

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

BUSINESS PLAN AND PROJECT MANAGEMENT PLAN FOR SUSTAINABLE
CHARCOAL BRIQUETTE PRODUCTION FACILITY CONSTRUCTION AND
IMPLEMENTATION

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

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This Final Graduation Project was approved by the University as
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DEDICATION

This work is dedicated first to God who gives the strength.

And especially to my wife Cornelia, and children David and Charissa, for putting up with all of the long nights and missed days at the beach.

Love you always.

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There are many persons who supported and contributed to the successful completion of this work.

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ABBREVIATIONS AND ACRONYMS

ITTO	International Tropical Timber Organisation
GPMb	Green Project Manager b
PKBOK	Project Management Body of Knowledge
FGP	Final Graduation Project
UCI	UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
PMI	Project Management Institute
WBS	Work Breakdown Structure
IPMA	International Project Management Association
PriSM	Project Integrating Sustainable Methods
GPM	Green Project Management Organisation
ISO	International Organisation for Standardisation
SDG	Sustainable Development Goals
UN	United Nations
GDP	Gross Domestic Product
CFO	Chief Financial Officer
GPM P5	Green Project Management P5 methodology
APM	Association of Project Management (United Kingdom)
PESTLE	Political Economic Social Technological Legal Environmental
ISSN	International Standard Serial Number
APA	American Psychological Association
PDCA	Plan, Do Check, Act
VoIP	Voice over Internet Protocol
EU	European Community
CARICOM	Caribbean Community

EXECUTIVE SUMMARY (ABSTRACT)

The Final Graduation Project was executed to facilitate the successful implementation of a Sustainable Charcoal Briquette Production Facility Construction and Implementation. The project intended to achieve this goal by applying the principles of project management and sustainable development processes from Green Project Management. The guidelines and knowledge areas outlined in The PMBOK 5th Edition (2015) served as the principle model for the creation of the project plan. The FGP provided the opportunity to put into practice the detailed knowledge gained from the the Master's Degree in Project Management.

Notably, the facility that was described and planned in this project, is intended for implementation in Guyana, South America. The country remains 75% forested and is highly important in the international lumbar trade. Timber contributes significantly to the GDP of Guyana but the efficiency of the production of sawn timber can be significantly improved (Guyana Forestry Commission, 2016) . However, there was little data to suggest that the benefit of applied project management techniques has been utilised to improve the productivity in this sector. Therefore this project seeks to apply project management principles to the creation of the project plan for a Sustainable Charcoal Briquette Production Facility construction while allowing the utilisation of skills and knowledge gained in the degree program.

The utilization of project management techniques in a sustainable development project such as this will increase the likelihood of project success while increasing the worth obtained per area of forest in keeping with the current efforts of the Guyana Forestry Commission (Proposed National Log Export Policy, Guyana Forestry Commission, February 2016, pg.20).

The project was conducted in three phases, Project Management Plan, Construcion Plan and the Implementation Plan as indicated below.

The general objective for this Final Graduation Project was To create the Project Management Plan for a Sustainable Charcoal Briquette Production Facility Construction and Implementation to be constructed in Guyana, South America starting December 2018

The specific objectives were as follows, specific objective two to create the Project Management Plan including the Subsidiary Plans, specific objective three to create the Construction Managenment plan consisting the following subsidiary Plans, scope and schedule management plans and specific objective four, To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility.

Cost management planning was not included in the project because the volatility of prices in the country of implementation would necessitate the careful cossting of the project much nearer to the project initiation.

The research methods utilised for the project were primarily analytical methods which were used to evaluate the information obtained and to utilise that information to create the project management plan. However, there were some instances where the need for descriptive research was required. However descriptive methodologies were not employed heavily to prepare the majority of the project plan.

The main conclusions derived from the project were that the Project Charter and the Project Management plan provided a comprehensive overview of the project with the work and planning divided into three phases; Project plan with subsidiary plans, construction plan and the implementation plan. The Project plan consisted the Quality Management Plan in addition to the Stakeholder Management plan, Risk Management plan, Procurement management plan Communications Management plan and the Sustainability Management plan.

The Sustainability Management plan was exhaustive in its assessment of the sustainability index of the project utilising the GPM P5 Analysis and provided significant possible cost saving opportunities for the facility

The second phase, the Construction Management plan included the Scope and Schedule management plans focused specifically on the construction of the steel framed structure purpose built to house the factory machinery. Finally, the Implementation Management plan provided the means for a smooth transition to fully operational production facility.

The recommendations resulting from the execution of this FGP were classified into two categories; directed to the project sponsor and to the University. Essentially, the recommendations to the sponsor of the project suggested that the Quality Management plan be extended to the production process, that the Sustainability Management plan be revisited after the start of production to explore additional means for further waste reduction, process improvements and revenue streams.

The primary recommendation to the University was the suggestion to provide an intellectual platform for the novel application of project management principles to be explored.

1 INTRODUCTION

1.1. Background

Sustainable development has become an almost mandatory requirement for the ethical, long-lasting growth of industries and economies, especially in developing countries. In many cases however, such development fails to address areas of common need in those vulnerable populations, focussing instead on larger scale national concerns such as electricity generation and water management.

Guyana, a highly forested country of less than 1 million persons, has a very active forestry sector, producing hard and soft wood products for both local consumption and export (www.forestry.gov.gy). The sustainably harvested wood is converted to sawn timber at sawmills around the country (Proposed National Log Export Policy, Guyana Forestry Commission, February 2016). However, the wood chips and waste are usually left to rot in large piles even though there has been an effort to improve the value obtained per unit of forest extracted (Proposed National Log Export Policy, Guyana Forestry Commission, February 2016). Guyana is an ITTO member and is therefore bound by the International Tropical Timber Agreement, 2006 (www.itto.int/itto_members).

The absence of attention to more mundane but important issues such as cooking fuel results in the continued degradation of the environment and contributes to pervasive poverty cycles in at risk populations. Furthermore, as populations urbanise, the need for fuel increases and is often met by sources that have little incentive or means to utilise sustainable practices to produce the fuel which, in many parts of the world, remains charcoal produced from biomass.

This project aims to address many of these concerns by utilising biomass waste from different sources, especially waste hard wood chips to produce “green” charcoal.

This project intends to build a production facility that utilises the waste material from the lumber industry to create charcoal which can then be packaged for use as fuel without contributing to further environmental loss while increasing the add-on value

of already cut timber. The project will provide the documentation necessary to implement and manage the project

1.2. Statement of the problem

The creation of a Project Management plan for this production facility construction is important to facilitate the uncomplicated implementation of the project. The plan will assess and define the actual time, (cost) and schedule requirements for the project while providing insight into the risks associated with the project. Further, in the context of the Final Graduation Project, the preparation involved will permit evaluation of the weaknesses and strengths of the plan thereby improving the likelihood of success. Prepared for execution in three phases; the project management plan, the construction plan and the implementation plan, this project addresses the functional application of project management principles.

There is a significant amount of waste created during the minimal processing required to produce usable timber from cut trees which reduces the composite value of the wood and represents an untapped revenue stream in the forestry industry in Guyana. Further to this, sustainable benefit can also be obtained when related secondary problems such as waste removal and the reduction of developmental pressure on the environment (unsustainable charcoal production) are partially addressed.

1.3. Purpose

The purpose of this project is to create the Project Management Plan for a Sustainable Charcoal Briquette Production Facility Construction and implementation.

The benefits of the creation of this plan include improved time and scope management, risk assessment and mitigation, evaluation of human resource requirements and an alignment of the project with sustainability development practices that underlie the spirit and intent of the original idea.

These documents will serve as the blueprint for the planning and work related to the construction of the facility and will serve to initiate the processes required for the successful completion of the project according to the standards outlined in Guide to the Project Management Body of Knowledge, (2015). Further, Guyana is a signatory to the International Tropical Timber Organisation which stipulates requirements for the utilisation of timber and its by-products. The creation of the business plan and the Project management plan will also align the project with the sustainable goals developed by the ITTO (Criteria and Indicators for the Sustainable Management of Tropical Forests, 2016, Chapter 4).

1.4. General objective

To create the Project Management Plan for a Sustainable Charcoal Briquette Production Facility Construction and Implementation to be constructed in Guyana, South America starting December 2018

1.5. Specific objectives

1. To create the Project Charter to authorise the implementation of the project and describe the project scope.
2. To create the Project Management Plan including the following Subsidiary Plans
 - 2.1. To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project.
 - 2.2. To create the Communications Management Plan for the Project to initiate and govern the required Communications processes.
 - 2.3. To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project.
 - 2.4. To produce the Procurement Management plan for the project to institute correct procurement procedures and processes.
 - 2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction

- 2.6. To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan

3. To create the Construction Management plan consisting the following subsidiary Plans:
 - 3.1. Scope Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work.
 - 3.2. Schedule Management Plan to define the schedule requirements for the Project.
4. To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility.

2. THEORETICAL FRAMEWORK

Company framework

2.1.1 Company background

The Dunamis Group of Companies was created in 2012 (personal communication CFO, ² Dunamis Group 2017) as a means of realizing the varied interests and initiatives of a husband and wife entrepreneur team. The parent company serves as the umbrella organisation for the diversified portfolio of investments. The organizational group serves to separate the management of the various entities for greater efficiency and to facilitate appropriate accounting practices.

With backgrounds in healthcare and related fields, the initial focus of the organisation was on the distribution of medical products.

However, the Company Group continues to expand with interest in accessing the opportunities now available in Guyana where both owners have spent significant time. As an English-speaking country (the only one in South America) having close ties both politically and culturally to the rest of the Caribbean, (<http://caricom.org/about-caricom/who-we-are>), Guyana is ideally poised to serve an increasingly important role in the region, especially in the area of Sustainable Development. It is the intent of the new project initiative to participate in the new growth and financial opportunities and to extend the portfolio of the organisation into new markets.

2.1.2 Mission and vision statements

The organisation begun with the mission to provide access to high quality affordable healthcare services and to find innovative sustainable solutions to common problems. This broad mandate has enables the organisation to capitalize on diverse opportunities as they present. In the context of the current project, the company is expanding into Sustainable development business prospects while utilising the project as a means of addressing current environmental and local economic issues such as reducing

deforestation (however small), reducing import dependency and increasing earnings for the company.

The vision statement is: *'Improving lives everywhere'*

2.1.3 Organizational structure

Dunamis Holdings and Investments Ltd., is the subsidiary of the Dunamis Group of Companies that bears responsibility for the planning and initiation of the Sustainable Charcoal Briquette Production Facility Construction and Implementation. The organizational structure of the parent company is charted below.

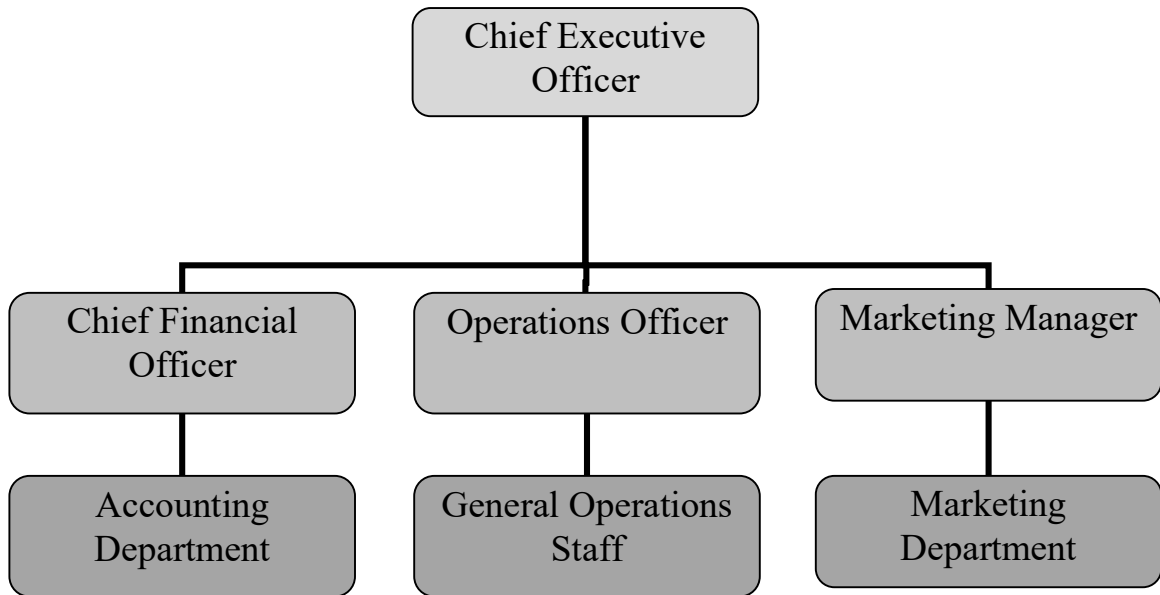


Figure 2 Organizational structure Dunamis Group of Companies (Source: Dunamis Enterprise Fact Sheet, 2013)

2.1.4 Products offered

Dunamis Enterprise Inc. currently offers healthcare related products through its subsidiaries Dunamis Healthcare and Dunamis Enterprise Inc. However, since the new venture will be conducted and managed in a different locality, the project will fall under the Dunamis Investment and Holding (Guyana) Ltd. This venture is ideally placed to

deliver the product portfolio that includes the sustainable biomass charcoal. As an add-on product, some of the biomass can also be converted to compost. This can be considered at a future date for exploration and will allow for the logical expansion of the products and services offered by the company.

Project Management concepts

The Dunamis Group of companies does not currently have an established framework for project management within the company. However, the project will provide the Impetus for the creation of policy toward that objective. It is important to note that the company utilises project management strategies to improve the outcomes of the projects that it undertakes.

The Company particularly interested from a corporate perspective in the value obtained from Sustainable development perspectives found in the Green Project Management initiative and the PriSM methodology (www.greenprojectmanagement.org/index.php/prism-methodology)

2.1.5 Project

Project, as defined by the Project Management Body of Knowledge Guide, 2013, is ‘a temporary endeavor undertaken to create a new product, service or result,’ (PMBOK Guide, 2013, pg. 3).

Another definition from the Business Dictionary (<http://www.businessdictionary.com/definition/project.html>) is: ‘A planned set of interrelated activities to be executed over a fixed period of time and within certain cost and other limitations.’

Both definitions indicate that projects are time limited, otherwise constrained activities that produce unique outputs. The charcoal facility plan is therefore a project that will be implemented under cost, time, and scope constraints to accomplish the final result; a completed project plan.

In order to qualify as a project, the endeavor under consideration should meet the basic criteria outlined in the above definitions. First, as indicated in the attached project schedule, the creation of the project plan is intended to be accomplished within three

months. Second, the schedule also defines the specific list of activities that are required to achieve the stated goal. Finally, the outcome of the project, a completed project plan, has not been done before under the exact circumstances that currently exist, making this project and its result exclusive.

2.1.6 Project management

In many instances, projects are completed without a formal plan to guide the work that is required for completion and more importantly success. Wrike.com reveals that in the statistics gathered for 2015, 41% of organisations do not use project planning methodologies and further, of those, 69% and 79% do not meet budget and schedule goals with projects (<https://www.wrike.com/blog/complete-collection-project-management-statistics-2015/#benefits>).

This indicates that there is significant benefit to the use of project management methods and techniques to optimize the return on investment for projects. This project is likely to gain advantages from the use of the project management techniques described in the PMBOK guide (2013), one of the more popular methodologies, used by more than 40% of the organisations surveyed by Wrike.com in 2015 (<https://www.wrike.com/blog/complete-collection-project-management-statistics-2015/#benefits>). Additionally, PMI.org noted that an astounding 89% of high performing organisations complete their projects successfully while low performers complete only 36%, (PMI, The High cost of Low Performance (2014), pg 2)

Despite the fact that 41% of organisations did not use project management, 97% of surveyed executives indicated that project management was critical to business performance and organizational success (Price Waterhouse Coopers, 2012).

Of importance in this project are the project management techniques related to planning for sustainability.

The Green Project Management Organisation, GPM, has in its 2016 survey, found that 94% of executives stated that projects and project management are integral to sustainable development and that 93% who have adopted [Sustainable practices] have seen a tangible increase in project performance (GPM.org, 2016). Therefore, the

confluence of project management, and the GPM P5 standards (GPM Global, 2009-2015). Will allow the project to achieve both its time and scope and sustainable goals.

2.1.7 Project life cycle

PMBOK (2013) defines Project life cycle as the 'series of phases that a project passes through from its initiation to its closure', (PMBOK Guide 2013, pg 38).

These phases are similar across many differing types of projects and are; Initiation, Planning, Executing and Closing.

The initiating phase refers to the first set of activities related to the project and involves formulating the project idea (s) or scope. The phase ends with the production of a document that outlines the objectives of the project and identifies the resources and responsibilities at a high level.

This project required significant thought for the initiation phase since the variety of choices for a Final Graduation Project are many. Further, the time constraint imposed by the university also serves to limit choices to those that can be completed within the specified time. However, time is still considered a significant risk to the completion of the graduation project.

Additional detail is added during the second stage or planning phase. During this phase, the project is dissected into the lowest level of detail required to accomplish the work, referred to as a work breakdown structure (WBS), attached as appendix 2. As shown in the figure below, the stage produces as the output, a project management plan that should contain all of the information needed to complete the project.

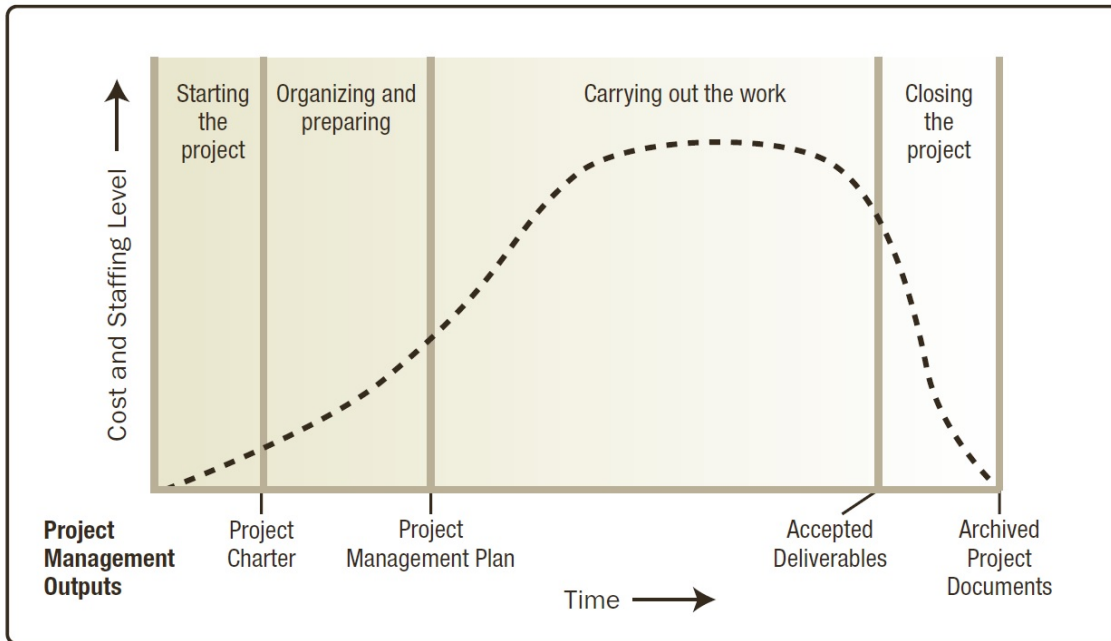


Figure 3 Generic Life Cycle Structure. Adapted from PMBOK Guide Fifth Edition, page 38

The third phase or executing involves doing the actual work needed to accomplish the objectives of the project whilst adhering to the management plan described in the project management plan. For the Final Graduation Project, much of the necessary work will be completed under tutelage.

Finally, having completed the work or otherwise deciding that the project should end, the last phase of projects is the closing phase where a formal end is brought to project work and the project output delivered to the relevant parties. While the project may end at this stage, the project output, here the framework of the Final Graduation Project, will continue to be developed as the input for another project.

Another graphic showing the project life cycle is reprinted below. (The GPM Reference Guide, 2013).

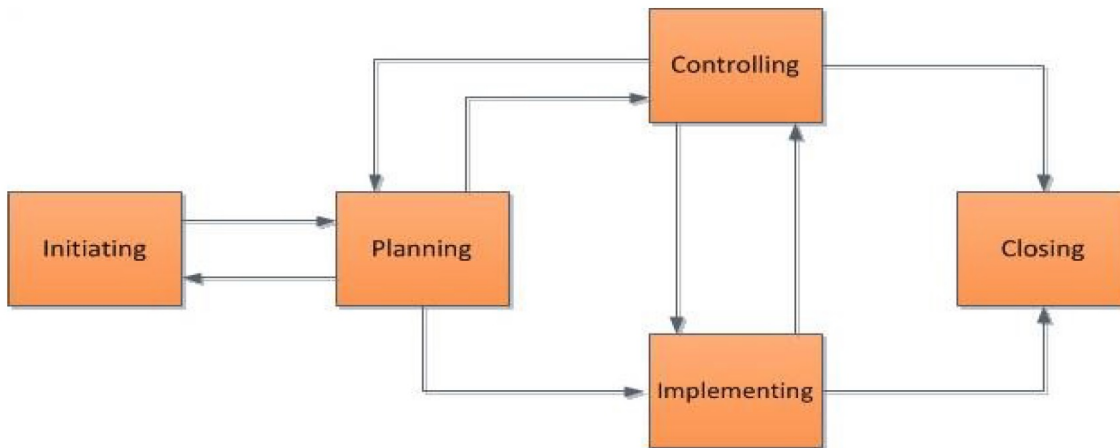


Figure 4 Graphic showing the project life cycle stages, The GPM Reference guide to Sustainability in Project Management, GPM Global, 2013

Other definitions of the project life cycle include iterative, incremental and adaptive life cycles which are specific to facilitating certain project types. (PMBOK, pg 45-46). These project life cycle types do not apply to the current endeavor.

2.1.8 Project management processes

The Project Management Institute defines project management as; the application of knowledge, skills, tools and techniques to project activities to meet the project requirements (PMBOK 2013, pg. 47).

PMBOK Guide (2013) is one example of an attempt to collate and unify existing knowledge and processes into a comprehensive useable format. Another such effort is the APM Body of knowledge from the Association of Project Management, in the United Kingdom. (APM Body of Knowledge, Sixth Edition, 2012).

According to PMI, there are 5 processes or process groups that describe project work, where process group refers to a collection of activities that are rarely singular events but tend to intersect with and influence each other in complex ways (PMBOK Fifth Edition, 2013 pg. 51). The distinction between a process which is a single activity or a process group referring to a collection of collaborative activities performed together is of little fundamental importance, so the terms are usually used interchangeably.

The processes are:

Initiating process

Planning Process

Executing Process

Monitoring and Controlling Process

Closing Process

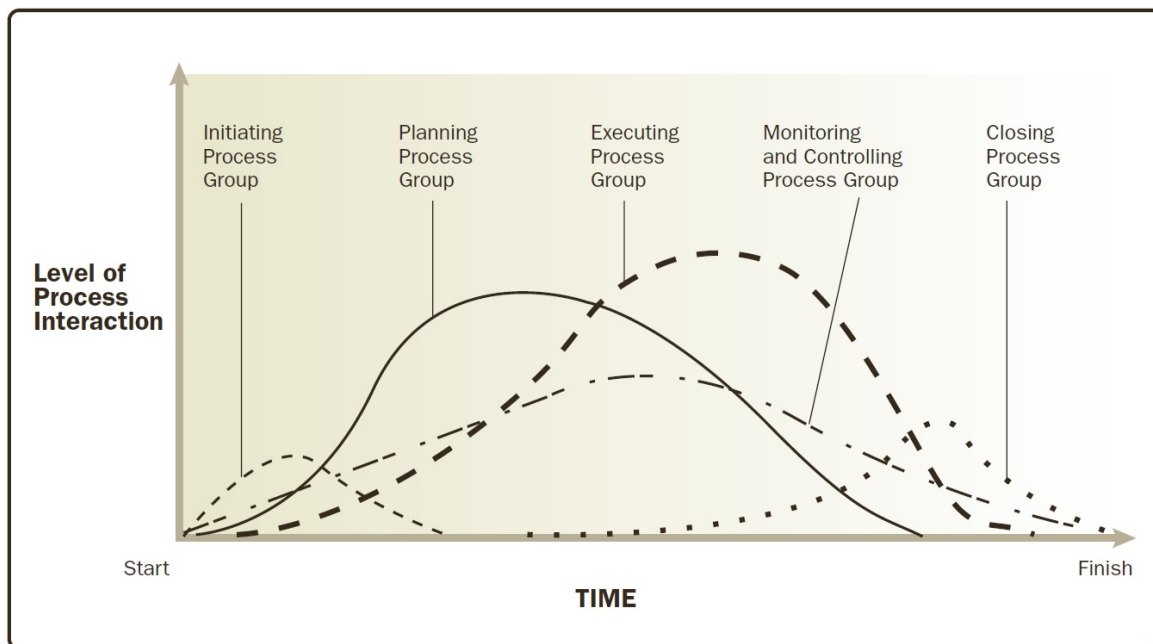


Figure 4 9 Interaction of process groups within a Project or Phase. Adapted from PMBOK Fifth Ed, 2013.PMI

The initiating process or process group is performed at the beginning of projects and serves to define the parameters of the project. This process is important because the information collected here, in the form of the project charter, establishes and authorizes the project. Also, critical to this stage is the collection of stakeholder details which enables appropriate planning in subsequent stages. The opportunity can be taken to ensure that the project is aligned with the organisation and its goals.

The second process, planning deconstructs the requirements found in the project charter into the detail needed to execute the work. This includes planning the scope, schedule, costs in accordance with the preapproved budget and several other

processes discussed later. An assessment of involved risk and calculation of reserves are also performed at this time.

Due to the nature of this project, the process groups to be utilized will be limited to the initiating and planning as described above.

The executing process describes the phase in which the work of the project is completed utilising the documentation and methodologies delineated in the planning stage.

The monitoring and controlling process ensures that the project plan is being followed and that necessary steps are being taken to correct any deficiencies. Finally, bringing the project to an end falls within the closing process group.

The graphic below shows the complex interactions between the project management process groups (PMBOK Fifth Ed. 2013)

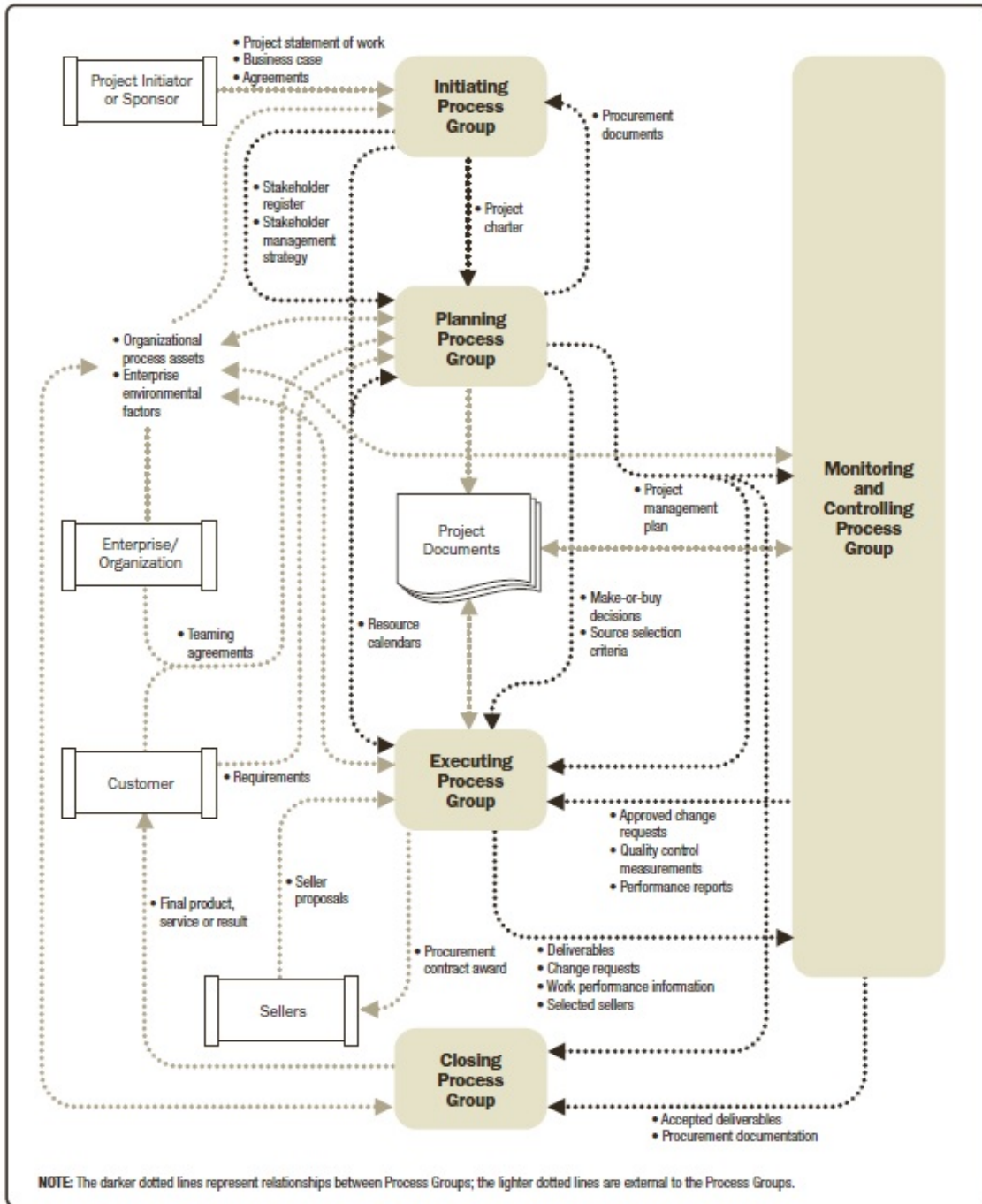


Figure 5 Interactions of Project Management process groups, Reprinted from PMBOK Fifth Edition, Project Management Institute, 2013. © 2013, PMI Inc.

2.1.9 Project management knowledge areas

The Project Management Institute, PMI has identified 10 major knowledge areas deemed necessary for successful planning (PMBOK Guide, 2013, pg. 60) within which 47 management process have been defined. The Project Management Institute has created a knowledge base that for the processes listed below and those definitions will be discussed.

The 10 knowledge areas are:

- 1 Integration Management
- 2 Time Management
- 3 Scope Management
- 4 Cost Management
- 5 Quality Management
- 6 Human Resource Management
- 7 Communications Management
- 8 Risk Management
- 9 Procurement Management and
- 10 Stakeholder Management

2.2.5.1

Integration Management

The process is integral to the concept of project management. It refers to the collective activities and processes that are leveraged to identify, define, combine, unify and coordinate the activity of the project (PMBOK Guide 2013, pg 63). Many of the included processes are performed in the early stages of project development. These include the ratification of the project charter and project plan, in addition to managing, controlling, monitoring and closing the project. Change control management is also considered part of this knowledge area.

One simple definition encapsulates the concept of integration management well.

Study.com (<http://study.com/academy/lesson/project-integration-management->

[definition-processes-example.html](#)) states that 'Project Integration management is the knowledge area that ensures good coordination between project activities'.

2.2.5.2

Scope Management

PMBOK Guide (2013) describes Scope management as including the processes to ensure that the project includes all the work required without additional unnecessary work. (PMBOK Guide 2013, pg. 105). This definition implies that the possibility exists to include work that is unneeded for the success of the project. Managing the scope of projects is very important to prevent scope creep. Joseph Heagney (Fundamentals of Project Management Fourth Ed. 2012) states that 'changes to project scope are often the factors that kill a project'. Therefore, managing the processes associated with the scope of a project can help increase the possibility of favourable project completion.

2.2.5.3

Time Management

Defined in PMBOK Guide 5th Edition (2013), Time Management refers to the processes required to manage the timely completion of the project. These processes include assessing, defining and planning the activities needed to complete the project and developing and managing the schedule of those activities. The final outcome of these processes is a schedule management plan which should contain the enough schedule and activity details to successfully complete the project.

Adrienne Watt (Project Management, 2014) states that necessary for the development of a schedule, activities must be defined, sequenced in the right order with the correct estimates of time and resources. By creating a schedule management plan for the charcoal briquette construction, the timing of critical events and milestones would also allow the monitoring of the process to find variances to could derail the project.

The tools and techniques that will be used in the Final Graduation Project will incorporate Gantt charts, in addition to the utilization of project scheduling software including Microsoft Project (Microsoft Corporation, 2016).

2.2.5.4

Cost Management

Cost management speaks to the management of the processes related to the project budget and will not be included in this project except for a statement of the costs associated with the creation of the Final Graduation Project. The justification for the exclusion is discussed below.

All of the knowledge areas are applicable to this Final Graduation Project with the exception of cost management.

Cost management has been excluded from this project because of the high variability of costing in the country in which the project will be initiated. Further, reliable data is not yet available to assure precise projections or to produce cost estimates. The local research required to increase the accuracy of the cost estimates cannot be performed within the time constraints of the graduation project and therefore have been excluded.

2.2.5.5

Quality Management

By providing specific quality goals and measures, and keeping track of the results, Quality Management seeks to ensure that the outcome of each process meets expectations. Throughout its long and storied history, quality management planning has sought to match expectations with actuality (K. Rose, 2014, pg. 20). Within the ambit of this Final Graduation Project, the quality management plan will ensure that the expected results are delivered every time by evaluating the products of each process at intervals.

This is especially important in the project environment, where the desire and motivation to use shortcuts and quick fixes is practically culturally institutionalized.

2.2.5.6

Human Resource Management

The Human resource management plan will create the framework within which the required levels and quantity of staff required for the project are made available at the right time and possessing the correct skills necessary for the job. This can be accomplished with new staff or training existing staff for new tasks. The human resource pool for the intended project location comprises of mostly low skilled workers therefore one challenge will be to attract and retain the necessary high-level staff. The Human Resource plan may include details on the methods that will be employed to achieve this goal.

2.2.5.7

Communications Management

The Communication management plan is intended to address the requirements for communications between the project staff and the stakeholders of the project. The plan will explain the techniques, methods and means of communication to be used in addition to establishing the frequency of the communications. Additionally, the communications management plan will discuss the degree to which critical information will be divulged and to whom.

2.2.5.8

Risk Management

Risk management planning explores the possible threats to the successful completion of the project and establishes planned responses to each threat should it arise. Risk

management is of great importance in the planning of this project due to the remote location and the inherent risk associated with operating in a jurisdiction of relatively immature project management and other facilitating administrative structures. Risk management for this project will involve a wide array of possible threats and analyze for prospective opportunities to be exploited.

2.2.5.9

Procurement Management

The procurement management plan to be adopted by the project will center on reducing procurement costs and working to ensure that the chances for misappropriation of funds intended for procurement is limited. This will be achieved by the use of several techniques including fixed price contracts, limiting the procurement to pool of trusted suppliers. PMBOK 5th Edition defines procurement as; 'including the processes necessary to purchase or acquire services, products or results needed from outside of the project team,' (PMBOK Guide 2015, pg. 355). Contained within the procurement management knowledge area is the management of the contracts accompanying the project. Care is to be taken regarding the use of principles of contract management to improve project outcomes.

2.2.5.10

Stakeholder Management

Stakeholder management is a critical part of the initial and other phases of the project. Harold Kerzner, 2009 describes stakeholders as those individuals or organisations that can be favourably or unfavourably influenced by the project (Project Management, A systems approach to planning, scheduling and controlling, 10th Edition, 2009). Essential to the process of managing stakeholders, is the thorough and complete identification of stakeholders and assigning those identified to the appropriate category that defines the importance (to the project) of each stakeholder. The importance of stakeholders is

measured by analyzing the levels of influence and interest that each has in the project and using that information to govern the relationship to the project (and project manager).

2.1.5.11

Implementation Planning

The implementation plan serves to facilitate the transition from 'project' to 'operational'. The implementation plan is of particularly significant import in those projects in which the project team is required to transfer 'ownership' of the project to a management team that will be responsible for using the output of the project to produce a product or service.

Detailed planning of the handover smooths the process and contributes to early and successful utilization of the project output. The implementation plan bridges the gap between building the factory and using the factory to produce actual goods. The implementation plan involves planning, allocating resources and training as some of its required processes.

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

2.3.1 Sustainable Development

The Final Graduation Project requires an assessment of the sustainability goals of the project as defined in specific objective 10 (Appendix 1).

Green Project Management, Global Inc. has sought to define the requirements for sustainability in project management utilising the P5 methodology (GPM Reference Guide, 2013, pg. 7). This practice involves the review of the five measurable factors related to sustainability; Planet, People, Profit, Process and Product (P5 Assessment) and is part of the PRiSM method (GPM Guide, 2013)

Done in the early stages of project planning, and initiation, the assessment provides a framework for the project sustainability plan. The graphic below indicates the stages at which the P5 Assessment can be incorporated in the usual project management processes described above.

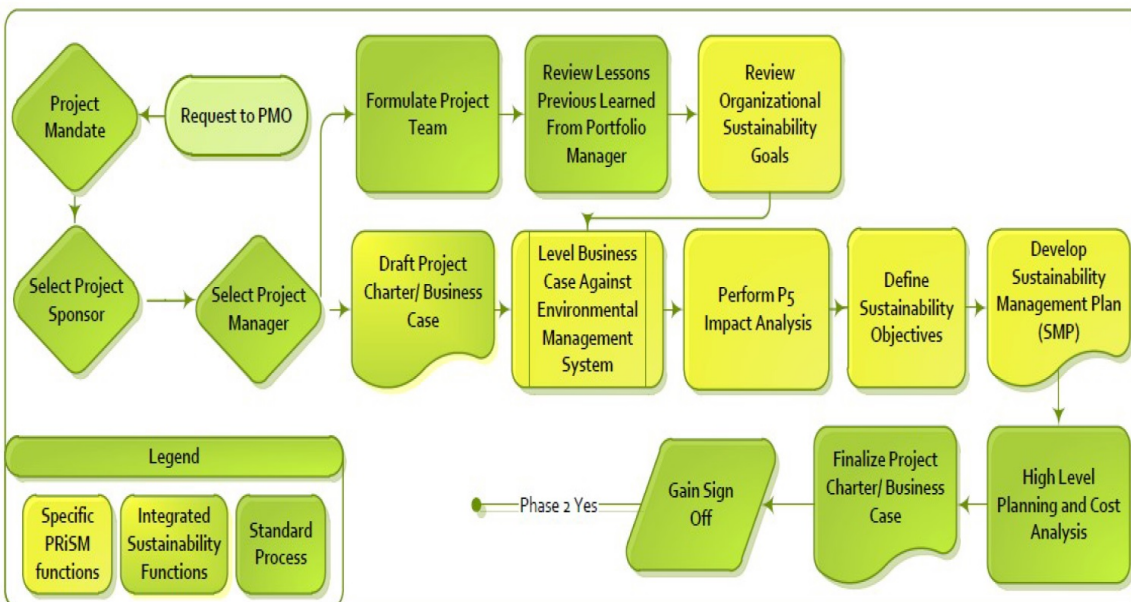


Figure 6 Graphic showing the inclusion of the P5 assessment in the project initiation phase, The GPM Reference guide to Sustainability in Project Management, GPM Global, 2013

Note that the processes specific to Sustainability planning are shown in yellow-green.

Additionally, important to the successful completion of the Final Graduation Project are the technical approaches relevant to the utilization of biomass for charcoal production and the relationship (partly addressed in the sustainability assessment described above) between the procurement of raw materials and organisations such as the International Tropical Timber Organisation and the Guyana Forestry Commission that are integral to the designation and certification of 'green' products.

2.3.2

In 2010, at the IPMA Expert Seminar themed 'Survival and Sustainability as Challenges to Projects', a paper presented by G. Silvius et al (Silvius, A.J.G. (2010), "Workshop report Group 2", pp. 155-160.) recognized and illustrated the need for a framework on which the principles of Sustainability could be presented for use in projects. The paper described the need for project management processes, competencies and performance indicators to be developed with a view to capturing (in addition to standardizing and disseminating) the impacts of sustainability planning. Further, the paper specifically discussed the utilization of the people-planet-profit concept of sustainability for the development of such a framework, referred to at that time as the Triple P or Triple Bottom line which was first described by John Elkington (1997) in his well-received book 'Cannibals with forks; The Triple Bottom Line of 21st Century businesses".

GPM P5

As a follow-up to the conference paper discussed above, there was a concerted effort by the Green Project Management Organisation to adapt and clarify the concepts of the discourse into a format that allowed for its integration into Project management and to translate the concepts into tools that were practical and applicable to the work of project management professionals (The GPM Guide 2013 pg. 30). The result of these efforts was the GPM P5 Methodology which refers to the expansion of the Triple P to People-Planet-Profit-Process-Products or P5. Each of the 5 elements is a measurable

separately and if applied together, form a 'complete' approach to incorporating Sustainability considerations into individual projects.

It should be noted that there is little mention of sustainability in the 5th Edition of the PMBOK Guide which describes in detail standards related to project management. In fact, the 2013 edition of PMBOK mentions the word sustainability only thrice in relation to organizational practices that may include sustainability and the word is not listed in the glossary or index.

Therefore, the GPM guide (illustrated in Fig. 7 above, pg. 21) provides some direction on where the sustainability practices should be incorporated into the usual PMBOK process groups and knowledge areas.

The incorporation of the P5 methodology in the project planning process is initiated by completing an assessment of the project, whilst in the planning stages, to ascertain a sustainability score for that project.

The assessment of the sustainability score for a project is referred to in the GPM methodology as the P5 Impact Analysis (GPM P5 Standard, pg. 34). The analysis examines in detail the Environmental, Societal and Economic impacts of project processes such as energy use, human rights and return on investment, examining 43 assessable elements in total.

There are several ways to perform the P5 analysis all of which result in the compilation of a risk table. When used with a scoring mechanism such as prescribed in the GPM P5 Standard (GPM P5 Standard, 2012, pg. 34), the greatest utility of the sustainability risk register can be recognized. The results of the risk register are then mapped to a Sustainability Management Plan which is the primary output of the Sustainability Management process.

Using this methodology allows for the early consideration of sustainability factors in the project being planned.

The GPM 2016 survey indicated that 93% of those who have adopted the GPM P5 strategies have seen a tangible increase in project performance (<https://www.greenprojectmanagement.org/the-p5-standard>). This suggests that there is some benefit to the incorporation of sustainability planning into the project life-cycle.

Additional tools such as the PESTLE analysis can also be used to give a broad view on the other factors that may affect the risk portfolio of a project. The PESTLE acronym does not appear to have a singular origin but evolved over a period of decades after Francis Aguilar initially mentioned EPTS in 1967 (<http://www.brighthubpm.com/project-planning/100279-pestle-analysis-history-and-application/>) referring to Economic, Technical, Political and Social factors of the business environment. The intent of the early use of the PESTLE analysis by Aguilar appeared to be for scanning the prevailing business environment, as the title of his publication suggests. Later authors extended the use of the mnemonic (<https://rapidbi.com/the-pestle-analysis-tool/>). The diagram below provides detail on the specific considerations examined in a PESTLE analysis (<http://pestleanalysis.com/how-to-create-pestle-analysis-template/>).

PESTEL Analysis		
POLITICAL	ECONOMIC	SOCIAL
1 Enter Political factors here...	Enter Economic factors here...	Enter Social factors here...
2		
3		
4		
5		
6		
7		
8		
9		
10		
TECHNOLOGICAL	ENVIRONMENTAL	LEGAL
1 Enter Technological factors here...	Enter Environmental factors here...	Enter Legal factors here...
2		
3		
4		
5		
6		
7		
8		
9		
10		

Fig. 7 PESTLE Analysis Template (<http://pestleanalysis.com/how-to-create-pestle-analysis-template/>)

GPM PriSM

The GPM PriSM methodology, Project Integrating Sustainable Methods, expands the use of the P5 methods to organisations to allow them to integrate sustainability

initiatives and project processes. As a management standard, the PriSM method incorporates and references several related standards, bodies of knowledge and other resources to provide a comprehensive integrated management tool. Two of these resources are the UN Global Compact and the ISO standards, discussed in detail below.



Fig. 8 Graphic illustrating the 5-phased approach of PriSM as an organisational tool (retrieved from <https://www.greenprojectmanagement.org/prism-methodology>)

UN Global Compact

In 2000, the United Nations organized and developed a series of 9 Sustainable Development Goals (SDGs) which were later expanded into the current 17 SDGs. The intention of the UN initiative was to encourage the use of the goals in mainstream business and to engender support for other UN goals such as the Millennium Development Goals.

As shown in the graphic below, the SDGs broadly reflect attention to social, economic and environmental factors.

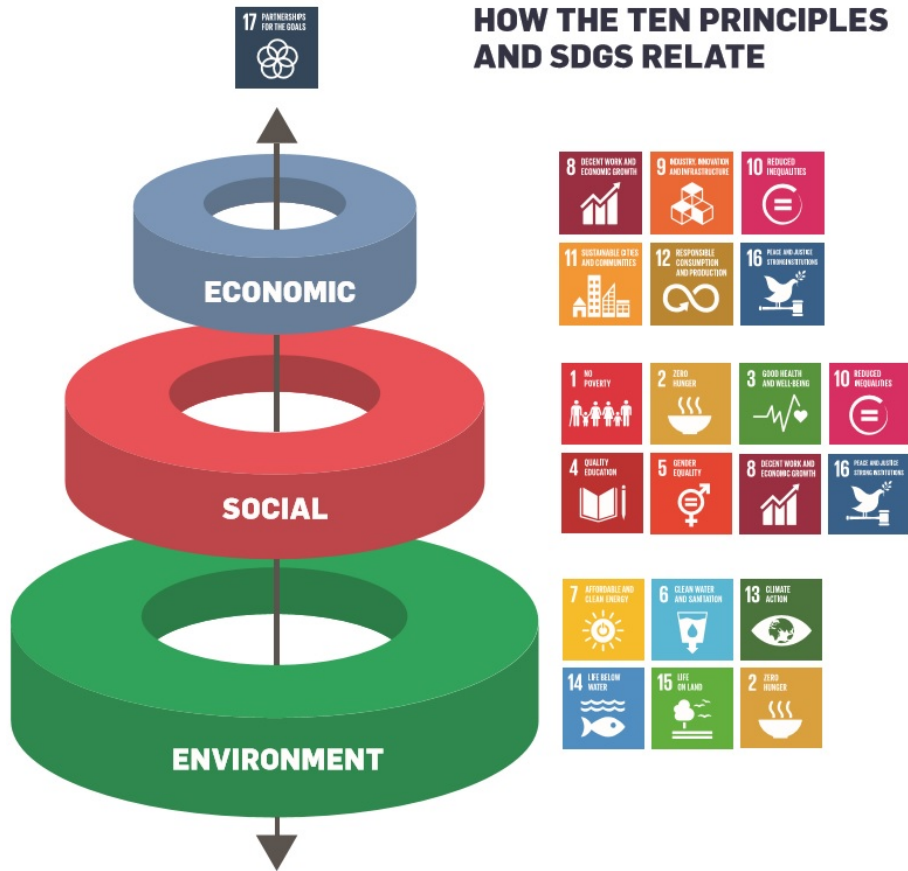


Fig Graphic showing the UN SDGs (retrieved and adapted from https://www.unglobalcompact.org/docs/publications/UN%20Impact%20Brochure_Concept-FINAL.pdf)

ISO Standards

The International Organisation for Standards, ISO is an independent organisation that has worked at the forefront of creating standards for use in many disciplines since 1947 (https://en.wikipedia.org/wiki/International_Organization_for_Standardization). The governing body has members in 163 countries around the world and have compiled

several standards that are directly applicable to work in project Management (<https://www.iso.org/what-we-do.html>). Specifically, there are several standards that address environmental issues, sustainable development and greenhouse gasses to name a (relevant) few.

Charted below are some of the pertinent standards that are relevant to project management (<https://www.iso.org/popular-standards.html>).

ISO Standard	
ISO 14001	The ISO 14001 standards provide guidance on the management of the environmental responsibilities for companies and projects
ISO 9001	This popular standard on Quality Management describes a Quality Management framework and system, and is the only certifiable ISO standard
ISO 26000	This standard guides the socially responsive behavior of companies and projects and is increasingly being utilised as a performance measure in many areas
ISO 31000	ISO 31000 informs the risk management practices of companies
ISO 5001	This energy management standard is particularly applicable to the efforts of projects to manage energy sustainably
ISO 21500	The ISO 21500 standard directly advises on project management processes and concepts

Chart 1 Showing applicable ISO standards (compiled by the author)

Solar Energy

While not theoretically a sustainable project management related concept, solar power generation is integral to the effort to improve energy management in small and large projects. And, when available, can contribute significantly to the reduction in greenhouse gas emissions, especially those related to power generation.

The proposed project site discussed herein lies at a latitude of 6° 8'46.19"N and longitude 58°13'56.17"W, 6 degrees above the equator in an area of abundant sunshine receiving between 2000-3000 hours of bright sunshine annually (<http://earth.rice.edu/mtpe/geo/geosphere/hot/energyfuture/Sunlight.html>). The data from the United Nations indicates 2490.6 hours of annual sunshine (<http://data.un.org/Data.aspx?d=CLINO&f=ElementCode%3a15>). This resource can contribute significantly to the reduction in grid supplied energy that is required for the manufacturing processes and further add to the sustainability profile of the project. However, it should be noted that several local regulations exist on the maximum amount of energy that can be generated from non-grid sources that will have to be negotiated to obtain the optimum benefit for the project.

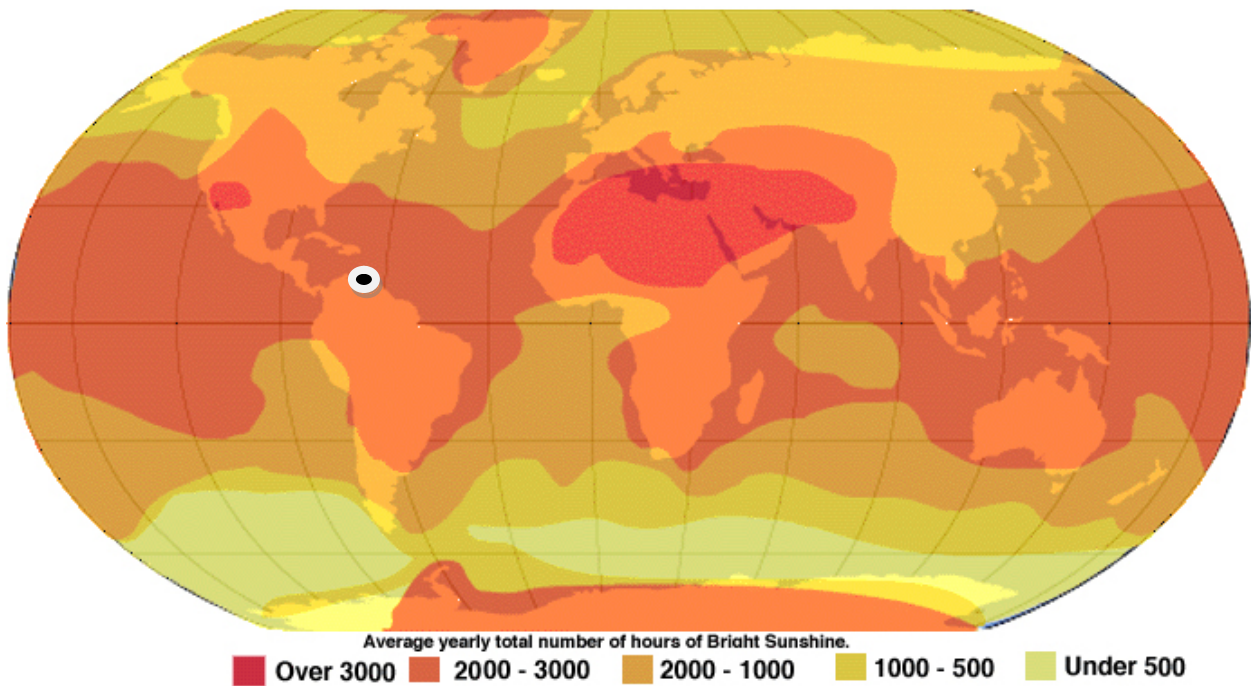


Fig. 10 Graphic showing the annual hours of sunshine worldwide (retrieved from <http://earth.rice.edu/mtpe/geo/geosphere/hot/energyfuture/Sunlight.html>)

* Note that the proposed project site is approximated with the black and white dot

Wind Energy

Wind energy is also an abundant though intermittent resource that is available for use in the project area. Its use will be maximized through the addition of a battery backup system that will allow the storage of excess energy, for example the energy generated at night, for use during the daily activities of the manufacturing processes.

Wind generators and turbines have reduced in cost over the last several years and have also benefitted from improvements in the related technology. The addition of wind turbine (s) to the energy generation capacity of the project will likely provide benefit but is not necessary at project initiation, though the infrastructure for its eventual addition are included in the project scope.

Green Charcoal Production

The production of charcoal from biomass has gained tremendous attention in the last decade or so, though for mostly negative reasons. Charcoal is very popular as a household fuel in some areas of the world (Agyeman et al, Journal of Sustainable Development Vol. 5, No. 4; April 2012). Interestingly, it is estimated that more than half of all timber harvested in the world is used as fuel wood, charcoal production included (International Energy Agency, 2002). However, unregulated charcoal production is a major factor in the ongoing environmental degradation and deforestation seen in many forested areas of the world (Emmanuel N., Davison J., The environmental impacts of charcoal production in tropical ecosystems of the world: A synthesis, In Energy for Sustainable Development, Volume 17, Issue 2, 2013, Pages 86-94, ISSN 0973-0826, <https://doi.org/10.1016/j.esd.2012.07.004>.

(<http://www.sciencedirect.com/science/article/pii/S0973082612000476>)) . Much of the environmental destruction occurs because of the use of live trees for the production of charcoal. In Saint Lucia, mangrove trees are often utilised for this purpose with the resultant degradation of the coastal ecosystems and increased vulnerability to

hurricanes and storms. (<http://www.tandfonline.com/doi/abs/10.1080/00207239308710819?journalCode=genv20>). Notably also, charcoal continues to enjoy a place in even developed economies for the creation of barbecues and other grilled foods.

Nevertheless, there are methods available for the production of this fuel source that address some of the environmental issues regarding the production of charcoal.

These considerations include; sustainable tree harvesting, use of waste biomass (such as bagasses, waste wood chips and greenery) for the charcoal production.

The method of producing charcoal involves pyrolysis which is the process of combustion in an anaerobic (lack of oxygen) environment. The processes required can be controlled to accomplish a specified output.

Specifically, the following schematic outlines the process of charcoal production.

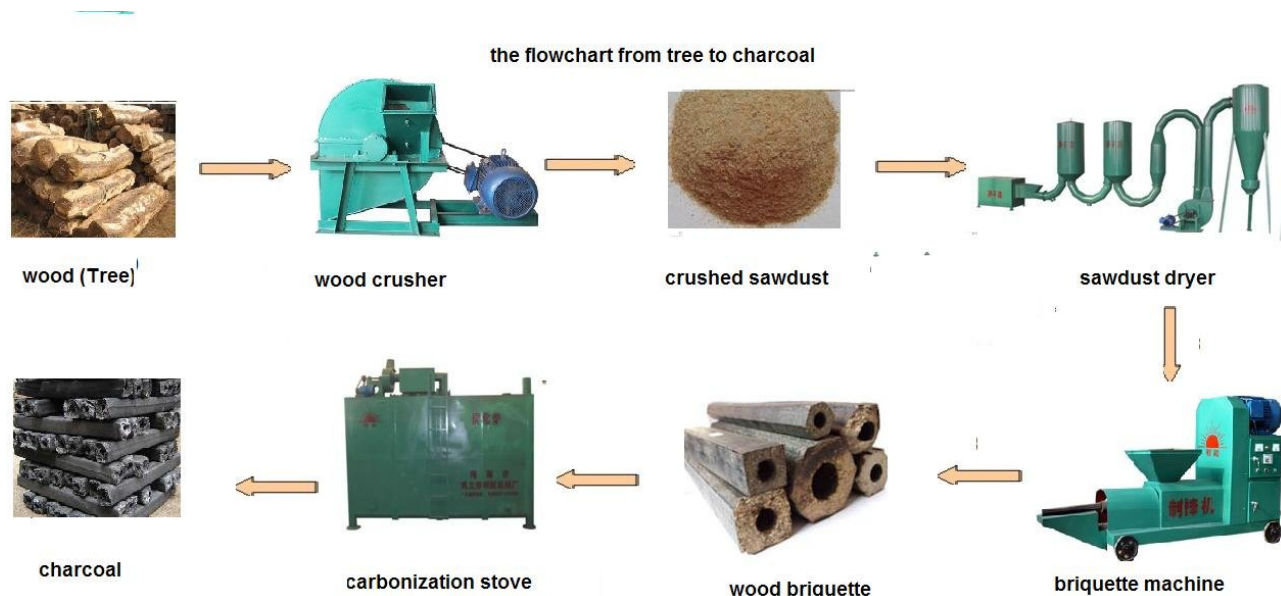


Figure 11 Showing the process of green charcoal production (<http://www.mingyangmachinery.com/index.html>)

In the context of the project, biomass is available in the form of bagasse, rice husks and waste, wood chips and sawdust, all of which can be compressed and pyrolyzed to form charcoal.

The manufacturing process is as follows:

- Procurement and delivery of raw material to site
- Raw material sorted
- **Material chipped and crushed to appropriate size**
- **Moisture content reduced in a dryer 10-15% or less**
- **Dried material conveyed to briquette machine**
- **Additives mixed**
- **Briquettes extruded**
- **Briquettes pyrolyzed** (8 to 12 hours)
- Briquettes cooled
- Product packaged
- Stored
- Delivered

Secondary Processing

- **Charcoal briquettes crushed**
- Mixed with additives
- **Pressed via rollers to bricks**
- Packaged
- Stored
- Delivered

Note that the processes in bold italix are machine performed processes

3 METHODOLOGICAL FRAMEWORK

³ 3.1 Information sources

Merriam-Webster (www.Merriam-Webster.com/dictionary/information) gives two useful definitions of the word information; first, ‘the communication or reception of knowledge or intelligence’ and secondly, ‘knowledge obtained from investigation, study, or instruction.’ While both of these definitions are applicable to the work of this Final Graduation Project, the second definition is most helpful.

Business dictionary (www.businessdictionary.com/definition/information.html) describes information as; ‘data that is accurate and timely, specific and organized for a purpose, presented within a context that gives it meaning and relevance and can lead to an increase in understanding and a decrease in uncertainty. This is perhaps the most thorough definition and is directly related to the current effort which aims to be correct, completed within a definite timeframe, with a systematic attempt to present the information in a manner that enables the reader to understand the concepts elucidated herein. The framework within which the information is discussed is clearly outlined in keeping with the definition.

Business dictionary defines source as; ‘a place from which things originate and a specific publication or other type of media where specific information was obtained. Merriam Webster adds ‘one that supplies information’ (www.Merriam-Webster.com/dictionary/source). This document utilizes several sources for the information that it contains including but not limited to; conversations and personal communications, journals articles, textbooks, compiled bodies of knowledge and internet sources. Every attempt has been made to choose reliable recognized sources and to cite the sources used correctly utilising the APA methodology (APA Manual, 6th Edition).

3.1.1 Primary sources

Primary information source is defined by the author as the place or origin of information or data which is considered important and reliable for further use. Well researched,

relevant information from journals, textbooks, respected articles are thought of as primary sources (Gavin Melville, FGP, 2017).

The primary sources utilised in this Final Graduation Project include:

Journals

Textbooks

Websites

Articles

Research papers

3.1.2 Secondary sources

Some sources of information and data are somewhat less reliable, may be less detailed or have fewer supporting arguments, often presenting nonoriginal data. These data sources are considered secondary sources and include personal communications, some internet related content, and some articles (Gavin Melville, FGP, 2017).

In the Final Graduation Project, the secondary sources used comprise;

Personal communication

Internet sources

Expert Advice

Interviews

Chart 2 Information sources (Gavin Melville, FGP, 2017)

Objectives	Information sources	
	Primary	Secondary
<p>1. To create the Project Charter to authorise the implementation of the project and describe the project scope.</p>	<p>PMBOK Guide and other texts Articles Governance and policy documents (from ITTO, GPM and others)</p>	<p>Personal Communications</p>
<p>2. To create the Project Management Plan including the following Subsidiary Plans</p> <p>2.1. To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project.</p> <p>2.2. To create the Communications Management Plan for the Project to initiate and govern the required Communications processes.</p> <p>2.3. To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project.</p> <p>2.4. To produce the Procurement Management plan for the project to institute correct procurement procedures and processes.</p> <p>2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction</p> <p>2.6. To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan</p>	<p>PMBOK Guide Textbooks GPM Standard</p>	<p>Expert Advice Interviews Personal Communications Internet sources</p>

<p>3. To create the Construction Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work comprising of:</p> <p>3.1. Scope Management Plan to detail the work required to complete the project</p> <p>3.2. Schedule Management Plan to define the schedule requirements for the Project</p>	<p>PMBOK Guide, Textbooks Microsoft Project</p>	<p>Internet sources Personal Communications Expert Advice</p>
<p>4. To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility</p>	<p>Textbooks Internet Sources</p>	<p>Expert Advice</p>

3.2 Research methods

Research method is defined by the Cambridge Dictionary as ‘a particular way of studying something in order to discover new information about it or understand it better (www.dictionary.cambridge.org/dictionary/english/research-method). The Business dictionary, however states that research Methods [methodology] is the process used to collect information and data for the purpose of making [business] decisions (www.businessdictionary.com/definition/research-methodology.html). Both definitions imply that research is a series of actions (a process) done in a specific way to obtain new information or knowledge. This FGP required the use of different research methods to acquire, understand and apply the information necessary to complete the project.

The research method utilised in this project is primarily analytical method of research wherein the researcher attempts to identify and demonstrate the how’s and whys of things. Much of project management relies on hard data or evidence; dates, percentages, heights, weights and widths rather than descriptive indicators.

3.2.1 Analytical method

Defined by Reference.com, analytical research is a specific type of research that involves critical thinking [skills] and the evaluation of facts and information relative to the research being conducted (www.reference.com/business-finance/analytical-research-94534a536bf46028#). Here analytical research was performed to investigate and create the project management plan.

3.2.2 Descriptive method

Descriptive research is defined by research methodology.net as the attempt to determine, describe or identify what is (www.research-methodology.net/research-methodology/research-design/conclusive.research/descriptive-research/). Whilst not used frequently, some objectives did require the use of this method to obtain the requisite data.

Chart 3 Research methods (Gavin Melville, FGP, 2017)

Objectives	Analytical Research	Descriptive research
<p>1. To create the Project Charter to authorise the implementation of the project and describe the project scope.</p>	<p>Analytical research was used to identify the project theme and to elaborate the details for the project charter</p>	<p>Descriptive research was used minimally to leverage the experiences of some stakeholders.</p>
<p>2. To create the Project Management Plan including the following Subsidiary Plans</p> <p>2.1. To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project.</p> <p>2.2. To create the Communications Management Plan for the Project to initiate and govern the required Communications processes.</p> <p>2.3. To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project.</p> <p>2.4. To produce the Procurement Management plan for the project to institute correct procurement procedures and processes.</p> <p>2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction</p> <p>2.6. To create the</p>	<p>Analytical research was utilised to plan and create the Quality, Communications, Risk, Procurement and Sustainability Management Plans and the Stakeholder Assessment</p>	<p>Descriptive research was indicated and used to identify some preferences of involved persons but was applicable in every instance of planning</p>

<p>Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan</p>		
<p>3. To create the Construction Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work comprising of: 3.1. Scope Management Plan to detail the work required to complete the project 3.2. Schedule Management Plan to define the schedule requirements for the Project</p>	<p>Analytical research was used to determine to project scope was also utilised to plan and create the Schedule management plan</p>	<p>Not applicable</p>
<p>4. To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility</p>	<p>Analytical research</p>	<p>Not applicable</p>

3.3 Tools

Tool is defined by the Business dictionary as ‘an item or implement used for a specific purpose (www.businessdictionary.com/definition/tool.html). This refers to software, forms, formats and templates utilized in the project to accomplish certain goals.

The tools that are used in the Final Graduation Project include (but not limited to)

Templates

Charts

Matrices

Software such as Microsoft Project Professional and Microsoft Excel and

Diagrams

Chart 4 Tools (Gavin Melville, FGP, 2017)

Objectives	Tools
1. To create the Project Charter to authorise the implementation of the project and describe the project scope.	Project Charter template.
2. To create the Project Management Plan including the following Subsidiary Plans 2.1.To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project. 2.2.To create the Communications Management Plan for the Project to initiate and govern the required Communications processes. 2.3.To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project. 2.4.To produce the Procurement Management plan for the project to institute correct procurement	Quality Management Plan Template Communications Management Plan template Microsoft Project Professional Risk Management template Procurement management plan template Stakeholder Assessment matrix Stakeholder Management plan template Sustainability Management plan template P5 assessment tool

<p>procedures and processes.</p> <p>2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction</p> <p>2.6. To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan</p>	
<p>3. To create the Construction Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work comprising:</p> <p>3.1. Scope Management Plan to detail the work required to complete the project</p> <p>3.2. Schedule Management Plan to define the schedule requirements for the Project</p>	<p>Scope Management Plan template</p> <p>Schedule management plan template, Microsoft Project, Microsoft Excel</p>
<p>4. To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility</p>	<p>Implementation Plan Template</p>

3.4 Assumptions and constraints

Assumption is defined in the PMBOK Guide, 2013 as 'a factor in the planning process that is considered to be true, real or certain without proof or demonstration (PMBOK Guide 5th Edition, 2013, pg. 124)

Constraint, though is defined as 'a limiting factor that affects the execution of the project.' (PMBOK Guide 5th Edition, 2013, pg. 124)

The assumptions considered in the preparation of the Final Graduation Project are:

- 1:** That sufficient time has been made available within the context of the Final Graduation Project to execute the amount of work required for the successful completion of the project

- 2:** that necessary finances will be committed to the completion of the documents, including but not limited to time off, research and the preparation of the actual documents

- 3:** That the need for a project of this magnitude and complexity is necessary and will provide the intended benefit and positive impacts .

The constraints:

- 1:** Time is a severe constraint considering the concomitant requirements of other external commitments.

- 2:** Access to some required information and research is limited, costly and in itself time consuming, further adding to time pressures.

Chart 5 Assumptions and constraints (Gavin Melville, FGP, 2017)

Objectives	Assumptions	Constraints
<p>1. To create the Project Charter to authorise the implementation of the project and describe the project scope.</p>	<p>It is assumed that the time allocated for the completion of the FGP is adequate.</p>	<p>Time is limited for the completion of the project</p>
<p>2. To create the Project Management Plan including the following Subsidiary Plans</p> <p>2.1. To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project.</p> <p>2.2. To create the Communications Management Plan for the Project to initiate and govern the required Communications processes.</p> <p>2.3. To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project.</p> <p>2.4. To produce the Procurement Management plan for the project to institute correct procurement procedures and processes.</p> <p>2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction</p> <p>2.6. To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan</p>	<p>It is assumed that the quality of the output will be sufficient to meet the requirements</p> <p>It is assumed that the communications methods chosen are readily available.</p> <p>It is assumed that the surrounding environs will be able to provide and sustain the Human resource requirements of the project.</p> <p>It is assumed that planning will be able to assess and plan for all major project risk in a reasonably uncertain region.</p> <p>It is assumed that the procurement requirements can be met satisfactorily in the implementation country.</p> <p>It is assumed that the stakeholder assessment is thorough and complete It is assumed that sustainability planning will increase the overall value of the project</p>	<p>The quality of the plant output is constrained to the capability and output of the plant machinery</p> <p>The Human resource pool is constrained by the location of the project.</p> <p>The communications plan is constrained to the types and methods of communication available in the country of implementation.</p> <p>Risk management is constrained by the known criteria established by the participating organisations eg the ITTO.</p> <p>Procurement management is constrained to limited suppliers for many of the project needs especially the manufacturing equipment.</p> <p>Stakeholder management is constrained by limited</p>

Objectives	Assumptions	Constraints
	and the environment	<p>information on the characteristics of the stakeholders.</p> <p>The sustainability management plan is constrained by the existing variability in the sustainability requirements of this growing knowledge area</p>
<p>3. To create the Construction Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work comprising:</p> <p>3.1. Scope Management Plan to detail the work required to complete the project</p> <p>3.2. Schedule Management Plan to define the schedule requirements for the Project</p>	<p>It is assumed that there is need for a project of this magnitude and complexity.</p> <p>The assumption is that schedule requirements are appropriately established</p>	<p>The scope is constrained due to a lack of time, finances and data and the schedule management plan creation is constrained to 1 week</p>
<p>4. To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility</p>	<p>It is assumed that the resources necessary for the Implementation Plan will be made available at the appropriate time and that the project will be completed sufficiently</p>	<p>The implementation plan is constrained by the allocated budget and that no staff be added specifically for the implementation phase</p>

3.5 Deliverables

Deliverables, as used within the context of this Final Graduation Project, is defined as; 'the project management term for the quantifiable goods or services that will be provided upon the completion of a project,' (www.investopedia.com/terms/d/deliverables.asp). The specific deliverables expected from the Final Graduation Project are documents.

The broad deliverables that will be developed in this project are as follows:

- **Project Charter.** And the **Project Management Plan** with the following subsidiary plans
 - **Quality Management Plan**
 - **Communications Management Plan**
 - **Risk Management Plan**
 - **Procurement Management Plan**
 - **Stakeholder Assessment document**
 - **Sustainability Management Plan**
- **Construction Management Plans with the following subsidiary plans**
 - **Scope Management Plan**
 - **Schedule Management Plan**
- **Implementation Management Plan**

Each deliverable will include the additional documents that are expected to be included in the specific deliverable. For example, PMBOK Guide 2013, includes the stakeholder register, issue log and stakeholder management plan as part of the stakeholder management knowledge area (PMBOK Guide 5th Edition, 2013, pg. 392). These documents will be added to and included in the Stakeholder Management Plan mentioned above.

Chart 5 Deliverables (Gavin Melville, FGP, 2017)

Objectives	Deliverables
<p>1. To create the Project Charter to authorise the implementation of the project and describe the project scope.</p>	<p>Project Charter. And the Project Management Plan both define the project and the work needed to accomplish the plan</p>
<p>2. To create the Project Management Plan including the following Subsidiary Plans</p> <p>2.1. To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project.</p> <p>2.2. To create the Communications Management Plan for the Project to initiate and govern the required Communications processes.</p> <p>2.3. To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project.</p> <p>2.4. To produce the Procurement Management plan for the project to institute correct procurement procedures and processes.</p> <p>2.5. To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction</p> <p>2.6. To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan</p>	<p>Quality Management Plan states the processes that will be used to check quality and how those processes will be implemented</p> <p>Communications Management Plan outlines the methods and pathways for project related communications</p> <p>Risk Management Plan describes the risk associated with the project and how the risks will be managed</p> <p>Procurement Management Plan indicates the procurement techniques and procedures to be followed by project staff</p> <p>Stakeholder Assessment document will indicate the project stakeholders and prescribe interaction methods based on relative impact on the project outcomes</p> <p>Sustainability Management Plan will align the project with sustainability development goals to increase its positive impact wherever possible</p>
<p>3. To create the Construction Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work comprising:</p> <p>3.1. Scope Management Plan to detail the work required to complete the project</p>	<p>Scope Management Plan explains the extent of the project and details the process for changing project parameters Schedule Management Plan describes the time plan for the project</p>

3.2. Schedule Management Plan to define the schedule requirements for the Project	
4. To create the Implementation Plan for the Project to guide the transfer and handover of the completed project	

RESULTS

4.1. Topic related to specific objective 1

The project charter and project management documents were created to execute the Charcoal Briquette Production facility in three phases.

The first phase was considered the planning phase in which the general project documents were produced. This phase provided the framework on which phases two and three could be executed.

The project charter is the document that provides the authority for work to begin on the project and gives a high-level overview of the general requirements of the project output.

Contained in the project plan, are the subsidiary plans outlined below.

Phase two, the construction phase, involved primarily the documentation of the construction requirements for the facility and phase three specified the details for an implementation plan which was a part of the project requirements.

4.2.1 Topic Related to Specific Objective 2.1

Project Quality Management

The processes involved in Project Quality Management serve several functions including planning the quality practices of the project, establishing the standards by which the project will abide and assessing project outcomes or deliverables at pre-planned intervals to ensure that the goals are being met. Finally, the means of correcting abnormal outcomes must also be included in the plan where appropriate. PMBOK Guide 5th Edition, inculcates the practice of quality in project work by including quality as a knowledge area (PMBOK Guide 5th Edition, 2013, pg. 227).

The diagram below illustrates the cyclic processes involved in Project Quality Management.

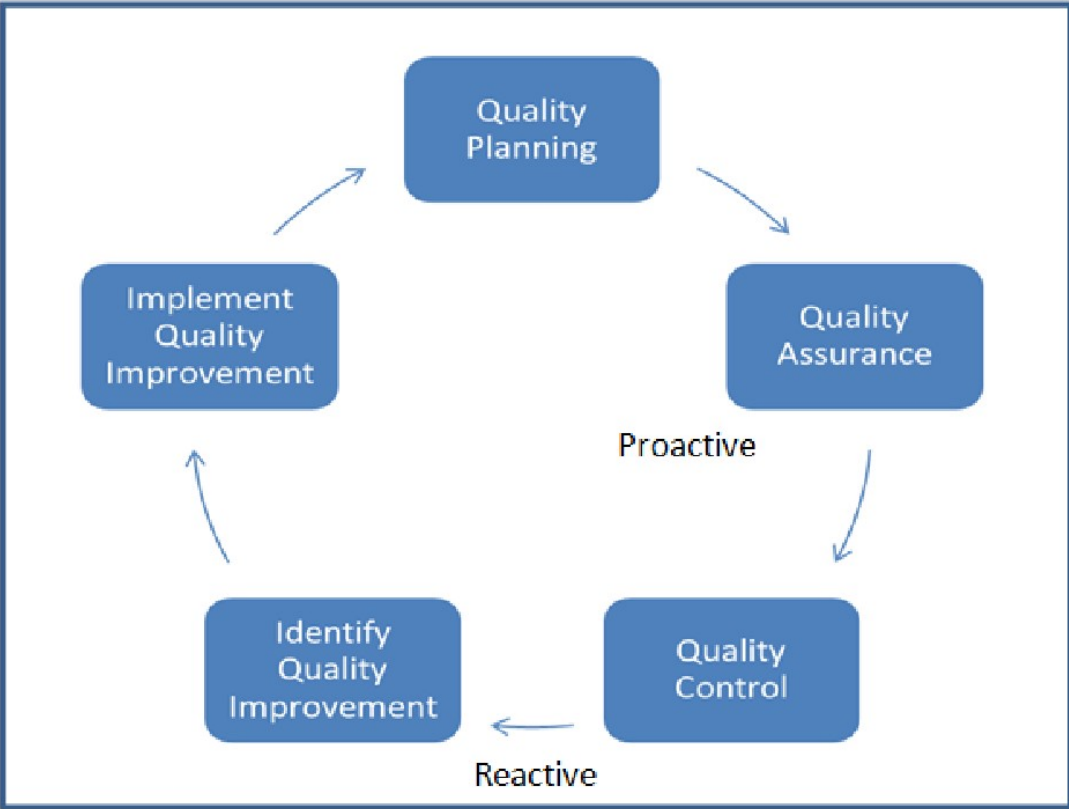


Fig 12 The cyclic processes of Project Quality Management
http://capmf.cio.ca.gov/pdf/templates/samples/STO_DMSII_QualityManagementPlan.pdf

Quality Management revolves around the familiar PDCA cycle, representing Plan, Do, Check and Act, popularised by W. Edwards Deming, one of the early quality management pioneers (<https://en.wikipedia.org/wiki/PDCA>). The process is illustrated below.

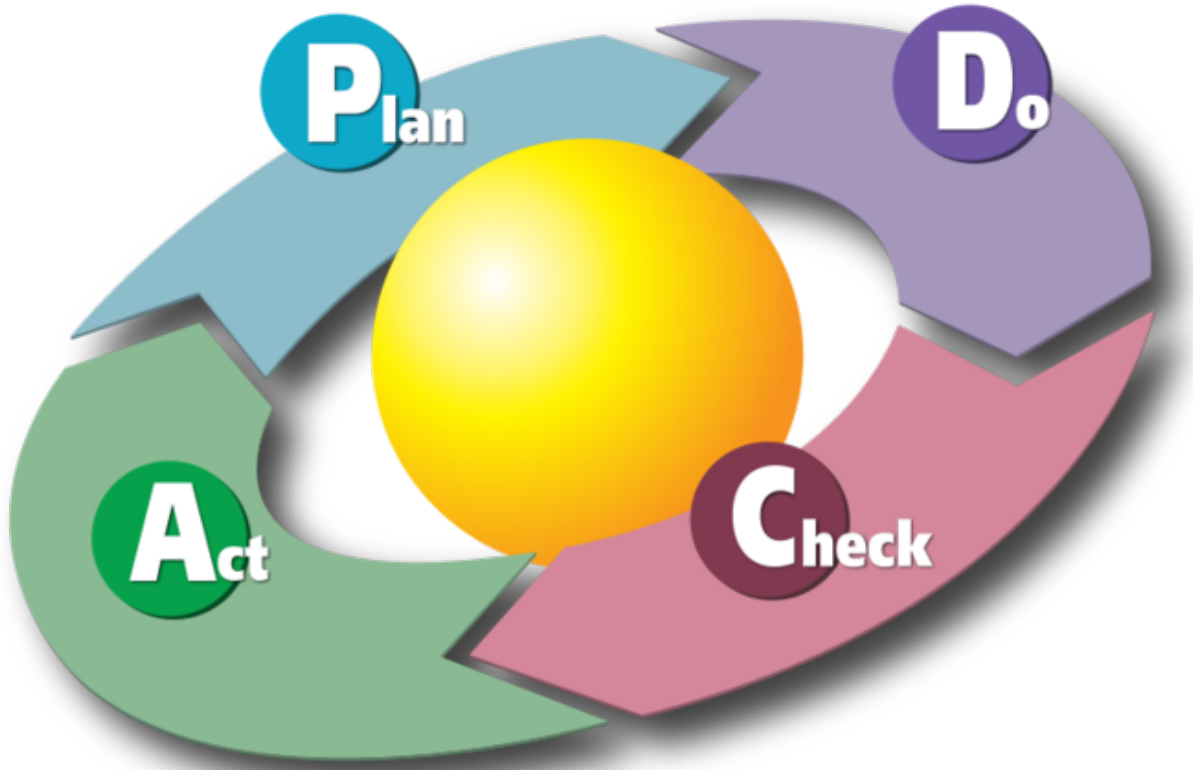


Fig 13 The Plan, Do, Check, Act Cycle (adapted from <https://courses.lumenlearning.com/boundless-management/chapter/bureaucratic-and-quality-control-tools-and-techniques/>).

Some of the more popular quality management methods include PRINCE2, Pareto Analysis, 6 Sigma, 5 Why's and Just in Time (<https://courses.lumenlearning.com/boundless-management/chapter/bureaucratic-and-quality-control-tools-and-techniques/>).

Quality Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

05 October 2017

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1.0	<i>Gavin Melville</i>	<i>15.10.2017</i>	<i>L. Angoy</i>	<i>15.10.2017</i>	<i>NA</i>

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Introduction

Quality Management has a definite and important role in the current project. The quality requirements of this project will be integrated within the project rather attempting to add the necessary processes later. Quality management processes serve to ensure that the project goals are actually met with the intention (and ability) to correct any deviations from the expected. The practice of including quality management processes in the project can, if used correctly, prevent wide variations from expectations and the resultant risk to successful project completion.

The project manager is expected to maintain the documented project standards and to mandate compliance from the relevant quality inspectors.

Quality Management Approach

Several approaches to managing quality in the project environment exist and each employs methodologies specific to the particular technique. No specific quality management method (e.g. PRINCE @ etc) was identified for use in this project but the general quality principles will be used to manage the quality requirements.

Roles and Responsibilities

There are three primary roles related to quality management for this project.

Project Manager

Responsible for the overall quality management of the project and is the recipient of the quality reports and measurements. The responsibility for corrective action also rests with the project manager except in those instances where the magnitude of the defect necessitates the involvement of the sponsor.

Structural Engineer

The structural engineer is responsible for the quality management aspects related to the construction of the facility and its structural integrity. He is also responsible for maintaining project compliance with applicable laws and codes regarding the construction.

Electrical Engineer

The electrical engineer has the responsibility of ensuring the quality requirements of the electrical components and installations for the project including electrical installation codes and the specific requirements for the electrical machinery that are needed for production.

Quality Requirements/ Standards

The construction of the facility is required to meet the national building codes listed below in addition to the technical specifications of the drawings.

National Building Codes are listed below:

- GCP 9-1 Enforcement
- GCP 9-3 Fire Safety
- GCP 9-5 Plumbing
- GCP 9-7 Hardwood
- GCP 9-8 Block Masonry
- GCP 9-9 Structural Steel
- GCP 9-13 Foundation
- GCP 9-26 Septic Tank
- General Technical Specifications and Performance

Quality Assurance

Quality assurance will be conducted by the respective personnel using the following methods:

- Construction material will be randomly sampled once weekly to ensure dimensional conformity to requested standards. Specifically,

The dimensions of concrete blocks, galvanised sheets, rebar and steel will be recorded on receipt once weekly or with every new delivery as appropriate

- Electrical purchases (materials and devices) shall be inspected on arrival and conformity to specification documented (e.g. the required gauge of wiring must be recorded on delivery and inspected)

Quality Control

Quality control will primarily be achieved by inspection and measurement of completed work to ensure the absence of significant deviation from expectations.

Specifically, weekly measurements of the following from random spots shall be used to control quality:

- Wall thickness
- Wall height
- Dimensional measurements of the building (height, width etc)

Quality Measurements

The quality measurements to be performed are as follows:

- Breaking strength of random concrete blocks from 4 batches to be tested at the National Laboratory
- Wall thickness
- Wall height
- Assessment of product from all of the production stages for the first 10 batches to be tested for density, uniformity and completeness of burn

Deviations of greater than 10% will require rework at the expense of the contractor or replacement of the offending order by the supplier.

In the case of defective production process output, an assessment of the fault will be made for correction (eg changes in temperature settings, compression settings etc.)

Documentation

Quality control measurements shall be documented in the appropriate lists and stored for reference.

All of the forms must be legibly signed by the responsible officer and dated.

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

_____ Date: _____

<Project Sponsor>

<Project Sponsor Title>

Adapted from <http://www.projectmanagementdocs.com/project-planning-templates/quality-management-plan.html#axzz4voqsUgOK>

4.5 Topic related to Specific Objective 2.2 Communication Management

Project Communication Management

The Communication Management plan was completed according to the requirements outlined in PMBOK Guide 5th Edition (PMBOK Fifth Edition, Project Management Institute, 2013, PMI Inc.) The purpose of the Communication Management plan is to ensure that project information is created, recorded distributed and stored in a manner that meets all of the project goals and provides the correct information to the correct person at the correct time in the appropriate format. The plan communications management process utilises several inputs and has as the major output, the communications management plan.

The communication management plan was completed after the stakeholder management plan since one of the required inputs to communications management is the stakeholder register in addition to the project management plan.

The communications management plan was created with knowledge of the specific circumstances in the project country and uses the tools and techniques listed in the diagram below.

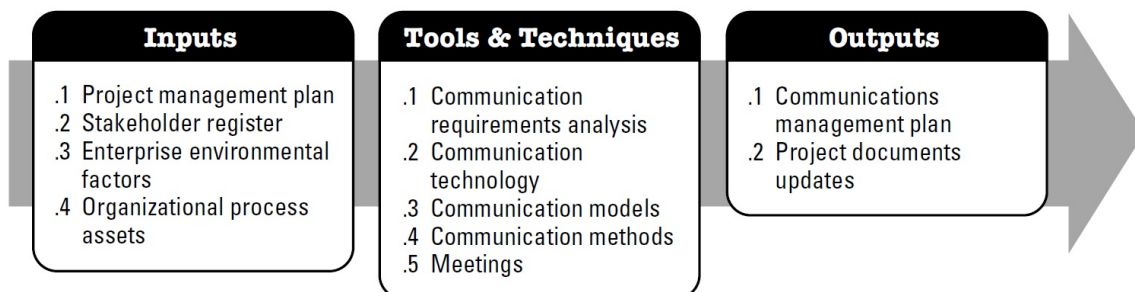


Fig 14 Figure showing Plan Communications Management processes (PMBOK Guide pg. 288)

Communications Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

05 October 2017

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Guidelines for Meetings 77
Communications Escalation Process 78

INTRODUCTION

The communication management plan detailed here will serve as the guide for the communications activities needed for the successful completion of the project. The plan will guide project personnel so that the information related to the project is well defined and controlled. Included in the plan are the outlines for meetings and the roles and responsibilities.

The roles and responsibilities for communication management will be detailed in the communications matrix which will be the primary resource for communication related information and guidance.

The plan also includes guidance for the use and dissemination of confidential and sensitive material since the exposure of such could constitute a material threat to the successful completion of the project.

Further, guidance is also provided for the escalation of important matters and details on the communication methodology are also included.

COMMUNICATIONS MANAGEMENT APPROACH

The approach to be taken by the Project Management team for this project will revolve around ensuring that the flow of information is accurate in content, method of transmission and recipient. Since much of the time will be spent on communications, it is important to ensure accuracy.

Strict attention to the communications matrix will be required from project team members.

All communication is expected to be professional, respectful and concise.

COMMUNICATIONS MANAGEMENT CONSTRAINTS

The primary constraints related to communication in this project are as follows:

Limited cellular and landline telephone service in the project area

High cost of service when available especially for overseas communication

Budget limitations on the expenditure for communication

ROLES

Project Sponsor

The project sponsor has the overall responsibility for the project as its champion. Communication to the project sponsor must be relevant and contain the required information for accurate decision making. The project sponsor has a preference for direct communication using emails and or telephone (including electronic means such as Skype and WhatsApp).

Project Manager

The Project Manager has responsibility for the daily running of the project. Much of the communications for the project will originate with the project manager. Reference to the communications matrix will guide the expectations for communications to and from the project manager.

Project Team

The project team is responsible for acting on the directives of the project manager to manage project activities.

Project Engineers

This project includes the services of a structural and an electrical engineer. Communications with these individuals will follow the general communications management requirements included here.

PROJECT TEAM DIRECTORY

The following table documents the communication details for each of the project team members and is considered confidential.

Role	Name	Title	Email	Phone
Project Sponsor	L. Angoy	Head of Business Development	langoy@dunamis.com	(592) 622 1111
Project Manager	G. Melville	Project Manager	gmelville@dunamis.com	(592) 622-1414
Project Stakeholders	See Stakeholder Register	See Stakeholder Register	See Stakeholder Register	See Stakeholder Register
Accountant	C. Melville	Manager	cmelville@hotmail.com	(592) 623-8121
Project Team		Team Members	projectoffice@dunamis.com	(592) 622 5454
Electrical Engineer	R. Cort		r.cort@abc.com	(592) 623 2315
Structural Engineer	D, Dewar		deardewar@xmbc.co.uk	(592) 664 2341

COMMUNICATION METHODS AND TECHNOLOGIES

The following methods of communication shall be used for this project (refer to the communications matrix to establish the specific method required for each stakeholder).

Written documents (including meeting minutes, agendas, letters)

Email and email documents (**preferred** to reduce waste)

Telephone calls including VOIP (Voice over internet protocols, referring to Skype, WhatsApp etc.)

Meetings

COMMUNICATIONS MATRIX

The following table identifies the communications requirements for this project.

Communication Type	Objective of Communication	Medium	Frequency	Audience	Owner	Deliverable	Format
Initial Meeting	Introduce the project team and the project. Review project objectives and management approach.	<ul style="list-style-type: none"> • Face to Face 	Once	<ul style="list-style-type: none"> • Project Sponsor • Project Team • Selected Stakeholders 	Project Manager	<ul style="list-style-type: none"> • Agenda • Meeting Minutes • Team Assignments 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer
Project Team Meetings	Review status of the project with the team.	<ul style="list-style-type: none"> • Face to Face • Conference Call 	Weekly	<ul style="list-style-type: none"> • Project Team 	Project Manager	<ul style="list-style-type: none"> • Agenda • Meeting Minutes • Project schedule • Team Status reports 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer
Technical Design Meetings	Discuss and develop technical design solutions for the project.	<ul style="list-style-type: none"> • Face to Face 	First Week and then as needed	<ul style="list-style-type: none"> • Project Technical Staff 	Technical Lead	<ul style="list-style-type: none"> • Agenda • Meeting Minutes 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer
Monthly Project Status Meetings	Project the status of the project to management.	<ul style="list-style-type: none"> • Face to Face • Conference Call 	Monthly	<ul style="list-style-type: none"> • Sponsor 	Project Manager	<ul style="list-style-type: none"> • Updates • Project schedule 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer
Project Status Reports	Report the status of the project including	<ul style="list-style-type: none"> • Email 	Monthly	<ul style="list-style-type: none"> • Project Sponsor 	Project Manager	<ul style="list-style-type: none"> • Project Status Report 	<ul style="list-style-type: none"> • Soft copy archived

	activities, progress, costs and issues.			<ul style="list-style-type: none"> • Project Team • Stakeholders 		<ul style="list-style-type: none"> • Project schedule 	project web site and on local computer
Team Reports	Report the status of the project including activities, progress, costs and issues	<ul style="list-style-type: none"> • Face to face • Conference calls • Email 	Weekly	<ul style="list-style-type: none"> • Project manager • Project Team 	Project Manager	<ul style="list-style-type: none"> • Team Status Reports 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer
External Meetings	Address external issues	<ul style="list-style-type: none"> • Face to face • Conference calls 	As needed	<ul style="list-style-type: none"> • External organisation • Project manager • Project Team 	Project Manager Project Team	<ul style="list-style-type: none"> • Meeting Minutes 	<ul style="list-style-type: none"> • Soft copy archived project web site and on local computer

GUIDELINES FOR MEETINGS

Meeting Chair Person

Meetings will be chaired by the project manager or the assistant project manager in his absence except occasions where the project sponsor chairs by necessity.

The chair person is responsible for ensuring that meetings start on time and time limits are honoured.

Meeting Agenda

The agenda for meetings will be produced by the Project Manager or Assistant Project Manager and circulated at least 5 business days prior to meeting except where such meetings are urgent and occur with shorter lead times.

Meeting Minutes

Meeting minutes will be kept for every meeting and recorded by a person designated by the meeting chairman. Such minutes will be circulated within 3 days of the meeting for corrections and formal acceptance.

Meeting minutes shall preferably be emailed for review and a soft copy kept in archive as part the project documents.

Action Items

Action items are to be recorded in every meeting and each action item associated with an owner for that item and a follow up date.

Scribe

A person shall be appointed at each meeting to serve as the scribe, recording minutes and other necessary information.

COMMUNICATION ESCALATION PROCESS

It is of vital importance to the project that conflict and disputes be managed effectively, and that miscommunication be avoided. The process of escalating matters is only useful if attempt has previously been made to address the issue unsuccessfully. It should be noted that the escalation process is not intended to bypass the usual lines of authority but to complement it. Only matters that can materially affect the outcomes of the project are to be included in the escalation process when needed.

Priority	Definition	Decision Authority	Timeframe for Resolution
Very High Priority	Major impact to project. If not resolved quickly there will be a significant adverse impact to revenue and/or schedule	Project Sponsor	Within 4 hours
High Priority	Moderate impact to project which may result in some adverse impact to revenue and/or schedule	Project Sponsor	Within one business day
Medium Priority	Slight impact which may cause some minor scheduling difficulties with the project but no impact to revenue.	Project Manager	Within two business days
Low Priority	Insignificant impact to project but resolution may be a better solution.	Project Manager	Work continues, and any recommendations are submitted via the project change control process

** NOTE: Escalation is only required if the owner of the issue had been unable to resolve the matter and the disclosure of any confidential information requires appropriate consent.

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>

<Project Sponsor Title>

Downloaded and modified from www.ProjectManagementDocs.com

4.7 Topic related to Specific Objective 2.3 Risk Management

Project Risk Management

Risk Management serves a critical role in the management of projects by allowing planning for intervention before negative impact to the project occurs. PMBOK Guide 5th edition defines risk as;” an uncertain event condition that can have a negative effect on project objectives.’ (PMBOK Guide 5th Edition, pg. 310). Further, positive risks can be defined as opportunities (Wiley et al, Project Management for instructional designers, Creative Commons, 2016)

Risk management follows a process in which the risks specific to the project are identified, classified, documented and strategies develop to address the risks before they create harm to the project. Opportunities are managed in the same way that risks are and the means to realise the possible benefit recorded.

There are three well defined means of managing risk: mitigate, avoid or accept, illustrated humorously below. Accepting the risk also allows for that risk to be transferred to another party.

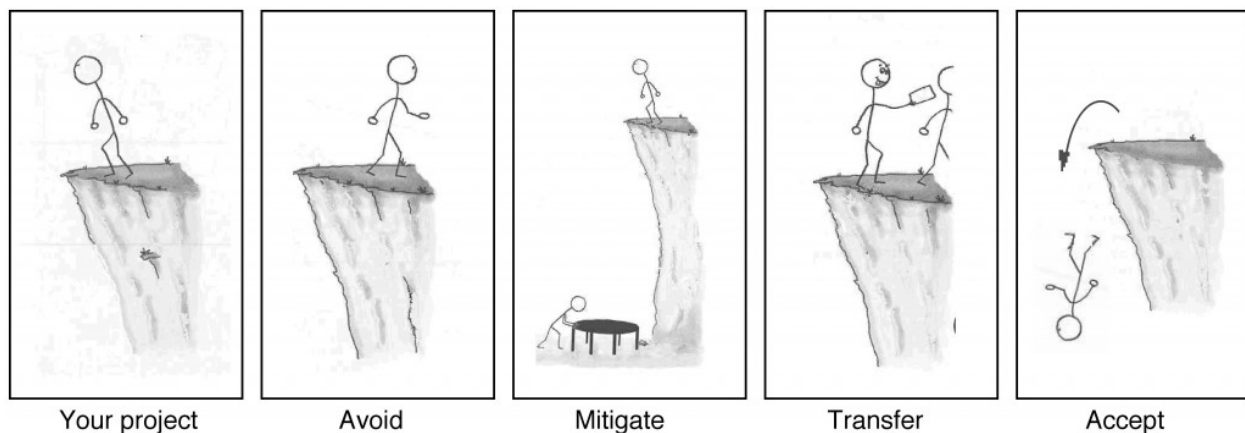


Figure 15 Risk Management Options
Illustration from Barron & Barron Project Management for Scientists and Engineers,
<http://cnx.org/content/col11120/1.4/>

Risk Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

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INTRODUCTION

The risk environment within which the current project will operate requires significant attention to identify and manage ongoing risk. This will require considerable knowledge of the region and the factors that are responsible for risk and being able to find ways of negotiating to a successful conclusion. Given the relatively unregulated setting within which business is conducted in Guyana, diligent attention to risk management will be of great benefit.

RISK APPROACH

The risk approach to be used in this project requires that the project manager be extremely proactive in managing the risk related to the project. Negotiation skills and persistence are very important in achieving the project objectives within the timeframe allotted. However, it should be noted that positive risks, called opportunities, may present and the project manager should be willing and able to explore the possibility of benefitting from the opportunities.

RISK ASSESSMENT

Risks will be assessed using the following risk assessment table that allows for the consistent evaluation of risks and standardises the weighting of risks. Additionally, the weighted risks are assessed on the impact that they can possibly have on the project. The impact is described in terms of the detriment to the project scope, cost, time, quality and the sustainability goals established for the project.

<i>Likelihood</i>	Severity		
	Low	Medium	High
Low (<20%)	C	B	A
Medium (20 – 50 %)	B	B	A
High (>50%)	A	A	A

Chart 10 Showing the risk severity and likelihood (compiled by the Author)

	Relative Risk and Likelihood <i>(negative risks)</i>		
Project Objective	Low	Medium	High
Cost	Marginal increase in project cost less than \$5,000 USD	Significant increase in Project cost more than \$5,000 USD but less than \$15,000 USD	Marked increase in Project cost greater than \$15,000 USD
Schedule	Marginal increase in Project schedule of less than 1 month	Moderate increase in Project time of 1 to 3 months	Marked increase in Project time of greater than 3 months
Scope	Minor scope change	Major scope change but project outcomes intact	Massive scope change or Project outcome unusable
Sustainability objectives	Less than 5 Sustainability objectives not met	5 to 15 Sustainability objectives not met	More than 50% of Sustainability Objectives not met
Quality	Small defects to building or machinery	Significant defects to building or Machinery requiring rework	Building or machinery unusable

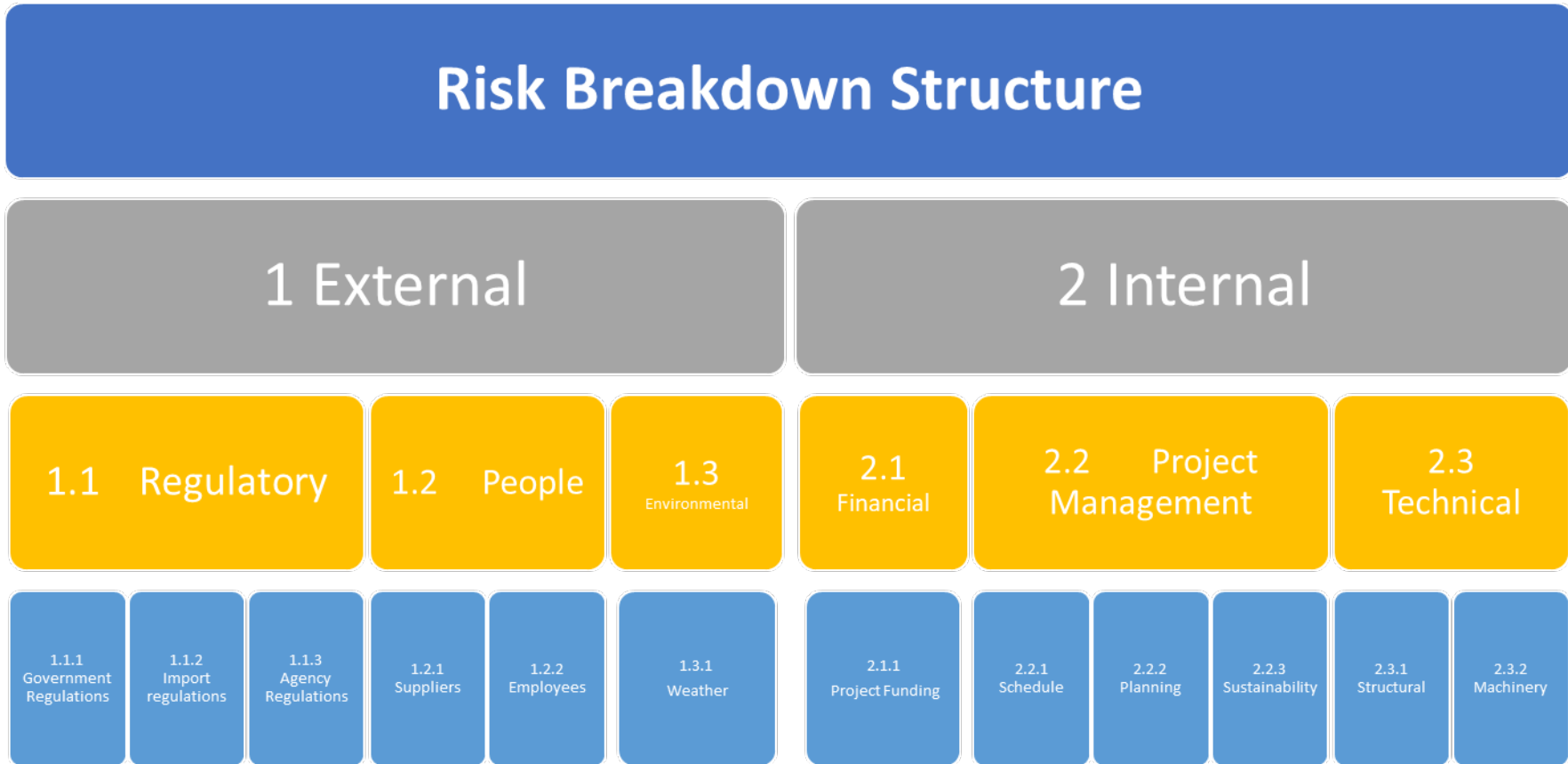
Chart 11 showing Impact scales on Risk for major project objectives (Source: compiled by the Author) and (Adapted from <https://image.slidesharecdn.com/projectmgmttoolkit-courseworkpresentation-sept2011final011-110920131711-phpapp01/95/project-management-toolkit-presentation-51-728.jpg?cb=1316525254>)

Risk Response Table

Risk Response	Description
Threats	
Accept	Generally, risks with low impact and probability of occurring can be accepted, indicating that no active intervention will be pursued though the risk will be monitored (Grade C)
Avoid	Active steps will be taken to ensure that the risk does not materialise especially for high impact and high likelihood risks (Grade A)
Mitigate	Active attempts will be taken to reduce either the likelihood of the risk occurrence or its impact, or both. This commonly used risk response can be used for any grade of risk (usually Grades A and B)
Transfer	The risk and its management will be transferred to a third party (for example, the use of insurance is a means of risk transfer).
Opportunities	
Share	An available opportunity will be shared with a third party (for example a supplier)
Exploit/ Enhance	The opportunity will be embraced and utilised for the benefit of the project. Included here would be actions aimed at increasing the probability of its occurrence and or the advantageous impact that the opportunity may have.
Reject	Despite the possible benefit, the opportunity is not accepted or utilised.

Chart 12 showing risk responses, compiled by Gavin Melville (adapted from <https://stakeholdermap.com/risk/risk-responses.html>)

RISK BREAKDOWN STRUCTURE



RISK REGISTER

Risk ID	Description	Impact	Likelihood	Severity	Grade	Date of last Review	Grade Change	Risk Response	Risk Owner	Response Time *
1	Delay in obtaining the relevant licences and permits	Possibly markedly delay project initiation	>50%	H	A	NA	None	Mitigate	Project Manager or Delegate	Immediate (denoting the need to rapidly address the issue at project start)
2	Delay in import permits	Severely affect the start of manufacturing operations	>50%	H	A	NA	None	Mitigate	Project Manager or Delegate	Immediate
3	Refusal of Duty-free status	Significant increase in project costs	20 – 50%	H	A	NA	None	Avoid	Project Manager or Delegate	Immediate
4	Delay in GFC Licence	Delay in marketing campaign and export sales	>50%	M		NA	None	Mitigate	Project Manager or Delegate	Weeks
5	Suppliers unable to provide required material (quantity and quality)	Delay in project start or significant scope change or cost increase	20 – 50%	H	A	NA	None	Mitigate	Project Manager or Delegate	
6	Unable to attract the required number of skilled workers	Delay in meeting Schedule requirements	<20%	L	C	NA	None	Mitigate	Project Manager or Delegate	Weeks
7	Unable to retain the required management staff		20 – 50%	H	A	NA	None	Mitigate	Project Manager or Delegate	Weeks
8	Prolonged bad weather causes construction delays		20 – 50%	M	B	NA	None	Accept	NA	NA
9	Project funding jeopardised or reduced		20 – 50%	H	A	NA	None	Mitigate	Project Manager or Sponsor	Immediate
10	Delay in ITTO and		>50%	M	A	NA	None	Mitigate	Project	Weeks

	Fairtrade approvals								Manager or Delegate	
11	Schedule estimation incorrect		>50%	H	A	NA	None	Avoid	Project Manager or Delegate	Days
12	Scope and Cost estimation and planning incorrect		>50%	H	A	NA	None	Avoid	Project Manager or Delegate	Days
13	Incorrect estimations of renewable energy returns		20 – 50%	M	B	NA	None	Mitigate	Electrical Engineer	Days
14	Inability to obtain the required amount and quality of raw material		20 – 50%	M	B	NA	None	Mitigate	Project Manager or Delegate	Weeks
15	Transportation delays		20 – 50%	L	B	NA	None	Accept	NA	Days
16	Structural integrity compromised due to sub-standard material		<20%	H	A	NA	None	Avoid	Structural Engineer	Immediate
17	Foundation cracking due to poor construction (unable to bear the weight of the machinery)		<20%	H	A	NA	None	Avoid	Structural Engineer	Days
18	Delay in the manufacture and shipping of machinery		>50%	M	A	NA	None	Avoid	Project Manager or Delegate	Immediate
19	Foundation damage due to soil subsidence		<20%	H	A	NA	None	Avoid	Structural Engineer	Days
20	Improper wiring and electrical planning		20 – 50%	H	A	NA	None	Avoid	Electrical Engineer	Immediate

Please note that this Risk Register is a progressively iterated document and is therefore intended to be upgraded

* Specific dates will be added to the Risk Register at Project start; the current information gives an indication of the likely response time

Opportunities that present are be included in another section of the Risk Table

ROLES AND RESPONSIBILITIES

Project Manager

Responsible for proactively managing the project risk with assistance from the project team.

The project manager will be responsible for:

- Weekly updates in the risk assessment
- Assessing for new risk in conjunction with the project team
- Aggressively Managing known risks

When necessary, the project sponsor, will be involved especially for high level risks that may require significant scope, cost or schedule changes.

Project Team

Assist the project manager in managing risk. As risk owners, the team members will be responsible for negotiating solutions as appropriate within the limits of the risk management parameters discussed with the team and the project manager.

Structural Engineer

Has responsibility for assessing and reporting on the technical risks associated with the structure and construction. The Structural engineer will also be responsible for managing risks in collaboration with the project manager and the project team

Electrical Engineer

The Electrical engineer will have the responsibility assessing and managing the technical risks associated with the fitting and installation of the electrical components of the factory machinery. Further, the engineer will be required to ensure that risks associated with the integration of the structural requirements and the installation requirements are assessed and managed appropriately (for example, having the right power outlet wired correctly for the placement of the machinery).

Risk management tasks will also need to be performed by other members of the team as needed such as the human resource personnel.

RISK MONITORING AND REVIEW

Project risk shall be discussed at weekly risk management meetings with emphasis on the high-grade risks and those risks that have increased in severity since they were last addressed.

The project manager shall chair such meetings with documented updates in the risk register including, but not limited to, the following:

- Risk and Grade
- Risk owner
- Resolution date
- Associated WBS entry

Risk owners are required to be present to provide updates on their managed risks.

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

_____ Date: _____

<Project Sponsor>
<Project Sponsor Title>

Adapted from <http://www.projectmanagementdocs.com/project-planning-templates/quality-management-plan.html#axzz4voqsUgOK> and www.egovernment.tas.gov.au/...management/.../Risk_management_plan_template_an...

4.8 Topic Related to Specific Objective 2.4 Procurement Management

Project Procurement Management Plan

The 5th Edition of the PMBOK Guide stated that Project Procurement Management comprises those processes essential to the acquisition of products and services for the project from outside of the project team. Further, the European Commission (EU) handbook on Project Procurement (Buying Green, Publications Office of the European Commission, Luxembourg, 2013) gives examples of sustainability conscious purchases such as energy efficient computers, electricity from renewable sources and furniture from sustainably harvested timber.

These considerations should be applied to the purchase of goods and services that are project related, especially those projects that incorporate sustainability in the project mandate.

Procurement management includes planning, selecting, contracting, controlling, and closing outsourced products and services.

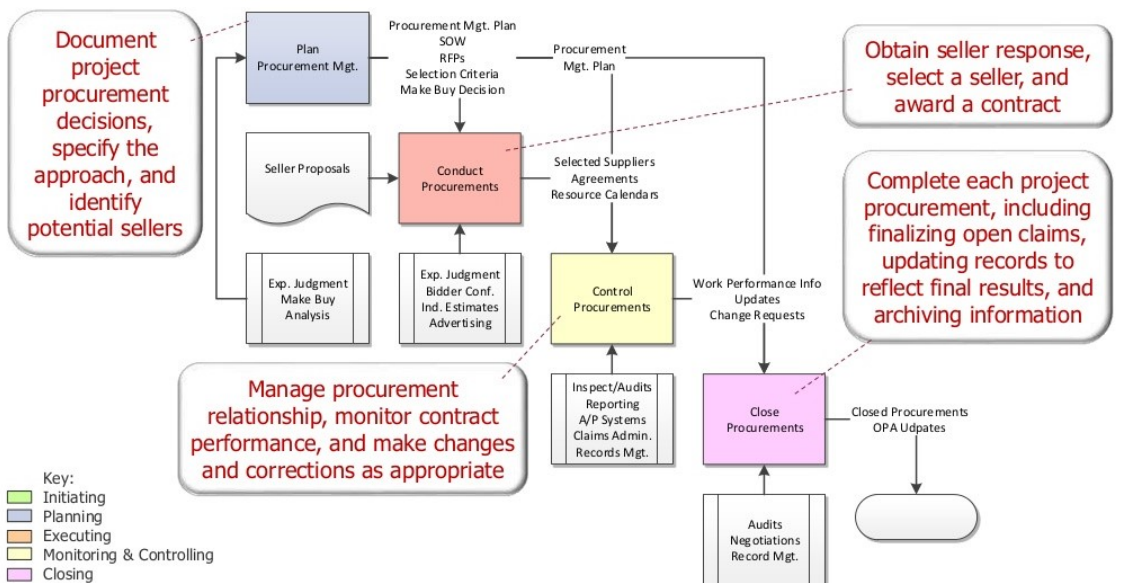


Fig 16 Illustrating the processes involved in Procurement Management (adapted from Tom Tiede, PMI Project Management Principles <https://www.slideshare.net/tltiede/pmi-project-management-principles>)

Procurement Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	<i>Gavin Melville</i>	<i>15.10.2017</i>	<i>L. Angoy</i>	<i>15.10.2017</i>	<i>NA</i>

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Introduction

The procurement management plan is essential to the success of the project by allowing the procurement strategies to be defined and made explicit. That definition provides a framework for procurement activities which can then proceed in a manner that fosters transparency. Furthermore, adherence to the procurement management plan creates an environment that can be relatively free of collusion and bribery, in adherence to sustainability goals.

Utilising a procurement strategy can also lower project costs by standardising the process through which goods and material is purchased. The use of a formal bidding process for example allows purchases at lower prices while maintaining the required quality.

The procurement management plan will adhere to the sustainability goals defined in the sustainability management plan and the general project objectives.

Procurement Management Approach

The approach to be used for this project will remain aligned to the sustainability management plan and will be the responsibility of the Project Manager. However, it should be noted that some of the machinery required for the project are specialty items that are custom manufactured to the specifications requested. These items will not be subject to all of the usual processes involved in procurement plan. For example, some items are of necessity exempt from an advertised bidding process, even if a bid or quote is requested from the vendor.

Such determinations will be the responsibility of the project manager and sponsor.

Local procurement will be utilised whenever possible as a means to improve the project's contribution to the community. Nevertheless, care must be taken to ascertain the actual cost local procurement to the project, maintaining awareness to factors such as transportation costs, volume discounts and vendor mark-up.

Procurement definition

The following items are listed for procurement to facilitate the successful completion of the project.

Item/ Service	Justification	Date required
Electrical Wood chipper (see detailed requirements in appendix ..)	Necessary to prepare the biomass into a standard size for production	
Electrical Drum Dryer (see detailed requirements in appendix ..)	Necessary to ensure the correct moisture content the biomass	
Electrical Briquette Press	Necessary to produce the briquettes	
Solar Water Heater system	Needed to dispense with use of electricity for heating water	
Photovoltaic and Battery system	Will reduce the electricity requirements of the project and production facility	
Wind Turbine (10 kWhr)	Will reduce the electricity requirements of the project and production facility	
5 Desktop computers (see project requirements in appendix ..)	Required for project functions	
2 Laptop Computers (see project requirements in appendix ..)	Required for project functions where portability is needed (e.g. offsite meetings)	
Filing Cabinet	Storage of project related material	
Office furnishings		
Electrical fitments (see detailed requirements in appendix ..)	Needed for completion of the electrical works	
Plumbing and bathroom fixtures	Establishment of reasonable working conditions for project staff and workers	
Measurement equipment for lumber (humidity/ wáter content)	To measure and ensure that raw material with the correct moisture percentage is processed	

Steel I-beams and rebar according to architectural drawings	Necessary for construction of the facility	
Cement according to architectural drawings	Necessary for construction of the facility	
Concrete blocks according to architectural drawings	Necessary for construction of the facility	

Contract Types

It is required that, as much as project, **Firm Fixed Price** contracts be utilised for procurement. Other contract types may only be considered if no other options are available and **ONLY WITH THE DIRECT EXPLICIT APPROVAL OF THE PROJECT MANAGER AND SPONSOR.**

Cost Determination

Cost determination will be performed by the Project Team and the accountant. Requests for bid will be circulated to appropriate vendors and the resulting bids analysed by the team. Attention shall be paid to Cost, Quality and on time delivery to determine the most suitable choice. Vendors with whom a relationship is established shall be given preference for future acquisitions once the requisite criteria are met.

The performance measures detailed below will be collected for each successful vendor and used for future determinations.

For readily available goods and services, simple cost comparisons will be conducted to ascertain benefit to the project; basic market research.

Procurement Constraints

The procurement activities of this project are constrained by the time and cost limits imposed by the project scope and schedule documents.

Procurement Approval Process

Contracts and bids for procurement that are less than \$250,000.00 (Guy) can be approved solely by the Project Manager. Smaller purchases may be approved by verbal assent from the Project Manager but will require that the order be physically signed within 2 working days.

Contracts and bids greater than \$250,000.00 (Guy) will require the approval of both the Sponsor and the Project Manager. Physical confirmation by signature of both parties is required except when verbal or emailed agreement is accepted if either party is out of state or otherwise unavailable.

Decision Criteria

A weighted score of the following criteria shall be used to determine the successful vendor bid:

Criteria	Maximum Score
Cost	10
Quality	8
Reliability (vendor delivery)	8
After sale Service	6
Warranty	5
Sustainability considerations	4

Additional information may be requested from vendors to make a determination including but not limited to samples etc.

Vendor Management

All vendors will be required to submit formal warranties and return information for products sold.

All received goods will be thoroughly checked for completeness and function (where possible) on receipt and the findings recorded.

Discrepancies will be brought to the attention of the vendor for redress.

Disputes will be escalated to the Project Manager as needed.

The scope of this function **excludes assessing the quality of building materials** (not Quantity) which will be the purvey of the Quality team contracted for that purpose.

Performance Metrics

The chart below shall be maintained for each approved vendor and each transaction.

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

- 1 – Unsatisfactory
- 2 – Acceptable
- 3 – Exceptional

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>

<Project Sponsor Title>

Template modified from: <https://gta.georgia.gov/sites/gta.../Procurement-Management-Plan-Template.docx>

4.9 Topic related to Specific Objective 2.5 Stakeholder Management

Project Stakeholder Management Plan

In his book, Project Management, Gary Heerkens states that stakeholders are “anyone that stands to gain or lose from the success or failure of the project” (Heerkens, G. Project Management, McGraw-Hill, 2002, USA).

The PMBOK Guide also dedicates a significant amount of attention to stakeholder management. Illustrated below are the processes involved in the management of the stakeholders.

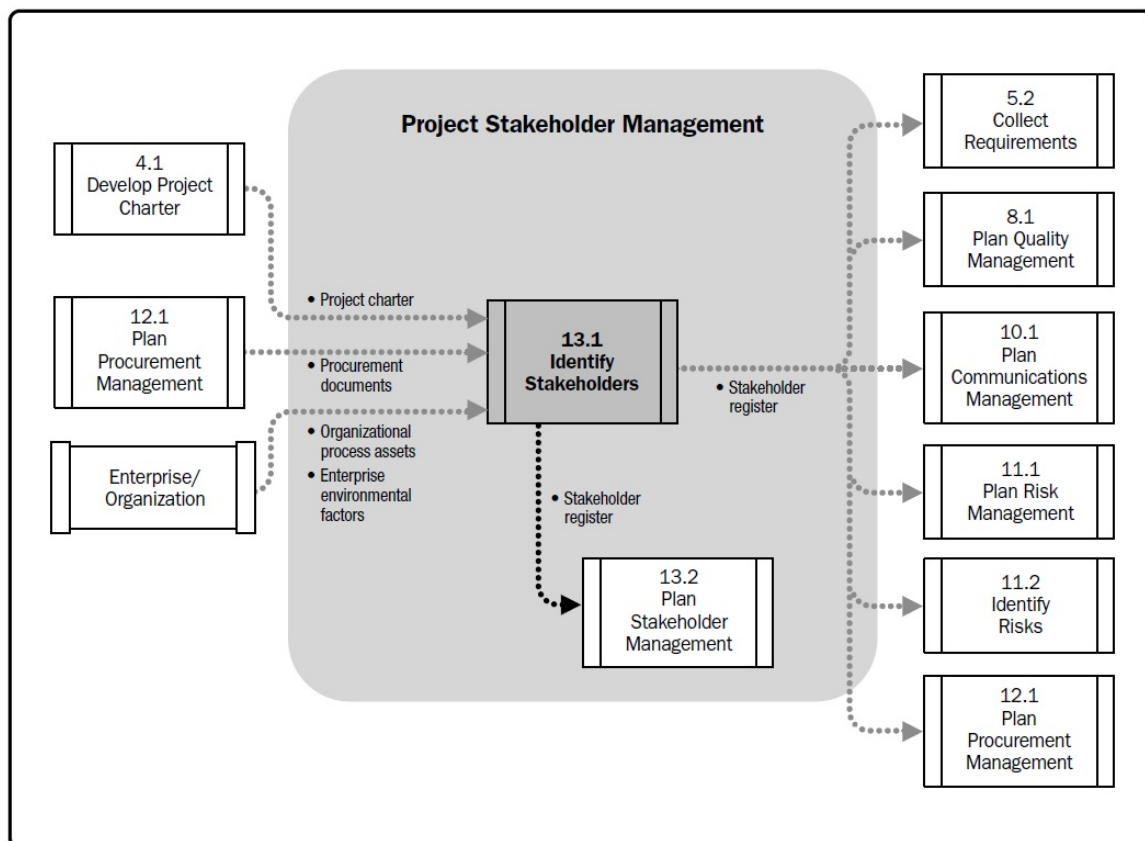


Fig 17 Illustrating the Stakeholder management processes (adapted from PMBOK Guide 5th Edition, Project Management Institute Inc, Pennsylvania, 2013)

The diagram above suggests, correctly, that identifying the stakeholders is the central process to managing the stakeholders. Accurate and thorough identification and assessment of the interested persons related to the project allows for tailored interactions which improve the likelihood of project success.

Stakeholder Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
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Introduction

Communication represents much the work of a project manager and, unsurprisingly, much of that communication involves stakeholder interactions.

The project Manager is expected to know and engage the appropriate stakeholders in the manner that best meets the project goals. The project manager should also be aware of the strengths (and weaknesses) of team members so that assignments, especially those related to interacting with stakeholders, are properly managed.

Stakeholder Management Approach

Stakeholder Management is a very important aspect the role of the Project Manager who has the responsibility of interacting with the varied stakeholders representing negative or positive interest in the project. The Stakeholder management approach involves the comprehensive definition of the roles and interests of the stakeholders and utilising that information to govern the level, frequency and requirements of each stakeholder communication.

The approach used in this project is based the prioritisation of the stakeholder interactions depending on the level of influence that they hold. Care must be taken to ensure that all communications are professional and respectful as set out in the Communications Management plan. The project manager must also be aware that the roles of stakeholders may change and result in the need for changes to the stakeholder classification and the framework for interactions. The stakeholder matrix included below must therefore be reviewed at regular intervals to ensure appropriate responses.

Roles

Project Sponsor: Responsible for engaging senior stakeholders and navigating the more critical challenges that may occur especially regarding the stakeholders

Project Manager: Primarily responsible for stakeholder communications to ensure the timely, accurate, consistent transfer of information to meet the stated needs of the stakeholders.

Project Team: Maintain stakeholder engagement as assigned and detailed below and documenting stakeholder interactions as necessary (e.g. maintaining copies of letters etc.)

Stakeholders: Responsible for articulating their requirements related to the project

Stakeholder	Contact	Role	Impact	Influence	Contact method and Frequency	Reason	Classification
L. Angoy	langoy@dunamis.com (592) 622 1111	Project Sponsor	High	High	Weekly	Status update and discussion of challenges	Positive Internal
J. Phulchere	jphulchere@abc.com (768) 645 6565	Architect	High	High	Weekly	Status updates and technical discussion	Positive Internal
J. Theobalds	abcengineers@abc.com (768) 634 4325	Structural Engineer	High	High	Weekly	Status updates and technical discussion	Positive Internal
R Cort	electricalwork@abc.com (592) 665 8767	Electrical engineer	High	High	Weekly	Status updates and technical discussion	Positive Internal
R. Seepersaud	rseepersaud@ito.com (592) 645 6677	ITO Local rep	Medium	Medium	Quarterly	Basic update, related challenges can be discussed	Neutral External
L DeFreitas	ldefreitas@gfcgov.gy	Guyana Forestry Commission	Low	Medium	Quarterly	Basic update, related challenges can be discussed	Neutral External
S. Retymier	sretymier@goinvest.gy (592)	Government Ministries (via Go Invest Guyana)	Medium	Medium	Quarterly	Basic update, related challenges can be discussed	Neutral External
K. Jaipaul	k.jaipaul@abc.com (592) 623 8978	Saw millers' Association	Low	Low	At Project start and end	Basic update	Positive External
J. Quagmire	(592) 623 8162	Community Leader	Low	Low	Quarterly	Basic update, no discussion of challenges	Positive External

Stakeholder Classification Matrix

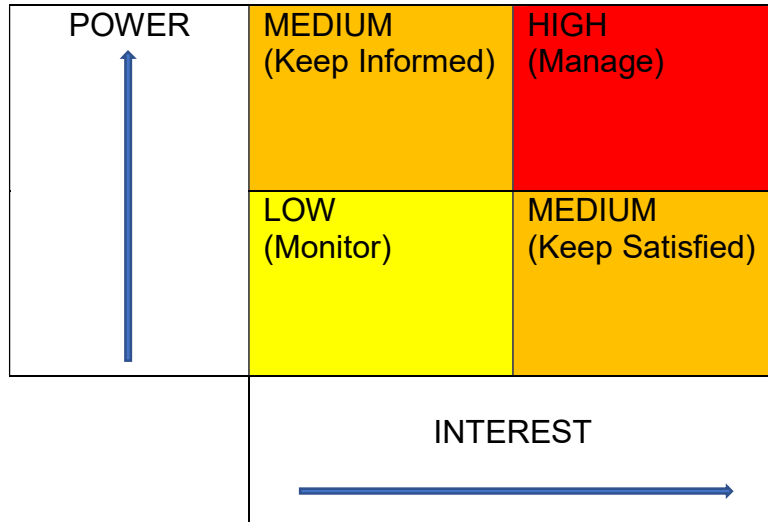


Figure 18 Showing the Stakeholder Classification Matrix, Adapted from <https://www.holistic-software.com/stakeholder-management>

Stakeholder review

The stakeholder review shall be performed monthly at the project team meetings chaired by the Project Manager. The purpose of the review shall be:

- To ensure that the list remains accurate with the addition of new stakeholders and the careful removal of obsolete entries as necessary
- To confirm that stakeholder communication is proceeding as required
- To ensure that as far as possible stakeholder expectations are being met

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

_____ Date: _____

<Project Sponsor>

<Project Sponsor Title>

Downloaded and modified from www.ProjectManagementDocs.com

4.10 Topic related to Specific Objective 2.6 Sustainability Management

Project Sustainability Management Plan

The Sustainability Management Plan for the Green Charcoal Briquette Production facility was created using the P5 Methodology described by the Green Project Management Organisation and was incorporated into the Project Planning phase as indicated in the diagram below.

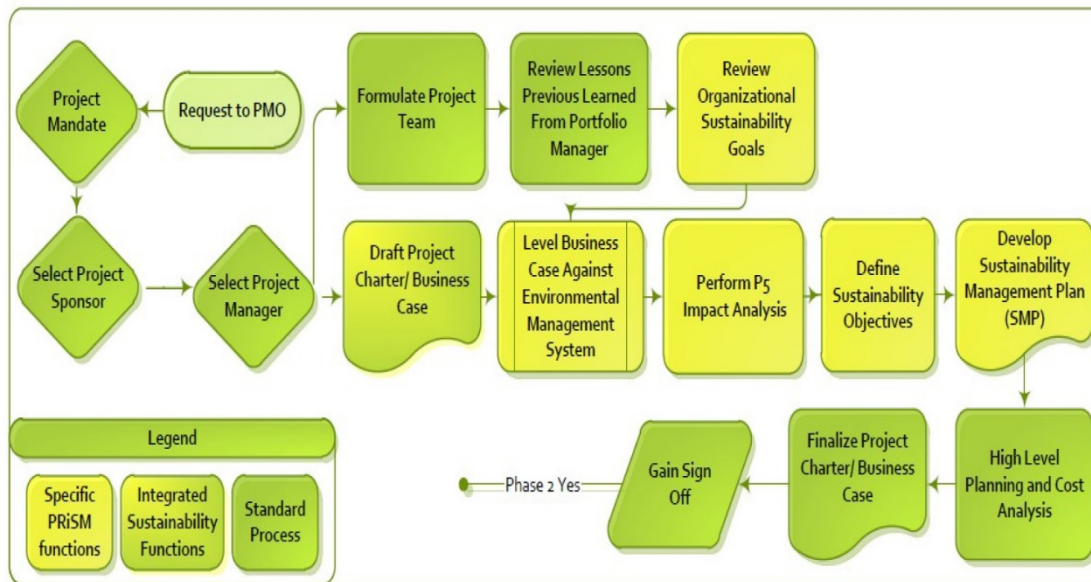


Figure 19 Showing the integration of GPM processes (adapted from GPM Standard pg 26)

The P5 method is most useful when the individual processes and process groups described in the GPM Standard for Sustainability (GPM Standard pg 34) are 'scored' during the assessment to give an indication of the relative importance and impact of a particular process on the overall project. The technique was applied to the Charcoal Briquette Production Facility and the resulting Risk Assessment documented.

While the PM Bok guide does not include a process of Sustainability management, the integration of the GPM P5 process into the planning phases described in PMBOK is complete and relatively seamless. The resulting document can be used to ascertain both the immediate sustainability index of a project and to track that index over time to confirm compliance with expectations.

Sustainability Management Plan

Dunamis Enterprise (Guyana) Limited

**Georgetown
Guyana**

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	<i>Gavin Melville</i>	<i>15.10.2017</i>	<i>L. Angoy</i>	<i>15.10.2017</i>	<i>NA</i>

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Introduction

The Final Graduation Project documented herein is aimed at furthering the sustainability development goals related to the forestry industry in Guyana. It is therefore of great importance that the project management processes that are utilised reflect the attention to sustainability goals so that the project and its effects do not undermine the overall project implementation ideals. The project outcome (the project management plan) when implemented, is intended to produce products that are considered sustainable in the acquisition and use of the raw materials.

Furthermore, the implementation of a Sustainability management plan potentially the efficiency of the project processes while reducing associated costs.

The sustainability management plan also provides a method for assessing the project sustainability. This will likely prove important in the certifying procedures that will be required later.

The processes used in the development of the Sustainability management plan are primarily based on the P5 methodology created and championed by the Green Project Management Organisation (release 1.5.1).

Sustainability Management Approach

The primary approach utilised in the preparation of the Sustainability Management plan was based on the GPM P5 Standard for Sustainability in Project Management (release 1.5.1). The P5 process refers to People, Planet, Prosperity, Processes and Products. This methodology was developed with the aim of ‘Driving Sustainable Business Change” in support of the Global Goals for Sustainable Development.

The P5 process enables projects to examine and address the Triple Bottom Line (The GPM Standard for Project Management, 2013, pg 8) specifically, the Social, Environmental and Financial bottom lines, referring to the interaction of projects (and businesses) with the social, economic and environmental dimensions of their activity. This contrasts with previous views that focussed narrowly on the triple constraints of Time, Cost and Scope (<https://pmworldlibrary.net/authors/dr-martin-barnes/>)

The environmental and social interactions have long been ignored with focus usually fixed on the economic indices of projects. History is littered with projects that were challenged by the consequences of ignored social and environmental issues. The P5 method however, affords a detailed examination of the social and environmental costs of a project with a view to mitigate risks and benefit from opportunities that may arise from such assessment.

In this project, the P5 impact analysis was performed using a scored risk register and coincided with efforts related to Quality Management Planning.

Sustainability Management Constraints

The primary constraint is that the efforts directed at Sustainability in this project are not allowed cause the project to exceed the maximum budget allocated.

The second constraint is that delays in the final project completion date attributable to Sustainability management plan would be acceptable.

Sustainability Management Requirements

Sustainability methods are required to be applied to all of the project activities

Sustainability methods must remain within budgetary allocations

The applied sustainability measures should maintain or improve product output to previously accepted levels.

Sustainability Management Roles and responsibilities

Project Manager: The final responsibility for the execution of the Sustainability Management Plan rests with the Project Manager, with assistance as needed from the Project Team

Sponsor: The Sponsor is responsible for authorising any acquisitions or changes related to the Sustainability Management Plan within the context of the time and budgetary constraints

Contractor: The selected contractor is responsible for executing the work required for the implementation of the Sustainability Management plan as directed by the Project Manager.

Electrical Engineer: The electrical engineer has the responsibility of ensuring that the electrical plans and execution meet the required codes and as relates to the sustainability management plan, that all electrical work indicated in the plan is acceptable and can be incorporated into the electrical system as needed (for example that the output from wind turbine and solar panels can be integrated into the system as needed).

Structural Engineer: The structural engineer has the responsibility of ensuring that the building meets required codes and quality standards and that any modifications made to accommodate the requirements of the sustainability management plan are acceptably integrated.

Accountant: The accountant is responsible for the financial transactions of the project and for ensuring the budgetary requirements and constraints are met.

Sustainability Management Review

The Sustainability Management Plan shall be reviewed by the Project Sponsor, the Project Manager and the project team every three months. The review shall assess the progress toward the achievement of the sustainability management goals and the output of the meeting shall be a reassessment of Sustainability Management plan and the associated P5 risk assessment.

Further, newly identified risks will be identified and included in the risk assessment.

GPM P5 Risk assessment matrix

P5 Category	P5 Sub-category	Element	Justification	Score	Legal Regulation	Proposed Action
Social	Labour Practices and decent Work	Employment	Limited employee prospects	-3	Labour code	Provide reasonable medium-term employment prospects
		Labour/Management relations	Poor relationship may develop	-2	Labour code	Establish sound HR policy
		Project Health and Safety	Project staff may not adhere to safety requirements at all times	+2	Health and safety statutes	Enforce worker safety briefings daily, mandatory PPEs e.g. hardhats, shoes etc
		Training and Education	Work force may not be adequately flexible	+1	None	Provide access to mandatory sponsored cross training at all worker levels
		Organisational Learning	Mandate a culture of documentation	+3	None	Ensure the establishment of useful documentation policy of company practices
		Diversity and equality	Non-diverse workforce	0	Discrimination laws	Establish unbiased hiring practices
		Local Competence development	Local work force may not possess adequate technical competence	-3	None	Provide technical training especially for equipment repair and installation
Society and Customers	Society and Customers	Community Support	No community outreach	-3	None	Maintain good community engagement
		Public policy	Limited public relations	-2	None	Ensure appropriate public relations policy
		Customer Health and safety	Ensure adequate product safety	+1	Customer Protection laws	Research and ensure product compliance with particular matter generation and additive safety
		Product labelling	Labels may not reflect product characteristics accurately	+1	Customer Protection laws and Export requirement regulations	Revisit and confirm that the product labels are accurate and meet export requirements
		Advertising	Advertising may be misleading	+1	None	Revisit advertising objectives and ensure compliance
Human Rights	Human Rights	Non-discrimination	Discrimination is pervasive	-3	Anti-discrimination laws	Actively assess company practices and hiring practices to ensure the absence of racial, gender or any other type of discrimination
		Exploitive child labour	Prevent child labour	-3	Local laws	Ensure that hiring requirements include the presentation of verifiable photo identification
		Forced Labour	Prevent forced labour	-3	Local laws	Ensure that schedules and work time confirm to local laws especially regarding overtime
Ethical	Ethical	Investment and	Standardise	+1	none	Provide clear guidelines for the procurement

	Behaviour	procurement practices	procurement practices to reduce fraud			policies of the organisation
		Bribery and Corruption	Prevent bribery and corruption	0	Local laws	Institute organisational checks and balances to prevent corruption e.g. limiting individual purchasing power and requiring prior authorisation for purchases
		Anti-competitive behaviour	Prevent illegal anti-competitive behaviour	0	Local laws	Document clear anti-competitive policies
Environmental	Transport	Local Procurement	Prioritise local procurement	-1	None	Ensure that procurement policies and activities place priority on local procurement
		Digital Communication	Reduce paper waste and use	0	None	Give preference to digital communication, noting however that all digital communication is not possible given the poor communications infrastructure in the area of the project
		Travelling and commuting	Reduce travel costs	+1	None	Ensure that written policy supports the reduction in travel costs and limits commuting to the greatest extent possible, noting however, that commuting is necessary since the factory is in a rural area. Consideration will be given to proving transportation to improve efficiency and decrease absenteeism
		Logistics	Improve logistics to reduce cost	+3	None	Include logistic planning in daily briefs to reduce costs associated with both delivery and pick up
	Energy	Consumption	Reduce energy consumption	+1	None	Integrate energy consumption reduction into daily activities and mandate low energy alternatives (e.g. LED fixtures) in the build process
		CO2 Emissions	Reduce CO2 emissions	0	None	Utilise condensers in the smoke stacks of the relevant production processes to decrease CO2 output
		Clean energy return	Maximise clean energy use	+2	None	Reuse energy where possible such as at the wood dryers to increase energy reuse and reduce loss
		Renewable energy	Increase the cost-effective use of non-grid power and improve resilience	+3	None	Install both solar panels and wind turbines to reduce grid energy use with battery storage
	Water	Water Quality	Prevent reduction in water quality	+2	None	Recycle water obtained from the drying process and from the soaking process to obtain additional value-added products such as tannin to be utilised in the tanning industry in Guyana
		Consumption	Reduce water consumption	+2	None	Employ water reducing measures at each process and for internal use (water saving faucets and lavatories)

		Sanitary water displacement	Ensure sanitary water displacement	+3	None	Recycle water to the greatest extent possible and confirm that water waste is disposed of so as not to adversely affect the nearby creeks or river
	Consumption	Recycling	Reduce cost by recycling where possible	-2	None	Provide the resources and incentives for recycling where ever possible and institutionalise the purchase and use of reusable materials
		Disposal	Reduce the cost and risk associated with poor disposal practices	-2	Local Laws	Mandate the proper disposal of waste and use of value added options to reduce waste
		Contamination and pollution	Reduce cost and improve efficiency by eliminating environmental contamination and limiting pollution	+1	None	Review production processes to find and eliminate pollution for example procuring electrical production equipment rather than diesel powered ones
		Waste	Reduce cost by reducing waste	+1	None	Incentivise waste reduction by staff by giving cash prizes for the best waste reduction ideas
Economic	ROI	Direct Financial Benefits	Improve shareholder returns	+2	None	Actively seek to reduce production costs
	Business Agility	Increased Business flexibility	Improve profitability	-2	None	Research and implement other value-added processes and products (such as using bagasse for charcoal production and the sale of tannins)
	Economic Stimulation	Local Economic impact	Increase the value of the company to the community and reduce likelihood of unsustainable staff turn over	-1	None	Institute hiring practices aimed at local hiring and purchasing locally when possible

Chart # Showing the GPM P% Assessment Matrix (compiled by the autor)

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>

<Project Sponsor Title>

4.11 Topic related to Specific Objective 3.1 Construction Management Plan

Project Scope Management

Project Scope management is described as the processes necessary to complete the project successfully but including only the work required. This definition underscores the concept of limiting the scope or the work to be done, to the confines established at the inception of the project are careful establishment of the requirements of the stakeholders and project sponsor.

Having established the scope of this project with well-defined requirements, the object of the scope management plan is to ensure that all the needed work is completed and that additions to the project plan are restrained, only when directly relevant to project success.

The diagram below illustrates the PMBOK Guide's description of the Plan Scope management stage excluding the requirements management plan.

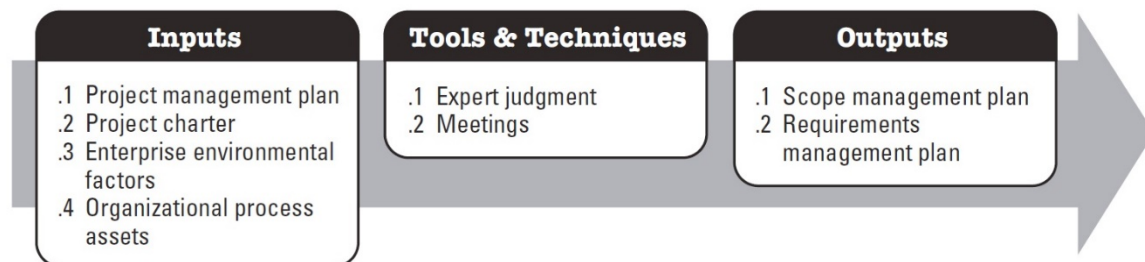


Fig 20 showing the Plan Scope Management process (adapted from PMBOK Guide 5th Edition,2013)

Scope creep, defined by PMI.org as the addition of work that is not authorised (Larson, R. & Larson, E. (2009). Top five causes of scope creep ... and what to do about them. Paper presented at PMI® Global Congress 2009—North America, Orlando, FL. Newtown Square, PA: Project Management Institute) can be reduced by rigorous attention to clear scope control plan. Utilising a formal verification process for scope changes to be approved and included ensured that there is greater control over which work is actually completed.

Included in the Scope Management plan are the following:

Activity Listing

Work Breakdown Structure (WBS)

Work Breakdown structure dictionary

Scope Management Plan

Dunamis Enterprise (Guyana) Limited

Georgetown
Guyana

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Gavin Melville	15.10.2017	L. Angoy	15.10.2017	NA

Introduction

The scope management plan for the Charcoal and briquette production facility follows the guidelines espoused by the Project Management Institute in the PMBOK Guide 5th Edition. For the purposes of this Final Graduation Project, the planning of the Scope management is described.

The Project Manager will be responsible for guiding and overseeing the project such that the requirements outlined below are met without the unnecessary addition of work. Scope management and the avoidance of scope creep will demand the careful attention of the project manager and sponsor.

Scope Management Approach

The approach to be used to manage the scope of this project relies on the authority of the project manager, the sponsor and the change control team to first ascertain that the

change requested is necessary, evaluate the full cost of the change (that is, to examine the effect of the change on the project cost, schedule, risk etc.) and with the consent of the sponsor integrate the change into the project plan. This will include the documentation of the change and its consequences in every area (for example, adding new risks if the changes expose the project to such).

The process for changes are as follows:

- Formal change request submitted
- Change request evaluated by the Project Manager
- Change request submitted to the Scope Control team
- Accepted changes submitted for Sponsor approval
- Accepted changes integrated in Project

Roles and Responsibilities

The primary responsibility for the management of the scope of this project lies with the Project Manager.

Project Manager

- Can accept or deny initial change requests or demand refinement or corrections before reconsideration
- Can approve changes with the limit of authority outlined elsewhere
- Chairs the Scope Control team

Sponsor

- Responsible for the authorisation of major scope changes as requested by the Scope Control team.

Scope Control team

- Assesses the initial requests for scope changes
- Comprised: Project Manager, Electrical Engineer, Structural Engineer, Designated Project team member (s)
- Technical consultant assistance when needed

Scope Definition

The project was defined after an extensive assessment of the strengths and opportunities available to the company in Guyana. The current project explores an untapped market and has the potential to raise the profile and earnings of the company. The scope of the project was limited since this represents the first effort in this region.

Scope statement

The project scope is defined as follows:

- Construction of a 60' by 100' steel framed galvanised roof structure with cement block walls and partitioned as described in the accompanying Architectural drawings (at a site to be confirmed in Guyana, SA)
- Procure and install the equipment listed below for the production of green charcoal briquettes
- Facilitate the staffing and initialisation of facility

Procurement of the following is required:

Item	Capacity	Power	Qty
Wood chips hammer mill FJ60	600-800kg/h	18.5kw	1set
THL-1 biomass carbonization stove	180-220kg/h	7.22kw	1set
Binder mixer JB600	Adjustable	1.5kw	1set
4M belt conveyer	Adjustable	1.5kw	1set
Charcoal roller mixer 140	150kg/10mins	5.5kw	1set
4M Belt conveyer	Adjustable	1.5kw	1set
Charcoal ball press machine 290	500-600kg/h	5.5kw	1set

Chart 21 Showing the Procurement Requirements for the Project (compiled by the author)

Activity List

WBS ID	Activity Level 1	Activity Level 2	
1.	Preparation of project site		
2.	Excavation of foundation		
		2.1.	Level and clean excavation WMCS
		2.2.	Concrete blinding (2")
3.	Placement of reinforcement		
4.	Concrete to footings		
		4.1.	Column
		4.2.	Strip foundation
5.	Concrete Piers to receive steel columns		
6.	Perimeter Foundation Block work		
7.	Compacted hard core to level to receive slab		
		7.1.	Sand blinding
		7.2.	Placement of damp proof membrane
8.	Castings of floor slab (4000 psi concrete)		
9.	Erection of steel frame		
10.	Installation of roof		
11.	Installation of external walls		
12.	Installation of partitions		
13.	Finishings		
		13.1.	Electrical
		13.2.	Plumbing
		13.3.	Installation of door and windows
		13.4.	Painting
		13.5.	Completion of ground works

Chart 22 Showing Activity List for Construction Phase of Charcoal Briquette Facility
(Prepared by the Author)

Work Breakdown Structure

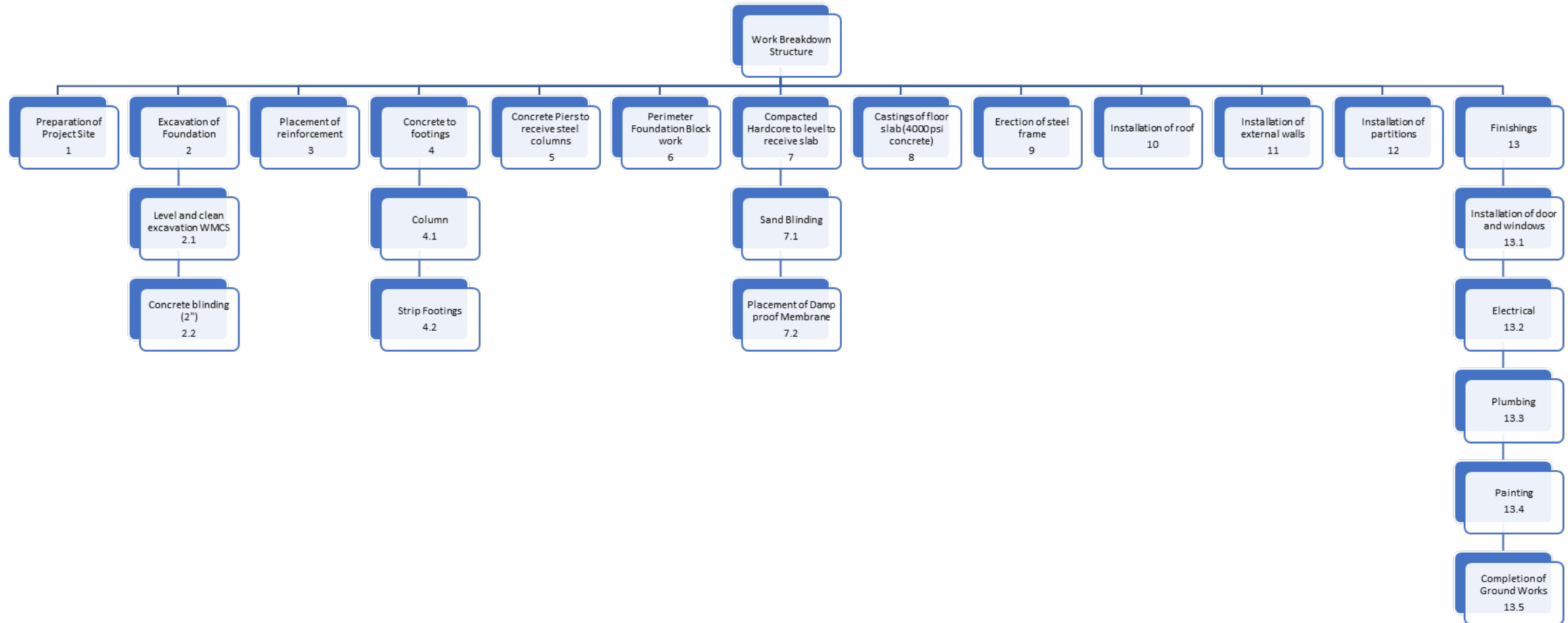


Fig 21 Showing the Work breakdown Structure for the Project (compiled by the Author)

WBS Dictionary

WBS ID		
Work Package Name		
Start Date:	End Date:	Responsibility:
Work Description		
Activities		
Cost:	1:	
	2:	
	3:	
	4:	

Chart 22 showing WBS Dictionary (Prepared by the Author)

Scope Verification

Project Scope will be verified by the completion of the milestones described in the project schedule.

Further verification of the project scope will occur via inspection by the project team of the ongoing and completed work with substantiation of the project quality according to the project Quality Management Plan.

Scope Control

The process for scope changes are as follows:

- Formal change request submitted
- Change request evaluated by the Project Manager
- Change request submitted to the Change Control team
- Accepted changes submitted for Sponsor approval
- Accepted changes integrated in Project

Control of scope changes shall follow the protocol outlined above and changes will not be accepted outside of the specified mechanisms.

Use of the change request form below is mandated for change requests to be considered and to be used for all change requests, regardless of area.

Change Requested by:		Submitted on:	
Contact Details			
Change Request name:			
Area Affected	Scope	Schedule	Cost
	Other:		
Proposed Change Details			
Description			
Justification			
Consequences			
Signed			
Date			
Outcome			
Authorised by:	Date:	Signature:	

Chart 23 Showing the Change Request for Project Use (prepared by the Author)

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>
<Project Sponsor Title>

4.12 Topic related to Specific Objective 3.2 Construction Management Plan

Project Schedule Management

Project Schedule Management is considered one of the Three Triple Constraints that have traditionally governed project management and has been the focus of much research and discussion.

Project schedule management is defined in the PMBOK guide as those processes required to assure the timely completion of the project (PMBOK Guide pg 141). The APM Body of knowledge (UK) further clarifies the definition as; 'the process of developing, maintaining and, communicating schedules for time and resource(s).'

These definitions indicate that process (methods or procedures) are necessary to manage time in projects and that these procedures and the resultant outputs (schedules) are to be shared with the appropriate stakeholder. Additionally, the concept of adjusting or maintaining the schedule is also referenced.

Given the importance of time on project completion, it is imperative that careful consideration be given to the sequencing or order of project work and to the actual amount of time committed to each project task.

Several methodologies are available to estimate the time required for each project task. PMBOK Guide includes the following:

- Analogous estimating; estimates based on similar historical data
- Parametric estimating: estimates using statistical algorithms
- Three-point estimations: estimates using the PERT technique

PERT estimation, Program Evaluation and Review Technique, is a means of increasing the accuracy of single point estimations by including an assessment of the Most likely, Optimistic and Pessimistic estimates, to arrive at a time that is most representative of the actual time that is needed for the completion of the task.

The task of scheduling project has been the recipient of advances in computer and software development such that programs such as Microsoft Project (Microsoft Corporation, 2016) have completely alleviated the need for manual scheduling including the creation of network diagrams, resource schedules and charting.

Additionally, charting the critical path of the project will allow the project team to anticipate and address schedule changes that may impact project success.

Schedule Management Plan

Dunamis Enterprise (Guyana) Limited

Georgetown
Guyana

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Gavin Melville	15.10.2017	L. Angoy	15.10.2017	NA

Introduction

The Project schedule will govern the time available for the completion of project tasks and will be continuously monitored by the project team for deviation. Significant changes to the expected schedule must be accompanied by corrections to the overall schedule but must be avoided.

The project manager is responsible for ensuring that the project schedule is adhered to and that contractual obligations are met. The Change control team will evaluate and address major schedule changes as part of the change control process.

Schedule Approach

The schedule was created using Microsoft Project and will be maintained in the same software by a designate of the Project Manager.

Start Date: 3rd December 2018

End Date: 18th June 2019

Roles and responsibilities

The Project Manager is responsible for the maintenance of the project schedule. Significant changes to the schedule will require the involvement of the Change Control team and as needed, the sponsor for authorisation of major schedule changes.

Project Activity list

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Scheduled Finish
1	Auto Scheduled	Preparation of project site	10 days	Mon 03/12/18	Fri 14/12/18		Structural Engineer, Contractor	Fri 14/12/18
2	Auto Scheduled	Excavation of foundation	15 days	Mon 17/12/18	Fri 04/01/19	1	Contractor, Structural Engineer	Fri 04/01/19
2.1	Auto Scheduled	Level and clean excavation WMCS	5 days	Mon 07/01/19	Fri 11/01/19	2	Contractor, Structural Engineer	Fri 11/01/19
Milestone	Auto Scheduled	Building Start	0 days	Thu 09/11/17	Thu 09/11/17		Contractor, Structural Engineer	Thu 09/11/17
2.2	Auto Scheduled	Concrete blinding (2")	10 days	Mon 14/01/19	Fri 25/01/19	3	Contractor, Structural Engineer	Fri 25/01/19
3	Auto Scheduled	Placement of reinforcement	5 days	Mon 28/01/19	Fri 01/02/19	2,3,5	Contractor, Structural Engineer	Fri 01/02/19
4	Auto Scheduled	Concrete to footings	10 days	Mon 04/02/19	Fri 15/02/19	6	Contractor, Structural Engineer	Fri 15/02/19
4.1	Auto Scheduled	Column	10 days	Mon 18/02/19	Fri 01/03/19	7	Contractor, Structural Engineer	Fri 01/03/19
4.2	Auto Scheduled	Strip foundation	15 days	Mon 18/02/19	Fri 08/03/19	7	Contractor, Structural Engineer	Fri 08/03/19
5	Auto Scheduled	Concrete Piers to receive steel columns	10 days	Mon 11/03/19	Fri 22/03/19	9	Contractor, Structural Engineer	Fri 22/03/19
6	Auto Scheduled	Perimeter Foundation Block work	8 days	Mon 04/02/19	Wed 13/02/19	6	Contractor, Structural Engineer	Wed 13/02/19
7	Auto Scheduled	Compacted hard core to level to receive slab	5 days	Thu 14/02/19	Wed 20/02/19	11	Contractor, Structural Engineer	Wed 20/02/19
7.1	Auto Scheduled	Sand blinding	3 days	Thu 21/02/19	Mon 25/02/19	12	Contractor, Structural Engineer	Mon 25/02/19
7.2	Auto Scheduled	Placement of damp proof membrane	2 days	Tue 26/02/19	Wed 27/02/19	12,13	Contractor, Structural Engineer	Wed 27/02/19

8	Auto Scheduled	Casting of Floor Slab (4000 psi Concrete)	10 days	Thu 28/02/19	Wed 13/03/19	14	Contractor, Structural Engineer	Wed 13/03/19
Milestone	Auto Scheduled	Foundation Complete	0 days	Thu 09/11/17	Thu 09/11/17		Contractor, Structural Engineer	Thu 09/11/17
9	Auto Scheduled	Erection of steel frame	20 days	Mon 25/03/19	Fri 19/04/19	10	Contractor, Structural Engineer	Fri 19/04/19
10	Auto Scheduled	Installation of roof	20 days	Mon 22/04/19	Fri 17/05/19	17	Contractor, Structural Engineer	Fri 17/05/19
11	Auto Scheduled	Installation of external walls	30 days	Thu 14/03/19	Wed 24/04/19	15	Contractor, Structural Engineer	Wed 24/04/19
Milestone	Auto Scheduled	Structure Complete	0 days	Thu 09/11/17	Thu 09/11/17		Contractor, Structural Engineer	Thu 09/11/17
12	Auto Scheduled	Installation of partitions	10 days	Thu 14/03/19	Wed 27/03/19	15	Contractor	Wed 27/03/19
13	Auto Scheduled	Finishings	15 days	Mon 20/05/19	Fri 07/06/19	18,19,21	Contractor	Fri 07/06/19
13.1	Auto Scheduled	Electrical	20 days	Mon 20/05/19	Fri 14/06/19	18,19	Contractor, Electrical Engineer	Fri 14/06/19
13.2	Auto Scheduled	Plumbing	10 days	Thu 28/03/19	Wed 10/04/19	21	Contractor	Wed 10/04/19
13.3	Auto Scheduled	Installation of door and windows	10 days	Thu 25/04/19	Wed 08/05/19	19,21	Contractor	Wed 08/05/19
13.4	Auto Scheduled	Painting	10 days	Mon 20/05/19	Fri 31/05/19	18,19,21	Contractor	Fri 31/05/19
13.5	Auto Scheduled	Completion of Ground works	2 days	Mon 17/06/19	Tue 18/06/19	23,24,25,26	Contractor,	Tue 18/06/19
Milestone	Auto Scheduled	Project Completion	0 days	Tue 18/06/19	Tue 18/06/19	27	Project Manager	Tue 18/06/19

Chart 24 showing the Project Activity list and Schedule (compiled by the Author).

Network diagram

Preparation of project site
Start: 03/12/18 ID: 1
Finish: 14/12/18 Dur: 10 days
Res: Structural Engineer, Contractor



Excavation of foundation
Start: 17/12/18 ID: 2
Finish: 04/01/19 Dur: 15 days
Res: Contractor, Structural Engineer

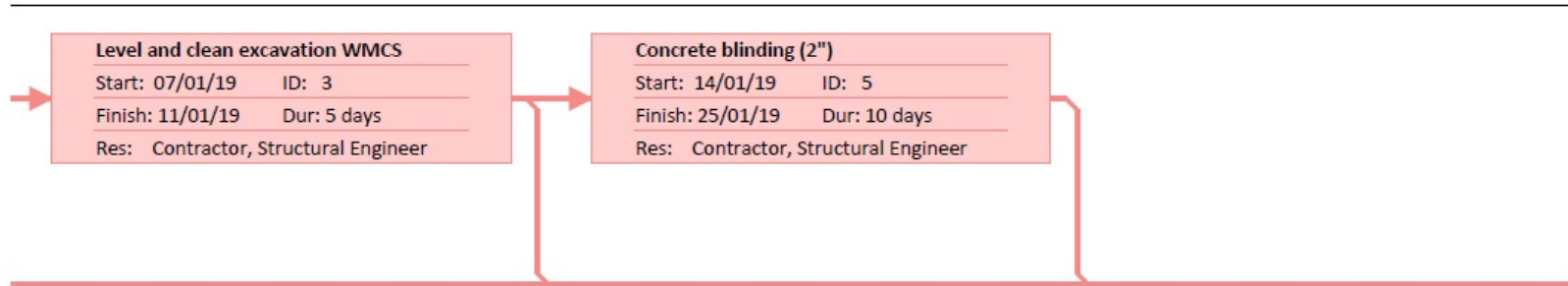


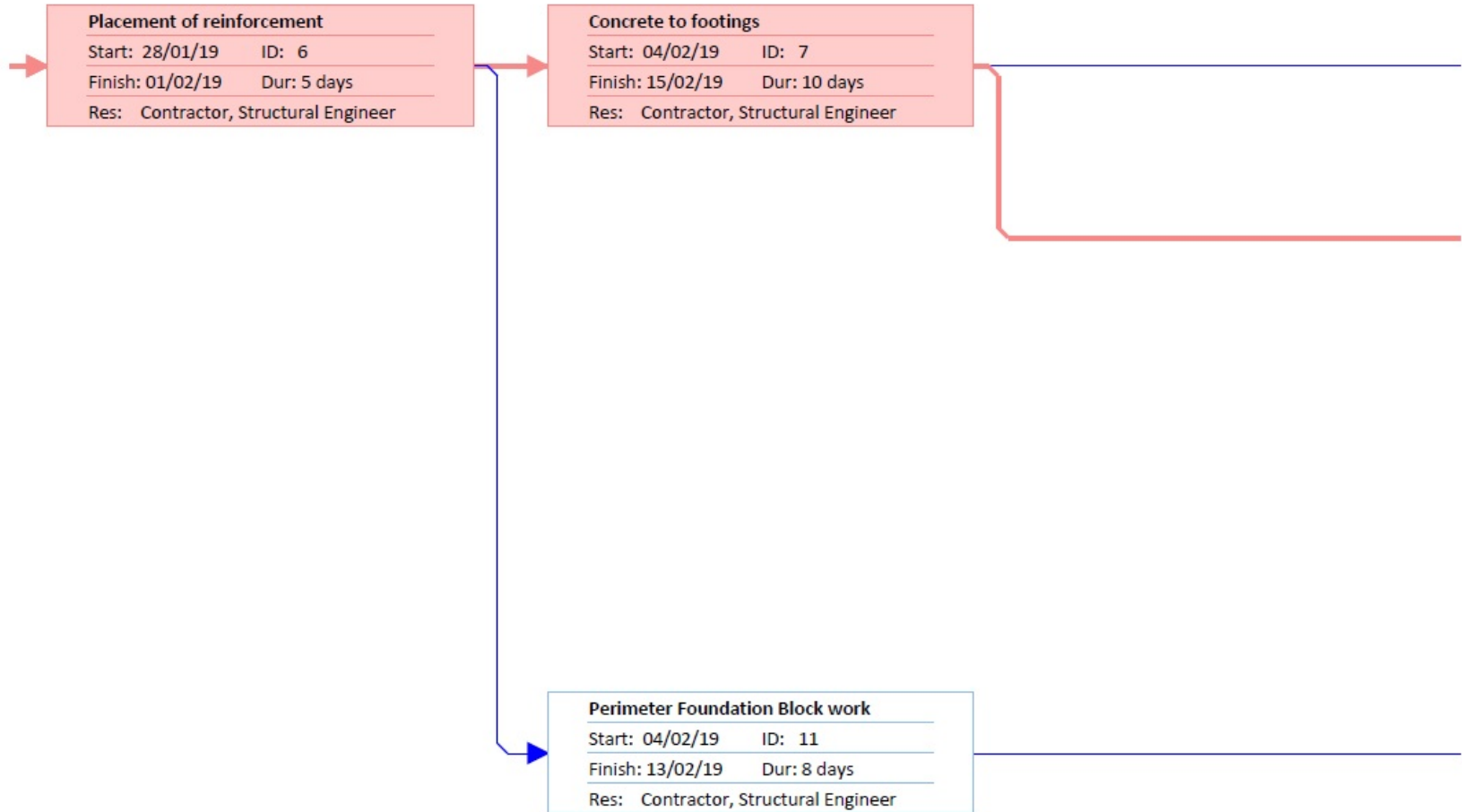
Building Start
Milestone Date: 09/11/17
ID: 4

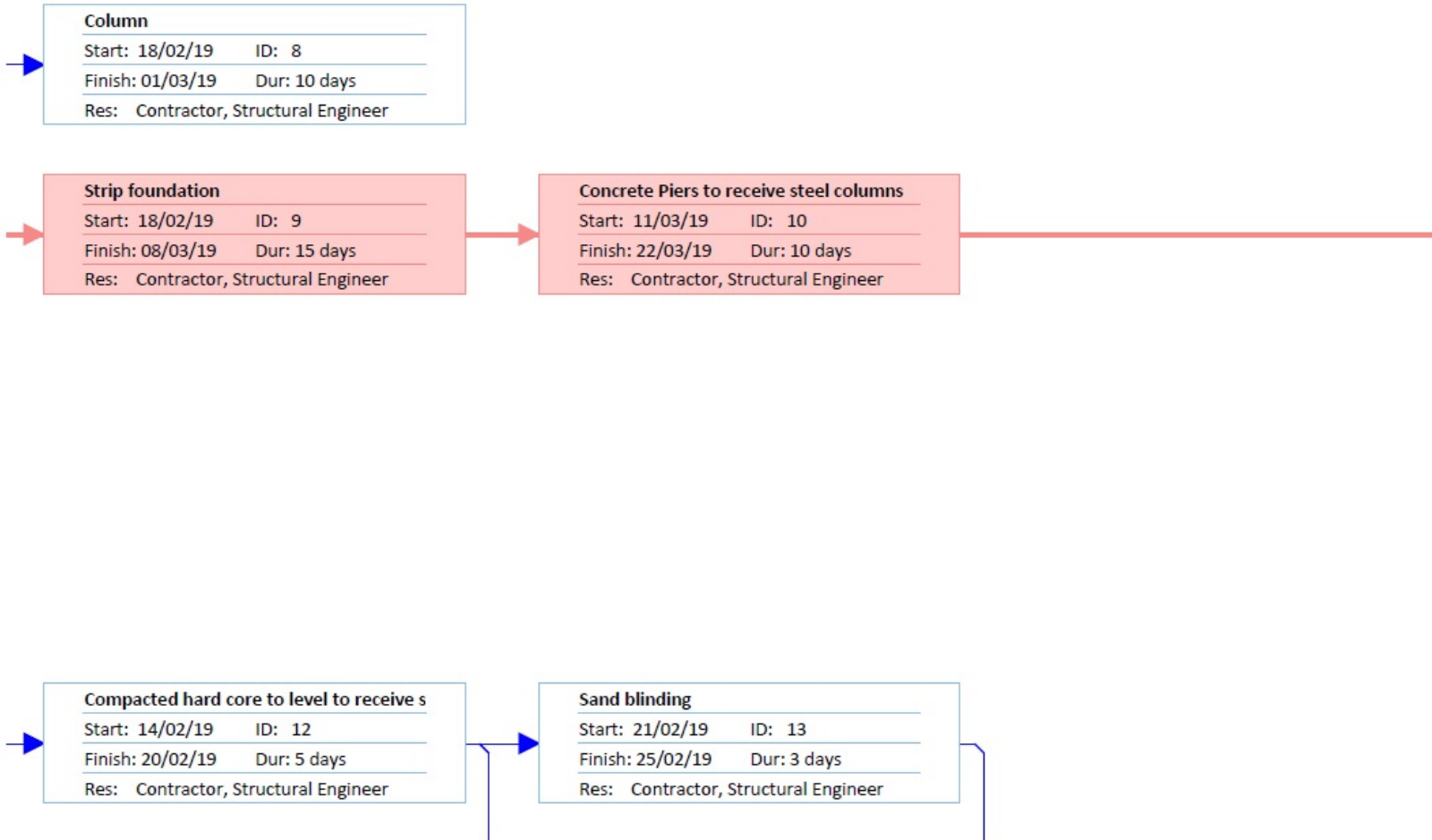
Foundation Complete
Milestone Date: 09/11/17
ID: 16

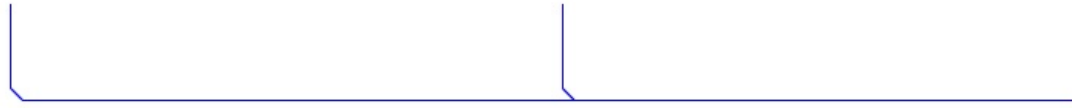
Structure Complete
Milestone Date: 09/11/17
ID: 20

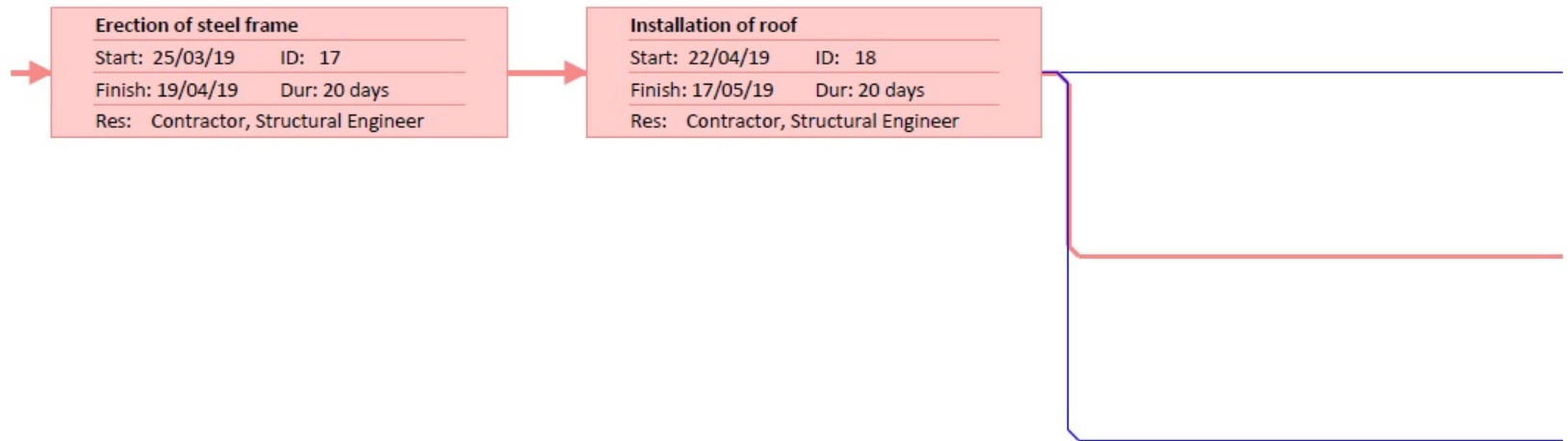
Project Completion
Milestone Date: 09/11/17
ID: 28

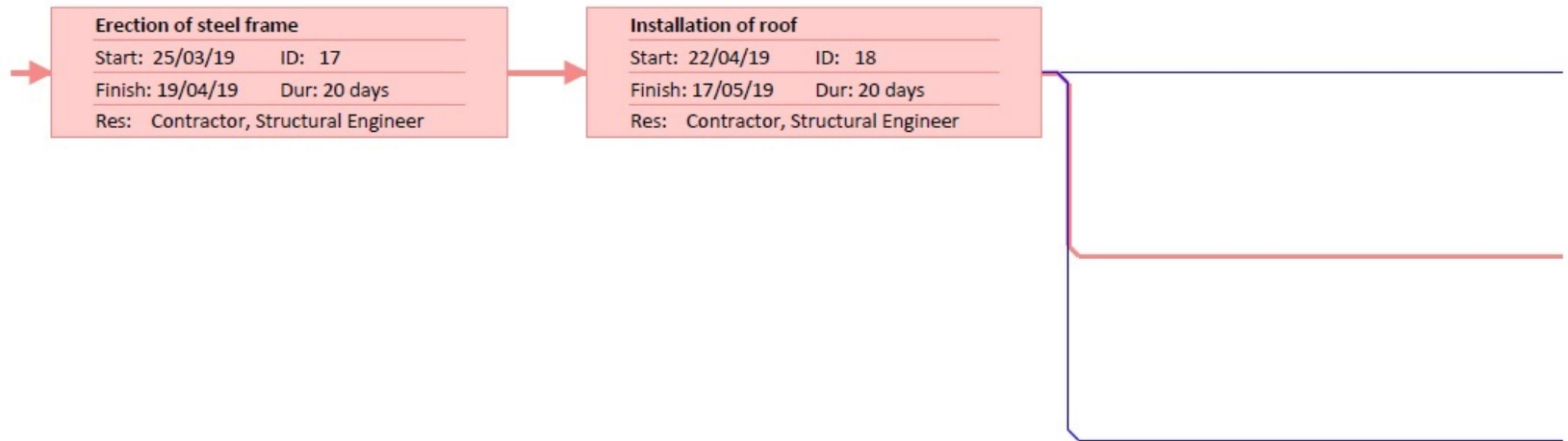


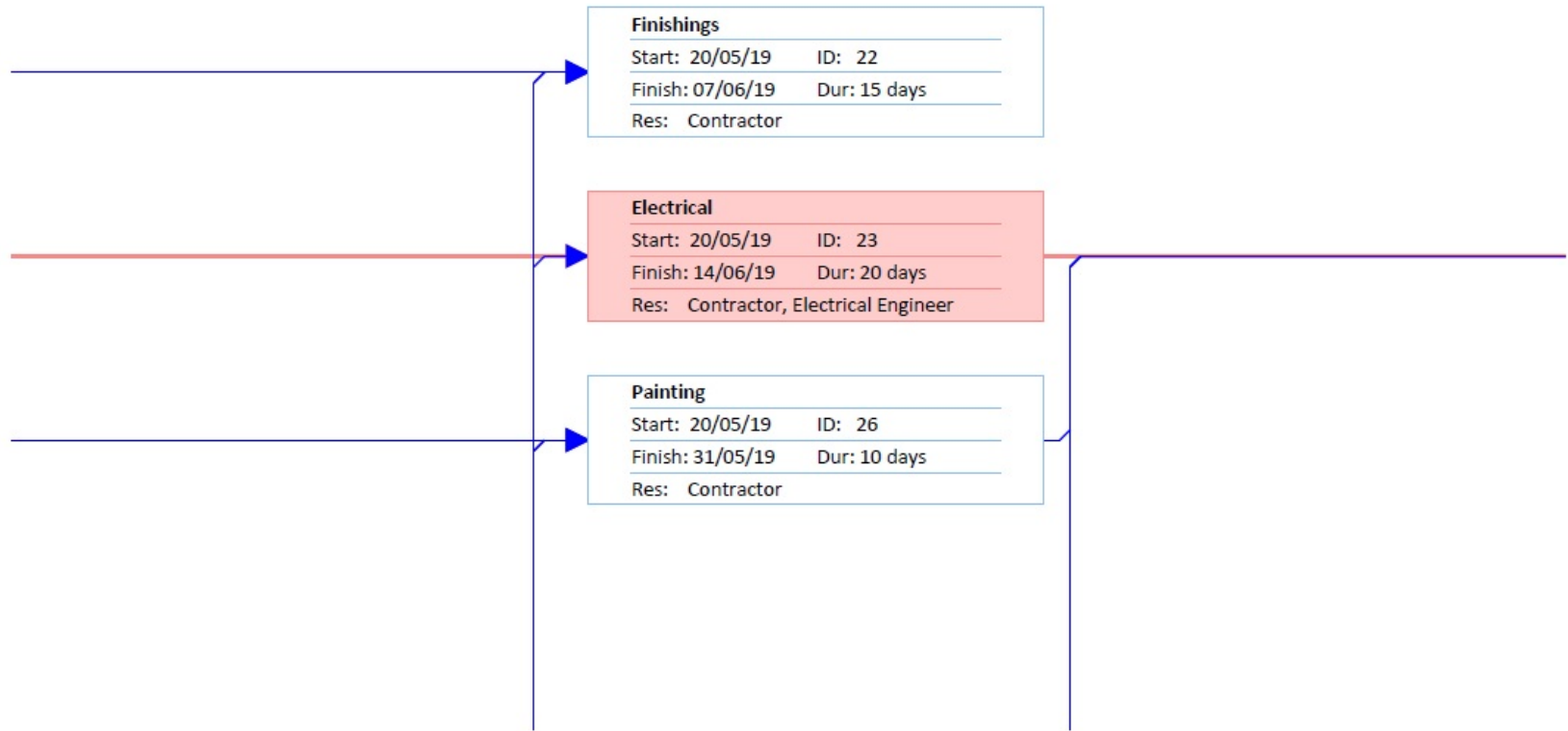


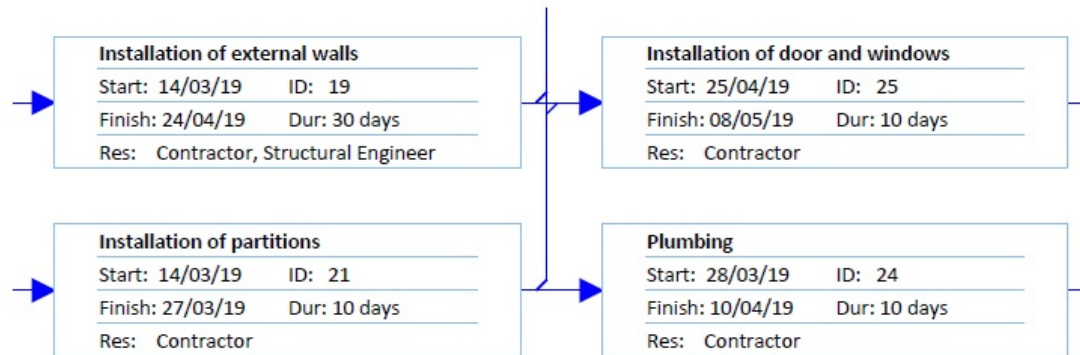












→ **Inspection**
Start: 17/06/19 ID: 27
Finish: 18/06/19 Dur: 2 days
Res: Contractor, Electrical Engineer, Stru



Fig.22 showing the Network Diagram for the project (compiled by the Author using Microsoft Project 2016, Microsoft Corporation)

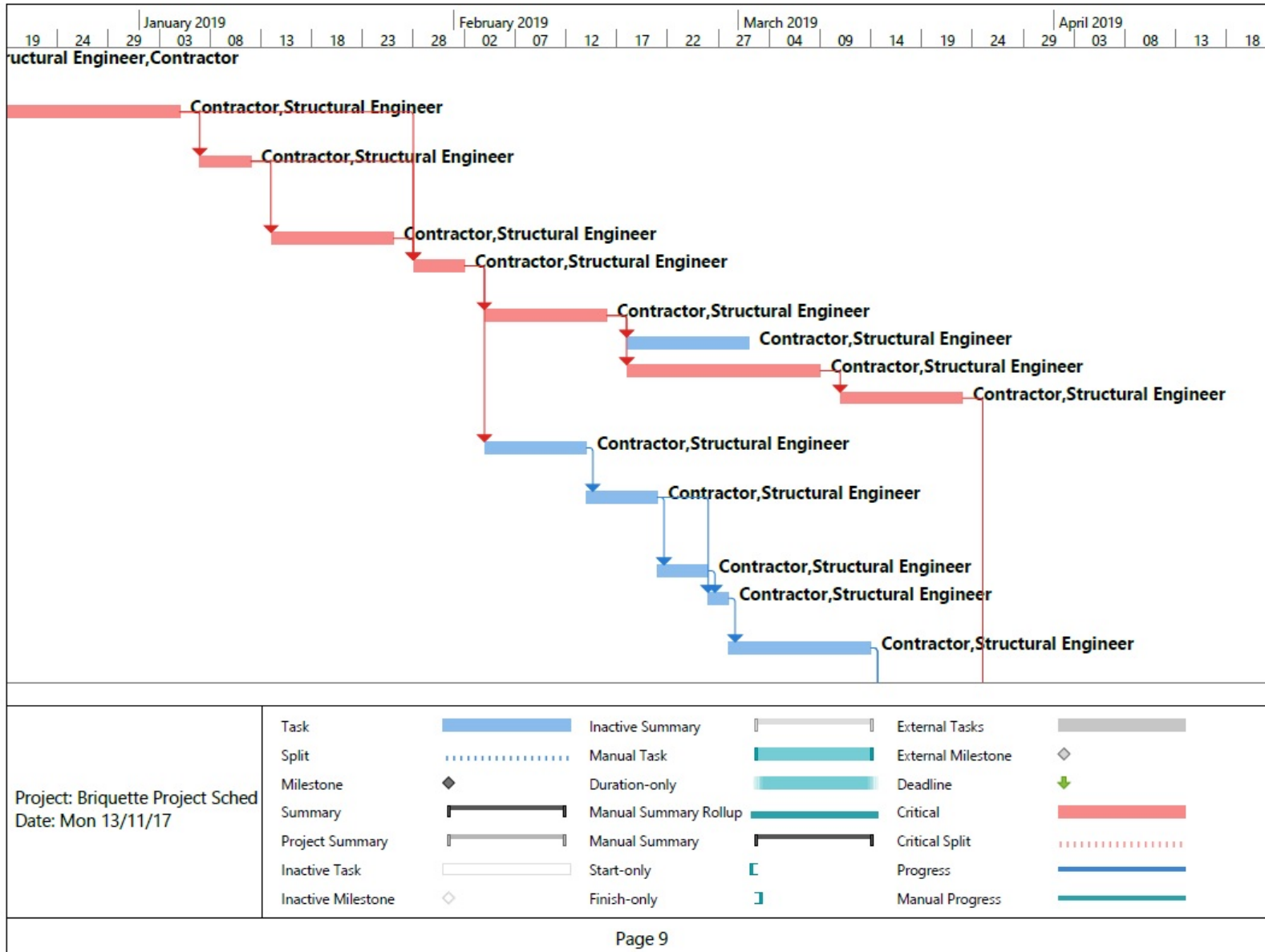
Project Gantt Chart Highlighting Critical Path

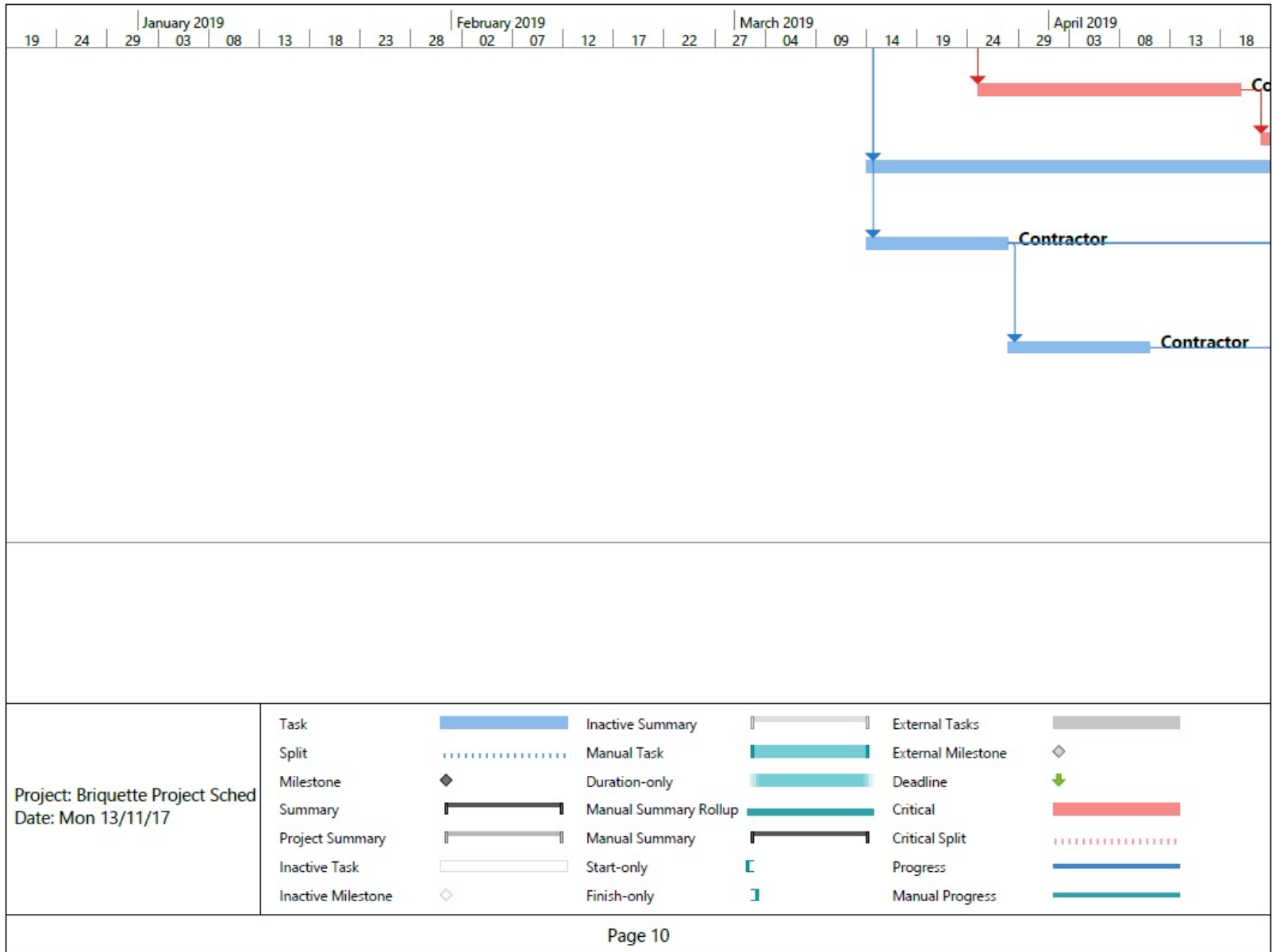
ID	ID	Task Mode	Task Name	Duration	Start	Finish	November 2017					December 2017					
							04	09	14	19	24	29	04	09	14	19	24
16	16	→	Foundation Complete	0 days	Thu 09/11/17	Thu 09/11/17		◆	09/11								
17	17	→	Erection of steel frame	20 days	Mon 25/03/19	Fri 19/04/19											
18	18	→	Installation of roof	20 days	Mon 22/04/19	Fri 17/05/19											
19	19	→	Installation of external walls	30 days	Thu 14/03/19	Wed 24/04/19											
20	20	→	Structure Complete	0 days	Thu 09/11/17	Thu 09/11/17		◆	09/11								
21	21	→	Installation of partitions	10 days	Thu 14/03/19	Wed 27/03/19											
22	22	→	Finishings	15 days	Mon 20/05/19	Fri 07/06/19											
23	23	→	Electrical	20 days	Mon 20/05/19	Fri 14/06/19											
24	24	→	Plumbing	10 days	Thu 28/03/19	Wed 10/04/19											
25	25	→	Installation of door and windows	10 days	Thu 25/04/19	Wed 08/05/19											
26	26	→	Painting	10 days	Mon 20/05/19	Fri 31/05/19											
27	27	→	Completion of Ground works	5 days	Thu 25/04/19	Wed 01/05/19											
28	28	→	Inspection	2 days	Mon 17/06/19	Tue 18/06/19											
29	29	→	Project Completion	0 days	Tue 18/06/19	Tue 18/06/19											

Project: Briquette Project Sched Date: Mon 13/11/17	Task		Inactive Summary		External Tasks	
	Split		Manual Task		External Milestone	
	Milestone		Duration-only		Deadline	
	Summary		Manual Summary Rollup		Critical	
	Project Summary		Manual Summary		Critical Split	
	Inactive Task		Start-only		Progress	
	Inactive Milestone		Finish-only		Manual Progress	



Project: Briquette Project Sched Date: Mon 13/11/17	Task		Inactive Summary		External Tasks	
	Split		Manual Task		External Milestone	
	Milestone		Duration-only		Deadline	
	Summary		Manual Summary Rollup		Critical	
	Project Summary		Manual Summary		Critical Split	
	Inactive Task		Start-only		Progress	
	Inactive Milestone		Finish-only		Manual Progress	





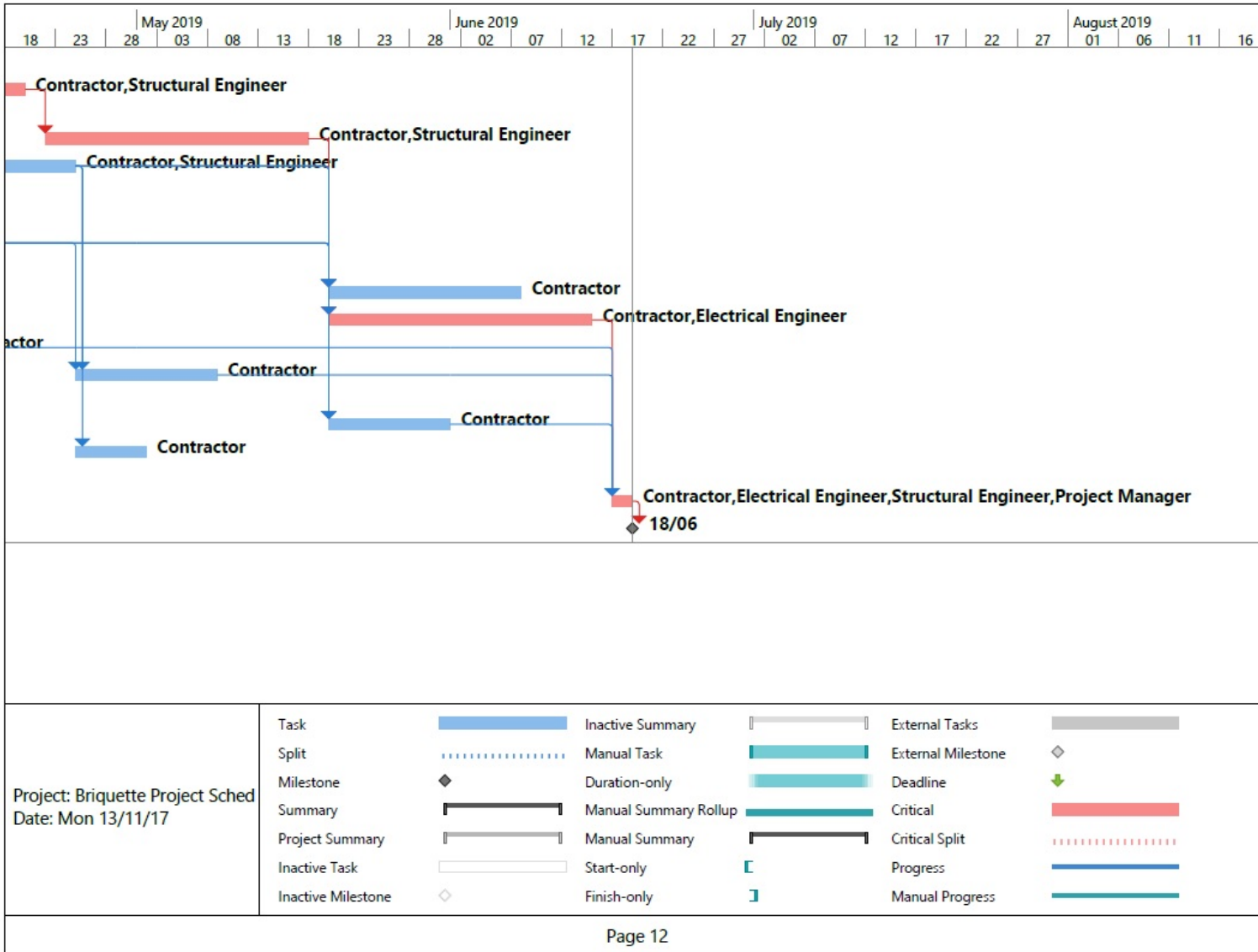


Fig 24 Showing the Project Gantt Chart and Critical Path (compiled by the Author using Microsoft Project 2016, Microsoft Corporation).

Schedule control

The Schedule control will be the responsibility of the Project Manager and will follow the same mechanisms created for the control of the project scope.

Decisions concerning the Project schedule can be made by the Project Manager with more significant changes necessitating the input of the Change Control team and when necessary, the Project Sponsor.

Documentation regarding schedule changes will be maintained as outlined in the Communications Management Plan.

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>

<Project Sponsor Title>

4.13 Topic related to Specific Objective 4 Implementation Plan

Project Implementation Plan

The project implementation plan is of great importance in bridging the interface between a completed project and a functioning project. The Businessdictionary.com describes the implementation plan as “(a) detailed listing of the activities, costs, challenges and schedules that are required to achieve the objectives”

(www.businessdictionary.com/definition/implementation-plan.html)

As often occurs, well executed projects fail to achieve the intended goals because of failures in the transition from project to function and utilisation.

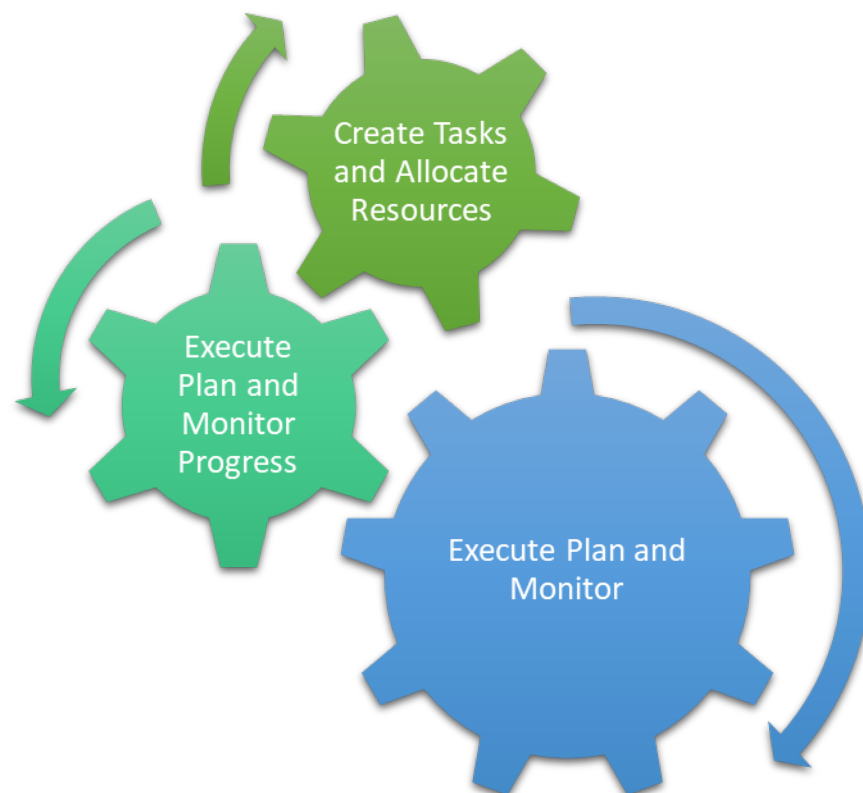


Fig. Graphic showing the important components of an Implementation Plan (created by the Author)

Implementation Plan

Dunamis Enterprise (Guyana) Limited

Georgetown
Guyana

05 October 2017

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Gavin Melville	15.10.2017	L. Angoy	15.10.2017	NA

Introduction

The implementation of the Green Charcoal and briquette Factory is intended to proceed as Phase 3 of the project. The plan is expected to be implemented during the latter part of the 2nd phase (Construction) of the project. This will facilitate the smooth transition of the plant to production of its intended output.

This phase will require additional staffing to enable the transfer of both information and authority for the proper function of the facility.

Approach

The approach to be used for this phase will utilise the skills of the project team to the greatest extent possible to hire and train (where appropriate) the staff that will be responsible for the daily function of the facility. The project manager will have the responsibility for overseeing the transition.

Stakeholders

Name	Position	Function
L. Angoy	Sponsor	<ul style="list-style-type: none">- Responsible for interviewing and hiring the required senior staff- Resolving related issues that exceed the capability of the Project Manager
G. Melville	Project Manager	<ul style="list-style-type: none">- Planning and overseeing the implementation process
	Project Team	<ul style="list-style-type: none">- Facilitating the training of the senior and line staff
	Vendor Representative	<ul style="list-style-type: none">- Providing detailed training and troubleshooting for equipment as per contractual agreement
	HR Manager	<ul style="list-style-type: none">- Preparing the staff requirements and hiring line staff
	Manager	<ul style="list-style-type: none">- Providing oversight to the staff training (line staff) and preparing for production start
	Electrical Engineer	<ul style="list-style-type: none">- Assessment and testing of the equipment and problem resolution.
		<ul style="list-style-type: none">-

Chart 25 Showing Stakeholders related to the Implementation of the Project (Source; Compiled by the Author)

Assumptions and Constraints

The assumption and constraints are as follows:

- That the project will encounter no challenges that preclude the initiation of the implementation plan
- That funding (outside of the project costs) will be available for the implementation process
- That appropriately qualified staff will be available for hiring

The Implementation is constrained by the budget to be allocated and that no additional staff will be added to the project team expressly for the implementation process

Performance Measures

The performance will be measured by the determination of the percentage of tasks completed at specific points in the schedule for the implementation plan. Tasks not completed by the relevant dates will be reviewed by the project team for cause and remedied as appropriate under the direction of the project manager.

Resources

Final confirmation of the financial resources for the implementation project have not yet been received and will be detailed later.

Communication

Communications will follow the protocols established in the Communications Management Plan section of the project plan

Documentation

Documentation will follow the protocols established in the Communications Management Plan section of the project plan

Tasks Matrix

Task	Objective	Responsibility	Due Date	Comments	Priority
Establish the 75% completion point of the project	To define the trigger for the start of the implementation plan	Project Manager		To be completed in conjunction with the project team and Sponsor	HIGH
Advertise for available positions		Project team Assignee			MEDIUM
Prepare and facilitate a space in Georgetown for interviews		Project team Assignee			MEDIUM
Establish minimum qualifying parameters for senior hires	To ensure that persons with the appropriate qualifications are interviewed	Project Manager, Project Team and Sponsor			HIGH
Prepare workspace for senior hires		Project team Assignee			MEDIUM
Finalise and notify senior hires		Project Manager			HIGH
Execute training for senior technical staff	To prepare the senior staff for managing the facility and staff	Project Manager, Electrical Engineer		Ensure that the training includes vendor staff for optimum results	HIGH
Facilitate advertisement for line staff	To assist in hiring the facility staff	Project team Assignee, Manager and HR Manager			LOW
Facilitate staff interviews and hires		Project team Assignee, Manager and HR Manager			LOW
Facilitate staff training	Prepare staff for production	Project Manager, Project team Assignee,			MEDIUM

		Manager and HR Manager			
Perform test runs on equipment	Prepare equipment and staff for production and troubleshoot equipment	Project Manager, Electrical Engineer, Manager		Exceedingly important to provide information on the function of the system	HIGH
Trouble shoot production issues until resolution	Assess and resolve production related issues	Project Manager, Project team Assignee, Manager and HR Manager		Exceedingly important to provide information on the function of the system and fix issues that may negatively influence production	HIGH
Final assessment	Confirm that all of the processes, equipment and staff needed for production are in place	Project Manager, Project team Assignee, Manager and HR Manager			HIGH
Formal Handover	Formally transfer project to Sponsor and production staff	Project Team			LOW

Chart 26 Task Detail of Implementation plan (Compiled by the Author)

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Date: _____

<Project Sponsor>
<Project Sponsor Title>

CONCLUSIONS

1 The creation of the Project Charter and Project Management Plan, following the knowledge areas outlined in the PMBOK Guide allowed for a comprehensive assessment of the work necessary to complete the Charcoal Briquette Production Facility. The Project plan was described in three phases, the Project Plan, with subsidiary plans, the construction plan and the implementation plan. However, the inclusion of a Cost Management Plan was not possible due to the significant volatility and unpredictability of the pricing environment in Guyana, South America, where the project will be undertaken. The absence of this plan did not negatively affect the execution of this FPG although its addition would have been useful, constraints notwithstanding.

2 The Quality management plan was prepared with the intention of ensuring that the project work met the required standards in fulfillment of Objective 2.1. This subsidiary plan in the Project Management plan complemented other efforts to maintain the quality of construction work completed on the project.

3. The Communications Management Plan describes the protocols necessary for project communications and documentation, and includes the expected timing and frequency communications while defining the methods to be used and the process for escalation of issues.

4. The Risk management plan documented the current and initial risks to the project and given that the project site was removed from the business headquarters, was important to alert the project team to possible challenges and consequences that could impact project success. The Risk Management plan also provided guidance on the methods to be used to classify and address risk events and to continually update the register.

5 Procurement Management Plan detailed the strategies to be used for procuring the required project goods and services and outside of this function, was of significance in addressing the possibility of collusion and corruption. The Procurement plan in part also allowed the project to meet some of the sustainability goals regarding business practices.

6 The Stakeholder management plan examined, recorded and classified the relevant persons and organisations that had input or interest in the project outcomes while describing the nature, frequency and accepted level of communications needed. The handling of sensitive information was also considered. Some of the traditional stakeholder issues such as community involvement were limited in the project because of the location, several miles removed from large communities.

7 The Sustainability Management plan is arguably the most in-depth deliverable of this project and addressed and scored every GPM P5 sustainability goal with a resultant comprehensive Sustainability Risk table which directs the efforts to making this Charcoal facility truly "Green". Extensions of the concepts included here not only improve the Sustainability index of the project but also can have definite positive impact on project finances. The sustainability GPM P5 assessment indicated that there were additional ways to improve the project. For example, treating the waste water and factory effluent provided a new income stream from the sale of the tannins to be used in leather production.

8 The Scope Statement and Scope management plan provided clarity on the project requirement and defined the work needed to complete the project. While the requirements for this project were not complex, clarification of the scope provided focus to prevent the expansion of the project work beyond what was feasible. For example, the exclusion of Solar and Wind installations, mentioned in

the Sustainability plan but not included in the initial work, was useful to make the project manageable and not delay project onset whilst allowing for their future inclusion.

9 The Schedule management plan was most concerned with and effective in the construction phase of the project, and while strict, may require the greatest flexibility for successful project completion.

10 Implementation Plan for the project sought to move the project smoothly from the project phase to production, relying on available project resources to facilitate that process. By coordinating the implementation to run concurrently with the final phases of the project, there was considerable time savings and the team would have had the opportunity to fix issues that may have arisen while the expertise to manage them was readily available, such as the engineers and the vendor representatives.

RECOMMENDATIONS

The following recommendations are directed to the Project Sponsor:

The Quality Management plan should be extended to include the production process for which the facility was constructed so that regular formal assessment of the facility output is ingrained into the culture of the new organisation with the intention that further include Quality management methodologies such as ISO 9002 and obtain certification if possible.

Revisit the Sustainability Management plan to focus on the implementation of those suggestions that could reduce the facility dependency on external energy sources and perform a comprehensive assessment of the actual energy usage of the facility in order to reduce energy use. Nearly all of the equipment, of necessity use electricity and therefore the cost savings are likely to be significant.

It is suggested that the production process be re-evaluated to ascertain whether there are additional revenue streams that could be incorporated into the production process. This may allow for the further reduction of waste and access to new markets, for example, unusable biomass could be converted to compost for sale.

To the University

Project Management is an important field and has the potential to change and improve many areas of endeavor. I would recommend that the University diversify the learning experience to include novel applications of project management and facilitate such exploration within the course.

It is also recommended that the University reduce the prescriptive learning methods currently used and engage in perhaps broader interpretations of the course material.

Finally, some of the templates used in the course need to be revisited and updated. There is also need to remove the Spanish language formatting from within the templates for English speaking students since it is very difficult to do so otherwise.

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APPENDICES

Appendix 1: FGP Charter

PROJECT CHARTER	
Date	Project Name:
26 th June 2017	PROJECT MANAGEMENT PLAN FOR SUSTAINABLE CHARCOAL BRIQUETTE PRODUCTION FACILITY CONSTRUCTION AND IMPLEMENTATION
Knowledge Areas / Processes	Application Area (Sector / Activity)
<p>Knowledge areas: Scope Schedule Sustainability Quality Communications Risk Procurement Stakeholders</p> <p>Process groups: Planning Initiating</p>	<p>Production (Add-on timber Product) Sustainable Development</p>
Start date	Finish date
26 th June 2017	12 th February, 2018
Project Objectives (general and specific)	
<p>General objective</p> <p>To create the Project Management Plan for a Sustainable Charcoal Briquette Production Facility Construction and Implementation to be constructed in Guyana, South America starting December 2018</p> <p>Specific objectives</p> <ol style="list-style-type: none"> 1. To create the Project Charter to authorise the implementation of the project and describe the project scope. 2. To create the Project Management Plan including the following Subsidiary Plans: <ol style="list-style-type: none"> 2.1 To create the Quality Management Plan for the Project to establish the Quality processes and expectations for the Project. 2.2 To create the Communications Management Plan for the Project to initiate and govern the required Communications processes. 2.3 To create the Risk Management Plan to assess, manage and respond appropriately the risks associated with the project. 2.4 To produce the Procurement Management plan for the project to institute correct procurement procedures and processes. 2.5 To create an accurate Stakeholder assessment document and enable suitable stakeholder interaction 2.6 To create the Sustainability Management Plan to address the Business case for the project and to identify areas within which sustainability can be incorporated in the Project plan 	

- 3 To create the Construction Management plan consisting the following subsidiary Plans:
 - 3.1 Scope Management Plan to define the project and ensure that all of the Project work is included without unnecessary additional work.
 - 3.2 Schedule Management Plan to define the schedule requirements for the Project.
- 4 To create the Implementation Plan to guide the initiation, handover and early operations of the Charcoal briquette and production facility.

This project intends to prepare the Business Plan and Project management plans for a Charcoal Briquette Facility construction and implementation. Project management plans define and detail the required processes to order to facilitate the successful implementation of the production facility. These documents will enable the Project Manager and relevant stakeholders to understand, manage and respond to the challenges associated with a project of this nature. The project documents will also allow for the continuity of project processes since the lead Project manager does not reside in the country in which the project is being implemented.

Further, the creation of a Project Management plan will facilitate the monitoring of the project that will likely be required by international sponsors such as the ITTO and allow alignment with the practices and requirements specific to that organisation.

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

The final output of this project is as follows:

1. Project Charter
2. Project Management Plan Including the following Subsidiary Plans:
 - a. Sustainability Management Plan
 - b. Quality Management Plan
 - c. Communications Management Plan
 - d. Risk Management Plan
 - e. Procurement Management Plan
 - f. Stakeholders Management Plan
3. Construction Management Plan
 - a. Scope Management Plan
 - b. Schedule Management Plan
4. Implementation Management Plan

Assumptions

- 1: That sufficient time has been made available within the context of the Final Graduation Project to execute the amount of work required for the successful completion of the project
- 2: that necessary finances will be committed to the completion of the documents, including but not limited to time off, research and the preparation of the actual documents
- 3: That the need for a project of this magnitude and complexity is necessary and will provide the intended benefit and positive impacts .

Constraints

- 1: Time is a severe constraint considering the concomitant requirements of other external commitments
- 2: Access to some required information and research is limited, costly and in itself time consuming, further adding to time pressures

Preliminary risks

- 1: If cost exceeds current budget allocations then completing the project could be difficult
- 2: If interruption occurs then project completion may be jeopardised

Budget

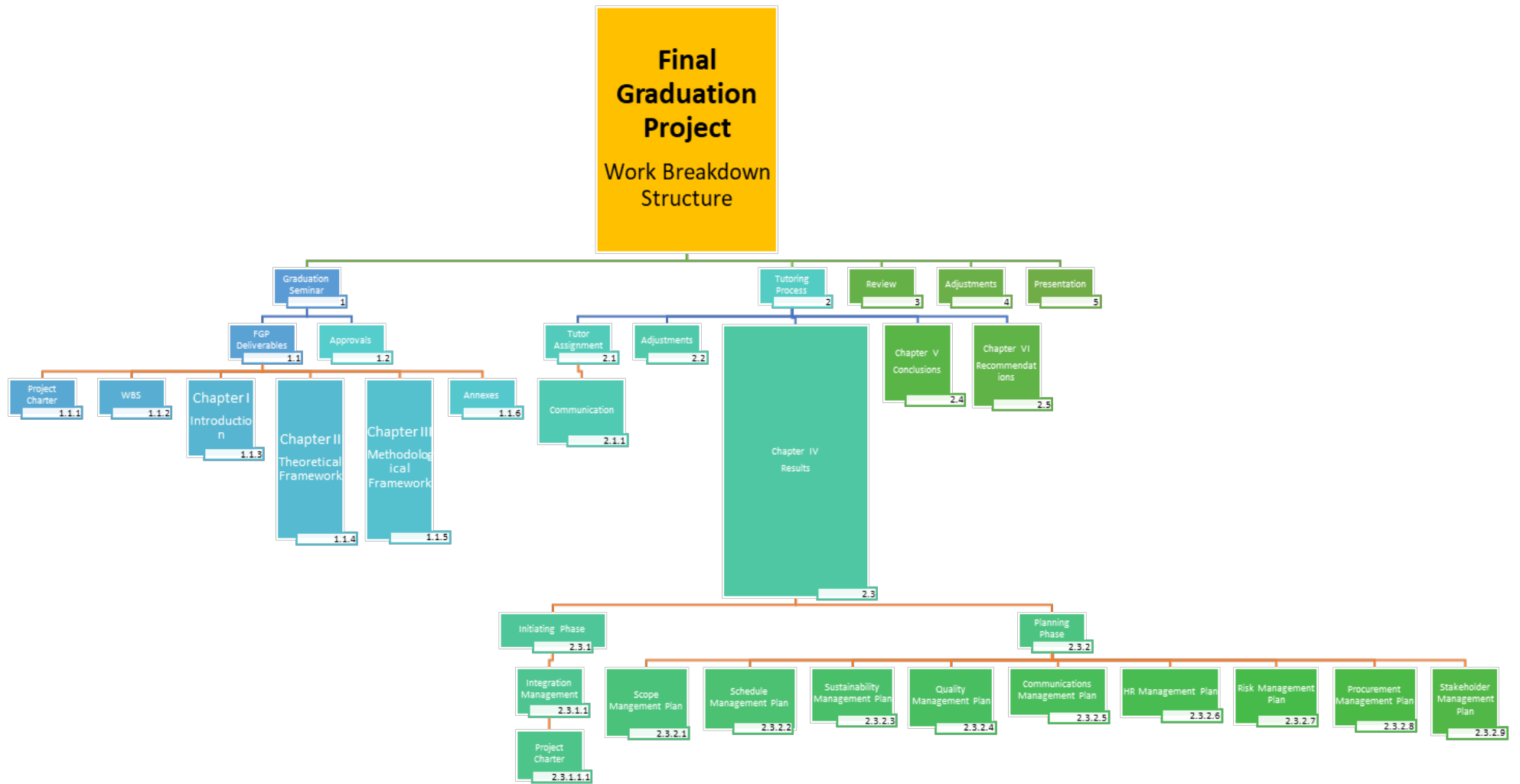
The budget for this project (FGP) is approximately \$1500.00 USD

Milestones and dates

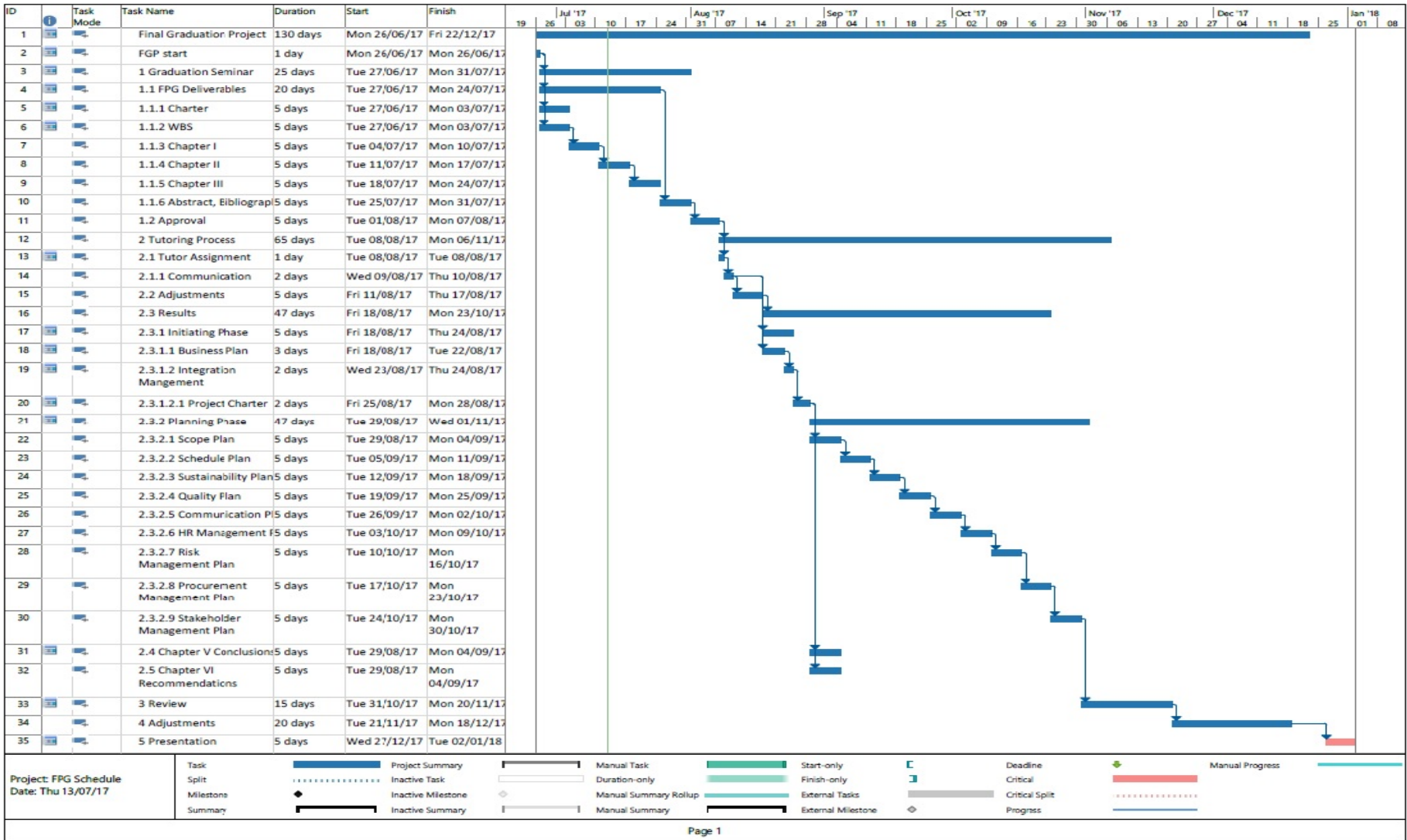
Milestone	Start date	End date
FGP Start	26.06.2017	12.02.2017
Charter	26.06.2017	02.07.2017
WBS	26.06.2017	02.07.2017
Chapter I Introduction	03.07.2017	09.07.2017
Chapter II Theoretical Framework	10.07.2017	16.07.2017
Chapter III Methodological Framework	17.07.2017	23.07.2017
Abstract, Bibliography	24.07.2017	30.07.2017
Approval	31.07.2017	04.08.2017
Tutoring Process	07.08.2017	28.10.2017
Review	31.10.2017	10.11.2017
Adjustments	13.11.2017	08.12.2017
Presentation	05.02.2018	10.02.2018

Relevant historical information	
No related information available	
Stakeholders	
Direct stakeholders: Dr. Gavin Melville FGP Tutor, Carlos Brenes Indirect stakeholders: UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL (UCI)	
Project Manager: Dr. Gavin Melville	Signature:
Authorized by:	Signature:

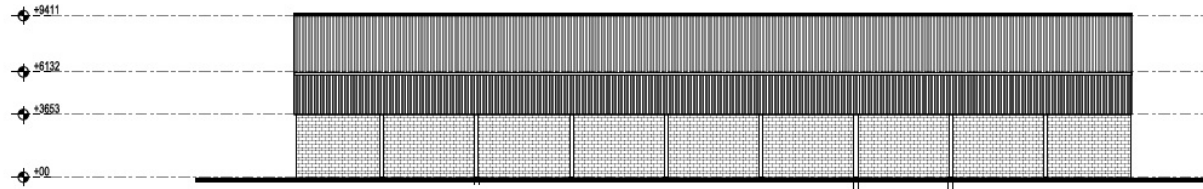
Appendix 2: FGP WBS



Appendix 3: FGP Schedule



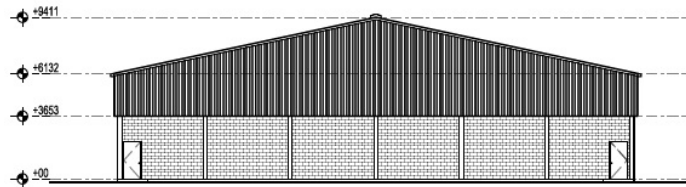
Appendix 4: Other relevant information



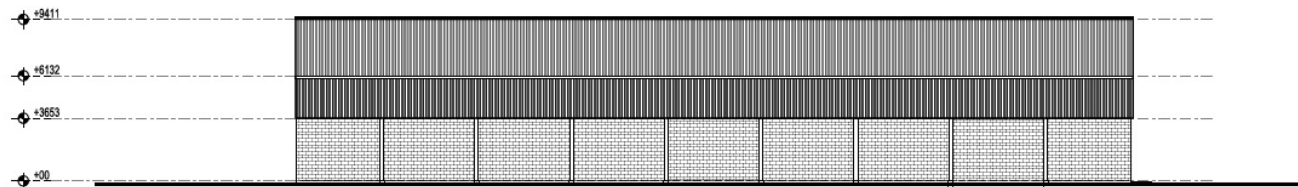
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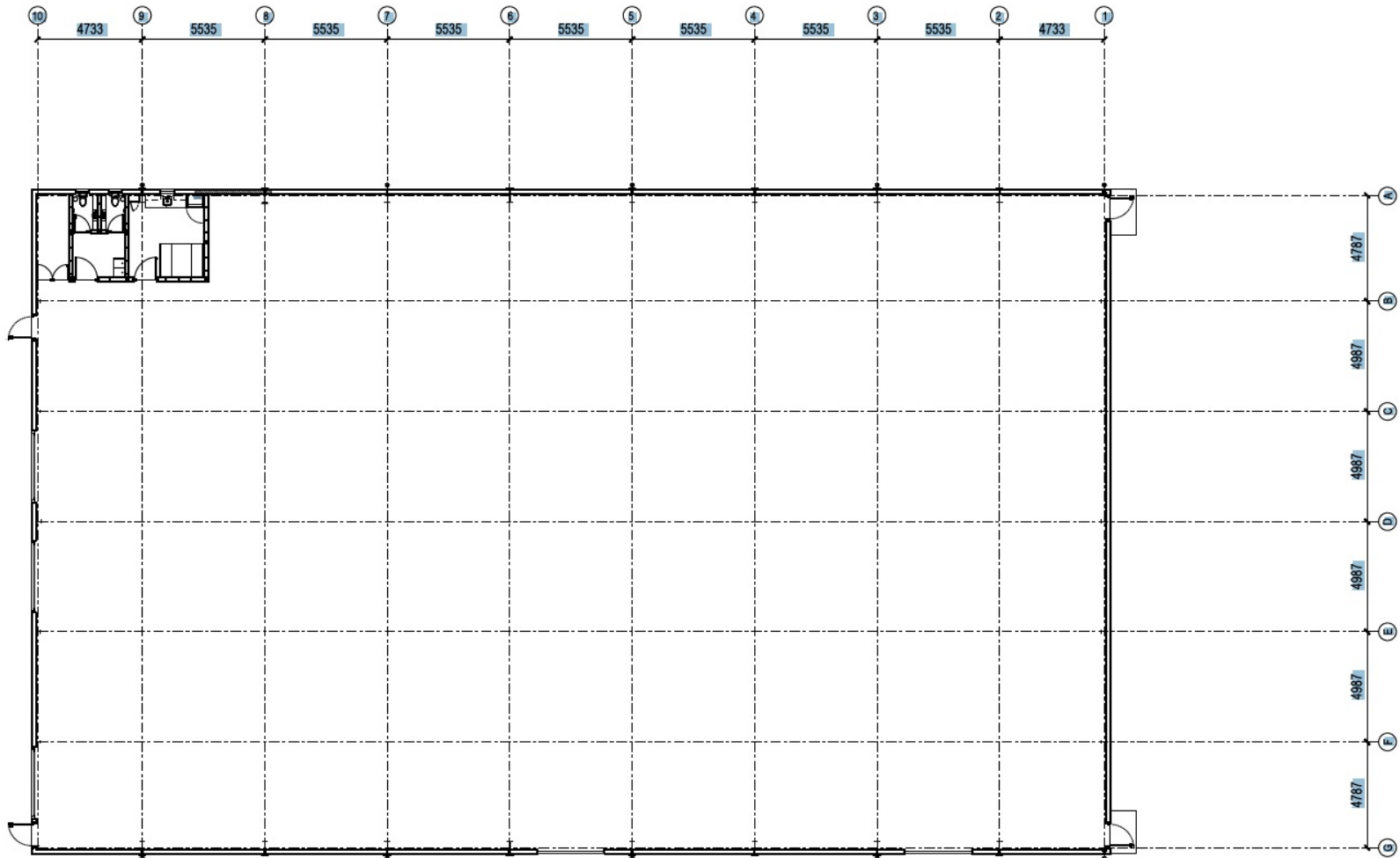
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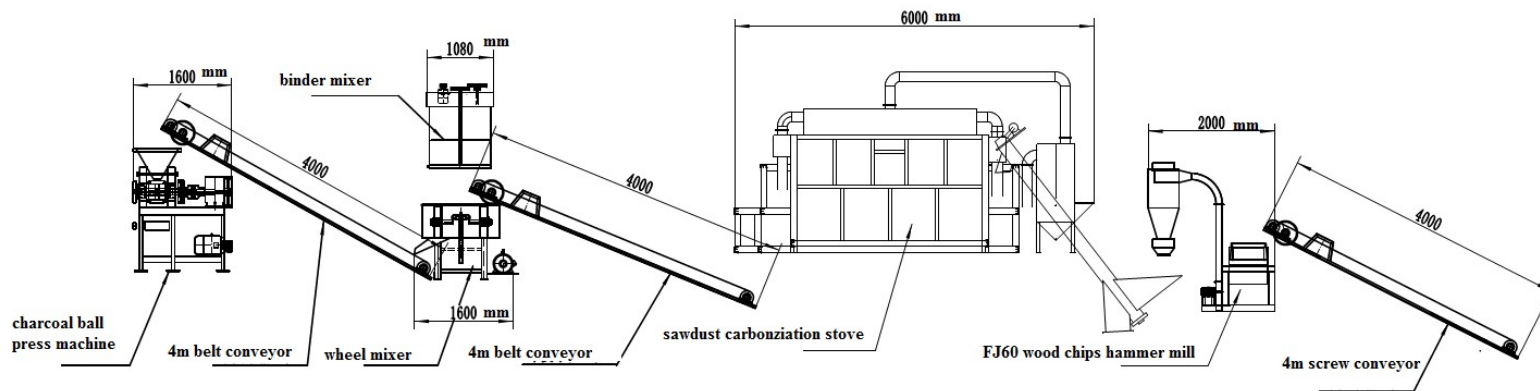
NORTH ELEVATION
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Elevation Plans of the Briquette Facility



Plan of the Briquette Facility



Schematic Diagram of the Charcoal Briquette Production Line

Curriculum Vitae and Certificates for Ms. Mary Wilfred, Director of Youth Development, Ministry of Equity, Empowerment, Social Justice, Youth, Sports, Local Government and Culture, Lecturer, Academic Writing, Research Methods, Ethics & Communications, South Eastern Caribbean College, Vieux Fort

Mary A. Wilfred
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Dennerly, Saint Lucia
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NATIONALITY Saint Lucian

EDUCATION

2012 **Project Management Institute**
Pennsylvania, USA
Project Management Professional (PMP)

2003 – 2005 **Waikato University**
Hamilton, New Zealand.
Master of Social Science: Development Studies

2000 **Project Planning and Management**
Certificate of Participation
Training Module by Caribbean Development Bank

1995- 1998 **University of the West Indies**
Mona Campus, Jamaica.
Bachelor of Science [B.Sc.]. Sociology [major] Social Policy and Administration [minor]:
First Class Honours

1990-1992 **Sir Arthur Lewis Community College**
Morne Fortune, Saint Lucia.
Certificate of Teacher Education

PROFESSIONAL EMPLOYMENT EXPERIENCE

2016- Director of Youth Development
Ministry of Equity, Empowerment, Social Justice, Youth, Sports, Local Government
and Culture

2014-2015 Programme Development Officer
Ministry of Youth Development and Sports

2013- Present Country Manager, Beckwith International Leadership Development (BILD) & Programme Development Officer
Ministry of Youth Development and Sports

2009-2012 UNDP Programme Officer
Ministry of Finance, Economic Affairs, Planning & Social Security

2008- 2010 Research Development Officer
Ministry of Social Transformation, Local Government & Community Empowerment

2005-2007 Teacher (CXC Social Studies): Clendon Mason Secondary School

1999-2003 Youth Policy Co-ordinator: Ministry of Education, Human Resource Development, Youth and Sports.

Coordinator of the Commonwealth Youth Certificate Programme

Prepared successful project proposals for grant funding to the following agencies:

- *UNICEF*
- *UNESCO*
- *Commonwealth Youth Programme*
- *Global Youth Network*

1988 – 1999 Teacher: Clendon Mason Secondary School
Social Studies (CXC), History, Geography & Literature

RESEARCH EXPERIENCE

2016 Strategic Feasibility Study: Assessment of the current status of Emergency Services in Saint Lucia

2013 Evaluation of the Caribbean Youth Empowerment Programme Phase II, International Youth Federation

2012 Analytical review of policies, strategies and programmes for youth employment in St Lucia, International Labour Organization (Caribbean Office)

- 2011** Technical Committee member for the Multi Indicator Cluster Survey (MICS), UNICEF
- 2010** Supervisor, National population and housing census
Research analysis for the development of sixteen community profiles in St. Lucia, St Lucia Social Development Fund (SSDF)
- 2009** Poverty Social Impact Analysis (PSIA) on the global economic impact on vulnerable groups
- 2009** Qualitative research for the National Poverty Reduction Strategy
- 2008** Compiled Country Report for CARICOM Youth Development Strategy based on the findings from the focus group discussion
- Conducted focus group discussions in St. Lucia for the CARICOM Youth Development Strategy known as ‘Youth Dreams and Visions’
- Conducted qualitative research with major social institutions for the Poverty Reduction Fund with regards to the PUENTE programme
- 2006** Analysis of qualitative research for World Bank Study on Disability in St. Lucia.
- 2005** Compiled Situation and Response Analysis for St. Lucia’s Health Sector
- 2004** Facilitated focus group discussions for the Poverty Reduction Fund
- The purpose of the focus group discussions was to evaluate the life skills development and life style management programme undertaken in communities*
- 2003** Joint consultant for UNFPA on population and development strategies in Saint Lucia
- This month-long work entailed conducting focus group discussions on population with key stakeholders, analysing documents and writing up a report*
- 2002** Assisted the Ministry of Development Planning in drafting Saint Lucia’s National Population Policy

2001 Assisted with the review of Saint Lucia's Health and Family Life Policy with UNICEF

2000 Conducted qualitative research with stakeholders throughout major communities in Saint Lucia for youth policy

Provided joint supervision for quantitative research with the Department of Statistics for youth policy

1994 Conducted survey interviews for UNIFEM on Women and Reproductive Health

OTHER

Part time lecturer Academic Writing, Research Methods, Ethics & Communications
South Eastern Caribbean College, Vieux Fort

Chairperson Inter-school and College Christian Fellowship

References:

Dr. Didacus Jules

Director General

OECS

Morne Fortune

Castries

Telephone: 758-4556237

Senator Fortuna Belrose

Minister for Culture & Local

Government

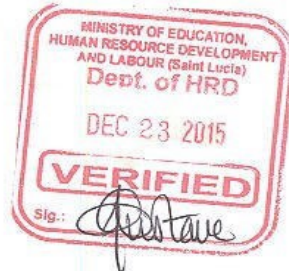
Graham Louisy Building

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758-7168702



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato



This is to certify that

Mary Anna Wilfred

having satisfied the requirements of the University

has been admitted to the Degree of

Master of Social Sciences

with **Second Class Honours (first division)**

R. Crawford

Professor Roy Crawford
Vice-Chancellor

Given under the Seal of
The University of Waikato
01 November 2005



5689

THE UNIVERSITY OF
THE WEST INDIES



Mary Anna Verlina Wilfred

having completed the Course of Study approved
by the University and having satisfied the
Examiners has this day been admitted by the
Senate to the Degree of

BACHELOR OF SCIENCE

**Sociology(Major), Social Policy and
Administration(Minor)**

with

First Class Honours



July 1, 1998

DATE

[Signature]

VICE-CHANCELLOR

[Signature]

UNIVERSITY REGISTRAR

Project Management Institute

THIS IS TO CERTIFY THAT

MARY WILFRED

HAS BEEN FORMALLY EVALUATED FOR DEMONSTRATED EXPERIENCE, KNOWLEDGE AND PERFORMANCE
IN ACHIEVING AN ORGANIZATIONAL OBJECTIVE THROUGH DEFINING AND OVERSEEING PROJECTS AND
RESOURCES AND IS HEREBY BESTOWED THE GLOBAL CREDENTIAL

Project Management Professional

IN TESTIMONY WHEREOF, WE HAVE SUBSCRIBED OUR SIGNATURES UNDER THE SEAL OF THE INSTITUTE


Peter Monkhouse • Chair, Board of Directors


Mark A. Langley • President and Chief Executive Officer

PMP® Number 1512799

PMP® Original Grant Date 09 June 2012

PMP® Expiration Date 08 June 2015





**Ministry of Equity, Social Justice, Empowerment, Youth Development,
Sports and Local Government**

Department of Youth Development and Sports

Communication on this subject
should be addressed to:
The Permanent Secretary
at the following number quoted:
Tel: (758) 468-5401/2
Fax (758) 453-6672
Email: most@gosl.gov.lc

Blue Coral Building
Bridge Street, 2nd and 3rd Floor
Castries, Saint Lucia, West Indies

19th November, 2017

TO WHOM IT MAY CONCERN

This is to confirm that I have thoroughly reviewed the Final Graduation Project of Mr. Gavin Melville entitled 'Business Plan and Project Management Plan for Sustainable Charcoal Briquette Production Facility Construction and Implementation', in partial fulfillment of the requirements for the Master in Project Management (MPM) Degree.

This paper is premised on an excellent thesis substantiated by evidence and scholarly work. Apart from minimum typographical or transposition of letters in words, this scholarly piece receives my highest commendation.

Sincerely

A handwritten signature in cursive script, appearing to read 'Mary Wilfred', written over a horizontal dotted line.

Mary Wilfred
DIRECTOR OF YOUTH DEVELOPMENT