Methodology CONALEP, Merida, Mexico Auspices of Ministry of Education, Belize
August 1997 - May 1998	Adjunct Lecturer, Technical Writing and Belizean Literature University College of Belize, Belize
June 1997	ESL, Lab Assistant (summer) University College of Belize, Belize
August 1993 - June 1994	Teacher, Integrated English (temporary) Mopan Technical High School, Benque Viejo Del Carmen, Belize
September 1993 - June 1994	English as a Second Language (ESL) Consultant & Trainer Society for the Promotion of Education, Art and Science (SPEAR) Belmopan, Belize
June to August 1994 & 1995	Culture and Language Trainer Peace Corps International, Belize
June - August 1992	English as a Second Teacher, Society for the Promotion of Education, Art and Science (SPEAR) Belmopan, Belize
August 1988 - June 1991	Belizean History and Literature Teacher, St. Catherine's Academy Spanish and Literature Teacher, Excelsior High School Belize City
August 1981 - June 1988	Elementary & Middle School Teacher, Catholic Public Schools San Ignacio, Belize

University of South Florida

has conferred on

Aline Edna Harrison

the degree of

Doctor of Philosophy

together with all the rights, privileges and honors appertaining thereto in consideration of the satisfactory completion of the course prescribed by the Faculty of the

College of Education

In Witness Thereof the undersigned have affixed their names and the seal of the University at Tampa, Florida, this eighth day of August, 2008.

Chair of the Board of Trustees

President of the University of South Florida

UNIVERSITY of SOUTH FLORIDA 1956

Dean of the College