

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

Project Management Plan for the elaboration of a feasibility study to connect Moengo, Albina and villages along the East-West corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network."

JERRY ASEJA

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Luis Diego Argüello

Tutor

Evelyn Hernandez

REVIEWER No.1

Eneida Góngora

REVIEWER No.2

JERRY ASEJA
Student full name

DEDICATION

I dedicate this project to my late Mother, my role model who stood at the basis of the development of my traits; persistence, determination and dedication.

I also dedicate this project to my family and friends. Without your support and understanding, I would not have been able to successfully finish this project.

Thank you!

ACKNOWLEDGMENTS

When I started this course in April 2017, I started it with an end in mind, as temporary endeavor, as a Project. The knowledge and tools developed and learnt along the way were immediately used to bring this project to where it stands now. Along the way, several risks manifested themselves but the impacts of these risks were successfully managed to bring this project to a success.

Having said the above,

I acknowledge with gratitude the effort and support rendered by my tutor, Luis Diego Arguello .

I would like to thank the members of Team 1 of which I was part of for their support and understanding during the life cycle of this project.

Special thanks goes to the Project Manager of Team 1, Alison Brome for the late night compiling of the group works and for her great character and personality.

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ABBREVIATIONS AND ACRONYMS

- AFD Agence Française de Développement
- APM Association of Project Management
- CDB Caribbean Development Bank
- CTO Chief Technical Officer
- DEV *Dienst Electrificatie*
- EEF Enterprise Environmental Factor
- ENICK *Electriciteitsvoorziening Nickerie*
- EPAR *Electriciteitsvoorziening Paramaribo*
- ESIA Environmental Social Impact Assessment
- EAS Energy Authority Act
- FGP Final Graduation Project
- GOS Government of Suriname
- IADB Inter-American Development Bank
- IEC International Electrotechnical Commission
- IEEE Institute of Electrical and Electronics Engineers
- IPP Independent Power Producer
- ISDB Islamic Development Bank
- LPG Liquefied Petroleum Gas
- MNR Ministry of Natural Resources
- MPM Master in Project Management
- MW Megawatt
- NV EBS *N.V. EnergieBedrijven Suriname*
- OHL Overhead Transmission Line
- OPA Organizational Process Assets
- PET Project Executing Team
- PMI Project Management Institute
- SS/PP Substation *Peperpot*
- UCI Universidad Para La Cooperacion Internacional

EXECUTIVE SUMMARY (ABSTRACT)

Suriname a country with approximately 500.000 inhabitants in the Caribbean, South America, consists of ten (10) districts. The majority of the population is located in four districts. *Paramaribo*, the capital, *Wanica*, *Commewijne*, *Para* and *Nickerie* have 24/7 electricity access available in most parts of these districts. *Coronie* and *Saramacca* are two sparsely populated districts, which also have access to 24/7 electricity in most of the populated areas. The three remaining districts, *Sipaliwini*, the biggest district, *Brokopondo*, and *Marowijne*, have many villages in the hinterlands which are lacking access to 24/7 electricity. These villages are supplied with 3 to 5 hours electricity on a daily basis and accounts for 6% of the population of Suriname.

The electrification level in Suriname is estimated at 85%, of which 79% connected to the NV EBS systems. NV EBS, a 100% state owned company, is central in the generation, transmission, distribution and commercialization of electricity in Suriname. The NV EBS operates six isolated systems in Suriname of which EPAR is by far the largest system and covers the districts of *Paramaribo*, *Wanica*, *Commewijne*, *Saramacca* and *Para*. Other power generation companies exist in Suriname but they must sell the produced electricity, unless for self-consumption to the NV EBS who is solely responsible for the transmission, distribution and commercialization of electricity in Suriname. The NV EBS is a statutory corporation under the policy direction of the Ministry of Natural Resources. NV EBS shares its responsibility for rural electrification with the Department of Rural Energy of the Ministry of Natural Resources that operates small power systems in the interior.

Villages along the East- to west Corridor are lacking 24/7 electricity and NV EBS is looking within its capabilities for technical and financial possibilities to supply these isolated villages with permanent electricity by extending its EPAR system. With the help of the Ministry of Finance of Suriname, funding was made available for the feasibility study for the project to connect isolated villages along the east to west Corridor to the NV EBS Grid. The aim of this feasibility study was to provide clarity with regard to the technical, financial and environmental viability of the proposed project.

The general objective was to elaborate a project management Plan to perform a feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. The specific objectives were: to produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration, to produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project, to create a schedule management plan to ensure that the project is completed on time, to develop a cost management plan to make sure the project is within the approved budget, to create a resource management plan to manage the resources needed for the successful completion of the project, and to construct a stakeholder management plan to promote productive involvement of stakeholders.

This research can be categorized as an applied research, because the outcome can immediately be used. Initially, information was gathered from primary and secondary sources and used as the foundation for understanding the project scope, timeline, procurement requirements, cost requirements, and stakeholder's requirements. The data were analyzed and gap analysis was performed to determine missing data for successful completion of project objectives. A plan was prepared to acquire the missing data, which included the research methods, content analysis, Interview and survey. The acquired data were used as input to different project management processes to produce the different project management plans.

The project management Plan created is a formal document that defines the basis of all the project work. It consists of all the other subsidiary plans and was initially developed using data retrieved from the project team and should be updated as more data become available. Although all the project management plans are important for the project success, the procurement management plan requires special attention as the output of this process will be required for the execution of other project activities and the further development of other project management plans. Apart for project management application, the project success also heavily depends on the input of the operation managers, as the project manager authority is limited due to hierarchy Organization.

In order to increase the likelihood of success of the project, the NV EBS is recommended to adopt a formal project management methodology that includes configuration management and give consideration to a Matrix organization in which the authority between project manager and operational manager is more balanced. Furthermore, a resource management plan should be developed using input from all ongoing projects for better monitoring and controlling of resources. Risk management and Communication management Plans which were not developed as part of this FGP, should be created, as these are two important aspects of the project and especially for the affected area because of their different cultures and habits.

1 INTRODUCTION

1.1. Background

N.V.*EnergieBedrijven* Suriname (NV EBS) is the state-owned power utility company in Suriname, serving over 148,000 customers. NV EBS is responsible for the operation of the national power system and covers generation, transmission, distribution and commercialization of electricity.

While a large share of the electricity consumption and production is located in the Paramaribo region, several smaller isolated systems exist elsewhere in the country. NV EBS operates six isolated power systems in Suriname:

- The *EnergieVoorziening Paramaribo* (EPAR), servicing Paramaribo and surroundings;
- The *EnergieVoorziening Nickerie* (ENICK) - servicing Nieuw Nickerie in Western Suriname;
- *Albina and Moengo* – in the district of Marowijne (eastern part of Suriname);
- *Apoera* - servicing the south western district of *Sipaliwini*;
- *Wageningen* - servicing the western part of *Nickerie* district; and
- *Totness* - servicing the *Coronie* district.

EPAR power system is the largest of NV EBS' power systems, serving over 134,000 customers in the Paramaribo and surrounding areas.

In the rural areas, the ministry of natural resources through *Dienst Electrificatie* (DEV) provides electricity to some isolated villages with small diesel generators, during 3 to 5 hours per day. EBS has identified a project of which pre-feasibility has been done to bring 24/7 electricity to isolated villages in the eastern region of the country. The identified project consists of the following three components;

- Component 1 : Construction 127 km of Over Head Transmission Line (OHL) from substation *Peperpot* (SS/PP) to *Albina*
- Component 2 : Construction of three (3) new substation (*Moengo*, *Wanhatti* and *Albina*) and upgrade one(1) existing substation (Substation *Peperpot*);

- Component 3: Connection of five (5) villages (*Wanhatti, Perica, Moengotapoe, AdjoemaKondre* and *Alfondsdorp*) to the grid including distribution facilities and low voltage networks according NV EBS standards.

1.2. Statement of the problem

Villages along the East to west Corridor outside the serve Area of the NV EBS are lacking 24/7 electricity. Several preliminary investigations, mostly based on desktop research have identified possible ideas for supplying these isolated villages with 24/7 electricity. These villages consist of 331 households with 1,314 inhabitants. Connecting these villages to the EPAR will account for 0.88% increase in customer's connections, which is not much but will serve as a stimulus for the economic activity in these areas.

One of these ideas is to extend the NV EBS transmission line from its current endpoint at *Peperpot* to the eastern border town of *Albina*. All the villages in between these two connection points could technically be connected to the grid, providing them with 24/7 electricity. The Moengo and Albina isolated power systems, which reside in the eastern part of Suriname, also have high maintenance and operation costs. The operation and maintenance cost for Moengo is 1.17 USD/MWh and for Albina 2.25 USD/MWh, while the EPAR has an O&M cost of 0.68 USD/MWh. In order to keep this Moengo and Albina grid in operation the government is subsidizing these regions heavily. Regional tariff increase to cover the maintenance and operational costs is not an option as Suriname has one tariff structure by law. A tariff increase would also have seriously political consequences and as the NV EBS is 100% owned by the government, this is not a move that is likely to happen. Fuel cost including transportation is the biggest contributor to the high operation and maintenance costs. Interconnecting the EPAR with Moengo grid and Albina grid will have a positive impact on the O&M cost as power could be supplied to these regions by the EPAR making the power generation in Moengo and Albina not necessary.

In order to materialize this idea, support of the GOS and I multilateral banks is required, as NV EBS does not have the necessary capital for the execution of the

project. This support for the proposed idea cannot be gained without a sound technical and economic justification.

Furthermore, it is not clear if the existing system and the proposed technical solution will be able to facilitate the connection of these villages at an economically acceptable cost. The feasibility study for the project to connect isolated villages along the east to west Corridor to the NV EBS Grid is expected to provide clarification to technical, economic, environmental and social issues related to the proposed idea.

1.3. Purpose

The main goal of the feasibility study is to determine the viability, environmental and social impact of the proposed idea. The feasibility study will quantify the electricity need; develop load forecast for the project within a radius of 25 kilometers of the initial projected transmission line and a tariff model for the affected. The forecast shall cover 25 years period of time and include at least three load growth scenarios (low, medium and high). Existing data such as demand projection and growth rate will be validated and updated as required.

Based on the developed scenarios the proposed technical idea must be further detailed to include: detail electrical and civil design based on international and local standards. A network study must be carried out to investigate the impact of the technical solution on the existing network. Counter or mitigation measures shall be identified for all possible negative effects on the existing system.

Environmental and social impact assessments of the project and an environmental and social management plan are also part of the study.

The benefit of the proposed feasibility study is that it will provide NV EBS with analysis and recommendation required to support its decision-making with regard to capital investment.

1.4. General objective

To elaborate a project management Plan to perform a feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorzienning Paramaribo" (EPAR) electricity network."

1.5. Specific objectives

1. To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration.
2. To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.
3. To create a schedule management plan to ensure that the project is completed on time.
4. To develop a cost management plan to make sure the project is within the approved budget.
5. To create a resource management plan to manage the resource needed for the successful completion of the project.
6. To construct a stakeholder management plan to promote productive involvement of stakeholders.

2 THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

The Ministry of Natural Resources (MNR) has overall responsibility for the energy sector and provides policy direction to the electric utility. NV EBS is a limited liability company that is 100% owned by GOS. NV EBS enjoys a monopoly for the transmission, distribution and sale of electricity but only accounts for approximately one-third of the electricity production. Independent Power Producers (IPP's) produce the rest. NV EBS employs approximately 1,300 people. The majority of these employers are in the capital city Paramaribo and a small number is located in the other districts where NV EBS operates isolated grids. NV EBS has a concession to operate on the whole soil of Suriname and have around 155.000 connections in Suriname. Power generations by NV EBS mainly take in Paramaribo at two fossil fuel plants with a total generating capacity of around 167 MW. The picture below shows an overview of the electricity generation by NV EBS in Suriname and customers served.

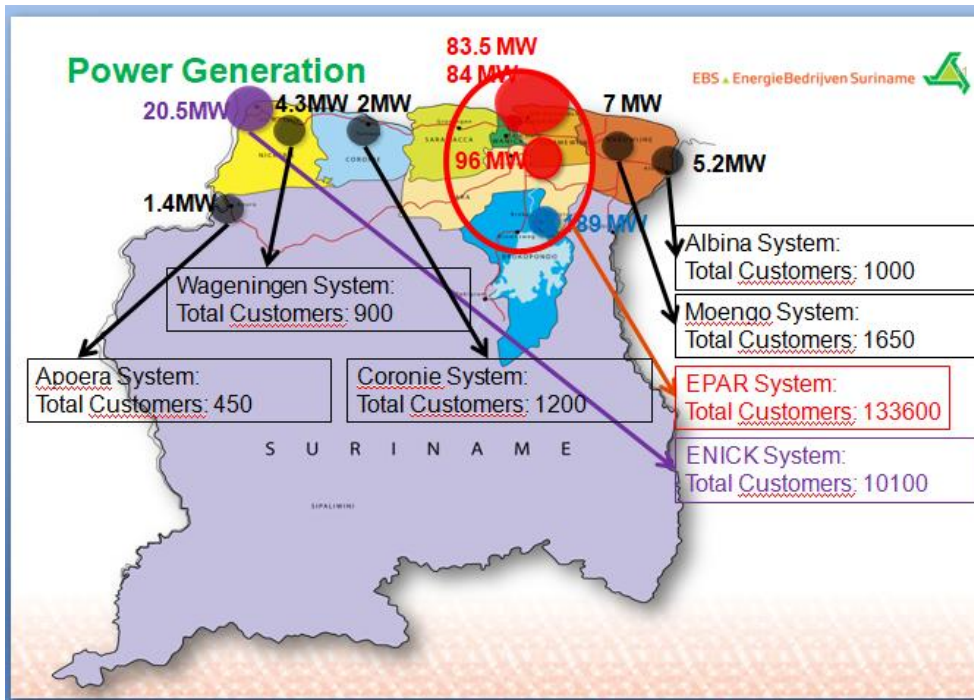


Figure 1 Power Generation (source: NV EBS)

The customer connections by NV EBS are grouped into categories. The residential customers are the biggest group but they account for a lesser portion of the electricity sales per year. NV EBS benefits the most from the electricity sales to the commercial and industrial customers. Most of the commercial and industrial customers are connected to the *EPAR* grid.

Chart 1 Customer Overview (source: NV EBS)

Type of Costumers	Number of Connections
Residential	135,001
Commercial	16,748
Industrial	220
Other	1,185
Total	153,154

In the Eastern Region of Suriname, two isolated NV EBS systems serve the clients in Moengo and Albina with 24/7 electricity. In both systems, the energy is produced with power units running on diesel fuel. These two systems account for 2,650 customer connections. The map below indicates the location of the villages to be affected by the feasibility study.

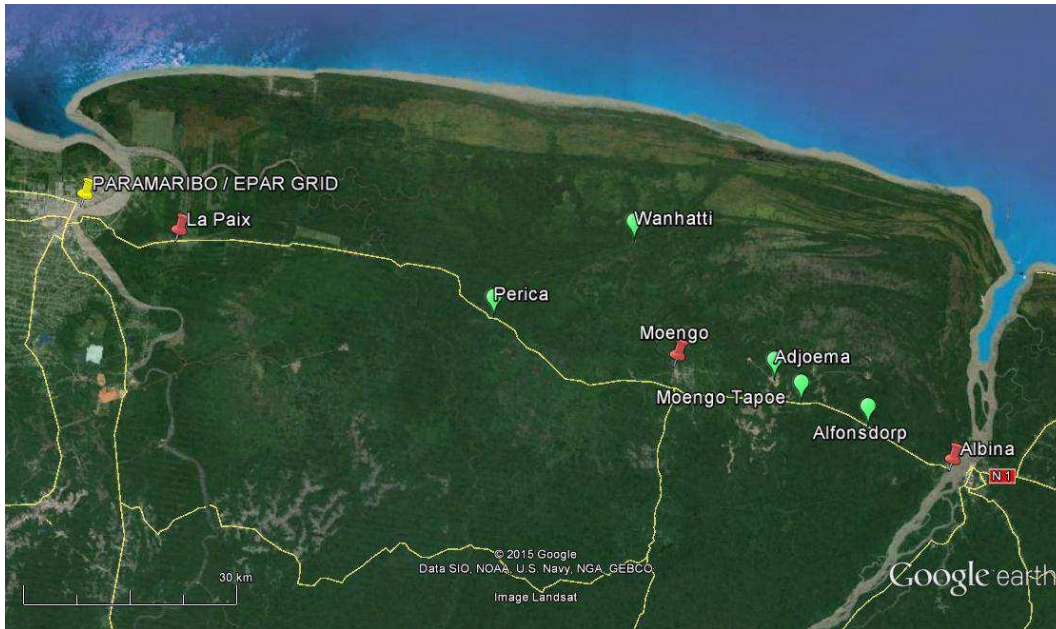


Figure 2 Villages between Moengo & Albina (source: NV EBS)

2.1.2 Mission and vision statements

Vision

The Vision of NV EBS is to be the leading power company in Suriname and the Caribbean by operating as a reliable development partner. (NV EBS, 2017)

Mission

To lead the industry by inspiring its people and creating added value for its consumers, the environment and shareholders by:

- Providing the community with reliable, cost-effective electricity;
- Demonstrating environmental care through efficient use of resources in the generation and distribution of energy;
- Obtaining benefits from existing and new opportunities in the field of electric power;
- Being devoted to 'first-class customer service', guaranteeing a balance between profit and affordability;
- Being innovative and incorporating industry's best practices;

- Being an exemplary employer and nurturing best performance, striving for the highest level of workplace safety and satisfaction. (NV EBS, 2017)

The proposed feasibility study is directly linked to the mission as the outcome of the feasibility study can result in obtaining benefits from new opportunities and on the other hand, create benefit for consumers, the environment and shareholders. The consumers can use reliable electricity to increase their economic activities. The benefit of the shareholder will increase on the other hand, as more people will use electricity.

2.1.3 Organizational structure

Recently NV EBS has changed its organizational structure. NV EBS is operating now as holding divided into several companies. The change was the result of two laws, the Electricity Act and Energy Authority Act (EAS) that came into force in March 2016.

Under EAS, a single-buyer model for electricity will be introduced that includes expanded participation of independent power producers and this should attract private investment to the sector to complement EBS' operations. The high-level organization structure of the reformed NV EBS is shown below.

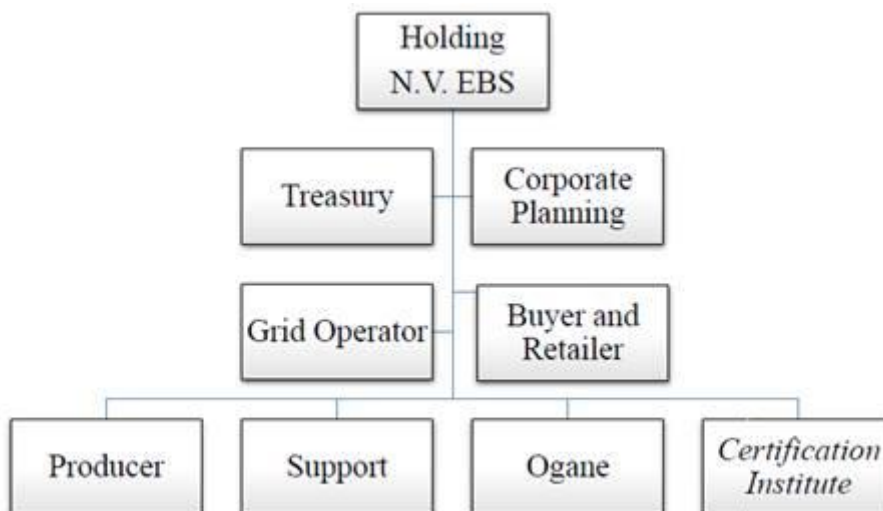


Figure 3 Organizational Structure (source: NV EBS)

Each subsidiary has its own management and organization structure. Project resides currently within Project Engineering Department, which is part of the supporting group and is reporting directly to the Chief Technical Officers (CTO). The project-engineering department is responsible for the execution of the feasibility study. A project executing team (PET) has been established for the feasibility study of which the organizational chart is shown below.

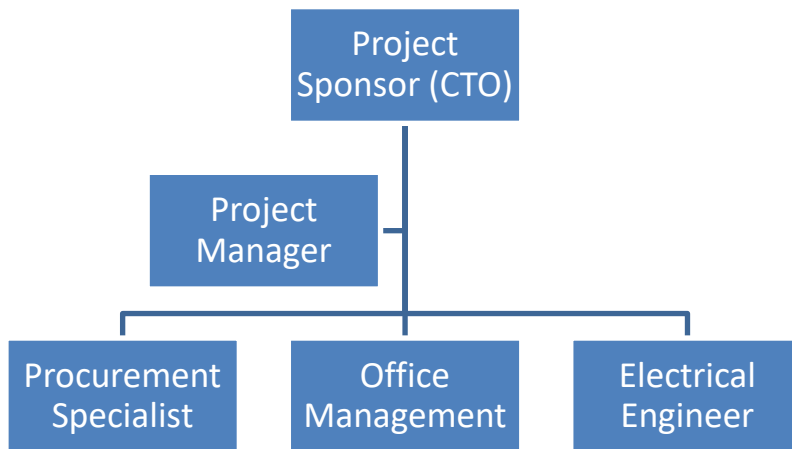


Figure 4 Project Executing Team (Source: NV EBS)

2.1.4 Products offered

The role of NV EBS as holding has not changed from its previous role. NV EBS is still responsible for the Generation, Transmission, Distribution, and Commercialization of Electricity. Apart from this role, *Ogane* is in charge of delivering LPG to households. OGANE distributes 90% of its propane in cylinders and 10% in bulk to commercial and industrial customers. On a daily basis, 3,000 cylinders are filled with LPG, which is distributed in three types of cylinders: 20 lbs, 28 lbs and 100 lbs.

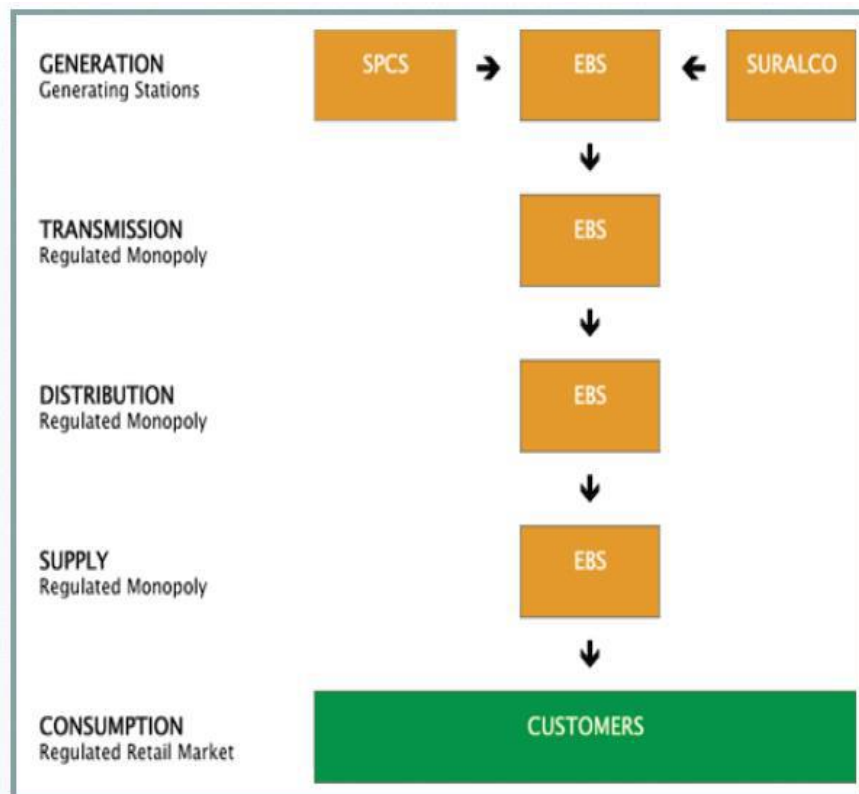


Figure 5 Power Generation, Transmission and Distribution (Source: NV EBS)

The output of the feasibility study has a direct link with the product offered by the NV EBS. If decided to continue with the project based on the outcome of the feasibility study, this will affect transmission, distribution and consumption. Transmission and distribution capacity will be expanded and more customers will be connected the NV EBS grid. The outcome of the feasibility study will provide NV EBS with analysis required to prioritize its effort to increase the electrification rate of Suriname.

2.2 Project Management concepts

2.2.1 Project

A Project is a temporary endeavor undertaken to create a unique product, service or result (Project Management Institute, 2017). Several other definitions exist for project, but they are all closely related. (Messi, 2017) Makes the following statement about project: "A project consists of a concrete and organized effort motivated by a perceived opportunity when facing a problem, a need, a desire or a

source of discomfort (e.g., lack of proper ventilation in a building). It seeks the realization of a unique and innovative deliverable, such as a product, a service, a process, or in some cases, a scientific research. Each project has a beginning and an end, and as such is considered a closed dynamic system. It is developed along the 4 Ps of project management: Plan, Processes, People, and Power (e.g., line of authority). It is bound by the triple constraints that are calendar, costs and norms of quality, each of which can be determined and measured objectively along the project lifecycle. Each project produces some level of formal documentation, the deliverable(s), and some impacts, which can be positive and/or negative (Messi, 2017). The association of project management (APM) defines a project as a unique, transient endeavor, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits. A project is usually deemed a success if it achieves the objectives according to their acceptance criteria, within an agreed timescale and budget (APM, 2018).

All these definitions have uniqueness and the temporary character of projects in common, even though different wording is used.

Feasibility study in the perspective of uniqueness, temporary and specific result can be considered a project. Every feasibility study is different, have an ending character and the objective is to produce specific result.

2.2.2 Project management

Project management is not something new. It dates back to a long time ago. In the past, it was more informal but now project management has developed into formal methodology. Two forefathers of project management are Henry Gantt, called the father of planning and control techniques who is famous for his use of the Gantt chart as a project management tool and Henri Fayol for his creation of the five management functions that form the foundation of the body of knowledge associated (civilengineersite.com).

Project management is the application of knowledge, skills, and techniques to project activities to meet the project requirements (Project Management Institute, 2017). The foundation of project management is formed by the process groups,

knowledge areas and processes. These are used in an integrated manner to meet the requirements of a project.

Project management is essentially aimed at producing an end product that will effect some change for the benefit of the organization that instigated the project. It is the initiation, planning and control of a range of tasks required to deliver this product, which could be a physical product, it could be new software or something less tangible like a new way of working (Naybour, 2018).

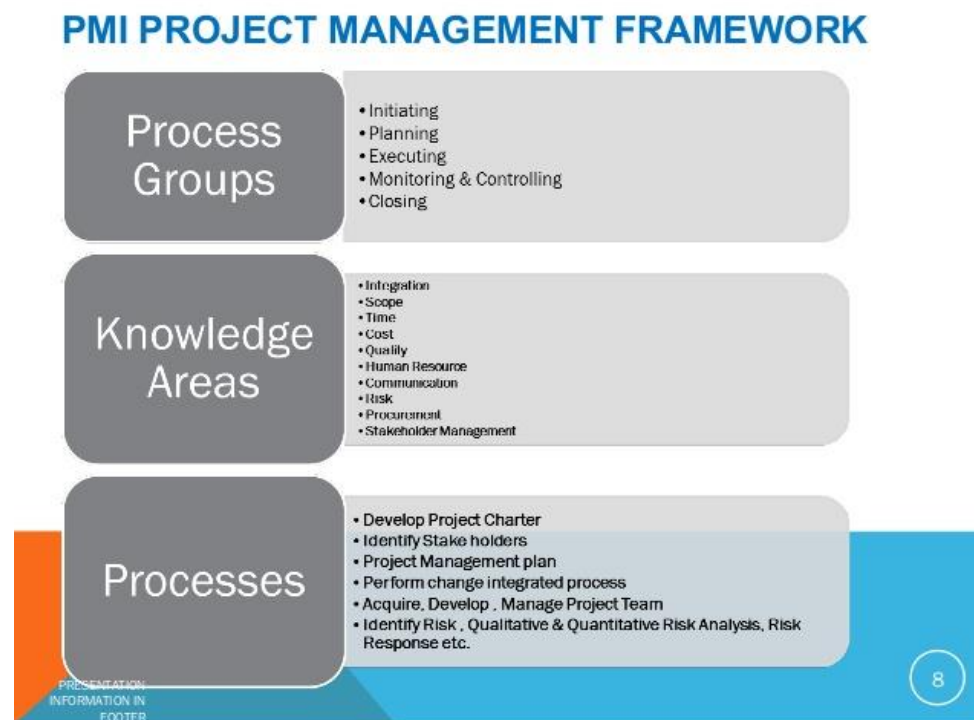


Figure 6 Project Management Framework (Source: PMI)

From an organizational perspective, the objective of project management is to align portfolios, program and project to the organizational strategies. A feasibility study can be used for alignment of project with the organizational strategy. A project will not be executed if no clear link can be established with the organizational strategy.

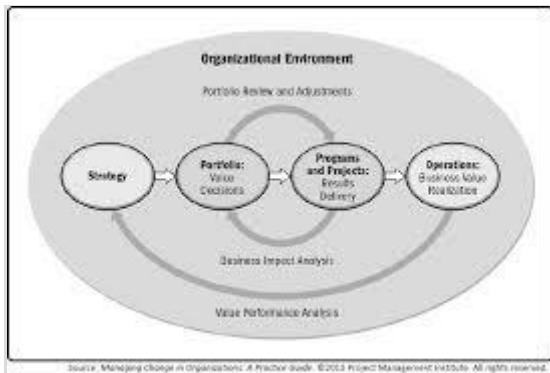


Figure 7 Organizational Project Management (source: PMI)

2.2.3 Project life cycle

Project life cycle according to PMBOK® GUIDE sixth edition is “the series of phases that a project passes through from its start to its completion” (Project Management Institute, 2017)). A phase is a collection of logically related project activities that culminates in the completion of one or more deliverable (Project Management Institute, 2017). Feasibility study is sometimes also considered a phase in a project. Examples of other phase names include but are not limited to:

- Basic Engineering,
- Detail engineering
- Commissioning

Project though unique goes through typical cycles consisting of starting the project organization and planning, carryout the work and ending the project. These cycles are sometimes referred to as the four generic phases of the project, which make up the generic project life cycle.

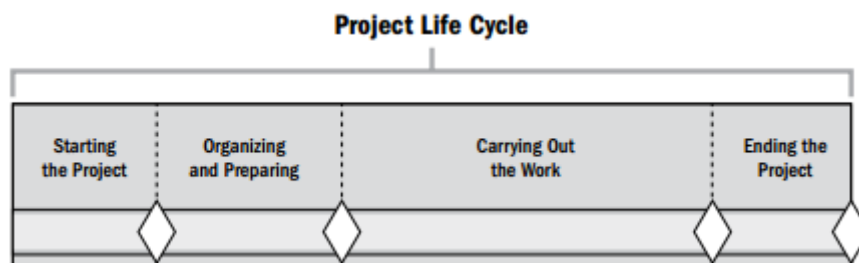


Figure 8 Generic Project Life Cycle (Source: PMI)

When a feasibility study is considered a project, it also has the project generic life cycle. For the feasibility study for the Integration of Moengo, Albina and villages

along the East-West Corridor into “Energievoorzienning Paramaribo” (EPAR) network the following phases have been identified:

Identification Phase

In this phase, the different ideas are prioritized and the best idea is selected for further evaluation.

Definition Phase

This phase links to the preparations of the requirements of the feasibility study.

Procurement phase

This phase includes all the activities required to acquire the eligible consultant for execution of the feasibility studies.

Inception Phase

The consultant prepares an initial report documenting all the available and missing data to successfully execute the project.

Execution Phase.

The consultant is actively involved in data gathering and detailing all the activities.

Reporting Phase.

Findings are presented to NV EBS and feedback is provided concerning the findings.

Closing

Acceptance of the result of the feasibility study and formally closing the project.

2.2.4 Project management processes

According to PMBOK® GUIDE sixth edition, process is “A systematic series of activities directed toward causing an end such that one or more inputs will be acted

upon to create one or more outputs (Project Management Institute, 2017). The project life cycle is managed by executing project management processes. Based on the characteristic of the project management process, it can be executed at predefined interval, once, continuously or as required. There are 49 processes divided into five process groups (Project Management Institute, 2017);

- Initiating process groups
- Planning process groups
- Executing process groups
- Monitoring and Control process groups
- Closing process groups

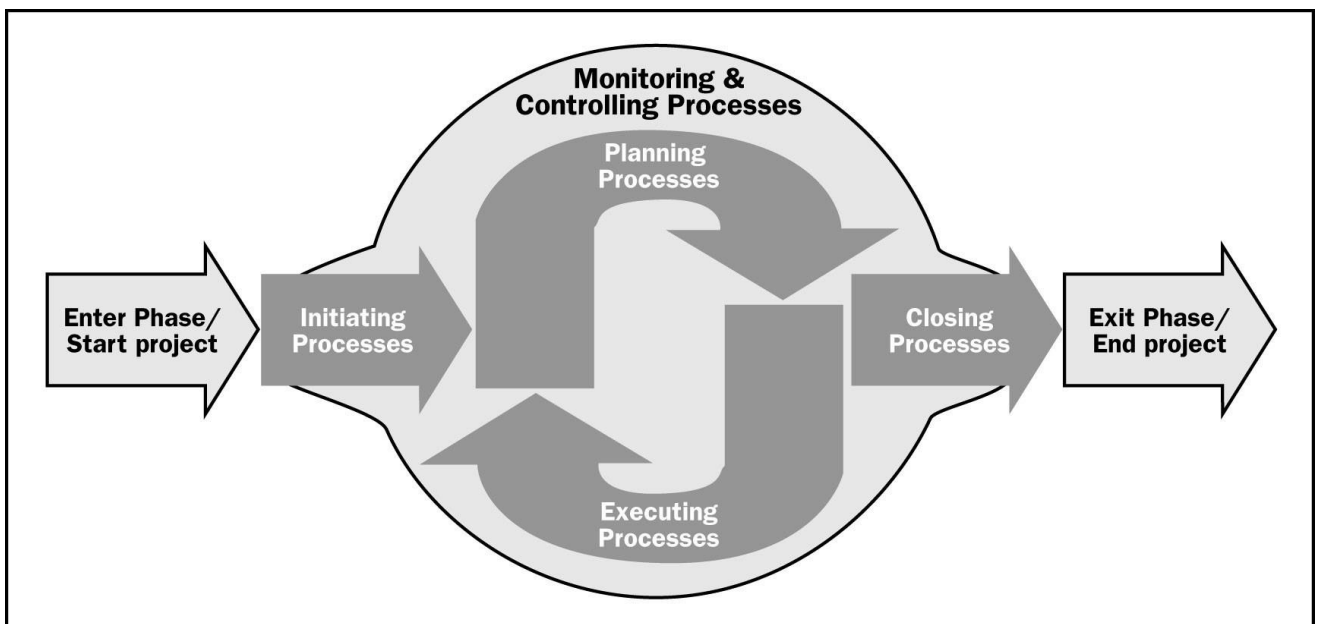


Figure 9 Project Management Process Groups (source: PMI)

Since the feasibility study is considered a project with different phase, all the five process groups are applicable for the feasibility study.

2.2.5 Project management knowledge areas

A knowledge Area is a set of processes associated with a particular topic in project management (Project Management Institute, 2017). PMBOK® Guide Sixth edition mentioned 10 Knowledge Areas but it leaves room open for additional knowledge areas based on the need of a specific project.

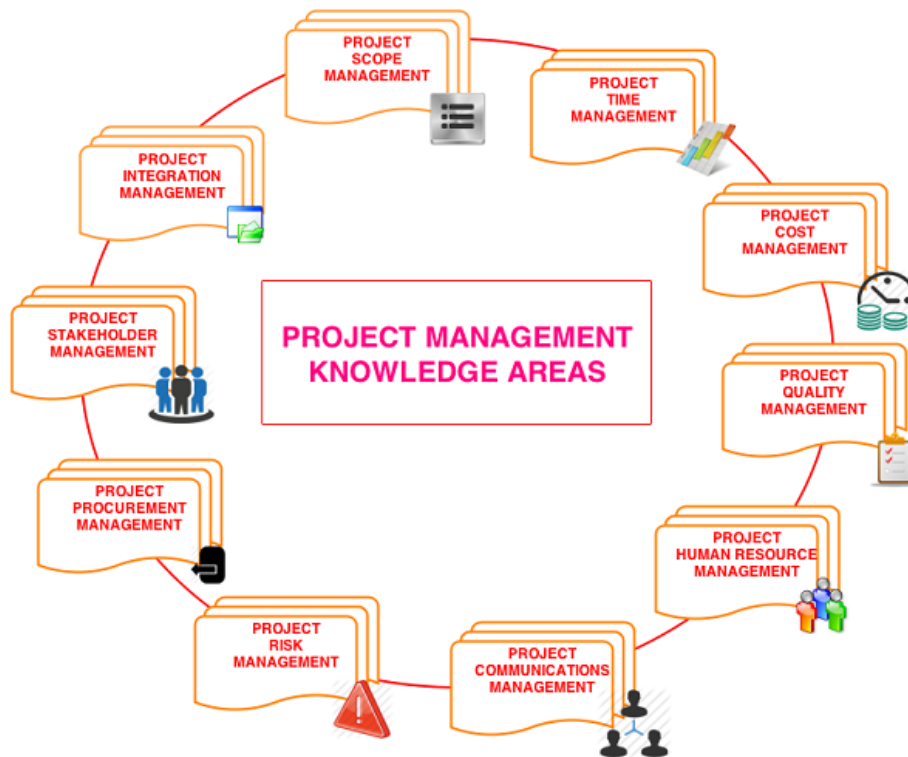


Figure 10 Knowledge Areas (source: www.kodyaz.com)

Although all the 10 knowledge areas are applicable for the feasibility study for the integration of Moengo, Albina and villages along the east-west corridor into energievoorziening Paramaribo (EPAR) network, based on importance for the specific feasibility study, the following knowledge areas have been identified.

Project scope management. Includes the processes and activities to ensure the project includes all the work required, and only the work required, to complete the project successfully (Project Management Institute, 2017)

Project Procurement Management. Includes all the processes necessary to purchase or acquire products, services or results needed from outside the project team (Project Management Institute, 2017).

Project Schedule Management. Includes the processes required to manage the timely completion of the project (Project Management Institute, 2017).

Project cost Management. Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so the project can be completed within the approved budget (Project Management Institute, 2017).

Project Resource Management. Includes the processes to identify, acquire, and manage the resources needed for the completion of the project (Project Management Institute, 2017).

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

2.3 Feasibility Study

Feasibility study is analysis of the viability of an idea. The feasibility focuses on answers the question “should we proceed with the Idea?”(Hofstrand & Mary Holz-Clause, What is Feasibility File C5-65, 2009) .The feasibility study provides support business decision making by providing analysis and recommendations required. It tries to identify issues upfront and recommend mitigation measures to help secure the actual project keeping in mind the project constraints. Determining in an early stage that an idea will not work saves time, money and frustration. Feasibility Study is done after the identification of the business idea. (Hofstrand & Mary Holz-Clause, What is Feasibility File C5-65, 2009)

2.3.1 Purpose of feasibility studies

Hofstrand & Mary Holz-Clause (2009) identified the following reasons for conducting feasibility study;

- Gives focus to the project and outline alternatives
- Narrows business alternatives
- Identifies new opportunities through the investigative process.

- Identifies reasons not to proceed.
- Enhances the probability of success by addressing and mitigating factors early on that could affect the project.
- Provides quality information for decision-making.
- Provides documentation that the business venture was thoroughly investigated.
- Helps in securing funding from lending institutions and other monetary sources.
- Helps to attract equity investment.
- Include all definitions and theory related to the project topic on this section.
- Include applicable subtitles as needed.

3 METHODOLOGICAL FRAMEWORK

Academic projects often require the use of information sources in order to define, illustrate, compare, support or apply ideas (Chan Shun Centennial Library, n.d).

3.1 Information sources

A source is a place or person from which you can obtain something useful or valuable. A resource is something that can be used to perform some function. The sources from where we get information are called information sources and these comprise of documents, humans, institutions as well as mass media like radio and television. Information sources are significant for information organizations and information users. This is because the sources indicate the current development in all fields, avoid duplication in research, give answers for specific queries, help us to understand some unfamiliar terms, provide meaning for terms and indicate broadened view of a subject. (ARORA, n.d)

Another definition for information source is, any system producing information or containing information intended for transmission; information science, the conventional designation for scholarly documents or publications, which serve not only as important sources but also as the means of transmission of information in space and time.

Information sources are distinguished by the form of representation: textual (books, journals, manuscripts), graphic (graphs, diagrams, plans, charts), and audiovisual (sound recordings, motion pictures, slides). Different information sources have arisen at various times, but they have all undergone significant evolution in the 20th century. The most important division of information sources was considered to be that into published and unpublished, since ideas and facts were acknowledged as introduced to scholarly use only after their publication, which implied wide dissemination and official registration of the corresponding documents. Information science has made a different division of information sources—into primary and secondary. Primary information sources chiefly contain new scholarly information or a new comprehension of known ideas and facts, such as books (excluding handbooks), periodicals and serials, special kinds of technical publications, scientific-technical reports, dissertations, and information charts. Secondary

information sources contain for the most part information from primary documents or about them, such as reference literature, surveys, journals of abstracts, library catalogs, and bibliographical indexes and card catalogs.

(encyclopedia2.thefreedictionary.com/Information+Source, n.d)

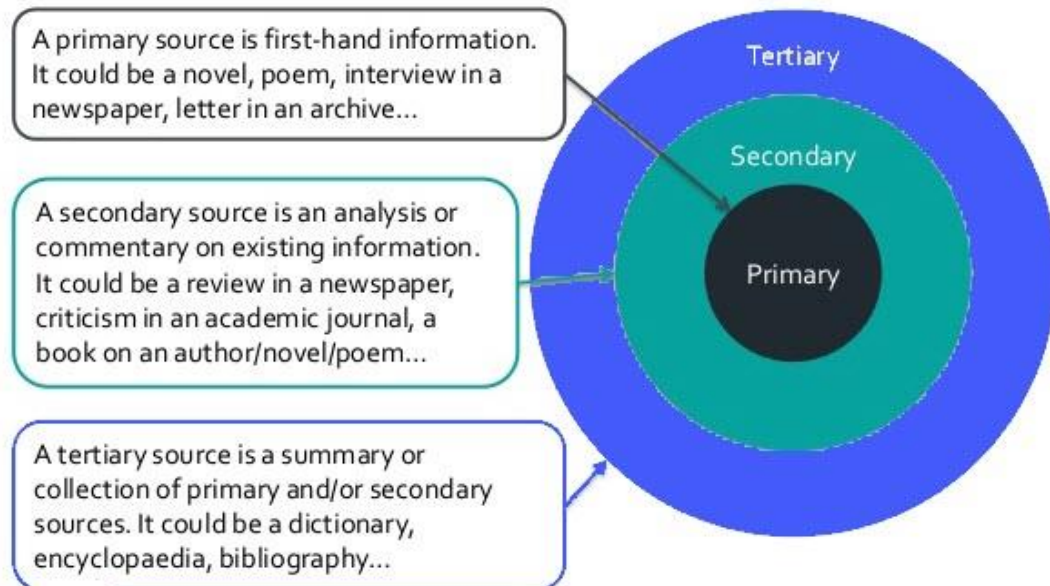


Figure 11 Information Sources (source: Colorado Virtual Library)

3.1.1 Primary sources

A primary source provides direct or firsthand evidence about an event, object, person, or work of art. Primary sources include historical and legal documents, eyewitness accounts, results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects. Interviews, surveys, fieldwork, and Internet communications via email, blogs, listservs, and newsgroups are also primary sources. In the natural and social sciences, primary sources are often empirical studies—research where an experiment was performed or a direct observation was made. The results of empirical studies are typically found in scholarly articles or papers delivered at conferences (ITHACA COLLEGE LIBRARY, n.d).

The primary sources to be used for the feasibility studies are PMBOK® Guide, MPM 2017/2018 course material, data retrieved from NV EBS, data retrieved from

DEV other FGP, Interviews with peoples from the affected areas, pre-feasibility study of the subject and professor feedback.

3.1.2 Secondary sources

Secondary sources describe, discuss, interpret, comment upon, analyze, evaluate, summarize, and process primary sources. Secondary source materials can be articles in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else's original research (ITHACA COLLEGE LIBRARY, n.d). Secondary sources to be used in the feasibility studies are books, websites, existing ESIA, International standards such IEEE and IEC.

Chart 2 Information sources (Source: Jerry Aseja)

Objectives	Information sources	
	Primary	Secondary
To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration.	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS • Interviews 	<ul style="list-style-type: none"> • Website • Books • FGP
To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS 	<ul style="list-style-type: none"> • Website • Books • FGP
To create a schedule management plan to ensure that the project is completed on time.	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS 	<ul style="list-style-type: none"> • Website • Books • FGP
To develop a cost management plan to make sure the project is within the approved budget.	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS 	<ul style="list-style-type: none"> • Website • Books

<p>To create a Resource management plan to manage the resource needed for the successful completion of the project.</p>	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS 	<ul style="list-style-type: none"> • Website • Books • FGP
<p>To construct a stakeholder management plan to promote productive involvement of stakeholders.</p>	<ul style="list-style-type: none"> • PMBOK® guide • MPM 2017/2018 course material • NV EBS • Interviews • DEV 	<ul style="list-style-type: none"> • Website • Books

3.2 Research methods

Research methods are the various procedures, schemes and algorithms used in research. All the methods used by a researcher during a research study are termed as research methods. They are essentially planned, scientific and value-neutral. They include theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc. Research methods help us collect samples, data and find a solution to a problem. Particularly, scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone. They accept only those explanations, which can be verified by experiments (Rajasekar, Philominathan, & Chinnathambi, 2013).

Research methodology is a systematic way to solve a problem. It is a science of Studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.(Rajasekar, Philominathan, & Chinnathambi, 2013)

Research is broadly classified into two main classes:

1. Fundamental or basic research
2. Applied research

The central aim of applied research is to find a solution for a practical problem that warrants solution for immediate use, whereas basic research is directed towards finding information that has broad base of applications and thus add new information to the already existing scientific knowledge (Rajasekar, Philominathan, & Chinnathambi, 2013).

Looking at the FGP, it can be classified as an applied research, because the outcome can immediately be used. For the purpose of the FGP content analysis, interview and survey research method have been used to meet the specific objectives. In some cases, a combination of one or more methods has been used for a specific objective.

3.2.1 Content analysis

Content analysis is a research technique used to make replicable and valid inferences by interpreting and coding textual material. By systematically evaluating texts (e.g., documents, oral communication, and graphics), qualitative data can be converted into quantitative data. Although the method has been used frequently in the social sciences, only recently has it become more prevalent among organizational scholars (www.terry.uga.edu/management/contentanalysis, n.d).

3.2.2 Interview

The word interview comes from Latin and middle French words meaning to “see between” or “see each other”. Generally, an interview means a private meeting between people when questions are asked and answered. The person who answers the questions of an interview is called the interviewee. The person who asks the questions of our interview is called an interviewer. (thebusinesscommunication.com/what-is-interview-types-of-interviews, n.d)

3.2.3 Survey

A systematic method for gathering information from (a sample of) individuals for the purposes of describing the attributes of the larger population of which the individuals are members. The attributes attempt to describe basic characteristics or experiences of large and small populations in our world (Enanoria, 2005).

Chart 3 Research methods (Source Jerry Aseja)

Objectives	Research methods		
	3.2.4 Content analysis	3.2.5 Interview	3.2.6 Survey
To produce a scope management plan to guarantee that the purpose and objectives of	All available documents related to the topic of scope	Unstructured interview was used to understand NV	

<p>the project are maintained throughout the project duration.</p>	<p>management Plan were studied and used as a guide to produce the scope management plan.</p>	<p>EBS Organizational Process Asset (OPA) and Enterprise Environmental factors (EEF).</p>	
<p>To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.</p>		<p>Unstructured interview was used to understand NV EBS Organizational Process Asset (OPA) and Enterprise Environmental factors (EEF) and to link them to the Procurement management Plan</p>	
<p>To create a schedule management plan to ensure that the project is completed on time.</p>	<p>All available documents related to the topic of schedule management Plan were</p>	<p>Unstructured interview was used to understand NV EBS Organizational Process Asset</p>	

	studied and used as a guide to produce the schedule management plan.	(OPA) and Enterprise Environmental factors (EEF) and to understand their preference for a scheduling method and software	
To develop a cost management plan to make sure the project is within the approved budget.	All available documents related to the topic of cost management Plan were studied and used as a guide to produce the cost management plan.		
To create a Resource management plan to manage the resource needed for the successful completion of the project.	All available documents related to the topic of resource management Plan were studied and used as a guide to produce the		

	resource management plan.		
To construct a stakeholder management plan to promote productive involvement of stakeholders.	All available documents related to the topic of stakeholder management Plan were studied and used as a guide to produce the stakeholder management plan...	Unstructured interview was use to understand needs, interest and expectations of the stakeholders.	Survey methodology was used to understand the needs, interest and expectations of the stakeholders

3.3 Tools

Tools and techniques form the link between the inputs and outputs of the 49 project management processes defined by PMI.

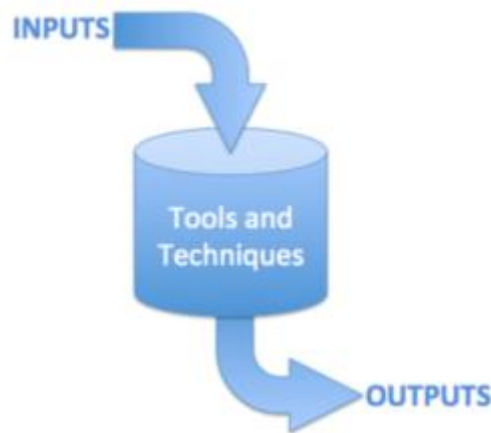


Figure 12 Inputs, Tools& Techniques, and Outputs (source: <https://oppmi.com/>)

Tool is something tangible, such as a template or software program, used in performing an activity to produce a product or result. (Project Management Institute, 2017).

Technique is a defined systematic procedure employed by a human resource to perform an activity to produce a product or result or deliver a service, and may employ one or more tools (Project Management Institute, 2017).

Below are the list of tools and techniques required to meet the objectives of the feasibility study for the Integration of Moengo, Albina and villages along the East-West Corridor into “Energievoorziening Paramaribo” (EPAR) network.

1. Expert Judgment

Expert Judgment is a technique in which judgment is provided based upon a specific set of criteria and/or expertise that has been acquired in a specific knowledge area, application area, or product area, a particular discipline, an industry, etc. Such expertise may be provided by any group or person with specialized education, knowledge, skill, experience, or training (Sotille, 2016)

2. Interpersonal and team skills

Skills used to effectively lead and interact with team members and other stakeholders (Project Management Institute, 2017).

3. Data gathering

Techniques used to collect data from various sources (Project Management Institute, 2017).

4. Meetings

Formal or informal deliberative assembly of individuals called to debate certain issues and problems, and to take decisions. Formal meetings are held at definite times, at a definite place, and usually for a definite duration to follow an agreed upon agenda. (www.businessdictionary.com, n.d)

5. Data analysis

Techniques used to organize, assess, and evaluate data and information (Project Management Institute, 2017)

6. Source selection criteria

A set of attribute desired by buyer which a the seller is required to meet or exceed to be selected for a contract

7. Organizational theory

Organizational theory provides information regarding the way in which people, teams and organizational units behave (Project Management Institute, 2017)

8. Data representation

Graphic representations or other methods used to convey data and information (Project Management Institute, 2017).

9. Decision making (voting)

Voting is a collective decision making technique and an assessment process for having multiple alternatives with an expected outcome in the form of future action. These techniques can be used to generate, classify, and prioritize products requirements.(Project Management Institute, 2017)

Chart 4 Tools (Source: Jerry Aseja)

Objectives	Tools
To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration.	<ul style="list-style-type: none"> • Expert Judgment • data analysis • meetings
To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.	<ul style="list-style-type: none"> • Expert Judgment • Meetings • Source selection criteria • Data analysis • Data gathering
To create a schedule management plan to ensure that the project is completed on time.	<ul style="list-style-type: none"> • Expert Judgment • data analysis • meetings
To develop a cost management plan to make sure the project is within the approved budget	<ul style="list-style-type: none"> • Expert Judgment • Data analysis • meetings
To create a Resource management plan to manage the resource needed for the successful completion of the project.	<ul style="list-style-type: none"> • Expert Judgment • Organizational theory • Data representation • meetings
To construct a stakeholder management plan to promote productive involvement of stakeholders.	<ul style="list-style-type: none"> • Expert Judgment • Data gathering • Data analysis • Data representation • Meetings • Decision making

3.4 Assumptions and constraints

As a project is full of uncertainties, proper project planning cannot take place unless we use assumptions. Proper project planning is linked directly to project success. We cannot manage something we have not planned for. As resources are scarce, planning is required to make sure that resources are available at the time required.

Assumption is a factor in the planning process that is considered true, real, or certain, without proof or demonstration (Project Management Institute, 2017).

Assumptions considered for the FGP are:

- Professor will provide timely feedback (1)
- The Student is reading all the course material (2)
- The student has access to the necessary software tools (3)
- All deliverable will be submitted In time (4)
- The Virtual campus will be available (5)
- Proposed FGP project will be accepted (6)
- The student has access to all the required information (7)

Another factor we need to take into consideration when we are planning a project is constraints.

According to the APM constraints are Restrictions or limitations that apply to a project, program, stage, work package etc. This could range from legal or regulatory constraints to time and cost limits (Praxis Framework Ltd, 2015)

Initially only one constraint was identified for the FGP; Time, the project must be completed in 3 months (1). Additionally identified constraints are:

Time

- each deliverable must be completed in one week(2)

- work can only take place after work hours.(3)

Quality

- Work must meet the FGP predefined quality (4)

Chart 5 Assumptions and constraints (Source Jerry Aseja)

Objectives	Assumptions	Constraints
To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration.	1,2,4,5,6,7	1,2,3,4
To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.	1,2,4,5,6,7	1,2,3,4
To create a schedule management plan to ensure that the project is completed on time.	1,2,3,4,5,6,7	1,2,3,4
To develop a cost management plan to make sure the project is within the approved budget.	1,2,3,4,5,6,7	1,2,3,4
To create a Resource management plan to manage the resource needed for the successful completion of the project.	1,2,4,5,6,7	1,2,3,4
To construct a stakeholder management plan to promote productive	1,2,4,5,6,7	1,2,3,4

Objectives	Assumptions	Constraints
involvement of stakeholders.		

3.5 Deliverables

A deliverable is any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase or project (Project Management Institute, 2017). Another definition for deliverable is a project management term for the quantifiable goods or services that will be provided upon the completion of a project. Deliverables can be tangible or intangible parts of the development process, and they are often specified functions or characteristics of the project (Investopedia, n.d).

The ultimate deliverable of the feasibility study for the Integration of Moengo, Albina and villages along the East-West Corridor into “Energievoorziening Paramaribo” (EPAR) networks to produce a comprehensive detail feasibility report, including technical design, financial analysis and environmental social Impacts of the recommended solution. Achieving the ultimate deliverable will be realized using the following FGP deliverables, which will ensure that the project is managed successfully to meet the project requirements

Project management plan

The project management plan is the document that describes how the project will be executed, monitored and controlled and closed (Project Management Institute, 2017).

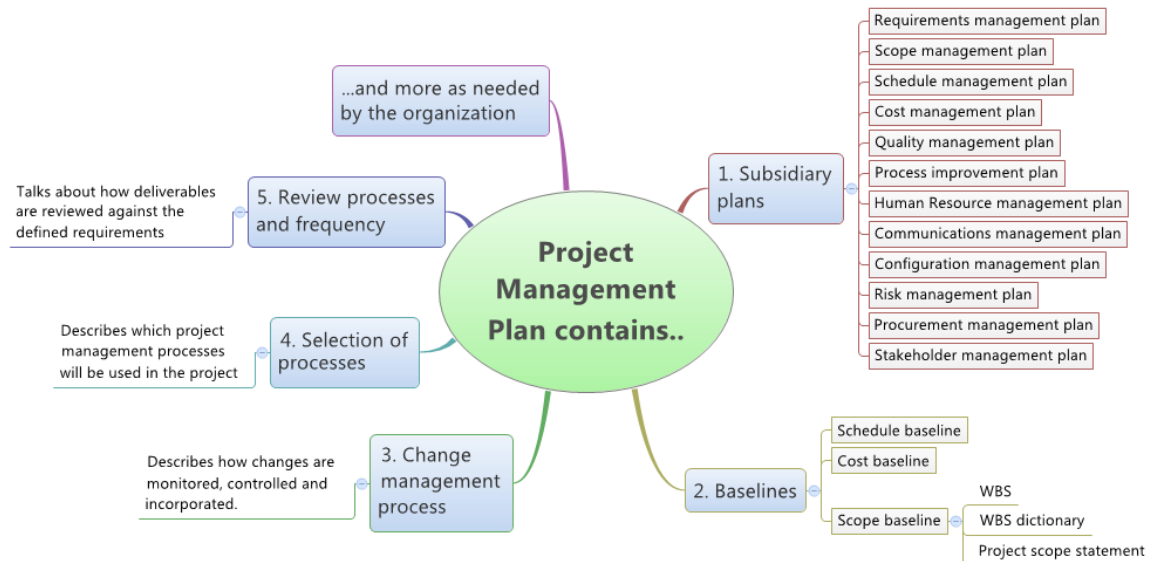


Figure 13 Content of Project management plan (source: www.pmaxamsmartnotes.com)

Scope management plan

Established how the scope will be defined, developed, monitored, controlled and validated (Project Management Institute, 2017).

Procurement management plan

Established how the project team will acquire goods and services from outside the performing organization (Project Management Institute, 2017).

Schedule management plan

Established the criteria and the activities for developing, monitoring, and controlling the schedule (Project Management Institute, 2017).

Cost management plan

Established how the cost will be planned, structured and controlled (Project Management Institute, 2017).

Resource management plan

Provide guidance on how project resources should be categorized, allocated, managed and released (Project Management Institute, 2017).

Stakeholder management plan

Established how stakeholders will be engaged in project decisions and execution, according to their needs, interest and impact (Project Management Institute, 2017).

Chart 6 Deliverables (Source Jerry Aseja)

Objectives	Deliverables
To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration.	Scope management plan.
To produce a procurement management plan to document how the correct resources will be acquired to successfully complete the project.	Procurement management plan.
To create a schedule management plan to ensure that the project is completed on time.	Schedule management plan
To develop a cost management plan to make sure the project is within the approved budget.	Cost management plan
To create a Resource management plan to manage the resource needed for the successful completion of the project.	Resource management
To construct a stakeholder management plan to promote productive involvement of stakeholders.	Stakeholder management plan

4 RESULTS

4.1 Scope Management Plan

Scope Management is the collection of processes, which ensure that the project includes all the work required to complete it while excluding all work that is not necessary to complete it. The Scope Management Plan details how the project scope will be defined, developed, and verified. It clearly defines who is responsible for managing the project's scope and acts as a guide for managing and controlling the scope.

Project Scope Management follows a five-step process; Collect Requirements, Define Scope, Create WBS, Verify Scope, and Control Scope.

Collect Requirements

This first step is the process by which we define and document the requirements needed to meet all project objectives. The foundation of this process is the project charter and stakeholder register. From these, the team can identify requirements, collectively discuss details associated with meeting each requirement, conduct interviews and follow-on discussion to clarify the requirements, and document the requirements in sufficient detail to measure them once the project begins the execution phase. This documentation also serves as an input to the next step in the process, which is to define scope.

Define Scope

This step is critical to the project's success as it requires the development of a detailed project/product description to include deliverables, assumptions, and constraints and establishes the framework within which project work must be performed.

Create WBS

This process breaks project deliverables down into progressively smaller and more manageable components that, at the lowest level, are called work packages. This

hierarchical structure allows for more simplicity in scheduling, costing, monitoring, and controlling the project.

Verify Scope

This is the process by which the project team receives a formalized acceptance of all deliverables with the sponsor and/or customer.

Control Scope

This is the process of monitoring/controlling the project/product scope as well as managing any changes in the scope baseline. Changes may be necessary to the project's scope but it is imperative they are controlled and integrated in order to prevent scope creep.

The Scope Management Plan provides the scope framework for the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. This plan documents the scope management approach; roles and responsibilities as they pertain to project scope; scope definition; verification and control measures; scope change control; and the project's work breakdown structure. Any project communication that pertains to the project's scope should adhere to the Scope Management Plan.

This project is for conducting feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. This includes acquiring a consultant and executing of the feasibility study.

The Project Manager, Sponsor and team will all play key roles in managing the scope of this project. The project sponsor, manager, and team members must be aware of their responsibilities in order to ensure that work performed on the project is within the established scope and budget throughout the entire duration of the project. Every scope change request will go through a very stringent process as

the budget of this project is fixed. The chart below defines the roles and responsibilities for the scope management of this project.

4.1.1 Scope statement

This project includes acquiring Consultant and managing the activities of the consultant .The scope of the consultant can be divided into three phases; the inception phase, the design phase and analysis phase. In the inception phase a complete review of existing documentation, kick-off meeting, and stakeholder consultations should take. The design phase includes technical investigation and documentation of the possible options and in the analysis phase, a comprehensive technical feasibility, financial and economic analysis of recommended investments and design should be carried out which includes developing a budget, schedule and environmental and social impact study. The deliverables of this project includes Consultant contract, final work plan, technical specifications and design, project budget and schedule, financial and economic analysis of the project, ESIA and ESMP. The project will be accepted once NV EBS has approved the final report.

4.1.2 Work Breakdown Structure

In order to effectively manage the project the scope is sub divided into seven main tasks. Each of the tasks is further divided into work packages. The figure below shows the WBS for this project.

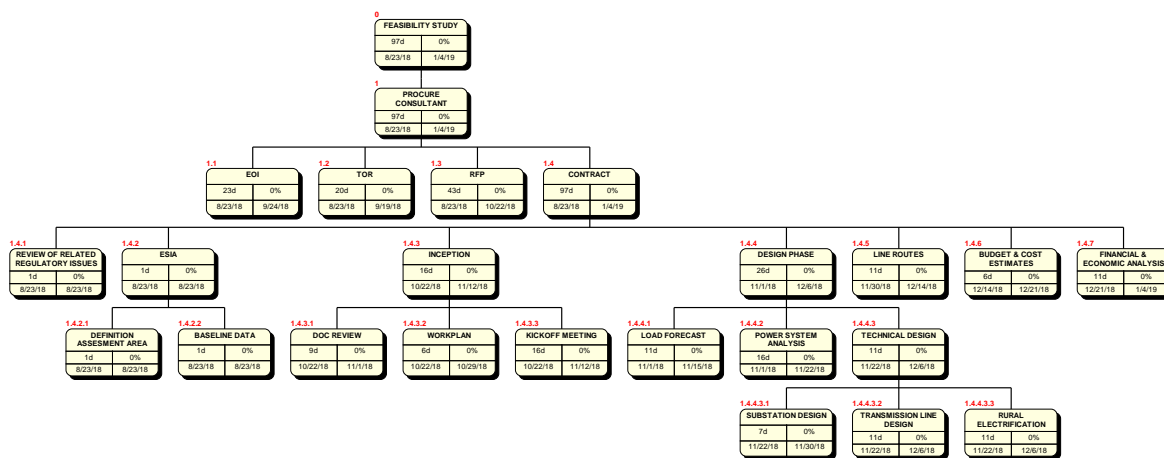


Figure 14 WBS Feasibility Study (Source: Jerry Aseja)

Task1 Acquire Consultant.

In this task all the activities require to procure the consultant is undertaken. This is a very important activity as it for the basis for all the other activities.

Task1.4.1 Review of related regulatory issues

The Consultant shall review existing regulations, laws and institutions that would impact project implementation (technical, social, environmental and others). Throughout the course of the study, he shall monitor any changes in regulations, laws, and institutions that would impact project implementation.

Task 1.4.2: Comprehensive environmental and social impact assessments

The Consultant shall conduct the environmental and social impact assessments of the project (components 1 and 2) and an environmental and social management plan with reference to local requirements and those of AFD that are based on World Bank E&S safeguards policies.

Task1.4.3: Document review, kick-off meeting, stakeholder consultations, work plan

Sub-Task 1.4.3.1: Document Review

NV EBS shall provide the Consultant with all available information related to the project and other electricity generation, transmission and distribution projects that are currently operational, under construction, or expected within the next five years and would impact the project.

Sub-Task 1.4.3.2: work plan

Review the work plan and gather input from the Client regarding the objectives of the study, issues surrounding NV EBS's plans for the project and any changes in the work plan.

Sub-Task 1.4.3.3: Kick-off meeting

The Consultant shall conduct a kick-off meeting to introduce its team, review the tasks to be performed under these TOR. The kick off meeting is the first meeting that will be held once the consultant have been engage (contract signed). This meeting should take place no later than one week after the contract has become effective and should include all the key stakeholders , the project team, the AFD, the sponsor, the consultant and other relevant stakeholders to be identified by the NV EBS.

Stakeholders consultations are one of the key activities to be executed by the Consultant. These consultations can be in the form of town hall meetings.

Task 1.4.4: Technical feasibility and design

Sub-Task 1.4.4.1: Load forecast

The Consultant shall develop a load forecast for the project within a radius of 25 kilometers of the initial projected route for the transmission line. The forecast shall cover a 25 years period and include at least three load growth scenarios (low, medium and high). The method selected to develop the load forecast shall be presented to NV EBS for its inputs.

The Consultant shall monitor the status of ongoing and planned electricity generation, transmission, and distribution projects that would impact the load forecast for the project.

Sub-Task 1.4.4.2: Power System Analysis

The Consultant shall develop a model of the project and carry out a power analysis to determine how the project would impact the existing electricity infrastructures of

EPAR. Counter or mitigation measures shall be identified for all possible negative effects and accompanied by financial consequences. The analysis shall include load flow calculations, stability (static, dynamic and transient), short circuit calculations, voltage profile at 69 and 12 kV level, active and reactive line loading, transmission and distribution losses, simulation of different fault type and their impact on EPAR.

Sub-Task 1.4.4.3: Technical design

Technical design shall encompass all aspect: electrical, civil work, quality of service, protection scheme, SCADA, based on international / national / NV EBS standards and consider actual surrounding conditions. For the line transmission and distribution line part IEEE will be used. For the substation IEC will be applied. All relevant design criteria and design drawings shall be properly documented and reported.

Subtask 1.4.4.3.1 Substations inspection, extension and construction

The Consultant shall develop a detailed design for all substations required for the project and estimate their cost. The design shall include the electrical compensation system and protection scheme for the communication, control and supervisory control and data acquisition systems (and its integration with NV EBS current systems) required for the project. All relevant design criteria and design drawings shall be properly documented and reported.

Subtask 1.4.4.3.2 Transmission line

The Consultant shall develop a detailed design for the transmission line and estimate its cost. The Consultant shall carry out load flows and stability analyses to determine the capacity of the 69 kV and 12 kV lines for different loading conditions and electricity generation schedules. He shall carry out analyses of critical component outages for real-time detection of problems on each line and on electricity generation facilities connected to the project. All relevant design criteria and design drawings shall be properly documented and reported.

Subtask 1.4.4.3.3 Rural electrification

The consultant shall identify all villages to be affected with a radius of 25 km of the proposed transmission line, verify and update existing demography data a detail design and estimate for the distribution and low voltage networks require to connect the households to the EBS electricity grid. Public lighting of LED type according to EBS standards in the villages and the connections up to the kilowatt-hours meters have also to be taken into consideration. Prepaid type of meter is preferred. The consultant will also be required to make an assessment of existing electrical installations in the villages. A ballpark figure should be presented to correct existing households' installation to become compatible with NV EBS standards

Sub-Task 1.4.5: Lines route

The Consultant shall spend at least 2 weeks conducting onsite assessments along proposed transmission and distribution lines. He shall assess the ROW needs as well as any project-affected parties. Using internationally acceptable approaches for both formal and informal settlements along the proposed route, he shall assess the total involuntary resettlement requirements and propose a resettlement action plan (and associated implementation schedule) – in conjunction with Task 6.

In this respect, The Consultant shall identify and analyze various route options for the transmission and distribution lines based on soil investigation and profiling, aiming to avoid private properties and minimizing other negative environmental and social impact (visual impact, noise, ...). The proposed substation sites for the project shall also be developed based on location of present and future load centers, existing and future sources of power source and grid, site maintenance requirements. Information should be comprehensively mapped and exploitable data should be made available to the EBS (kml files for instance).

The Consultant shall assess the best location for poles and towers with all security guarantees for neighboring houses.

Task 1.4.6: Develop cost estimates and investment need for project

The Consultant shall prepare detailed cost estimates for the construction of the proposed transmission and distribution lines and all related systems and equipment requirements. He shall derive civil work prices for the project, taking into account internationally acceptable and practiced construction methodologies for estimating the costs for construction equipment, local labor, materials, etc. He shall base the material and equipment prices on industry quotes and appropriate equipment contingencies.

In addition to the construction, material, labor and related project costs, the Consultant shall develop cost estimates for engineering, supervision, administration, legal requirements, land acquisition, towers/poles, resettlement and environmental remediation. He shall allow for appropriate contingencies, price escalations due to inflation for the duration of the construction time needed for the proposed transmission and distribution lines.

Task 4 Deliverables: project budget and schedule.

Task 1.4.7: Conduct a financial and economic analysis of recommended investments

Based on the total investment requirements for the project, the Consultant shall conduct detailed economic and financial analyses, including a life cycle cost analysis of equipment and services, of the proposed investments using internationally acceptable methodology for such analyses. He shall calculate the economic and financial internal rates of return and net present value under a variety of assumptions and the results of the load flow analyses.

Also, the Consultant shall provide a model for end-used tariff for the rural electrification component including: number of connections, consumptions and electricity sold, unaccounted for power consumption, recovery target, operation

and maintenance expenditure, investment program, depreciation of assets, tentative annual balance sheet. The model will remain simple but will help to determine the real price of electricity and allow the Client to propose adequate tariff and investments strategy.

The methodology proposed by the Consultant on this particular task will be subject to in-depth scrutiny during evaluation of the bids.

4.1.3 Scope Verification

As this project progresses the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement, WBS and WBS Dictionary. Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager and Sponsor will meet for formal acceptance of the deliverable. During this meeting the Project Manager will present the deliverable to the Project Sponsor for formal acceptance. The Project Sponsor will accept the deliverable by signing a project deliverable acceptance document. This will ensure that project work remains within the scope of the project on a consistent basis throughout the life of the project.

4.1.4 Scope Control

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

If a change to the project scope is needed the process for recommending changes to the scope of the project must be carried out. Any project team member or sponsor can request changes to the project scope. All change requests must be submitted to the Project Manager in the form of a project change request

document. The Project Manager will then review the suggested change to the scope of the project. The Project Manager will then either deny the change request if it does not apply to the intent of the project, or convene a change control meeting between the project team and Sponsor to review the change request further and perform an impact assessment of the change. If the change request receives initial approval by the Project Manager and Sponsor, the Project Manager will then formally submit the change request to the Change Control Board. If the Change Control Board approves the scope change, the Project Sponsor will then formally accept the change by signing the project change control document. Upon acceptance of the scope change by the Change Control Board and Project Sponsor the Project Manager will update all project documents and communicate the scope change to all project team members stakeholders.

4.2 Procurement Management Plan

4.2.1 Introduction

The purpose of the Procurement Management Plan is to define the procurement requirements for the project and how it will be managed, from developing procurement documentation through contract closure. The Procurement Management Plan complies with AFD procurement guidelines and the NV EBS internal processes. The Procurement Management Plan defines the following:

- Procurement definition
- Type of contract
- Identifying potential bidders
- Required deliverables
- Evaluation criteria (weighting of requirements)
- Establishing contract deliverables and deadlines
- Vendor Management/Oversight

This Procurement Management Plan sets the procurement framework for the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. It will

serve as a guide for managing the procurements throughout the life of the project and will be updated, as acquisition needs change. This plan identifies and defines the items to be procured, the types of contracts to be used in support of this project, the contract approval process, and decision criteria. The importance of coordinating procurement activities, establishing firm contract deliverables, and metrics in measuring procurement activities is also included.

4.2.2 Procurement Management Approach

The Project Manager will provide oversight and management in concert with appropriate AFD procurement and management staff for all procurement activities under the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. The Project Manager will work with the project team to identify all items to be procured for the successful completion of the project. The Project Manager will then review the procurement list with the Project Sponsor for approval. The process involves determining whether, if so, what to acquire, how to acquire it, how much is needed, and when to acquire it.

4.2.3 Procurement Definition

The following procurement service have been determined to be essential for completion and success of the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network

Chart 7 Procurement Plan (Source: Jerry Aseja)

Item/Service	Justification	Category	Needed By
Consultancy Services	Need to undertake the feasibility study	service	23 August 2018

In addition to the above list of procurement item, the following individuals are authorized to approve purchases for the project team:

Name	Role
Jerry Aseja	Project Manager
Marcel Eyndhoven	Project Sponsor

4.2.4 Contract type

The consultancy services contract will be procure on basis of Firm-Fixed price and payment will be made based on Milestones. First an Expression of Interest (EOI) will be issued after which the Request for Proposal (RFP) will distributed to the selected vendors in order to procure the consultancy services within the required time frame and at a reasonable cost under the firm fixed price contract once the vendor is selected.

4.2.5 Procurement Approval Process

The procurement model must comply with AFD procurement policy for the selection of consultant which in this case is international competitive bidding using the Quality Cost based selection method. As a first step an EOI have to be released in at least one local Newspaper and one International site and 1 month have to be allowed for the possible vendors to prepare their EOI. After closing of the EOI advertising period, the received proposals will be evaluated upon which 3 to 6 possible suppliers will be selected to continue to the RFP process. Before continuing to the RFP process, approval needs to be provided by evaluation team, the sponsor, the MinFin and the AFD. After receipt of the no objection from AFD, the RFP is submitted to the selected suppliers. For the evaluation of the RFP, the two-stage method is used, Technical and Commercial offers should be submitted in several sealed envelopes. The technical proposal is evaluated first after which the commercial bids is evaluated. After each stage, formal approval has to be given using the approval routing described above.

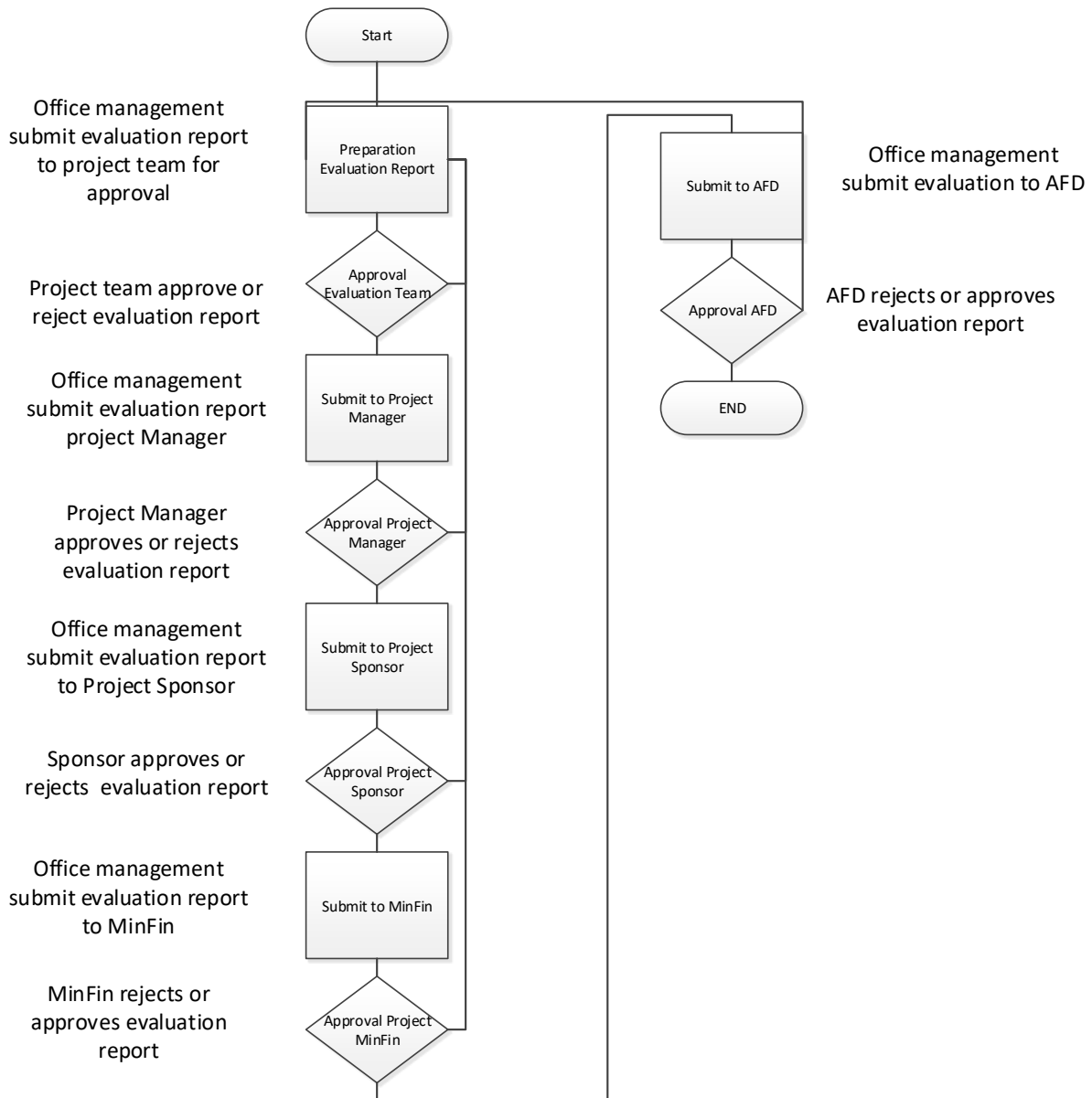


Figure 15 Approval Routing (Source: Jerry Aseja)

4.2.6 Decision Criteria

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

- Mandatory Requirements
- Vendor financial documentation
- General Qualifications & Experience (vendor and proposed staff)
- Past performance Technical Qualifications
- Quality

- Ability of the vendor to provide all items by the required delivery date
- Cost

These criteria will be measured by the AFD evaluator, Subject Matter Experts (SME) and the Project Manager. The final decision will be made based on these criteria as well as available resources.

4.2.7 Vendor Management

The Project Manager is ultimately responsible for managing vendors. In order to ensure the timely delivery and high quality of products from vendors, the Project Manager will meet weekly with the procurement department along with Consultant to discuss the progress. The purpose of these meetings is to review all documented specifications for the services. This forum will provide an opportunity to review each item's development or the service provided in order to ensure it complies with the requirements established in the project specifications. It also serves as an opportunity to ask questions or modify contracts or requirements ahead of time in order to prevent delays in delivery and schedule. The Project Manager will be responsible for scheduling this meeting on a weekly basis until all items are delivered and are determined to be acceptable.

4.3 Schedule Management Plan

4.3.1 Introduction

The project schedule is the roadmap for how the project will be executed. Schedules are an important part of any project as it can be used to proactively guide the project to timely completion. The schedule gives a snapshot picture of the project's status at any given time. The purpose of the schedule management plan is to define the approach the project team will use in creating the project schedule. This plan also includes how the team will monitor the project schedule and manage changes after the baseline schedule has been approved. This includes identifying, analyzing, documenting, prioritizing, approving or rejecting, and publishing all schedule-related changes.

4.3.2 Schedule Management Approach

The initial project schedules will be created using MS Project 2013 as they are already familiar with this software and has a valid license for this software. Starting with the deliverables identified in the project's Work Breakdown Structure (WBS). The project will be further divided in activities that form the basis for the specific work packages that must be performed to complete each deliverable. Activity sequencing will be used to determine the order of work packages and assign relationships between project activities. The most commonly used relationship for the project is the "Finish to Start" relationship. Activity duration estimating will be used to calculate the number of work periods required to complete work packages. Resource estimating will be used to assign resources to work packages in order to complete schedule development.

Once a preliminary schedule has been developed, the critical path and the project duration will also be calculated. The draft schedule will be reviewed by the project team and any resources tentatively assigned to project tasks. The project team and resources must agree to the proposed work package assignments, durations, and schedule. Once this is achieved the project sponsor will review and approve the schedule and it will then be base-lined. This schedule will be provided to the

Consultant as starting point. After the inception period the consultant will be required to update the schedule as necessary and present it to the project team for approval.

The following will be designates as milestones for the project schedule:

- Start of the project
- Completion of scope statement and WBS/WBS Dictionary
- Base-lined project schedule
- Project kick-off
- Approval of roles and responsibilities
- Requirements definition approval
- Launch of EOI
- Launch of RFP
- Engagement of the Consultant
- Approval Inception Report
- Completion of technical specifications and design.
- Completion project budget and schedule project implementation
- Completion financial and economic analysis of the project
- Completion of environmental and social impact assessments
- Acceptance of final report

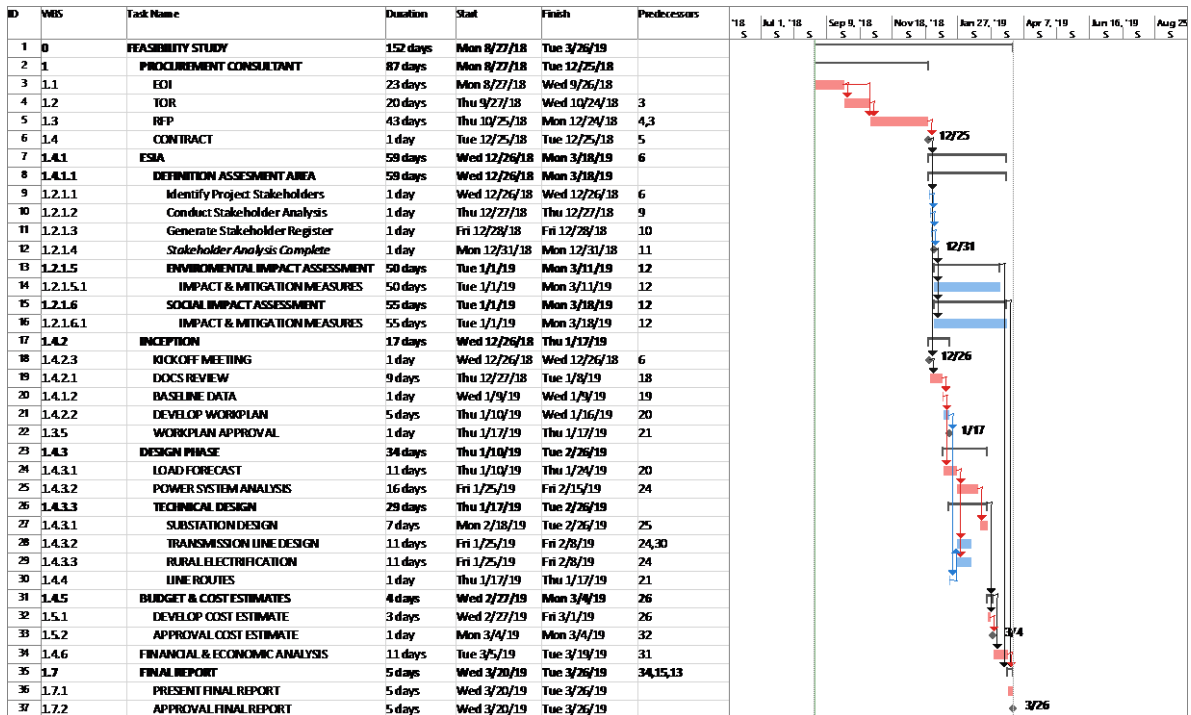


Figure 16 Preliminary Project schedule (source: Jerry Aseja)

Roles and responsibilities for schedule development are as follows:

The project manager will be responsible for facilitating work package definition, sequencing, and estimating duration and resources with the project team. The project manager will also create the project schedule using MS Project 2013 and validate the schedule with the project team, stakeholders, and the project sponsor. The project manager will obtain schedule approval from the project sponsor and baseline the schedule.

The project team is responsible for participating in work package definition, sequencing, and duration and resource estimating. The project team will also review and validate the proposed schedule and perform assigned activities once the schedule is approved.

The project sponsor will participate in reviews of the proposed schedule and approve the final schedule before it is base-lined.

The project stakeholders will participate in reviews of the proposed schedule and assist in its validation.

4.3.3 Schedule Control

The project schedule will be reviewed and updated as necessary on a weekly basis for the first two months and later on bi-weekly basis with actual start, actual finish, and completion percentages that will be provided by task owners.

The project manager is responsible for holding weekly and bi-weekly schedule updates/reviews; determining impacts of schedule variances; submitting schedule change requests; and reporting schedule status in accordance with the project's communications plan.

The project team is responsible for participating in weekly and bi-weekly schedule updates/reviews; communicating any changes to actual start/finish dates to the project manager; and participating in schedule variance resolution activities as needed. The project team is also responsible for immediate communication of schedule variances to the project manager that to their assessment is critical and cannot wait until the bi-weekly meeting.

The project sponsor will maintain awareness of the project schedule status and review/approve any schedule change requests submitted by the project manager.

4.3.4 Schedule and Scope Changes

If any member of the project team determines that a change to the schedule is necessary, the project manager will make sure that the change request is evaluated against the established change request procedure and that the effect of the change is properly documented.

Once the change request has been reviewed and approved the project manager is responsible for adjusting the schedule and communicating all changes and impacts to the project team, project sponsor, and stakeholders.

Any changes in the project scope, which have been approved by the project sponsor, will require the project team to evaluate the effect of the scope change on the current schedule. If the project manager determines that the scope change will significantly affect the current project schedule, he/she may request that the schedule be re-baselined in consideration of any changes that need to be made as

part of the new project scope. The project sponsor must review and approve this request before the schedule can be re-baselined.

4.4 Resources Management Plan

4.4.1 Introduction

Human resources management is an important part of the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. The human resources management plan is a tool that will aid in the management of this project's human resource activities throughout the project until closure. The human resources management plan includes:

- Roles and responsibilities of team members throughout the project
- Project organization charts
- Staffing management plan to include:
 - a. How resources will be acquired
 - b. Timeline for resources/skill sets
 - c. How performance reviews will be conducted
 - d. Recognition and rewards system

The purpose of the human resources management plan is to achieve project success by ensuring the appropriate human resources are acquired with the necessary skills, resources are trained if any gaps in skills are identified, team building strategies are clearly defines, and team activities are effectively managed.

4.4.2 Roles and Responsibilities

The roles and responsibilities for the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network are essential to project success. All team members must clearly understand their roles and responsibilities in order to successfully

perform their portion of the project. For the Project, the following project team roles and responsibilities have been established:

Project Manager (PM)

Responsible for the overall success of the Project. The PM must authorize and approve all project expenditures. The PM is also responsible for approving work activities. The PM will be responsible for reporting project status in accordance with the communications management plan. The PM will evaluate the performance of all project team members and communicate their performance to functional managers. The PM is also responsible for acquiring human resources for the project through coordination with functional managers. The PM must possess the following skills: leadership/management, budgeting, scheduling, and effective communication.

The Electrical Engineer (EE)

The EE is responsible for gathering the technical requirements for the Project. The Electrical Engineer will work closely with the consultant in the preparation of specifications for inclusion in the reports and will provide support to all other team members. In addition, the Electrical Engineer will be responsible for maintaining good coordination and dialogue between all entities involved in the implementation of the Project. The EE may not authorize any project expenditures nor allocate any resources without PM approval. EE performance will be managed by the PM and communicated to the EE's Functional Manager.

The Procurement Specialist (PS)

The Procurement Specialist is responsible for the overall management and administration of all aspects and activities associated with procurement of goods, works and services for the Project in accordance with AFD and NV EBS guidelines for Procurement , guidelines for the Selection and Engagement of Consultants. He/she will assist PC in the invitation of bids and the preparation of bid reports.

The Financial Specialist (FS)

The Financial Specialist will be responsible for ensuring the efficient and effective financial administration of the Project, managing optimally the financial resources and reporting on all expenditure on the Project. He/she will support the PM with inputs to the Report on Investment Costs.

Functional Managers (FM)

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

The Consultant

The consultant will be responsible for executing the activities as mentioned in the Term of Reference (TOR) in the Request for Proposal (RFP).

4.4.3 Project Organizational Charts

The following RACI chart shows the relationship between project tasks and team members. Any proposed changes to project responsibilities must be reviewed and approved by the project manager. Changes will be proposed in accordance with the project's change control process. As changes are made all project documents will be updated and redistributed accordingly.

Chart 8 RACI (source: Jerry Aseja)

	Project Manager	Electrical Engineer	Procurement Specialist	Financial specialist	Functional Managers	The sponsor	The Consultant
Requirements Gathering	A	R	C	I	C	C	
Acquire Consultant	A/R	C	C	I	C	I	
Review of regulatory issues		R					
Conduct comprehensive ESIA	A	C	I	I	C	I	R
Document review	A	C	I	I	C	I	R
Kick off meeting	A	C	I	I	C	C	R
work plan	A	I	I	I	C	I	R
Load forecast	A	C	I	I	C	I	R
Power system analysis	A	C	I	I	C	I	R
Technical design	A	C	I	I	C	I	R
Lines route	A	C	I	I	C	I	R
Develop cost estimates and investment need for	A	C	I	I	C	I	R

project							
Conduct a financial and economic analysis of recommended investments	A	C	I	I	C	I	R

R – Responsible for completing the work

A – Accountable for ensuring task completion/sign off

C – Consulted before any decisions are made

I – Informed of when an action/decision has been made

4.4.4 Staffing Management

Staff Acquisition:

For the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. the project team will consist entirely of internal resources. The complete feasibility study itself will be outsourced. The project team will be responsible for engaging the consultant to execute the feasibility study. It is also expected that the Consultant will required interacting with internal resources during the feasibility study. The Project Manager will negotiate with functional and department managers in order to identify and assign resources in accordance with the project organizational structure. All resources must be approved by the appropriate functional/department manager before the resource may begin the project work. The project team will not be co-located for this project and all resources will remain in their current workspace.

Resource Calendars:

The duration of the feasibility study is five months. The project team is established before the start of the project. A resource histogram is prepared by the project manager for the first part of the project, which is to acquire the Consultant. The consultant is required to elaborate further on the resources histogram to include all the required resources to successfully complete the project. The resource histogram is part of the work plan to be developed by the consultant and needs to be presented to the project team for approval.

The resource histogram below illustrates the resources required for the for contracting the Consultant.

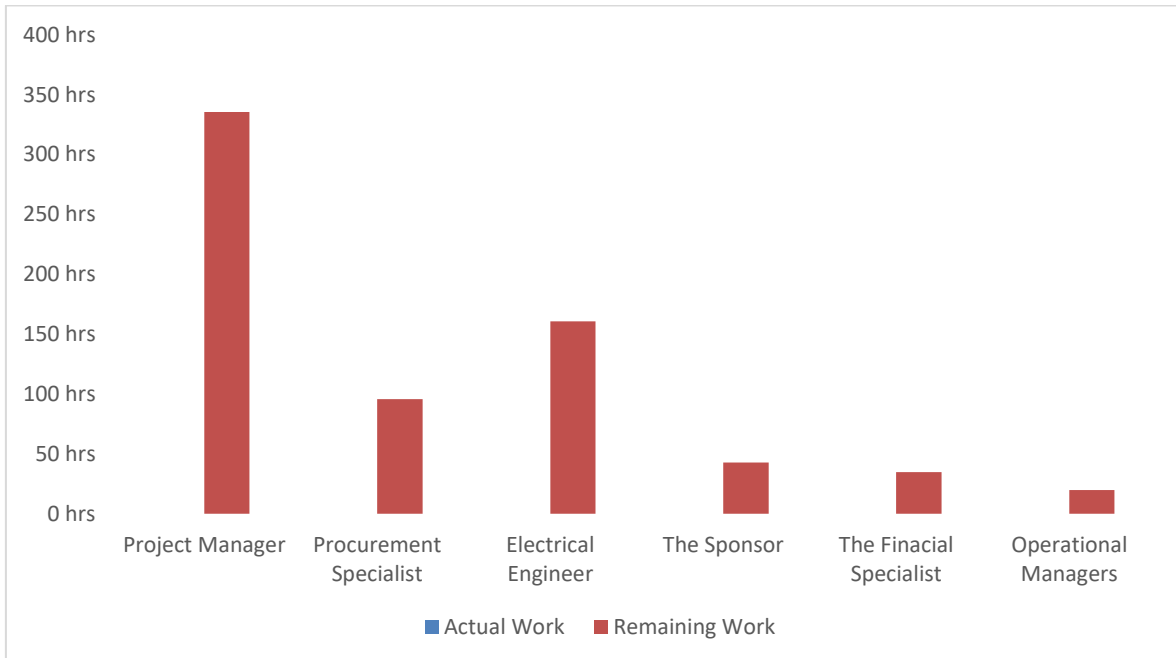


Figure 17 Resources Histogram (source: Jerry Aseja)

Performance Reviews:

The project manager will review each team member's assigned work activities at the onset of the project and communicate all expectations of work to be performed. The project manager will then evaluate each team member performance throughout the project and how effectively they are completing their assigned work. Prior to releasing project resources, the project manager will meet with the appropriate functional manager and provide feedback on employee project

performance. The functional managers will then perform a formal performance review on each team member.

Recognition and Rewards:

The scope of this project does not allow for potential for monetary rewards but there are several planned recognition and reward items for project team members.

- Upon successful completion of the Project, a party will be held to celebrate the success of each team member with the team members' families present.
- Upon successful completion of the project, any team member who satisfactorily completed all assigned work packages on time will receive a certificate of thanks from the CEO.
- Team members who successfully complete all of their assigned tasks will have their photo taken for inclusion in the company newsletter.
- The company will provide free family movie tickets for the top two performers on each project.

4.5 Cost Management Plan

4.5.1 Introduction

The Project Manager will be responsible for managing and reporting on the project's cost throughout the duration of the project. During the monthly project status meeting, the Project Manager will meet with management to present and review the project has cost performance for the preceding month. Performance will be measured using earned value. The Project Manager is responsible for accounting for cost deviations and presenting the Project Sponsor with options for getting the project back on budget. The Project Sponsor has the authority to make changes to the project to bring it back within budget.

4.5.2 Cost Management Approach

Costs for this project will be managed at the third level of the Work Breakdown Structure (WBS). Control Accounts (CA) will be created in compliance with NV EBS guidelines to track costs. Earned Value calculations for the CA's will measure and manage the financial performance of the project. Although activity cost estimates are detailed in the work packages, the level of accuracy for cost management is at the third level of the WBS. Payments for this project are made against milestones. The payments schedule agreed in the contract will be the basis for managing cost performance. Payments are not made unless the milestones have been reached. Partially or percentage of complete payments are not possible. Costs may be rounded to the nearest dollar and work hours rounded to the nearest whole hour.

4.5.3 Measuring Project Costs

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

- Schedule Variance (SV)
- Cost Variance (CV)
- Schedule Performance Index (SPI)

If the Schedule Performance Index or Cost Performance Index has a variance of between 0.1 and 0.2 the Project Manager must report the reason for the exception. If the SPI or CPI has a variance of greater than 0.2 the Project Manager must report the reason for the exception and provide management a detailed corrective plan to bring the projects performance back to acceptable levels.

Chart 9 Cost performance Thresholds (source: Jerry Aseja)

Performance Measure	Yellow	Red
Schedule Performance Index (SPI)	Between 0.9 and 0.8 or Between 1.1 and 1.2	Less Than 0.8 or Greater than 1.2
Cost Performance Index (CPI)	Between 0.9 and 0.8 or Between 1.1 and 1.2	Less Than 0.8 or Greater than 1.2

4.5.4 Reporting Format

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

4.5.5 Cost Variance Response Process

The Control Thresholds for this project is a CPI or SPI of less than 0.8 or greater than 1.2. If the project reaches one of these Control Thresholds a Cost Variance Corrective Action Plan is required. The Project Manager will present the Project Sponsor with options for corrective actions within five business days from when the cost variance is first reported. Within three business days from when the Project

Sponsor selects a corrective action option, the Project Manager will present the Project Sponsor with a formal Cost Variance Corrective Action Plan. The Cost Variance Corrective Action Plan will detail the actions necessary to bring the project back within budget and the means by which the effectiveness of the actions in the plan will be measured. Upon acceptance of the Cost Variance Corrective Action Plan it will become a part of the project plan and the project will be updated to reflect the corrective actions.

4.5.6 Cost Change Control Process

The cost change control process will follow the established project change request process. Approvals for project budget/cost changes must be approved by the project sponsor.

4.5.7 Project Budget

The budget for this project is detailed below. Costs for this project are presented in various categories.

Fixed Costs:	\$300.000
Reimbursable I Costs	\$ 50.000
Total Project Cost	\$350.000
Management Reserve	\$ 50.000

4.6 Stakeholders Management Plan


4.6.1 Introduction

The project Stakeholder Management Plan identifies the approach to managing project Stakeholders, Stakeholder Management roles and responsibilities, Stakeholder Identification, Stakeholder Analysis and Stakeholder Management Strategies.

During the Initiating Process Phase, the project team generates an initial Stakeholder list and records names, roles and responsibilities in a Stakeholder register. As the project progresses to the Planning Process Phase, much more time and effort is required for Stakeholder Management. The attracted consultant is responsible in this phase for generation of a more comprehensive list that is presented to the NV EBS for approval.

The intended audience of the Stakeholder Management Plan includes the Project Manager, project team, Project Sponsor, and essential Stakeholders whose support is vital to carrying out the plan.

Chart 10 Stakeholders Register (source: Jerry Aseja)

 Stakeholder Register Matrix					
Project Name		Feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network- Stakeholder Analysis			
Main Sponsor	The AFD				
ID	Stakeholders	Roles - Responsibilities	Main Expectations	Major Requirements	Influence/Impact (Low-Medium-High)

1	The Sponsor	Responsible for resolving issue beyond the project manager influence	Create business opportunity for the NV EBS	Need to be aware of all project Critical Activities	High
2	The Project Manager	Responsible for the execution of the project	Successful completion of the project	Receive the necessary support of the project team and sponsor	High
3	The NV EBS	The Executing Agency	Reduce operational cost	Being updated regularly	Medium
4	The Ministry of Natural Resources	Has the overall responsibility of the Energy sector in Suriname	Reduce operation cost and creating and economic stimulants for the Area	Involvement in the project	Low
5	The Villages	Consumers of Electricity	Receive 24/7 electricity	received regular update of the project progress	Medium
6	The Government of Suriname	Approval of the Grant	Increase the electrification rate Suriname	Needs Regular updates	High
7	The Ministry of Regional Development	responsible for development of the villages	Reduce operation cost and creating and economic	Involvement in the project	low

			stimulants for the Area		
8	Telecommunication Company	telecommunication provider	Collaborate with the NV EBS in the project	received regular update of the project progress	low
9	EDF (Utility Company France Guyana)	Responsible for electricity generation, transmission and distribution in France Guyana (neighboring Country)	Possibility to purchase electricity from the NV EBS	received regular update of the project progress	Low
10	The Ministry of Finance	Approval of Funding	Project should be completed within budget	Needs to be aware of the cost performance of the project	High
11	Nimos	Approval of ESIA	Consistent with environmental guidelines in Suriname		medium

4.6.2 Roles and Responsibilities

The table of Roles and Responsibilities below provides descriptions of duties for project roles in Stakeholder management.

Chart 11 Stakeholders management Roles and Responsibilities (source: Jerry Aseja)

Name	Role	Responsibilities
Marcel Eyndhoven	Sponsor	<ul style="list-style-type: none"> - Approve or deny scope change requests as appropriate - Evaluate need for scope change requests - Accept project deliverables - Identify stakeholders
Jerry Aseja	Project Manager	<ul style="list-style-type: none"> - Measure and verify project scope - Facilitate scope change requests - Facilitate impact assessments of scope change requests - Organize and facilitate scheduled change control meetings - Communicate outcomes of scope change requests - Identify Stakeholders - Analyze stakeholders - Communicate with stakeholders
Robert Pancham	Electrical Specialist	<ul style="list-style-type: none"> - Measure and verify project scope - Validate scope change requests - Participate in impact assessments of scope change requests - Facilitate team level change review process - Identify stakeholders - Analyze stakeholders

		<ul style="list-style-type: none"> - Communicate with stakeholders
Rashjree Patandin	Procurement Specialist	<ul style="list-style-type: none"> - Evaluate the need for scope changes and communicate them to the project manager as necessary - Identify stakeholders
Felicity Bommel	Office Management	<ul style="list-style-type: none"> - Evaluate the need for scope changes and communicate them to the project manager as necessary - Communicate outcomes of scope change requests - Update project documents upon approval of all scope changes
The Consultant		<ul style="list-style-type: none"> - Review of related regulatory issues - Develop Comprehensive environmental and social impact assessments - Undertake document review, kick-off meeting, stakeholder consultations and develop work plan - Prepare Technical feasibility and design - Develop cost estimates and investment need for project - Conduct a financial and economic analysis of recommended investments - Identify stakeholders - Analyze stakeholders - Communicate with stakeholders

4.6.3 Stakeholder Identification

Utilize a Stakeholder Register to identify key Stakeholders and their associated levels of influence on the project. The initial stakeholders list developed by the project team shall serve as the basis for the Consultant to develop the comprehensive stakeholders. The stakeholders of the project will be further identified using documentation from previous studies. The Ministry Regional development (Expert Judgment) shall also be consulted as they have a database of all the villages in the Area. Public meeting will be held. Social media and other relevant media such as TV and Radio will be used to share information about the project and to invite affected and impacted people or organization to attend the public meeting. The attendances lists of these meeting will also be used to further develop the stakeholders list. A survey will also be help under local company to document their interest in the project

4.6.4 Stakeholder Analysis: Influence and Impact

Determining the Stakeholder influence and impact begins in the Initiating Phase and continues throughout the project's Planning and Executing Phases. In the Initiating Phase, Stakeholders are identified and analyzed as thoroughly as possible, given the project information known at that time. That analysis continues in the Planning Process Phase. The analysis involves determining the following for each Stakeholder identified:

- Project Influence – How much control does the Stakeholder have over project decisions regarding project cost, schedule, scope and ultimate success?
- Project Impact – How much impact does the Stakeholder have on the project and/or how much impact does the project have on the Stakeholder?

Based on the analysis, Stakeholders can generally be categorized into four possible groups as shown in the chart below.

Chart 12 Generic stakeholders' impact & Influence (source: Jerry Aseja)

	High Impact	Low Impact
High Influence	A. Manage closely; keep informed and solicit ongoing input and participation	B. Keep informed; meet their needs
Low Influence	C. Manage, but less closely; periodically keep informed and solicit input	D. Monitor periodically

The Stakeholders most critical to project success are in Category A, the high influence/high impact group. They must be active project participants. Some are on the project team itself, but others may be external Stakeholders who have direct contact with the project team and provide input to the project decision-making process. They may be included on the project team itself, such as in the role of an advisor or Subject Matter Expert (SME), who can effectively represent his/her perspectives on an ongoing basis. The result from the initial analysis are presented in the chart below.

Chart 13 Feasibility Study stakeholders Impact and Influence (source: Jerry Aseja)

	High Impact	Low Impact
High Influence	<ul style="list-style-type: none"> • The project Sponsor • The Project Manager • The Ministry of Natural Resources • The NV EBS 	<ul style="list-style-type: none"> • The Government of Suriname • NIMOS • The Ministry of Finance • The Ministry of Regional development
Low Influence	<ul style="list-style-type: none"> • The Villages • The Media 	<ul style="list-style-type: none"> • The Telecommunication Company • EDF

4.6.5 Stakeholder Management Strategies

The development of Stakeholder Management Strategies focuses on methods, content, direction, and frequency of communication required by each of the Stakeholders.

Management strategies identified in the Stakeholder Management Plan should be performed and monitored as in any other scheduled project activity. The Project Manager, the Consultant and Project Sponsor should include a review of Stakeholder management activities during project status meetings.

The Stakeholder Management Plan should be reviewed and assessed on a regular basis to determine:

- If the project team is effectively engaging Stakeholders
- If the Stakeholder levels of interest or impact have changed
- Whether more needs to be done to obtain the needed level of Stakeholder support

4.6.6 Execution of Management Strategies

Execution of Management Strategies includes the processes for reviewing and updating the Stakeholder Management Plan and Stakeholder Register.

Feedback about the management strategy will determine whether modification is required. As the scope of the project becomes more clearly defined over time, the list of Stakeholders and the nature of their involvement may change over time.

Example Stakeholder management activities that can be included in the schedule include, but are not necessarily limited to:

- Events scheduled to provide information for Stakeholders
- Other communication events and activities
- Tasks related to preparation and review of materials to support the events and other communication activities
- Responsibilities for capturing input gathered from Stakeholders
- Follow-up to assess incorporating the input into the project execution
- Providing feedback to Stakeholders about the results of their input

5 CONCLUSIONS

1. The project management Plan is a formal document that defines the basis of all the project work and is the foundation for the success of the feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network. It consists of a series of individual project management plans and other documents.
2. The project management plan is not created all at once. It is progressively elaborated, which means it is developed, refined, revisited and updated. Since the project management plan integrates all the knowledge area management plans into a cohesive whole, it needs to be assembled after all the component plans have been created.
3. These plans are developed in various processes according the PMBOK® GUIDE and together they form the baseline against which project activities are measured against.
4. The results of this project may not be conclusive because cost is a limiting factor and as a result, the scope was tailored to meet the project budget of \$350.000.
5. The schedule management plan, Scope Management Plan and the cost management plans are developed in the Project Management Plan process.
6. All the required project management plans for "feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network were developed using data provided by the project team. These plans will be updated in a later phase of the study by the Consultant as more detail information becomes available.
7. The data available for the feasibility study allowed for the successful development of the individual management plans which, if executed properly, will ensure the success of the project.

8. The procurement management plan consisted of only one activity but this is one of the most important plans of this project as it paves the way for the further execution of this project.
9. Although a project teams is form, NV EBS operates as strong hierarchy organization limiting the project manager authority. Project management knowledge is limited only to certain part of the organization and this is causing conflicts resulting in delays.
10. Given the fact that only the villages along the east-west corridor will be new costumer connections because Moengo and Albina systems are already part of the NV EBS, the project is expected to increase NV EBS market penetration with 0.88%.
11. The connections of the villages to 24/7 electricity will serve as an economic stimuli and it is expected that economical activities in these areas will increase, resulting in job creation and development of these Rural areas.
12. The main benefit for the project to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorziening Paramaribo" (EPAR) electricity network for NV EBS will be the significant reduction in operation costs of the isolated systems of Moengo and Albina
13. The inter connections of the Moengo and Albina subsystems will increase the reliability, quality of service and reduced the amount of energy not served but given the lack of historical data on plants availability and energy not served , the increase in reliability cannot be quantified.
14. The total investment cost to implement the optimum solution is estimated at 20.6 million USD with an uncertainty of around 30%.
15. Assuming the cost of electricity send from EPAR to Moengo –Albina system is 56.2 USD/MWh, the connection of the villages 4.84 million USD and the net present value of generation cost in the isolated system without interconnection at 84.1million USD results in a net present value of 30.9 million USD for the optimum solution, meaning the optimum scenario is economically justified.

6 RECOMMENDATIONS

1. The NV EBS should improve their project management practice to increase the likelihood of project success, a formal methodology should be adopted which incorporate configuration management.
2. The NV EBS should use a formal process to initiate the start of a project, a project charter, the document that capture and organize the business needs objectives, project description, preliminary scope statement, initial project risks, project deliverables, summary milestones, project budget and states that the project exist and provide the project manager with written authority to begin work.
3. The NV EBS should established a change control board to evaluate all project changes to prevent scope creep and gold plating.
4. NV EBS should develop a communication management plan for this project because Stakeholders engagement is a very important aspect, especially because of the different culture in the affected area.
5. The success of the feasibility studies relies heavily on the detail and accuracy of data retrieved from the stakeholders, it is therefore required that NV EBS invest time in the development of a detail risk management plan to capture and classify project risks, so that effective risk responses could be planned.
6. The NV EBS has several projects in execution, it is therefore recommended to develop an integral resources management plan that covers these entire projects to effectively monitor and control the resources.
7. In order to further increase the project likely hood of success, NV EBS should consider a Matrix organization in which the project manager has more authority of the resources.

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
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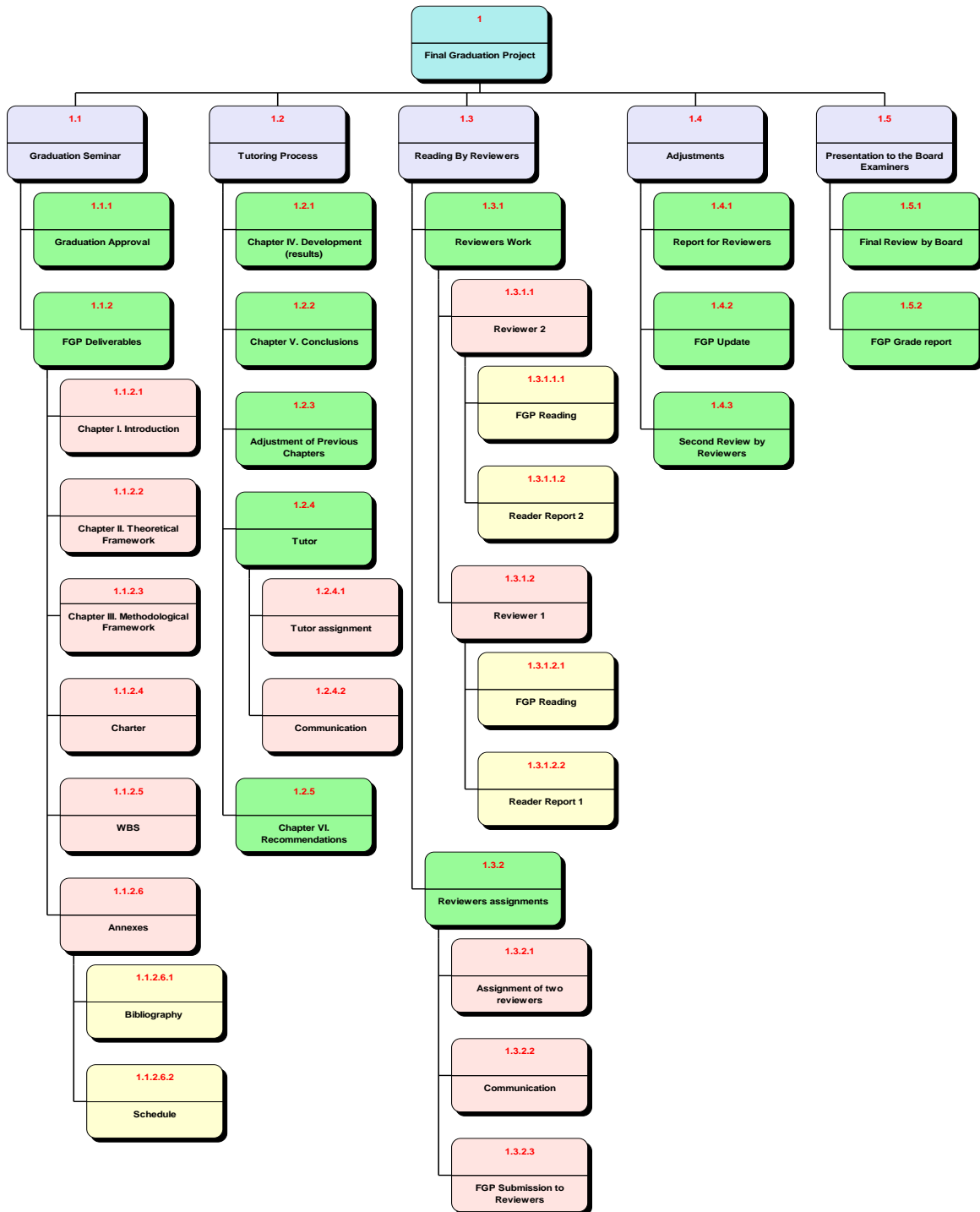
APPENDICES

Appendix 1: FGP Charter

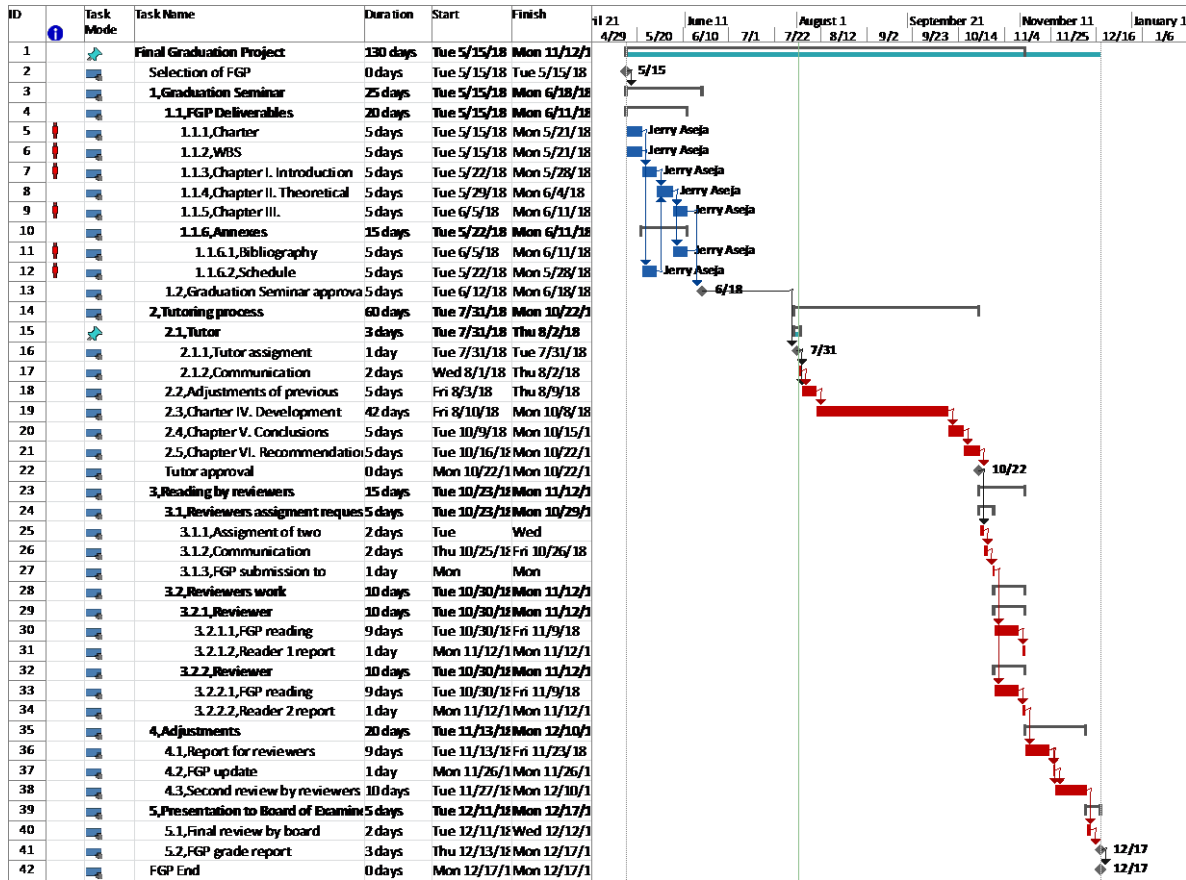
PROJECT CHARTER	
Date	Project Name:
May 19 th , 2018	Project Management Plan for the elaboration of a feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorzienning Paramaribo" (EPAR) electricity network."
Knowledge Areas / Processes	Application Area (Sector / Activity)
Knowledge areas: Integration, Scope, Schedule, Cost, Quality, Resource, Communication, Risk, Procurement and Stakeholders Process groups: Initiating, Planning, Executing, Monitoring and Control , Closing	Should indicate the application area or sector related to the project. For example: construction, finance, information technology, CSR, etc.
Start date	Finish date
May 19 th , 2018	October 21 ST , 2018
Project Objectives (general and specific)	
<p>General objective: To elaborate a project management Plan to perform a feasibility study to connect Moengo, Albina and villages along the east-west corridor into the "Energievoorzienning Paramaribo" (EPAR) electricity network."</p> <p>Specific objectives:</p> <ol style="list-style-type: none"> 1. To produce a scope management plan to guarantee that the purpose and objectives of the project are maintained throughout the project duration. 2. To produce a procurement manage plan to document how the correct resources will be acquired to successfully complete the project. 3. To create a schedule management plan to ensure that the project is completed on time. 4. To develop a cost management plan to make sure the project is within the approved budget. 5. To create a Resource management plan to manage the resource needed for the successful completion of the project 6. To construct a stakeholder management plan to promote productive involvement of stakeholders 	
Project purpose or justification (merit and expected results)	
<p>In the eastern part of Suriname from Stolkersliver to Albina which is approximately 100 km long, only two places ,Moengo and Albina have 24/7 electricity. All the other villages and community along the East –West road have 3 to 5 hours electricity per day. Sustainable economic development and growth in this region is limited because of the lack of reliable electricity supply. This study aims at providing the justification required to support NV EBS Capital Investment Plan and is aligned with NV EBS mission of which three key aspects are :</p> <ul style="list-style-type: none"> • Providing the community with reliable, cost-effective electricity; • Demonstrating environmental care through efficient use of resources in the generation and distribution of energy; • Obtaining benefits from existing and new opportunities in the field of electric power. 	
Description of Product or Service to be generated by the Project – Project final deliverables	
A comprehensive detail feasibility report, including Technical design, Financial analysis and Environmental Social Impacts of the recommended solution.	

Assumptions		
<ul style="list-style-type: none"> • Professor will provide timely feedback • The Student is reading all the course material • The student has access to the necessary software tools • All deliverable will be submitted In time • The Virtual campus will be available 		
Constraints		
Time: The project must be completed in 3 months		
Preliminary risks		
Grade lower than seven, may result in redoing the course, impacting the duration of the FGP		
Budget		
The "Agence Française de Développement" (AFD) has provided a grant of \$350.000 through the Ministry of Finance of Suriname to finance the Feasibility study		
Milestones and dates		
Milestone	Start date	End date
Selection of FPG	May 14 th 2018	May 19 th 2018
Approval of FPG	May 19 th 2018	June 17 th 2018
Assignment of Tutor	June 17 th 2018	June 30 th 2018
Delivery of Final Grade	June 30 th	
Final Presentation	October 21 ST 2018	
Relevant historical information		
<p>NV EBS is the state-owned power utility company supervised by the Ministry of Natural Resources (MNH) and in charge of the operation of the power system. NV EBS' operations entail generation, transmission, distribution and commercialization of electricity. NV EBS shares its responsibility for rural electrification with the DEV, the MNH's department of rural energy, which operates small power systems in isolated and remote communities where NV EBS networks do not reach customers. NV EBS operates seven isolated power systems in Suriname, serving over 150,000 customers with the EPAR being the largest of NV EBS's power systems, serving the capital Paramaribo and surrounding areas. Previously a pre-feasibility study was undertaken to identify isolated areas which can be connected to the NV EBS network for 24/7 electricity</p>		
Stakeholders		
<p>Direct stakeholders:</p> <ul style="list-style-type: none"> • All Villages along the East West Corridor • The Government of Suriname • The Ministry of Finance • AFD • NV EBS • DEV • Environmental Agencies Suriname • Energy Authority Suriname • Companies in the Region <p>Indirect stakeholders:</p> <ul style="list-style-type: none"> • Construction Companies in Suriname, • multilateral banks(CDB, ISDB, IADB) • France Guyana • The Media 		
Project Manager: Jerry.Aseja		Signature: 
Authorized by:		Signature:

Appendix 2: FGP WBS



Appendix 3: FGP Schedule



Appendix 4: Revision Dictum

October 18, 2018

Dear Academic Advisor,

RE: Philological Review of Final Graduation Project submitted by Jerry Aseja in partial fulfillment of the requirements for the Masters in Project Management (MPM) Degree

I hereby confirm that Jerry Aseja has made all the corrections to the Final Graduation Project document, as I have advised. In my opinion, the document now meets the literary and linguistic standards, expected of a student reading for a degree at the Master level.

Sincerely,

Cynthia Binda-Karg

A handwritten signature in cursive script that reads "C Binda-Karg". The signature is written in dark ink and is positioned above a horizontal line that serves as a separator.

*De Examencommissie in Suriname
heeft aan*

KARG, CYNTHIA BERNADETTE

geboren in Paramaribo *de* 14^e November 1964

uitgereikt de
AKTE VAN BEKWAAMHEID
tot het geven van Onderwijs in het vak

ENGELS

na het afleggen van een examen, hetwelk algenomen is in overeenstemming
met de krachtens de Lager-Onderwijsverordening 1960.
(G.B. No. 108) gegeven voorschriften.

Handtekening van de
geëxamineerde,

Cynthia Karg

Paramaribo, de 12^e December 19~~6~~⁹⁰

Namens de Examencommissie,

PLAKZEGEL

/N. 2.5670
SURINAME

Voorzitter

Secretaris