UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR EXPANDING BROADBAND INFRASTRUCTURE AND EVALUATING THE FEASIBILITY OF AFFORDABLE SERVICE MODELS FOR LOW-INCOME USERS IN RURAL AREAS.

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DEDICATION

This thesis is dedicated to God, whose grace and guidance have sustained me throughout this journey. To my family, whose unwavering love, patience, and encouragement provided the strength I needed during challenging times. A special thank you to my mother and fiancé, whose sacrifices, prayers, and boundless support have been the foundation of my success. To my close friends, thank you for your constant motivation, listening ears, and words of reassurance. Your presence and support have meant more than words can express. This accomplishment is as much yours as it is mine.

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Lastly, I would like to thank Ms. Sophia Crawford for her excellent coaching sessions and for inspiring me to remain focused and committed to my goals and my tutor, Mr. Xavier Salas for assisting me throughout the tutorship phase.

ABSTRACT

The objective of this document is to develop a project management plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low-income users in rural areas of Belize. Currently, there are not many studies or projects that address internet connectivity barriers and digital inclusion which hinder education, healthcare, and economic participation of the persons living in these communities.

The final deliverable of this project is a project management plan comprising key subsidiary management plans, including integration, scope, schedule, cost, quality, resource, communication, risk, procurement, and stakeholder management plans that will enable Central TV & Internet to carry out the broadband expansion in the rural areas. These plans outline the processes, methodologies, and tools required to manage the expansion of broadband initiatives effectively, as they are guided by the principles of the Project Management Institute and the Project Management Body of Knowledge.

The results of this project underscore the demand for digital inclusion via affordable and reliable broadband in rural areas. The project identifies the importance of conducting a detailed market analysis to adapt cost-effective service models that meet the needs of low-income users while ensuring financial viability for the service provider. It is recommended that the Project Manager carries out the project incorporating stakeholder input through a robust Stakeholders Management Plan, utilizing risk analysis software for proactive risk management, and leveraging partnerships and funding opportunities to offset infrastructure costs. These strategies aim to enhance the scalability and sustainability of broadband solutions, ensuring long-term benefits for rural communities and advancing digital inclusion in Belize.

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ABBREVIATIONS AND ACRONYMS

ABBREVIATIONS AND ACRONYMS Abbreviation / acronym	**Explanation**
COVID	Corona Virus Disease
CPI	Cost performance index
CPM	Critical Path Method
EMV	Earned Monetary Value
FGP	Final Graduation Project
GPM	Green Project Management
IPTV	Internet Protocol Television
ICT	Information &Communication Technologies
NGO	Non-Governmental Organization
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Project Management Office
RBS	Risk Breakdown Structure
RTM	Requirements Traceability Matrix
SDG	Sustainable Development Goals
SPI	Schedule Performance Index
TV	Television
UCI	Universidad Para La Cooperacion Internacional
WBS	Work Breakdown Structure

EXECUTIVE SUMMARY

Residents in rural areas of Belize faced significant barriers to accessing reliable and affordable broadband services, which were critical for education, healthcare, and economic participation. While some providers offered services in these areas, they were often costly or lacked the necessary reliability to meet the growing demand for digital connectivity.

These challenges hindered community development and prevented equitable access to essential online services. This situation required a structured approach to evaluate and implement sustainable, cost-effective broadband solutions in these communities.

This project management plan served as a comprehensive guide for Central TV & Internet, a cable and broadband company, enabling the Project Manager to coordinate the implementation process. It ensured the feasibility of affordable service models for low-income users, fostering sustainable connectivity and meeting the growing demand for digital access in rural communities. By prioritizing sustainable practices, communities create systems that remain reliable and effective as technology and user needs advance.

The generic objective of this final graduation project was to develop a project management plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low income users in rural areas. The specific objectives of this project were to develop an integration management plan for managing project activities effectively throughout the project lifecycle, to develop a scope management plan that outlined how the project's scope would be defined, validated, and controlled, to develop a schedule management plan that defined the timeline for project tasks and ensured that the project was completed on time, to develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stayed within its financial constraints, to develop a quality management plan that ensured that the project met the required standards and quality control processes, to develop a resource management plan that focused on identifying, acquiring, and managing the necessary resources required to complete the project, to develop a communications management plan that ensured effective communication among all stakeholders, to develop a risk management plan that involved identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks, to develop a procurement management plan that ensured procurement was done in a timely and cost-effective manner, and to develop a stakeholder engagement plan that outlined strategies for managing stakeholder expectations and communication throughout the project.

The methodology utilized in this project was a qualitative, quantitative and analytical approach. The most important resources were industry publications, the PMBOK guide sixth edition, and data gathered from surveys, interviews and focus groups. The project management plan was created using the guidelines of the Project Management Institute and the Project Management Body of Knowledge.

1 INTRODUCTION

1.1. Background

Central TV & Internet, a cable and broadband distribution company established in 2001 in Belize, provides services to both urban and rural communities. In recent years, the demand for reliable and affordable internet connectivity has surged, driven by the growing need for digital access in education, healthcare, and economic activities. Implementing a project management plan will enable the company to evaluate the feasibility of affordable service models for low-income users, ensuring the sustainable expansion of broadband services in rural areas. According to PEW Charitable Trusts, by bringing awareness to the issue, policymakers and partners can address the challenge of extending broadband access to the community at large and ensure that residents are connected to that service (2022).

1.2. Statement of the problem

Residents in rural areas of Belize face significant barriers to accessing reliable and affordable broadband services, which are critical for education, healthcare, and economic participation. While some providers offer services in these areas, they are often costly or lack the necessary reliability to meet the growing demand for digital connectivity. These challenges hinder community development and prevent equitable access to essential online services. This situation requires a structured approach to evaluate and implement sustainable, cost-effective broadband solutions in these communities.

1.3. Purpose

The project seeks to develop a project management plan for the expansion of broadband services in rural areas of Belize. This plan will serve as a comprehensive guide, enabling the Project Manager to coordinate with all relevant stakeholders and outline a clear and structured approach for the implementation process. It aims to ensure the feasibility of affordable service models for low-income users, fostering sustainable connectivity while maintaining the company's commitment to providing high-quality service to its customers and meeting the growing demand for digital access in rural communities.

1.4. General objective

To develop a project management plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low-income users in rural areas.

1.5. Specific objectives

1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.

4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.
7. To develop a communications management plan that ensures effective communication among all stakeholders.
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.

2 THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

The research for this project is carried out with the expertise of Central TV & Internet, a leading cable and broadband company in Belize. Established in 2001, the company initially focused on providing cable television services but has since expanded its offerings to include broadband internet, with an emphasis on delivering high-speed internet access and digital television to both urban and rural communities across the country. Central TV & Internet is committed to enhancing connectivity by utilizing advanced technologies, such as fiber-optic networks and the most up-to-date digital systems. Central TV & Internet also supports local educational initiatives, empowering students and schools by providing connectivity solutions, thereby enabling access to digital learning resources and supporting Belize's educational development. In terms of its broader impact, the company's expansion into rural areas through initiatives like the integration of fiber-optic infrastructure. By continuing to innovate and adapt to new technological advancements, the company is paving the way for future developments that will continue to enhance both community life and the industry as a whole. This project contributes to the ongoing efforts to expand broadband access to underserved rural areas, aligning with the company's mission to provide superior technology and services while fostering inclusive digital growth across Belize.

2.1.2 Mission and vision statements

Mission: To provide a communication medium to inform, educate, and entertain our customers using the best technology by any standard (NEXGEN, 2024)

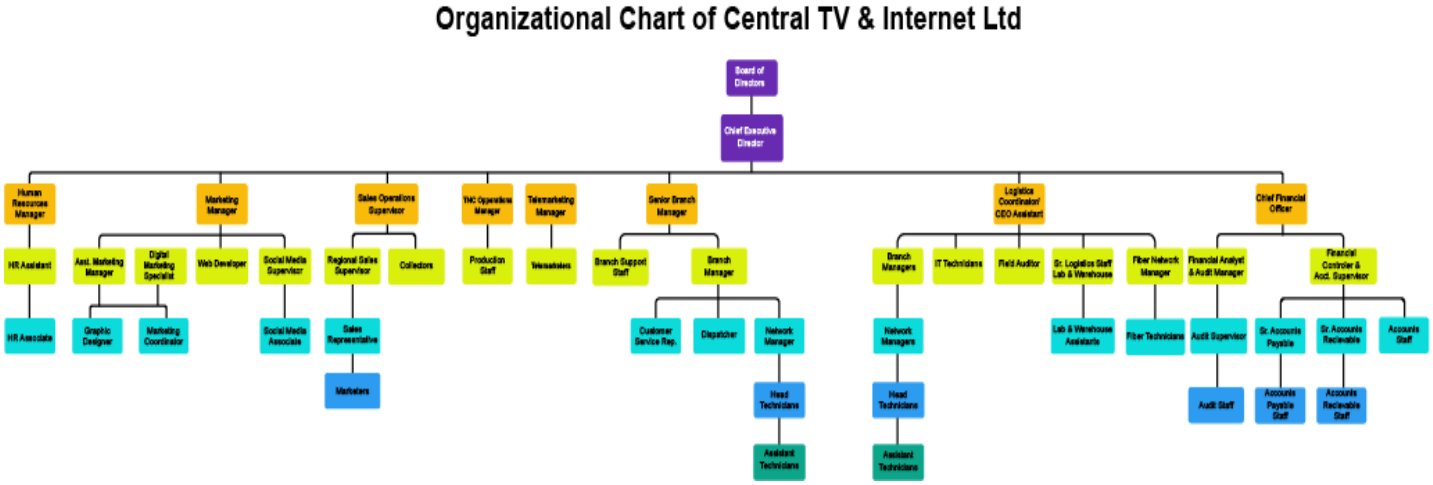
Vision: To be the leading broadband provider in Belize by utilizing the most advanced technology available and providing superior services to our customers(NEXGEN, 2024)

2.1.3 Organizational structure

Central TV & Internet is a relatively large organization in Belize which is comprised of approximately 300 employees. The organization is comprised of directors, middle managers, supervisors and employees. There are 7 major departments which are Human Resources, Marketing, Sales, Telemarketing, Logistics, Information Technology and Customer Service.

Figure 1

Organizational structure (Central TV & Internet Employee Handbook, 2024)



2.1.4 Products offered

Central TV & Internet offers broadband internet services, digital television services, fiber-optic internet solutions, streaming services and IPTV. For this project, we will focus on broadband and fiber-optic internet services that can be offered to rural communities for the purpose of learning and economic development. Listed below are the services offered by Central TV & Internet:

1. Broadband Internet Services: Central TV & Internet provide high-speed internet access to residential and business customers. The company offers a range of broadband packages, including fiber-optic and wireless connections, aimed at delivering reliable and fast internet service. The project will focus on expanding broadband coverage to rural areas, where internet access is limited or unavailable. As part of the project, the company seeks to identify cost-effective ways to extend fiber-optic and wireless broadband services to underserved regions. The project will also explore innovative business models and technology solutions to make broadband more accessible in these rural communities.

2. Fiber-Optic Internet Solutions: Central TV & Internet provides fiber-optic internet provides ultra-fast and reliable internet connections with higher speeds and greater bandwidth compared to traditional broadband options. Central TV & Internet uses fiber-optic technology to deliver internet services to urban areas and select locations in Belize. The project aims to assess the feasibility of deploying fiber-optic networks in rural areas of Belize. The project will explore the cost, logistics, and technological requirements of extending fiber-optic infrastructure

to underserved regions, ensuring that rural communities can benefit from high-speed internet connectivity like urban areas.

2.2 Project Management concepts

2.2.1 Project management principles

The principles of project management are crucial for the effective execution of projects. Key principles such as stewardship, teamwork, leadership, and value delivery guide the management of resources, the coordination of team efforts, and the creation of value for stakeholders (Project Management Institute, 2021). For this project, which focuses on expanding broadband access in rural Belize, these principles are applied by ensuring ethical use of resources, encouraging cross-departmental collaboration, providing strong leadership, and adapting the approach to the specific needs of rural communities. By following these principles of project management, the project will provide a plan which includes the infrastructure deployment while maximizing its benefits for the community, in line with the company's goal of improving digital connectivity .

2.2.2 Project management domains

According to the *Guide to the Fundamentals of Project Management* (PMI, 2021), project performance domains encompass key areas that directly influence a project’s success. These domains include stakeholder engagement, team performance, scope, schedule, cost, quality, risk, procurement, and integration performance. In the context of the Final Graduation Project (FGP) aimed at expanding broadband access in rural Belize and assessing the feasibility of affordability in rural areas, the most critical domains are stakeholder engagement, scope

performance, and risk performance. Stakeholder engagement ensures that all relevant parties, including local communities, government and non-government bodies, and private sector partners, remain actively involved throughout the project. On the other hand, risk management is vital for addressing the logistical and financial challenges posed by deploying infrastructure in remote areas. These domains work together to optimize resource use, mitigate potential risks, and ensure the successful execution of the FGP, aligning with the overall strategic goals of the project. In relation to this final graduation project (FGP), the project processes will include:

- Initiation Process.
- Planning Process
- Execution Process
- Monitoring and Controlling Process
- Closing phase.

2.2.3 Predictive, adaptative and hybrid projects

Predictive project life cycles are characterized by an emphasis on specification of requirements and detailed planning during the beginning phases of a project (Project Management Institute., 2017, pp. 666).Developing detailed plans based on clearly defined requirements and constraints helps minimize risks and reduce costs. Key milestones are established to ensure timely involvement of stakeholders. During execution, the monitoring and controlling processes aim to limit changes that could affect the project's scope, timeline, or budget.

Adaptive projects are often decomposed into a sequence of phases called Iterations. Each iteration utilizes the relevant project management processes (Project Management Institute., 2017, pp. 667). Highly adaptive projects typically implement all project management process

groups continuously throughout the project lifecycle. Drawing from lean thinking principles, this approach—commonly known as “continuous and adaptive planning”—emphasizes the recognition that plans will evolve as work progresses (Project Management Institute., 2017, pp. 668). As new information emerges, the project plan is updated to reflect these insights. The goal is to continuously refine and enhance all aspects of the project management plan, extending beyond the predetermined checkpoints associated with iterations, to ensure alignment with the project's dynamic needs .

Hybrid projects is an approach that recognizes adapting to the uniqueness of the organizations and their projects. When effectively implemented, hybrid project management methods can achieve performance and outcomes comparable to those of predictive or agile methodologies. Research from PMI's Pulse of the Profession reveals similar success rates across different approaches, as organizations increasingly adopt the most suitable methods for their projects (Project Management Institute., 2024). This growing adoption of hybrid approaches marks a significant shift in project management. Instead of relying on a single framework across the organization, the focus has shifted to using fit-for-purpose strategies tailored to the specific needs, challenges, and objectives of each project. This approach empowers project teams to make informed decisions and align their methods with strategic goals effectively.

The final graduation project (FGP) will follow a predictive project lifecycle as the project management plan will adhere to a specification of requirements and detailed planning which will be conducted at the beginning phase of the project.

2.2.4 Project management

According to the Project Management Institute, a project is a temporary endeavor undertaken to create a unique product, service, or result (2017). Projects are characterized by their temporary nature since they have a defined beginning and end; however, it does not imply that a project must have a short duration. A project concludes when its objectives are successfully achieved, when it is determined that the objectives cannot or will not be met, or when the project is no longer needed. Any decision to terminate a project requires formal approval and authorization from the appropriate authority.

The Association of Project Management defines Project Management as an application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget (2024). A defining feature of project management, as opposed to general management, is its focus on achieving a specific final deliverable within a finite timeframe, whereas general management is an ongoing, continuous process.

Project management is vital for ensuring projects meet quality standards by effectively balancing budget, time, and scope constraints. Project management has five stages (initiation, planning, execution, monitoring and control, closure),when combined with project management styles (Six Sigma, Agile, Scrum , Kanban, Waterfall, Critical Path Method. Lean Project Management), it offers a project-based structure allows organizations to be more flexible and adaptable to changing market conditions (National University, 2024). It encompasses the

planning, organizing, and management of resources to achieve defined goals and objectives. By fostering productivity, efficiency, and profitability, project management enhances organizational performance. Additionally, it promotes team collaboration, minimizes risks of miscommunication and conflicts, and addresses potential challenges.

2.2.5 Project management knowledge areas and processes

The Project Management Knowledge Areas are specialized fields commonly applied in managing projects. Each Knowledge Area consists of processes related to a specific aspect of project management. According to the Project Management Institute, there are 10 core Knowledge Areas are utilized in many projects across various industries, however, depending on the unique requirements of a particular project, additional Knowledge Areas may be necessary (2017). The 10 key Knowledge Areas include:

1. Project Integration Management combines and coordinates all project processes and activities to achieve the project's objectives efficiently.
2. Project Scope Management ensures the project encompasses only the work necessary for successful completion, preventing scope expansion.
3. Project Schedule Management plans, develops, and monitors the project timeline to ensure tasks are completed on schedule.
4. Project Cost Management plans, estimates, budgets, and monitors expenses to ensure the project remains within its approved financial limits.
5. Project Quality Management focuses on meeting quality standards for the project and its deliverables to satisfy stakeholder expectations.

6. Project Resource Management identifies, secures, and manages the resources (human, material, and equipment) required to accomplish project goals.
7. Project Communications Management oversees the exchange of information among stakeholders to maintain clarity and transparency.
8. Project Risk Management identifies potential risks, analyzes their impact, and develops strategies to mitigate them effectively.
9. Project Procurement Management manages the acquisition of goods or services from external sources to support project execution.
10. Project Stakeholder Management engages and manages stakeholders by understanding their expectations and involving them in key decisions and activities.

2.2.6 Project life cycle

The Project Management Institute describes the project life cycle as a series of phases that a project passes through from its inception to the end of the project (2017). The Institute Project Management describes a project phase as a collection of interrelated activities that collectively result in the completion of specific deliverables (2024). These phases can be structured sequentially, iteratively, or in an overlapping manner, with their naming, number, and duration tailored to the project's nature and objectives. The phases within the project management life cycle are determined by the organization's management and control needs, the project's characteristics, and its intended purpose. The types of life cycles are essential for managing project work, as different approaches can be used for execution depending on the desired results, benefits, outcomes, and the level of uncertainty, novelty, and risk tolerance. The choice of deployment strategy is crucial in determining the most appropriate form of life cycle for the

project. The types of live cycles are Linear (waterfall), Iterative (agile) and Hybrid Life cycle (Association of Project Management , 2024).

Figure 2

Project life cycle

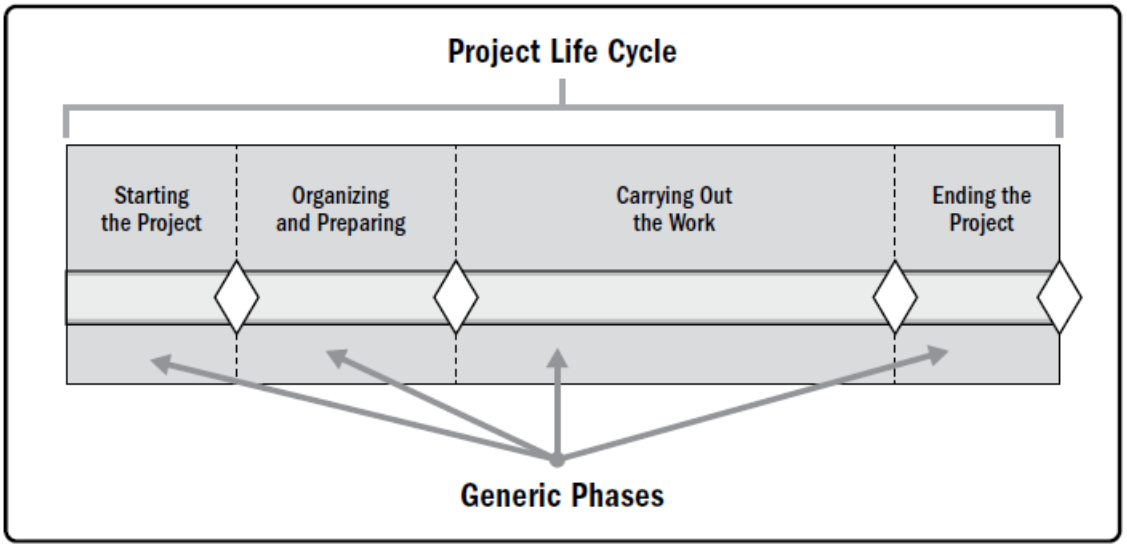


Figure 2 represents a Project Life Cycle, Project Management Institute, 2017

The figure above illustrates the complexity of a project lifecycle which includes starting the project, organizing and preparing, carrying out the work and closing the project.

Projects are comprised of several key components that result in their successful completion. This Project Management guide identifies and explains this as various components that interrelate to one another during the management of a project as seen in Figure 3 below:

Figure 3

Interrelationship of PMBOK Guide Key Components in Projects

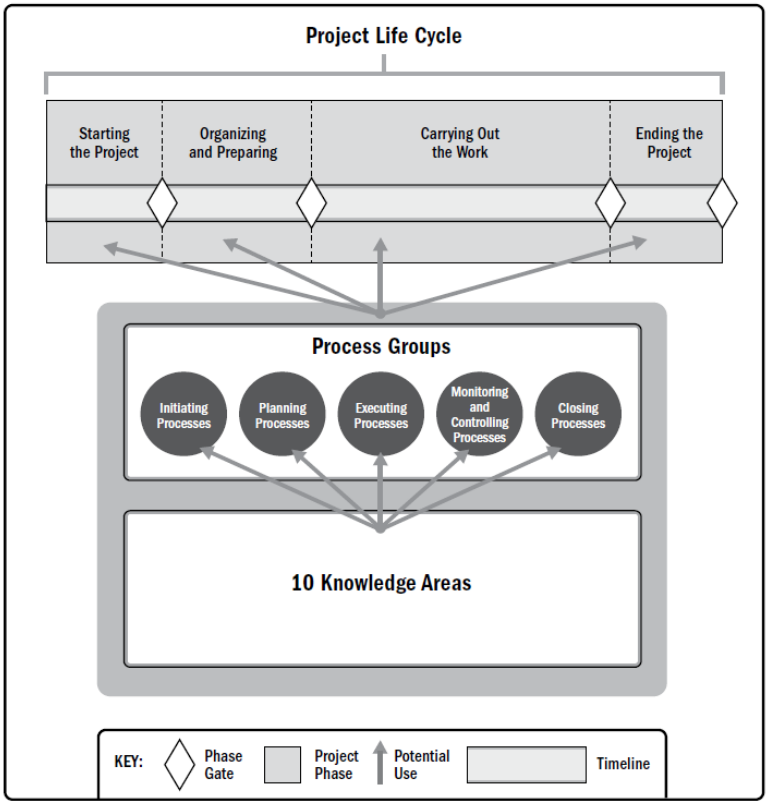


Figure 1-5. Interrelationship of *PMBOK® Guide* Key Components in Projects

Figure 3 represents Interrelationship of PMBOK Guide Key Components in Projects , Project Management Institute, 2017

2.2.7 Company strategy, portfolios, programs and projects

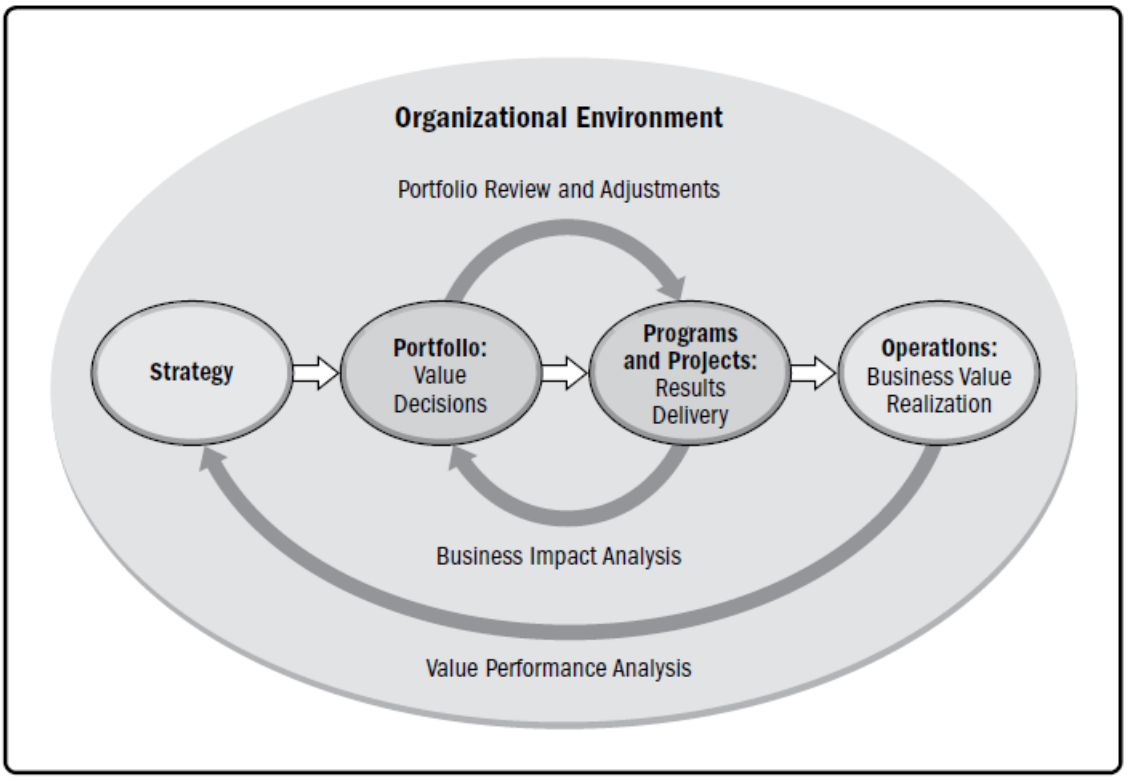
A company's strategy is defined as the course of action or set of decisions that supports entrepreneurs in achieving certain business goals (The Strategy Institute, 2023). It is a master plan that outlines the direction the organization intends to make, the actions it will undertake, and the resources it will give to attain certain competitive benefits and drive sustainable growth (The Strategy Institute, 2023). The relationship between the strategy and the portfolios, programs and projects is based on the management processes, tools and techniques utilized. According to the Project Management Institute, portfolios, programs, and projects are all aligned with or guided by organizational strategies, with each playing a distinct role in achieving strategic goals:

- **Portfolio management** ensures alignment with organizational strategies by selecting the appropriate programs or projects, prioritizing tasks, and allocating the necessary resources.
- **Program management** coordinates the components of its programs and manages interdependencies to deliver the intended benefits.
- **Project management** focuses on accomplishing specific goals and objectives that contribute to the overall success of the organization.

Figure 5 illustrates the relationship between strategy, portfolios, programs and projects and operations. Within portfolios or programs, projects are a means of achieving organizational goals and objectives. And they are often accomplished in the context of a strategic plan.

Figure 4

Organizational Project Management



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

The expansion of broadband access in rural areas of Belize presents a critical challenge, as many remote communities remain underserved in terms of digital infrastructure. This issue is primarily due to geographic isolation, high infrastructure costs, and limited governmental and private sector investment in these areas. The digital divide, a term that refers to the gap between those who have access to modern information and communication technologies (ICTs) and those who do not, is a significant issue in Belize's rural regions. Without adequate internet connectivity, rural residents face limitations in accessing essential services such as education, economic opportunities and digital inclusivity . Additionally, businesses in these areas struggle

to compete in a digital economy, further deepening the disparity between rural and urban populations.

Currently, broadband infrastructure in Belize is available countrywide to all urban and some rural areas however, there is still a vast number of rural communities without reliable or affordable access to high-speed internet. Efforts to expand broadband to these areas have been hindered by several factors, including the high cost of deploying infrastructure in remote locations, regulatory challenges, and the lack of incentives for private sector companies to invest in these areas. Government initiatives and partnerships with non-governmental organizations (NGOs) have attempted to address this issue, but progress has been slow.

One notable project in recent years has been the Government of Belize's initiative to partner with telecommunications companies to provide broadband access to rural communities. These projects, while a step in the right direction, have faced various challenges, such as underdeveloped infrastructure and insufficient coverage in some of the most remote areas. Additionally, there have been difficulties in ensuring the affordability and sustainability of these broadband services, which are often priced too high for low-income households in rural areas.

The 2022-2025 Digital Agenda of Belize recognizes the need for expansion of reliable internet connection and access points to remote and rural areas in Belize to support the use of digital services and mobile applications (Government of Belize, 2022) . Overall, a few studies and research initiatives have been conducted to explore potential solutions to the broadband access problem in rural areas community and how these issues can be mitigated. Following the COVID-19 pandemic, Belize has recognized the critical need for reliable broadband access, particularly for remote learning. The pandemic highlighted the importance of broadband

connectivity for all communities, but especially for those in rural and remote areas, where access to digital education and online resources is often limited. The shift to online learning underscored the digital divide, revealing how essential internet access is for education, economic participation, and overall community development. For rural areas, where infrastructure is typically underdeveloped, expanding broadband access has become an urgent priority to ensure that all students, regardless of location, have equal opportunities for learning and growth.

2.3.1 Current situation of the problem or opportunity in study

The current situation regarding broadband access in rural Belize remains a significant challenge, particularly in the context of expanding digital services and enabling equitable access to education, healthcare, and economic opportunities. The lack of digital connectivity hampers the ability of these communities to fully participate in modern digital activities, further deepening the digital divide between urban and rural areas. The opportunity lies in addressing these gaps by expanding broadband infrastructure, ensuring affordable pricing models, and improving digital literacy among rural populations. Following the COVID-19 pandemic, the need for reliable broadband became more apparent, as remote learning and telecommuting became essential. This brought awareness to the communities in rural areas, in specific, that need expanding connectivity and modernizing public services and building digital resilience (Government of Belize, 2022). As a result, Belize developed a National Digital Agenda that will focus on key goals including bridging the digital divide, enhancing government efficiency with e-services and cybersecurity, and promoting digital skills, innovation, and economic recovery in priority sectors. Proposed improvements include finding a sustainable way to

increase digital literacy in the rural areas and educating the population on the benefits of broadband connectivity and how best it can be utilized in the areas of healthcare, economy and educational purposes.

2.3.2 Previous research done for the topic in study

One study done by the Government of Belize, Department of E-Governance & Digitalization Unit which analyzed the digital footprint of Belize and discussed the adversities, status of digitalization, the new vision and strategic goals and recommendations for improving E-governance (2022). The digital agenda for Belize aims to foster digital transformation by addressing infrastructure, governance, and recovery through innovative ICT tools. Its three pillars are ICT and Technological Enablers, Digital Government, and Digitalization for Recovery which focus on expanding connectivity, modernizing public services, and building digital resilience post-COVID-19. The project management plan will provide a comprehensive approach of what is required to carry out a portion of this project which mainly focuses on expanding connectivity and building digital resiliency. In addition to providing broadband services, the project will explore various models to enhance internet accessibility, reliability, and affordability.

2.3.3 Other theory related to the topic in study

While the project aims to expand broadband access in rural Belize and assess the feasibility of affordable models for low-income users, it is crucial to incorporate principles of Regenerative Development and Green Project Management. These frameworks offer valuable strategies for fostering sustainable, community-centered outcomes. Regenerative development emphasizes

creating systems that not only sustain but actively enhance the well-being of communities, environments, and economies (Muller, n.d.) and Green Project Management (GPM) offers a robust framework and methodologies designed to embed sustainability at every stage of project management and ensuring that projects are successful, environmentally, and socially responsible (Institute Project Management, 2024). Applying this framework will ensure that the broadband expansion effort minimizes its environmental footprint while contributing to the community's long-term sustainability goals.

3 METHODOLOGICAL FRAMEWORK

3.1 Information sources

Sources of information can come from various outlets including media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages (University of Fort Hare, 2021). However, the information needed will be extracted from the sources based on the type of research or project being conducted.

3.1.1 Primary sources

According to the University of Wisconsin, primary sources of information are firsthand accounts of research or events, including original scholarly research findings, raw data, testimonies, speeches, historical artifacts, or other evidence that offer unique and original information about a person or event. These sources provide researchers with direct access to original ideas, events, and data (2024).The primary sources of information for this project data and information will be acquired through multiple sources such as statistical data from the

Statistical Institute of Belize , local Belizean articles, international articles, interviews and surveys.

3.1.2 Secondary sources

Secondary sources of information analyze, synthesize, evaluate, and interpret primary sources (University of Wisconsin, 2024). For this project, we will be utilizing secondary sources from The Project Management Body of Knowledge (PMBOK), review papers, literature reviews and news articles. This information will provide substance and corroborate primary source raw data and information collected in the field.

Chart 1

Information sources (Karen Novelo, November 2024)

Objectives	Information sources	
	Primary	Secondary
1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Project initiation documents, Interviews with project stakeholders, Review organizational policies and guidelines	PMBOK, PMI
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Stakeholder requirements documents, project charters and agreements, workshops or brainstorming sessions with stakeholders, scope statements from similar projects	PMBOK, PMI
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.	Project schedules research, expert judgment from project managers, project team availability calendars	PMBOK, PMI

4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Research on budget forecasts and estimates, procurement bids	PMBOK, PMI
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	Quality standards or regulations applicable to the project, Quality audits and reports, Stakeholder quality requirements, Benchmarks from previous projects	PMBOK, PMI
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	Skills required, Vendor and contractor agreements, Historical data on resource utilization	PMBOK, PMI
7. To develop a communications management plan that ensures effective communication among all stakeholders.	Stakeholder analysis reports, Organizational communication policies, Feedback from stakeholders on communication preferences, Records and communication logs	PMBOK, PMI
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.	Risk registers documents, Expert judgment or interviews, Environmental and regulatory risk assessments, Organizational risk tolerance policies	PMBOK, PMI

9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.	Procurement requirements and specifications, Vendor proposals and contracts, Market research on suppliers	PMBOK, PMI
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Stakeholder interviews and surveys, Stakeholder communication logs, Historical engagement plans from similar projects	PMBOK, PMI

3.2 Research methods

Research methods offer a systematic approach used to collect, analyze, and interpret data in scientific investigations (Smith, 2024). The research methods used in this project are qualitative research, quantitative research, and analytical research .These approaches were selected to provide a comprehensive understanding of the project's objectives and to ensure that the findings are well-rounded and actionable. Below is an explanation and justification for each method:

3.2.1 Qualitative Research

Qualitative Research will aid to gather in-depth, subjective insights from stakeholders, including local communities, government agencies, and project team members. This method provides valuable context for the planning process, especially in understanding stakeholder concerns, expectations, and potential barriers. For example, focus groups or interviews could reveal concerns about affordability or technical challenges, which would be critical to address when developing communication strategies, stakeholder engagement plans, or risk management strategies. This method is usually employed in

educational, organizational, or community settings, which is beneficial to gathering quality information for this project (ATLAS.ti, 2024).

3.2.2 Quantitative Method

Quantitative research follows a deductive approach to data analysis, where hypotheses are formulated at the outset, and precise measurements are essential. This method involves the use of statistical analysis to interpret numerical data, which is typically categorized into two types: descriptive and inferential analysis (Sreekumar 2023). Quantitative Research is crucial for developing the data-driven aspects of the project management plan, particularly in areas like cost estimation, resource allocation, and scheduling. Structured surveys and questionnaires can provide measurable data on current internet usage, demand for service, and projected growth, which will inform budget forecasts, timeline estimates, and resource needs. For instance, quantitative data can help estimate the number of users that will need service and guide the selection of appropriate infrastructure technologies. This research method ensures that the project plan is grounded in objective data, allowing for more precise planning and more effective decision-making, particularly in areas like scope management and cost management.

3.2.3 Analytical Method

Analytical Research utilizes existing facts or information and critically evaluates them to draw meaningful conclusions or insights. This involves analyzing the available data to

assess its relevance, accuracy, and implications in relation to the research topic (GUST, 2024). Analytical Research will be used to critically assess the project's management approach, ensuring it aligns with best practices in project management as defined by PMBOK frameworks. Analytical research allows the project manager to compare proposed strategies for integration, quality management, risk management, and resource management against industry standards, drawing on case studies and literature reviews.

Chart 2

Research methods (Karen Novelo, November 2024)

Objectives	**Research methods**		
	Qualitative	Quantitative	Analytical
1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Interviews with stakeholders to identify integration needs and coordination issues.	Surveys to collect data on past integration successes and challenges in similar projects.	Information gathered from sources will be used to create the Integration Management Plan.
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Focus groups to understand community needs and expectations for broadband services.	Survey data on the scale of services needed (e.g., households, areas to be covered).	Review scope management approaches in past broadband projects.
3. To develop a schedule management plan that defines the timeline for project tasks	Interviews with local authorities and technical	Data from similar projects on	A baseline for the schedule management plan

and ensures that the project is completed on time.	teams to assess realistic timelines.	installation times and resource needs.	will be created and analyzed.
4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Conversations with stakeholders to understand budget challenges and financial constraints.	Survey data on infrastructure costs and expected revenue from service provision.	Review cost management strategies in similar projects.
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	Focus groups with end users and technicians to define quality standards.	Collect data on broadband quality metrics (e.g., user satisfaction, speed).	Analyze quality management practices from successful projects.
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	Interviews with suppliers and contractors to assess resource availability.	Survey data on resource needs, such as materials and workforce.	Analyze resource management strategies from similar projects.
7. To develop a communications management plan that ensures effective	Interviews with stakeholders to understand	Survey data on effective communication	Analyze communication strategies from

communication among all stakeholders.	communication preferences.	channels and frequencies.	similar projects to ensure alignment
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.	Focus groups to identify potential risks and challenges in rural areas.	Survey data on common risks and their impacts from similar projects.	Review risk management practices from similar projects.
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.	Interviews with procurement experts to identify procurement challenges.	Quantitative data on typical procurement timelines and costs.	Analyze procurement strategies from similar projects.
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Focus groups with community members to understand expectations and concerns.	Survey data on stakeholder engagement and communication preferences.	Analyze stakeholder engagement methods used in similar projects.

3.3 Tools

Tools are essential resources that help navigate the complex array of software and methods aimed at streamlining project workflows, improving team collaboration, and ensuring successful project outcomes (Simplilearn, 2024). In this project, the tools that will be utilized are project management templates and frameworks, existing documents and historical data and digital applications and software. The summary of tools must be shown in a chart such as chart 3 below:

Chart 3 Tools (Karen Novelo, November 2024)

Objectives	Tools
1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Project Charter Project Management Plan Change Control System
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Work Breakdown Structure (WBS) Scope Baseline Scope Validation
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.	Microsoft Project or Project Scheduling Software Gantt Charts Critical Path Method (CPM)

Objectives	**Tools**
4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Cost Estimation Tools Budgeting Tools
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	Quality Metrics Quality Audits Control Charts
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	Resource Allocation Software Team Development Tools
7. To develop a communications management plan that ensures effective communication among all stakeholders. .	Communication Matrix Stakeholder Analysis

8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.	Risk Register Risk Breakdown Structure (RBS)
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.	Procurement Management Tools Contract Templates Supplier Evaluation Tools
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Stakeholder Register Stakeholder Engagement Assessment Matrix Communication Plan

3.4 Assumptions and constraints

Project assumptions provide a foundation for decision-making, risk management, and project planning and constraints are limitations or restrictions that impact project execution, and dependencies are the connections between tasks or deliverables in a project (Smartsheet, 2024). Managing these assumptions, constraints, and dependencies is essential to ensuring the project stays on track and meets its objectives. For this project and as it relates to expanding rural broadband coverage, several assumptions and constraints have been identified to guide decision-making and risk management. The summary of assumptions and constraints is shown in chart 4 below:

Chart 2

Assumptions and constraints (Karen Novelo, November 2024)

Objectives	Assumptions	Constraints
1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Availability of all project resources, stakeholder cooperation and technological infrastructure.	Limited budget and time constraints for effective coordination of the implementation plan
2 To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Assumes that stakeholders' expectations are clearly and that the project scope is clearly outlined without major changes.	As a result of scope creep due to shifting priorities, regulatory limitations, and stakeholder demands.
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.	Timely availability of materials, resources, and approvals without delays	Dependency on external suppliers, regulatory approvals, and weather-related delays.
4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Cost estimates will be accurate, and funding will be available	Limited financial resources

Objectives	Assumptions	Constraints
	throughout the project.	
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	There will be access to qualified quality management personnel and tools.	There are limited quality control specifications and not being implemented.
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	There are adequate human resources, materials, and equipment readily available	Limited availability of skilled labor and equipment due to the remote location.
7. To develop a communications management plan that ensures effective communication among all stakeholders.	Stakeholders will be responsive to communication channels and all communication tools will be readily available	Constraints due to remote locations and limited internet connectivity for some stakeholders.
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks. .	Risks will be identified, and mitigation strategies will be in place.	External factors, such as weather or government regulations, which can delay or increase project costs and lack of contingency plan.

Objectives	Assumptions	Constraints
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.	Procurement information will be available and contain relevant information to goods and services.	Procurement information such as shipping costs, and availability of critical materials or components are not available.
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Stakeholders are engaged and supportive throughout the project.	Stakeholder cooperation and resistance from members in the community

3.5 Deliverables

A deliverable is defined as any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.(PMBOK, 2016). Each deliverable will provide detailed frameworks for managing various aspects of the broadband expansion project, ensuring that the project progresses smoothly and achieves its objectives. The summary of deliverables is shown in chart 5 below:

Chart 5

Deliverables (Karen Novelo, November 2024)

Objectives	Deliverables
1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Integration Management Plan
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Scope Management Plan
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.	Schedule Management Plan
4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Cost Management Plan

5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	Quality Management Plan
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	Resource Management Plan
7. To develop a communications management plan that ensures effective communication among all stakeholders.	Communications Management Plan
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.	Risk Management Plan
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.	Procurement Management Plan
10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Stakeholder Engagement Plan

4 RESULTS

The Project Management Plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low-income users in rural areas provides a structured approach to executing the project efficiently while ensuring optimal resource utilization, stakeholder engagement, and alignment with strategic objectives. While project management methodologies offer a systematic framework, the implementation presents unique challenges.

This project requires close collaboration with key stakeholders, including the Project Sponsor, Project Manager, technical teams, regulatory authorities, and local communities, to gather essential information and refine project objectives. A foundational component of this process is the Project Charter, which formally authorizes the project, defining its scope, objectives, risks, key stakeholders, deliverables, milestone schedule, budget estimates, and approval criteria.

Following the PMBOK framework, the development of the Project Charter involved consultations, stakeholder engagement, and departmental coordination to ensure alignment with the project's goals. With the Project Charter in place, the next step in Project Integration Management was the development of this Project Management Plan, which outlines the strategies for execution, monitoring, and risk mitigation. To ensure clarity and consistency, structured templates and standardized documentation were used, facilitating effective communication and decision-making across all project phases.

This plan serves as a roadmap for guiding project implementation, tracking progress, and addressing potential challenges, ensuring the successful expansion of broadband infrastructure and the assessment of affordable service models to enhance connectivity for low-income users in rural areas.

4.1.Integration Management Plan

The first objective of the project is the creation of a Project Integration Management Plan. This plan includes the processes and activities required to identify, define, combine, unify, and coordinate various processes and project management activities within the project management process groups (PMBOK, 2017). The Project Integration Management Plan consists of several key processes including:

- Develop project charter
- Develop project management plan
- Direct and manage project work
- Manage project knowledge
- Monitor and control project work
- Perform integrated change control
- Close project or phase

To develop the project charter, meetings were conducted with Central TV & Internet's management team, Chief Executive Officer, Logistics Managers and Marketing Manager initially, to assess the organization's broadband expansion and pricing structures. During these discussions, key inputs such as business needs, financial constraints, and technical feasibility were documented. The business case and project objectives were consolidated into formal documentation, ensuring alignment with strategic priorities.

The development of the project management plan involves integrating scope, schedule, cost, quality, resource, communication, risk, procurement, and stakeholder management plans. This integration ensures a cohesive approach to project execution, minimizing inefficiencies and streamlining decision-making.

Chart 6 illustrates the project charter ; all the start and end dates have been documented. The project manager will oversee key processes during project execution, including directing and managing project work, managing project knowledge, and monitoring and controlling project progress.

Chart 6: Project Charter (Karen Novelo, January 2025)

PROJECT CHARTER	
DATE:	**PROJECT NAME:**
January 7, 2025	Project Management Plan for Expanding Rural Broadband Coverage and Assessing Feasibility of Affordable Broadband Models for Low-Income Users.
KNOWLEDGE AREAS/ PROCESS GROUPS:	**APPLICATION AREA:**
Knowledge Areas: Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Communication Management, Project Risk Management, Project Procurement Management, Project Stakeholder Management Process groups: Initiating, Planning, Execution, Monitoring & Control & Closing	Telecommunications/ Digital Infrastructure
PROJECT START DATE:	**PROJECT FINISH DATE:**
October 28, 2024	April 18, 2025
PROJECT OBJECTIVES (General and Specific):	
General Objective	
To objective of this project is to develop a project management plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low-income users in rural areas.	
Specific Objective	
1 To provide broadband access in Santa Ana, Toledo, a rural area in Southern Belize, by expanding infrastructure to this underserved community within the project timeline. 2 To assess and propose affordable broadband service for low-income users , ensuring financial sustainability for both the provider and users. 3 To streamline the implementation process by collaborating with key stakeholders, ensuring at least 80% stakeholder engagement. 4 To enhance digital literacy and broadband adoption by developing and executing outreach programs in targeted rural areas. 5 To establish a monitoring and evaluation system that tracks broadband deployment progress, user adoption rates, and service affordability, ensuring data-driven decision-making.	

PROJECT PURPOSE OR JUSTIFICATION (MERIT AND EXPECTED RESULTS):

The purpose of this project is to expand broadband infrastructure and evaluate the feasibility of affordable service models for low-income users in rural areas. Currently, many rural communities lack reliable internet access, which limits opportunities for education, healthcare, and economic growth. This project will address this issue by providing a scalable broadband solution that meets the needs of underserved areas.

The project aligns with Central TV and Internet's strategic objectives of fostering digital inclusion, increasing market penetration, and enhancing its position as a market leader in the broadband sector. By facilitating connectivity in rural communities, Central TV and Internet will not only contribute to social development but also position itself as a key player in the growing digital landscape.

The implementation of this project will reduce reliance on traditional, costly infrastructure while improving the affordability and accessibility of broadband services for low-income users. This, in turn, will contribute to higher subscriber numbers, promote long-term customer loyalty, and establish Central TV and Internet as a responsible and sustainable provider dedicated to bridging the digital divide.

ASSUMPTIONS:

1. Central TV and Internet have sufficient technical and administrative staff available to assist with the project implementation.
2. All stakeholders will cooperate in supporting project objectives.
3. It is assumed that weather conditions will permit uninterrupted fieldwork and installation activities during the planned timeline.
4. Local communities will be receptive to the project and the availability of affordable broadband services.
5. It is assumed that material and equipment suppliers will deliver quality goods on time, based on agreed procurement schedules.

CONSTRAINTS:

1 The project must be completed within the predefined 90-day duration, with no room for significant schedule overruns.
2 Weather conditions or geographic challenges may delay infrastructure installation.
3 Terrain and access conditions in the rural area may limit the speed and ease of installation.
4 Outreach and training activities must align with the community's availability and willingness to participate.
5 The affordability of service packages for low-income users may require careful structuring to remain financially sustainable for Central TV and Internet.

PRELIMINARY RISKS:

1. If equipment or installation teams are delayed, the project timeline could be impacted, leading to missed milestones and potential delays in service rollout.
2. If existing infrastructure is incompatible with new technology or if network issues arise, it may lead to additional costs and delays.
3. If key stakeholders do not fully engage or support the project, this could lead to slow adoption or disruptions in progress.
4. If unexpected costs arise from unforeseen environmental conditions, technical challenges, or regulatory requirements, the project's budget may exceed initial estimates.
5. Low-income users may be hesitant to adopt broadband services due to lack of understanding or distrust in new technologies, affecting uptake and long-term sustainability.

BUDGET:

USD $54,884.50

MILESTONES AND DATES:

Milestone	Start Date	End Date
Project Start	1/3/2025	1/3/2025
Approvals	10/1/2025	13/01/2025
Infrastructure Development	14/01/2025	2/7/2025
Network Design & Engineering	14/01/2025	2/7/2025
Affordability & Feasibility Studies	10/2/2025	17/02/2025
Pricing Model Development	10/2/2025	12/2/2025
Pilot Programs & User Testing	13/02/2025	17/02/2025
Training	18/2/2025	24/02/2025
Soft Launch	25/02/2025	27/02/2025
Mass Rollout	28/02/2025	5/3/2025
Project Close	11/3/2025	12/3/2025

RELEVANT HISTORICAL INFORMATION:

Central TV & Internet is a cable and broadband provider that has expanded its services to numerous towns and villages across Belize. While the company currently delivers broadband access to approximately 70% of the country, many communities still lack internet connectivity. Although surveys have been conducted in some of these underserved areas, a comprehensive plan for service expansion has yet to be developed.

STAKEHOLDERS:

Project Sponsor, Rural Community Residents, Installation Technicians & Contractors, Project Team, Project Sponsor, Schools and Learning Centers, equipment & Material Suppliers, Community Liaison Officer

PROJECT MANAGER

Karen Novelo	Signature:
Adrian Lizarraga	Signature:

4.2. Scope Management Plan

The creation of the Scope Management Plan is the second objective of this project. It defines how the Broadband Expansion and Affordability project scope must be planned, defined, and controlled to ensure successful completion. It outlines the processes required to ensure that all necessary work is included while preventing scope creep. This plan is essential for maintaining alignment with the project goals, timelines, and budget constraints. To fulfill this objective, various activities and methodologies were employed, including the use of a Requirements Traceability Matrix, Work Breakdown Structure (WBS), WBS Dictionary and a Roles and Responsibility Matrix. The project charter developed in the previous objective serves as a foundation for planning the project scope. Additionally, enterprise environmental factors must be considered, including but not limited to:

- Working Hours – Most project activities, including groundwork, occurred between 7:00 AM and 5:00 PM to ensure maximum efficiency.
- Geographical Challenges – A site survey was conducted to evaluate the feasibility of installation based on the landscape of the area.
- Regulatory and Compliance Requirements – The project must comply with national government policies and existing telecommunications regulations to ensure lawful and smooth implementation.

Scope Management Approach

The Project Manager will have sole responsibility for scope management. The scope of this project is defined by the Scope Statement, Work Breakdown Structure (WBS) and WBS Dictionary. The Project Sponsor and Project Manager collaborated to establish and approve the criteria for measuring and validating the project scope.

Scope changes may be proposed by the Project Manager, internal stakeholders, or any project team member. However, all change requests will be directed to the Project Manager, who will document them in a change request tracker and assess their potential impact.

If a change involves technical adjustments or optimizations that do not affect the project's budget, timeline, or overall objectives, the Project Manager may approve it independently. However, changes that impact costs, timelines, or the project's strategic goals will be escalated to the Project Sponsor for review and approval.

Once a change is approved, the Project Manager will update all relevant project documents, including the scope statement, Work Breakdown Structure (WBS), and project schedule. The change will then be communicated promptly to all stakeholders and project team members.

The Project Sponsor will retain final authority to accept the completed project deliverables and validate the project scope, ensuring alignment with the project's objectives and success criteria.

Roles and Responsibilities

The Project Sponsor, Project Manager, and Project Team will each play vital roles in managing the project scope. It is essential that all parties clearly understand their responsibilities to ensure that all work remains aligned with the approved scope throughout the project lifecycle. Chart 7 below outlines the specific roles and responsibilities related to scope management.

Chart 7 : Scope Management Roles and Responsibilities (Karen Novelo, January 2025)

Name	Role	Responsibilities
Adrian Lizarraga	Project Sponsor, CEO	• Approve key project decisions and support high-level project objectives. • Review and approve or reject scope change requests that impact project cost or timeline. • Assess scope change requests that influence project value or performance duration. • Accept and validate project deliverables.
Karen Novelo	Project Manager	• Facilitate scope change requests. • Keep records of change requests. • Approve technical change requests that do not affect cost and performance period. • Organize and facilitate scheduled change control meetings. • Communicate outcomes of scope change requests.

		• Update project documents upon approval of all scope changes.
Jennie Moguel	Marketing Manager	• Oversee the pricing models used in the market. • Coordinate digital and printed marketing campaigns in the community. • Responsible for community engagement programs
Ivanna Richards	Operations Supervisor	• Coordinate all technical operations between the technical team, customer service, marketing and sales departments.
Adelissa Pulido	Logistics Manager, Headquarters	• Manage logistics and resources at headquarters. • Coordinate with technical teams and ensure smooth operations. • Handle procurement and distribution.
Neisy Pott	Logistics Manager, Southern Area	• Oversee logistics in the southern region. • Ensure timely delivery of materials and equipment. • Liaise with local teams.

Define Scope

The scope of this project was defined through a structured requirements collection process. Meetings and interviews were conducted with key stakeholders, including the project team and potential users in the rural community. Insights gathered from these engagements will be utilized for the development of the Project Requirements Documentation and Requirement Management Plan. These documents outline the technical, operational, and service requirements necessary to expand broadband infrastructure and deliver affordable service to low-income users in rural areas.

- **Scope Description**

  Location and Geographical Scope: The expansion of this project targets Santa Ana Village located in Toledo, Belize. It is a rural community with a small population. Figure 5 represents an image of the project area.

Figure 5 Map/Image of Project Area (Source: Karen Novelo, February 2025)

Description of the project: This project focuses on expanding internet access in the Santa Ana area, where a recent survey identified approximately 40 households that would directly benefit from improved connectivity. The survey collected valuable insights regarding the preferred service rates and packages suitable for the community. This information will guide the development of tailored service offerings and will serve as the basis for conducting an investment and return analysis to assess the project's financial feasibility and long-term sustainability.

- **Assumptions**

The following assumptions are made to support the successful advancement of the project:

- Key stakeholders, including the project sponsor, community leaders, and internal teams, will remain supportive and cooperative throughout the project lifecycle.
- Infrastructure installations are in alignment with regulatory compliance.
- The rural community identified for the project will be receptive to the implementation of broadband services.
- Equipment and materials required for the installation of broadband infrastructure will be available without significant delay.
- The project team has the technical capacity and expertise required to deliver the project.
- The allocated project budget of USD $55,000 is sufficient to meet the scope requirements.
- Weather conditions will not cause significant delays during the installation phase.
- Community members will participate in digital literacy and outreach programs to maximize broadband adoption.

- **Constraints**

The following constraints are acknowledged as potential limitations in the execution of the project:

- Delays in the procurement or delivery of essential infrastructure equipment.
- Limited access to certain rural areas due to poor road conditions or environmental barriers.
- Fluctuations in costs for network components and installation services.
- Resistance or low participation from community members in outreach and training programs.
- Time limitations due to fixed funding and a non-extendable implementation period.
- Any changes in telecommunications regulations that may impact infrastructure deployment.

- Limited availability of skilled labor or technical support in remote project areas.

- **Project Deliverables**

The key deliverables of this project include:

- Design and implementation of a broadband network infrastructure in targeted rural areas.
- Installation and testing of fiber-optic cables and supporting equipment.
- Development of affordable broadband service packages for low-income households.
- Launch of a pilot program to test pricing and performance.
- Execution of a community outreach and digital literacy campaign.
- Final project report outlining implementation, results, and recommendations.

- **Acceptance Criteria**

The project will be deemed complete and accepted based on the following criteria:

- All project deliverables are achieved as outlined in the project scope and work breakdown structure (WBS).
- Broadband infrastructure is fully installed, tested, and functioning reliably in the designated rural communities.
- Service packages are operational and accessible to the target users.
- Community outreach activities are successfully completed and documented.
- A final walkthrough or review is conducted with the project sponsor and key stakeholders.
- A final project report is submitted and approved.
- The project sponsor signs off on the completion, confirming that outcomes align with expectations and scope.

- **Project Exclusions**

This project does not include the following:

- Ongoing operations and maintenance of the broadband infrastructure post-implementation.
- Expansion of the network beyond the initially identified rural areas.
- Procurement of customer-end devices (e.g., modems or routers for end-users).
- Any future upgrades or enhancements outside the defined scope.

Project Scope Statement

This project involves developing a broadband network design plan, fiber-optic testing and deployment of broadband infrastructure to deliver high-speed, reliable, and affordable internet services to rural communities.

This project will be considered complete and accepted once broadband services are successfully installed at residential homes and are offered at an affordable rate in the targeted rural area of Santa Ana, Toledo Belize. The infrastructure must also be compatible with existing network systems, quality standards and regulatory requirements.

The project does not include ongoing operations, maintenance, or future network expansions beyond the defined service areas. Only internal personnel and approved contractors will be engaged in this project. Additionally, the project budget must not exceed USD$55,000.

Collect Requirements

The collect requirements process involves the collection, documentation and management of project requirements as it relates to the needs of the stakeholder to meet the objectives of the broadband expansion and affordability project. Using expert judgment and research methods (surveys and stakeholder meetings) , meetings were held during the first week to identify the area that needed expansion and to compile, analyze, prioritize and document all information necessary for the expansion. Through these actions, the major requirements that satisfy the main

objectives of the project were composed and the stakeholders and technical project requirements were developed as listed below:

- **Stakeholder Requirements**

The following stakeholder requirements were derived from internal interviews with the management team and surveys conducted in the Santa Ana area:

- Affordable internet packages must be available for low-income households.
- Internet service must be stable and reliable, with minimal interruptions.
- The expansion must support both residential and small business users.
- Community members must be educated on available packages and benefits.
- The infrastructure should be compatible with existing telecommunications systems.
- Transparent communication must be maintained throughout the project lifecycle.
- The project must remain within the allocated budget of USD $55,000.

- **Technical Requirements**

The following technical requirements were identified during infrastructure assessments and technical planning:

- Infrastructure must meet local telecommunications standards and regulatory requirements.
- Fiber optic cabling must be used where feasible to ensure high-speed performance.
- Equipment must support at least 50 Mbps downlink speed for end-users.
- Installation must include secure housing for key network components (e.g., routers, switches).
- Bandwidth allocation must support future upgrades and network scaling.
- The system must include monitoring tools for service uptime and performance.
- Installations must support IPv6 and be scalable for future technological upgrades.
- Adequate site drainage and pole-mounted solutions should be used to mitigate flood risks.

Requirements Traceability Matrix

In this project, the Requirements Traceability Matrix (RTM) depicted in Chart 8 will be used to track and manage the technical, operational, and service requirements for the project. It ensures that each requirement is properly documented and aligned with the project objectives. The RTM will provide a structured way to monitor how each requirement is addressed throughout the project lifecycle, supporting validation of deliverables, change control, and overall scope management.

Chart 8 Requirement Traceability Matrix for the expansion of broadband project (Source: Karen Novelo, February 2025)

Req. ID	WBS Deliverable	Requirement Description	Category	Source	Status
1.0	1.1.1.1.1. Requirement Documentation	Define all technical, regulatory, and business requirements	Planning	Project Manager	Open
2.0	1.2.1.1. Network Design & Engineering	Develop a robust network architecture to support rural broadband expansion	Technical	Logistics Manager	Open
3.0	1.2.1.1.1. Fiber Optic Planning	Identify and map out fiber-optic routes for connectivity	Technical	Logistics Manager	Open
4.0	1.2.1.1.2. Installation & Testing	Conduct field testing to ensure infrastructure meets service standards	Technical	Operations Supervisor	Open
5.0	1.2.2.1 Pricing Model Development	Develop affordable pricing models/packages for low-income users	Business	Asst. Marketing Manager	Open
6.0	1.2.2.2 Pilot Program and Testing	Implement a pilot program to validate pricing and service models	Business	Logistics Manager	Open
7.0	1.2.3.1. Community Outreach	Conduct awareness campaigns to drive adoption	Social Impact	Asst. Marketing Manager	Open

Work Breakdown Structure

To ensure successful execution, the project has been divided into manageable work packages, each aligned with specific activities and deliverables. These work packages are designed not to exceed 40 hours of effort, allowing the Project Manager to maintain clear oversight of the scope and progress. Adhering to the schedule is critical, as delays could impact service rollout and regulatory compliance in the targeted rural communities. The WBS for this project is illustrated in Figure 6 and the Legend for the Work Breakdown Structure is illustrated in Figure 7.

Figure 6 Work Breakdown Structure (Karen Novelo, January 2025)

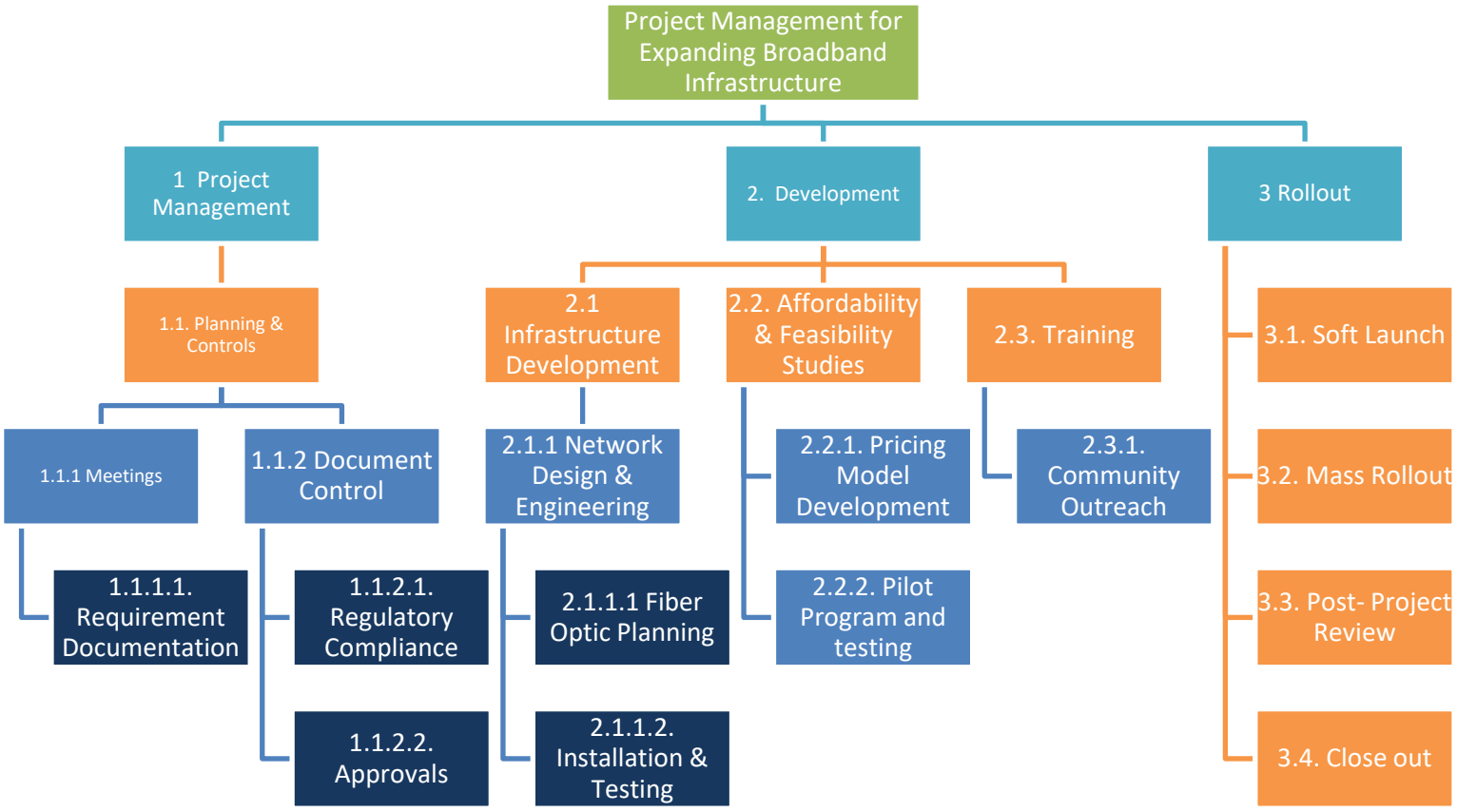


Figure 7 Legend for the Work Breakdown Structure (Karen Novelo, January 2025)

The WBS Dictionary for this Broadband Expansion and Affordability Project provides a detailed overview of the various elements and activities outlined in the Work Breakdown Structure (WBS). These details are organized and presented in Chart 9.

Chart 9 : Work Breakdown Structure (WBS) Dictionary (Karen Novelo, January 2025)

Level	WBS Code	WBS Element	WBS Element Description
1	0	Project Management for Expanding Broadband Infrastructure and Affordability Project	Overseeing the entire broadband expansion project, ensuring alignment with project goals and objectives.
2	1	Project Management	Coordinating and managing all aspects of the project, including planning, controls, compliance, and documentation.
3	1.1	Planning & Controls	Developing project plans, schedules, and monitoring controls to ensure project success.
4	1.1.1.	Meetings	Organizing stakeholder, management, and project team meetings to provide updates and gather feedback.
5	1.1.1.1	Requirement Documentation	Defining project requirements and scope, including technical, regulatory, and operational needs.
4	1.1.2	Document Control	Managing project documentation, ensuring proper version control, and accessibility.
5	1.1.2.1.	Regulatory Compliance	Ensuring project adherence to legal and regulatory requirements, including permits and licenses.

5	1.1.2.2.	Approvals	Securing necessary approvals from relevant authorities and stakeholders.
2	2	Development	Executing the technical development of the broadband infrastructure.
3	2.1.	Infrastructure Development	Designing and deploying the physical and technological components for broadband services.
4	2.1.1.	Network Design & Engineering	Creating detailed network designs for fiber optic and wireless connectivity.
5	2.1.1.1	Fiber Optic Planning	Planning and designing the fiber optic network layout and routes.
5	2.1.1.2.	Installation & Testing	Installing and testing the fiber optic and wireless infrastructure for quality assurance.
3	2.2	Affordability & Feasibility Studies	Evaluating cost-effective options and feasibility for broadband expansion.
4	2.2.1	Pricing Model Development	Developing pricing strategies and models for affordable broadband services.
4	2.2.2	Pilot Programs & User Testing	Implementing pilot programs to test broadband services and gather user feedback.
3	2.3	Training	Educating employees and users on broadband services and digital literacy.
4	2.3.1.	Community Outreach	Conduct awareness and adoption initiatives within the community.
2	3	Rollout	Deploying broadband services to targeted areas.
3	3.1	Soft Launch	Testing services and ensuring the service is functional in a controlled environment before full deployment.
3	3.2	Mass Rollout	Executing the full deployment of broadband services to all targeted areas.
3	3.3.	Post- Project Review	Evaluating project outcomes, documenting lessons learned, and recommending improvements.

3	3.4.	Closeout	Finalizing all project activities, including documentation and handover.

Validate Scope

The validate scope process ensures that completed work packages are formally reviewed and accepted according to the predefined project requirements. This validation confirms that the deliverables meet the necessary quality and performance standards and align with the approved scope.

Weekly progress meetings will be held with the Project Sponsor, Project Manager, and key stakeholders to review completed work packages. Prior to each meeting, each project member must ensure they are prepared to provide updates using the requirements checklist, developed from the project's scope and deliverables. This checklist will assist in assessing the completeness, functionality, and quality of the work performed.

If the deliverables meet the acceptance criteria, the Project Sponsor will formally sign off on the work. Any variances or issues identified will be documented, and recommendations will be made to address them promptly. The Project Manager will compile a Monthly Progress Report, which will serve as a record of scope validation and support ongoing performance evaluation throughout the project lifecycle.

Control Scope

The control scope process is essential for monitoring project activities, managing scope changes, and preventing scope creep. Change requests may originate from the project team, stakeholders, or the Project Manager based on evolving conditions or technical constraints. All requests must be submitted using a Change Request Form and reviewed by the Change Control Board (CCB).

Each change will undergo an impact analysis to assess its effects on project scope, budget, and schedule; its alignment with project goals and regulatory requirements; and any potential risks or constraints introduced by the change.

The approved changes will be formally documented and integrated into the Project Management Plan, the Work Breakdown Structure (WBS), and any affected documents such as the Scope Statement, Schedule, or Requirements Documentation. The Project Manager is responsible for ensuring that all team members are informed of approved changes, and that implementation is monitored closely.

Regular scope control ensures the project remains aligned with its intended outcomes, and that deviations are proactively managed to maintain delivery success.

Sponsor acceptance

Approved by the Project Sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

4.3. Schedule Management Plan

The Schedule Management plan is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule (Project Management Institute, 2017, pp. 571). The primary advantage of this process is that it offers clear guidance and direction for managing the project schedule throughout its duration.

This document serves as the foundation for planning, executing, and monitoring the project schedule. It provides comprehensive guidance to the project team and stakeholders on scheduling tasks, managing timelines, and tracking project progress. The schedule management plan will serve as a reference document for the entire project team, including the project sponsor, ensuring transparency and alignment.

Plan Schedule Management

The schedule management plan defines the framework for how the project's timeline will be developed, managed, and controlled throughout the execution of the broadband expansion and affordability project. The project schedule was created following a four-week planning period during which weekly meetings were held with the Project Manager, technical team, and key stakeholders. These meetings supported the identification and breakdown of tasks into work packages aligned with the project scope and deliverables. Additional inputs used to inform the scheduling process included historical data from similar infrastructure expansion projects, expert judgment from network engineers and field specialists, lessons learned from prior rural deployments, and relevant research regarding regulatory timelines and service implementation. The scheduling methodology ensures that milestones are effectively tracked, while task dependencies and resource availability are accurately accounted for. The schedule is represented through a Gantt chart and will be updated regularly to reflect actual progress. Weekly progress meetings will be used to monitor adherence to the timeline, and any deviations will be assessed and addressed through the integrated change control process to ensure timely completion of all project phases.

Define Activities

During the defined activities process, the specific actions required to complete the project were identified and documented using the Work Breakdown Structure (WBS) as a foundational guide. The WBS provided a detailed breakdown of work packages, outlining the sequence of technical, operational, and community-focused activities necessary to deliver reliable and affordable internet access to the rural area.

Given the dynamic nature of infrastructure projects and the potential for unforeseen technical or regulatory challenges, the project adopts an adaptive life cycle approach. While a comprehensive schedule has been prepared, it is expected to evolve as the project progresses. This flexible approach allows the project team to make real-time adjustments in response to changes, ensuring continued alignment with the project goals and timely delivery of each milestone. To document and manage this information, Microsoft Office and Ganntpro Project Management Online Solution were used as the primary scheduling tool. Chart 10 provides a detailed breakdown of the activity list and project scheduling components.

Chart 10: Activity List (Source: Karen Novelo, January 2025)

Activity ID	Activity Name	Description	Responsible for activity
1	Project Management	Overseeing project execution, coordination, and risk management.	Project Manager
1.1	Planning & Controls	Establishing project timelines, milestones, and performance metrics.	Project Manager
1.1.1.	Meetings	Conducting regular meetings to review project progress.	Project Manager, Technical Team, Logistics Managers, Operations Supervisor
1.1.1.1	Requirement Documentation	Defining technical, financial, and operational requirements.	Project Manager
1.1.2	Document Control	Managing project documentation and control.	Project Manager
1.1.2.1.	Regulatory Compliance	Ensuring adherence to national telecommunications	Project Manager, Logistics Managers, Operations Supervisor

		regulations and environmental policies	
1.1.2.2.	Approvals	Obtaining necessary stakeholder approvals.	Project Manager, Logistics Managers, Operations Supervisor, CEO
2	Development	Execution phase involving network infrastructure and feasibility and affordability studies.	Project Manager, Logistics Managers, Operations Supervisor, Asst. Marketing Manager
2.1.	Infrastructure Development	Physical deployment of broadband infrastructure.	Project Manager, Logistics Managers, Operations Supervisor, Network Engineers
2.1.1.	Network Design & Engineering	Developing network architecture and connectivity plans.	Project Manager, Logistics Managers, Operations Supervisor, Network Engineers
2.1.1.1	Fiber Optic Planning	Designing and mapping fiber optic routes.	Project Manager, Logistics Managers, Operations Supervisor, Network Engineers
2.1.1.2.	Installation & Testing	Deploying and testing network components for functionality.	Project Manager, Logistics Managers, Operations Supervisor, Network Engineers
2.2	Affordability & Feasibility Studies	Evaluating economic viability and user adoption strategies.	Project Manager, Operations Supervisor, Asst. Marketing Manager
2.2.1	Pricing Model Development	Developing affordable service packages for rural areas.	Project Manager, Operations Supervisor, Asst. Marketing Manager
2.2.2	Pilot Programs & User Testing	Conducting small-scale implementations for validation.	Project Manager, Logistics Managers, Operations Supervisor, Network Engineers, Asst. Marketing Manager
2.3	Training	Preparing staff and community for broadband adoption.	Project Manager, Operations Supervisor, Asst. Marketing Manager
2.3.1.	Community Outreach	Promoting broadband adoption through engagement programs.	Project Manager, Operations Supervisor, Asst. Marketing Manager
3	Rollout	Official launch of broadband services.	Project Manager, Operations Supervisor, Asst. Marketing Manager
3.1	Soft Launch	Limited-scale implementation to test systems before full rollout.	Project Manager, Operations Supervisor, Asst. Marketing Manager

3.2	Mass Rollout	Full-scale deployment of broadband services.	Project Manager, Operations Supervisor, Asst. Marketing Manager
3.3	Post-Project Review	Conduct a structured evaluation of the project's performance.	Project Manager, Logistics Managers, Operations Supervisor, Asst. Marketing Manager
3.4.	Closeout	Final evaluation and documentation of project completion.	Project Manager, Logistics Managers, Operations Supervisor, Asst. Marketing Manager CEO

Once all project activities are identified and defined, the next step involves determining and documenting the dependencies between these activities. Figure 8 illustrates a Project Schedule Network Diagram where the precedence diagramming method was applied, with a finish-to-start relationship used to establish logical sequencing.

Figure 8: Project Schedule Network Diagram (Source: Karen Novelo, January 2025)

Sequence Activities

To ensure maximum efficiency in executing the project, the relationships and dependencies among project activities were carefully mapped and documented. The sequencing of these activities was determined using the scope baseline and WBS outlined in previous sections of this document, ensuring alignment with project objectives and deliverables.

The sequencing process was guided by the logical flow of work across various phases, including planning, design, installation, testing, and community engagement. The Project

Schedule and Activities List provide a clear depiction of the order in which tasks must be performed.

Estimate Activity Duration

During the estimate activity durations process, the time required to complete each activity within the broadband expansion and affordability project was determined. The final estimates were based on historical data from previous broadband infrastructure projects managed by the team, using the analogous estimating method. Where project-specific variations were identified, such as geographic location or equipment availability, expert judgment from network engineers and field specialists was applied to adjust the estimated durations appropriately. To refine the estimates, the project team held weekly meetings over a four-week period to review and validate activity durations. This collaborative process ensured that all estimates reflected realistic timelines, resource constraints, and technical requirements, ultimately contributing to the development of the finalized project schedule. The final duration estimates are presented in Chart 11.

Chart 11: Activity Duration (Source: Karen Novelo, January 2025)

Activity ID	Activity Name	Duration
0	Broadband Expansion and Affordability Project	90 Days
1	Project Management	10 days
1.1	Planning & Controls	10 days
1.1.1.	Meetings	8 days
1.1.1.1	Requirement Documentation	4 days
1.1.2	Document Control	5 days
1.1.2.1.	Regulatory Compliance	3 days

1.1.2.2.	Approvals	3 days
2	Development	40 days
2.1.	Infrastructure Development	15 days
2.1.1.	Network Design & Engineering	15 days
2.1.1.1	Fiber Optic Planning	15 days
2.1.1.2.	Installation & Testing	10 days
2.2	Affordability & Feasibility Studies	5 days
2.2.1	Pricing Model Development	5 days
2.2.2	Pilot Programs & User Testing	5 days
2.3	Training	7 days
2.3.1.	Community Outreach	7 days
3	Rollout	20 days
3.1	Soft Launch	3 days
3.2	Mass Rollout	5 days
3.3.	Post- Project Review	5 days
3.4.	Closeout	2 days

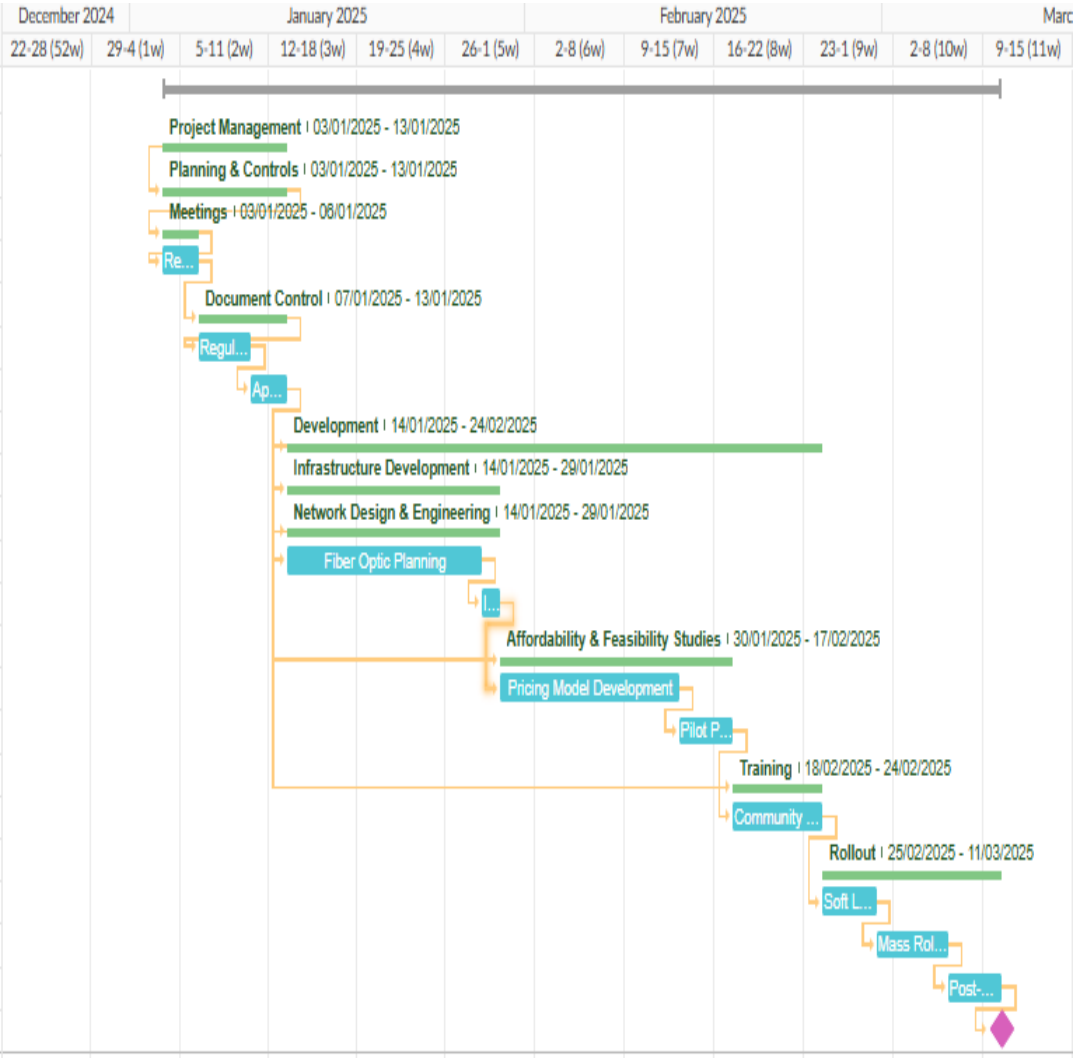
The subsequent process following the estimation of project activities was the development of the project schedule. GanttPRO was used as the primary tool for scheduling, resulting in the finalized project schedule, which is presented in Figure 9.

Develop Schedule

The project schedule for the project was developed based on the defined scope, detailed activity list, and estimated durations for each task. The project schedule integrates all the information to establish a realistic and achievable timeline.

Figure 9: Project Schedule for the Broadband Expansion and Affordability Project (Source: Karen Novelo, January 2025)

	Task name	Start date	End date
		03/01/2025	11/03/2025
1	Project Management	03/01/2025	13/01/2025
1.1	Planning & Controls	03/01/2025	13/01/2025
1.1.1	Meetings	03/01/2025	06/01/2025
1.1.1.1	Required Documen...	03/01/2025	06/01/2025
1.1.2	Document Control	07/01/2025	13/01/2025
1.1.2.1	Regulatory Complia...	07/01/2025	09/01/2025
1.1.2.2	Approvals	10/01/2025	13/01/2025
2	Development	14/01/2025	24/02/2025
2.1	Infrastructure Developm...	14/01/2025	29/01/2025
2.1.1	Network Design & En...	14/01/2025	29/01/2025
2.1.1.1	Fiber Optic Planning	14/01/2025	28/01/2025
2.1.1.2	Installation & Testing	29/01/2025	29/01/2025
2.2	Affordability & Feasibility...	30/01/2025	17/02/2025
2.2.1	Pricing Model Develo...	30/01/2025	12/02/2025
2.2.2	Pilot Programs & User ...	13/02/2025	17/02/2025
2.3	Training	18/02/2025	24/02/2025
2.3.1	Community Outreach	18/02/2025	24/02/2025
3	Rollout	25/02/2025	11/03/2025
3.1	Soft Launch	25/02/2025	27/02/2025
3.2	Mass Rollout	28/02/2025	05/03/2025
3.3	Post-Project Review	06/03/2025	10/03/2025
3.4	Closure	11/03/2025	11/03/2025



Schedule Control

The project schedule for the project will be reviewed and updated on a weekly basis. Task owners will provide actual start and finish dates along with completion percentages to ensure accurate tracking of progress.

The project manager will lead weekly schedule reviews to assess schedule performance, identify variances, and evaluate potential impacts. The project manager will also be responsible for submitting schedule change requests as needed and providing regular schedule updates in accordance with the project's communication plan.

The project team will participate in weekly schedule reviews and will promptly communicate any changes to actual start and finish dates to the project manager. Team members will also engage in resolving schedule variances when necessary to keep the project on track.

The project sponsor will remain informed of the project schedule status and will review and approve any schedule adjustments to ensure that resources are focused on completing project deliverables on time.

Schedule Adjustments and Threshold Percentage

To ensure structured decision-making, any proposed modifications to the schedule will follow a formal evaluation and approval process. Project team members are responsible for identifying necessary adjustments to the project schedule. If a modification is proposed, the Project Manager and the team will conduct a review meeting to evaluate its feasibility and impact. If the proposed modification exceeds predefined thresholds, the Project Manager must submit a formal schedule change request for stakeholder approval. A change request is mandatory under the following conditions:

- The duration of the work package is expected to decrease by 5%.
- The duration of the work package is expected to increase by 10%.

- The overall project timeline is expected to shorten by 10% .
- The overall project timeline is expected to extend by 5% .

Changes that do not meet these thresholds will require review and approval from the project manager, with appropriate justification, specifically as it relates to being behind schedule. The project manager will be responsible for updating the schedule, communicating any modifications and their implications to the team and stakeholders, and ensuring that all change requests are documented and archived after approval.

Sponsor acceptance

Approved by the project sponsor:

_____ Date: _____
Adrian Lizarraga
Chief Executive Officer

4.4. Cost Management Plan

The cost management plan was developed using the project plan and schedule management plan as primary inputs. Weekly status meetings with the project manager, project sponsor, and key stakeholders will serve as a platform for presenting financial updates. Meeting minutes will document these discussions and be shared digitally to ensure transparency and accountability.

The project manager is responsible for monitoring expenditure, tracking cost performance, and documenting any financial changes. When budget overruns occur, a presentation detailing corrective measures will be prepared and submitted to the project sponsor. For urgent financial matters, the project manager will communicate via email, providing sufficient justification and supporting documentation for any cost-related decisions. The sponsor may request additional data or clarification as needed.

To ensure effective tracking, control accounts will be established, and their financial performance will be evaluated using Earned Value Management (EVM). Funds will be allocated to each work package based on the percentage of work completed within a given timeframe, relative to the total cost required for completion. The Cost Performance Index (CPI) and Schedule Performance Index (SPI) will be calculated regularly to assess financial efficiency.

Cost variances will be closely monitored. If variances reach a threshold of ±0.1, a status change will be triggered, and the affected cost item will be flagged with a yellow indicator in project status reports, signaling early warning. If variances reach ±0.2, the item will be flagged with a red indicator, indicating a critical issue that demands immediate corrective action. The project manager must then implement strategies to restore CPI and SPI to acceptable ranges and avoid further deviation.

Estimate Costs

During the estimate cost process, a financial assessment was conducted to determine the anticipated cost of executing the broadband expansion and affordability project. The estimation was guided by the Work Breakdown Structure (WBS), and historical cost estimates from similar projects. Cost estimates were influenced by current market rates for materials and services, as well as by industry benchmarks.

The parametric estimating method was applied by calculating the product of unit costs and the projected quantities needed. This approach provided a consistent and scalable method for generating cost projections.

In the project budget, a contingency reserve was included using the Expected Monetary Value (EMV) method, which will be further explained in the Project Risk Management Section. This approach ensures that a specific reserve amount is available to address identified risks if they arise. Additionally, a management reserve set at 10% of the total project budget was included to account for unforeseen issues and potential risks, serving as a financial safeguard to maintain project stability and support successful completion.

Determine Budget

The budget for this project is detailed below in Chart 12. Costs for this project are presented in the Equipment, Labor and Logistics, Training and Community Outreach categories.

Chart 12: Project Budget (Source: Karen Novelo, January 2025)

Equipment			
Quantity	**Item**	**Unit Cost (USD)**	**Total Amount (USD)**
1,500 ft	6C Fiber Cable Wire	$ 0.20	$ 300.00
40	Fiber Drop Cable	$ 3.50	$ 140.00
40	Fiber Dead End / Anchors	$ 2.25	$ 90.00
10	Splice Enclosure	$ 20.00	$ 200.00
40	Termination Box (Wall-mounted)	$ 16.00	$ 640.00
1	Conduit Accessories	$ 2,000.00	$ 2,000.00
10	40' Wooden Utility Pole, Class 3	$ 887.00	$ 8,870.00
10	Pole Planting	$ 300.00	$ 3,000.00
1	Trenching	$ 1,250.00	$ 1,250.00
Labor and Logistics			
Quantity	**Item**	**Unit Cost**	**Total**
4	Technician Labor (installers)	$ 4,100.00	$ 16,400.00
1	Hired Labor	$ 500.00	$ 500.00
1	Meal Allowances	$ 500.00	$ 500.00
1	Fuel	$ 1,000.00	$ 1,000.00
Training & Community Outreach			
Quantity	**Item**	**Unit Cost**	**Total**
100	Printing of Training Material	$ 5.00	$ 500.00
1	Billboard (Printing and Rental)	$ 3,500.00	$ 3,500.00
3	Informational Video (Production Costs)	$ 3,000.00	$ 3,000.00
100	Flyers	$ 3.00	$ 300.00
100	Brochures	$ 3.00	$ 300.00
100	Posters	$ 4.00	$ 400.00
		Cost Estimate Total	$ 42,890.00
		Contingency Reserve	$ 7,005.00
		Subtotal	$ 49,895.00
		Management Reserve (10%)	$ 4,989.50
		Total Expenditure	**$ 54,884.50**

Measuring Project Costs

Performance of the project will be measured using the earned value management method. The following four earned value metrics will be used to measure project's cost performance:

- Schedule Variance (SV): Measures schedule performance by comparing planned progress to actual progress.
- Cost Variance (CV): Evaluates the project's financial performance by comparing the budgeted cost of work performed to the actual cost.
- Schedule Performance Index (SPI): Assesses progress achieved versus planned progress.
- Cost Performance Index (CPI): Compares the value of completed work to the actual costs incurred, ensuring financial efficiency.

If the SPI or CPI has a variance between 0.1 and 0.2, the Project Manager must report the reason for the exception. In cases where the SPI or CPI has a variance greater than 0.2, the Project Manager must provide a comprehensive report outlining the cause of the issue and present a detailed corrective action plan to restore project performance to acceptable levels. Chart 13 illustrates the performance measures for the project.

Chart 13: Performance Measure (Source: Karen Novelo, January 2025)

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

Reporting Format

Cost management reporting will be conducted through regular work progress reports, with cost-related data submitted to the Project Manager. The project status report will include a dedicated "Cost Management" section, incorporating the earned value metrics outlined in the previous section. Any cost variances exceeding the predefined thresholds in this Cost Management Plan will be documented, along with the corresponding corrective actions. Any change requests triggered by project cost overruns will be identified and tracked within this report to ensure proper oversight and resolution.

Cost Variance Corrective Action Plan

As indicated in Chart 12, the acceptable control threshold for CPI or SPI is set at less than 0.8 or greater than 1.2. If the project reaches one of these thresholds, implementing a cost variance corrective action plan is mandatory.

Within five days of the cost variance being reported, the project manager will present a range of corrective action options to the project sponsor. Once a corrective action is selected, the project manager will arrange a meeting with the project sponsor to formally present the cost variance corrective action plan.

This plan will outline the necessary steps and strategies to realign project costs with the planned budget. Upon approval and acceptance, the cost variance corrective action plan will be integrated into the overall project plan. The corrective actions will be incorporated as new tasks within the existing project structure to ensure proper implementation and tracking.

Control Costs

To effectively manage and control project costs, Earned Value Management will be used to track financial performance and progress. A monthly analysis will be conducted to compare the

planned value of work with the actual work completed, providing insights into the financial status of the project. The actual cost incurred during each reporting period will be evaluated to determine whether the project remains within budget. This information will be documented in monthly progress reports, using both comparison graphs and numerical data to enhance clarity and transparency.

All cost changes will be reviewed by a designated Change Control Board . The cost baseline will be updated in alignment with project developments and change requests. If changes indicate the need for additional funding, a review will be conducted to determine whether a withdrawal from the project's contingency reserve is necessary. No cost-related decisions or adjustments will be implemented without the final approval of the project sponsor, ensuring financial accountability throughout the project lifecycle.

Sponsor acceptance

Approved by the project sponsor:

_____ Date: _____
Adrian Lizarraga
Chief Executive Officer

4.5 Project Quality Management

Project Quality Management includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders' objectives (Project Management Institute, 2017, pp. 271).

The creation of the Quality Management Plan is a key objective of this project. Expanding broadband infrastructure to rural areas is essential for bridging the digital divide and ensuring equitable access to reliable internet services. Adherence to network performance metrics, including bandwidth capacity, latency, uptime reliability, and security protocols are all quality management factors.

To meet these quality standards, the broadband infrastructure must be designed and implemented using best practices for fiber-optic and wireless network deployment. The system must support efficient data transmission, minimize service disruptions, and facilitate scalability for future network expansions. The project team will ensure that the quality standards outlined in the Quality Management Plan are integrated into every phase of project execution, from design and installation to testing and final deployment.

Plan Quality Management

By integrating the risk management plan, stakeholder engagement plan, project charter and project scope, a quality criterion was developed to outline the standards and expectations to be upheld throughout the implementation of the broadband expansion project.

Expert judgment from the project team, as well as historical data from similar projects, were also leveraged to establish relevant benchmarks. These inputs supported the identification of quality-related assumptions and constraints that may influence the overall execution and performance of project deliverables. This quality framework ensures that all activities align with the defined service standards, compliance requirements, and stakeholder expectations.

Quality Management Approach

The quality management approach ensures that high standards are maintained throughout the broadband infrastructure expansion project. This applies not only to the final output but also to the processes involved in project execution. Achieving the quality objectives of this project is essential to its success, ensuring that broadband services meet industry standards, regulatory requirements, and end-user expectations. The project will apply an integrated quality approach to define quality benchmarks, measure quality, and implement continuous improvements. Quality must be planned into the project from the outset to prevent unnecessary rework, additional costs, delays, and resource wastage.

The project manager will document all organizational and project-specific quality standards for both the broadband infrastructure and the implementation processes. All quality management documents will be integrated into the project management plan. Upon successful project completion, quality-related documentation will be transferred to operational teams responsible for maintaining and managing the broadband network.

The project manager will collaborate with the project team to monitor and analyze product and process quality metrics. The collected data will serve as a benchmark for evaluating and meeting project quality standards. These quality measurements will be reviewed by the project sponsor to ensure alignment with project objectives.

The key quality metrics for this project will include, but are not limited to:

- Schedule adherence
- Resource utilization
- Process performance
    - Infrastructure deployment
    - Network testing and optimization
- Cost efficiency
- Network performance
    - Speed and bandwidth capacity

    - Service reliability and uptime
- Infrastructure design compliance
- Customer satisfaction and user experience

Any project team member can propose quality improvements. All recommendations will be reviewed to assess the cost-benefit impact of implementing changes. The potential effects of these improvements on network performance and existing processes will be carefully evaluated. If a proposed improvement is implemented, the project manager will update all relevant project documentation accordingly. Simultaneously, the quality manager/project manager will ensure that operational guidelines and procedures reflect the approved changes.

Quality Requirements and Standards

Quality requirements and standards ensure compliance with defined benchmarks and demonstrate how project objectives align with established performance criteria. The two primary focus areas for quality management in the broadband expansion and affordability project are product quality and process quality.

Product Quality

The project team will establish the quality standards, levels, and requirements related to the broadband infrastructure, ensuring alignment with existing national telecommunications regulations , industry best practices and Central TV & Internet's internal quality policies. These standards will encompass network reliability, data transmission speeds, latency thresholds, and uptime guarantees. If any gaps are identified, an assessment will be conducted to update the relevant standards and integrate them into the project plan. The project team will also be responsible for ensuring that all stakeholders are informed of these quality expectations. During network testing and deployment, assessments will be conducted to verify compliance with these standards and ensure that the broadband infrastructure meets or exceeds the set quality levels.

Process Quality

The project team will define the quality standards, levels, and requirements governing the processes involved in expanding broadband infrastructure. These standards will be based on established engineering, installation, and maintenance protocols, as well as industry benchmarks for network deployment. If any process quality gaps are identified, an assessment will be conducted to integrate the necessary updates into the project documentation. The project team will be responsible for communicating these process quality standards to all relevant stakeholders. Throughout the implementation phase, regular assessments will be conducted to confirm adherence to established process quality requirements.

Quality Assurance

To ensure that quality requirements and performance thresholds are met, periodic audits will be conducted based on defined quality standards. The broadband expansion and affordability project's quality assurance process will focus on the efficiency of network deployment processes and the overall functionality and reliability of the broadband service. An iterative approach will be employed, incorporating process metrics measurement, data analysis, and continuous improvement strategies.

Quality assessments will be performed by the project manager in collaboration with the project team at scheduled intervals. The key quality assurance metrics for the project include:

- Network Performance
- Functional Service Models
- Installation efficiency
- System uptime
- Speed consistency
- Rework and Issue Resolution

The project manager will oversee quality management and ensure that audit findings contribute to continuous monitoring and improvement of quality metrics. If discrepancies are identified, corrective actions will be implemented as needed. Chart 14 demonstrates the Quality Assurance Metrics for the expansion of broadband and affordability service models.

Chart 14: Quality Assurance Metrics (Source: Karen Novelo, January 2025)

Process Action	Acceptable Standards	Process Phase	Assessment Interval
Network Performance	Minimal latency and consistent service availability	Development	Per testing phase completion
Functional Service Models	Modems are compatible and service packages tailored to meet user needs, offering tiered pricing and scalable options for residential, business, and community services.	Development	Weekly for customer service evaluations
Installation Efficiency	Maximum of 60 minutes for standard household installation	Development	Per installation completed
Service uptime	95% network availability	Development	Daily review
Speed Consistency	90% of consistent speed during peak hours	Development	Daily review
Rework and Issue Resolution	Less than 48 working hours assigned for troubleshooting	Development	Weekly issue tracking

The quality assurance process for the broadband expansion and affordability project will focus on monitoring system performance, service delivery, and adherence to project standards. Regular assessments will be conducted to ensure compliance with predefined quality metrics.

Control Quality

Quality control measures for the broadband expansion and affordability project will focus on ensuring that network components, deployment processes, service performance and pricing models meet the established standards and expectations.

As broadband service is an intangible product, quality will be evaluated based on service performance metrics and customer satisfaction. Regular project meetings will be held to discuss potential improvements and service issues, if any. Suggested enhancements will be documented, reviewed, and communicated to stakeholders.

Ensuring compliance with all quality standards is essential for project success. Meeting these standards will confirm that the project is executed at the highest quality level, ensuring reliable delivery within the allocated budget and resources.

Quality Control Measurements

All deliverables and processes related to the project must be measured against predefined quality standards. Below are examples of quality control logs that will be used to track compliance with quality benchmarks as depicted in Chart 15 and Chart 16.

Chart 15: Issue-Based Quality Assurance Log Template (Source: Karen Novelo, January 2025)

Issue ID	Issue Description	Detected By	Date Identified	Severity (Low/Med/High)	Corrective Action	Responsible Party	Resolution Date	Status (Open/Closed)
1	High latency detected	Technician	M/D/Y	High	Adjust network routes	Network Engineer	M/D/Y	Closed

Chart 16: Compliance-Based Quality Assurance Log Template (Source: Karen Novelo, January 2025)

Compliance Area	Standard/Requirement	Evaluation Date	Compliance Status	Action Required	Responsible Party	Deadline
Network Latency	≤ X ms	MM/DD/YYYY	Non-Compliant	Adjust routing	Network Engineer	MM/DD/YYYY
Installation Efficiency	≤ 60 minutes	MM/DD/YYYY	Compliant	None	Field Technician	N/A

Sponsor acceptance

Approved by the project sponsor:

_____ Date: _____
Adrian Lizarraga
Chief Executive Officer

4.6 Project Resource Management

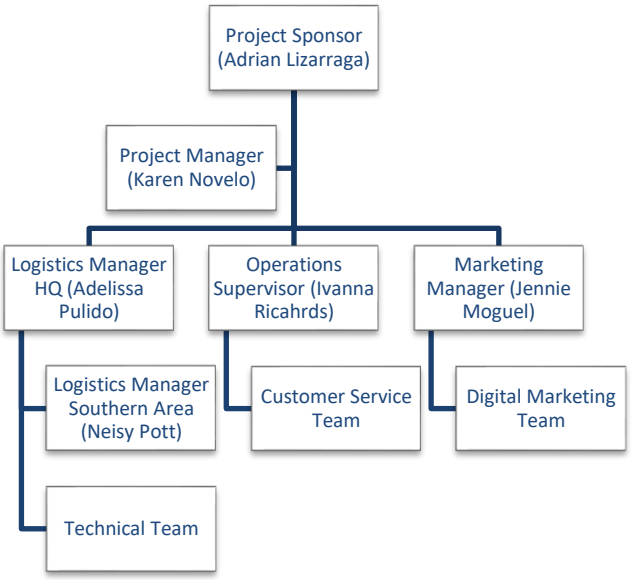
Project Resource Management encompasses the processes involved in identifying, acquiring, and overseeing the resources essential for the successful execution of the project. These processes ensure that the project manager and team have access to the appropriate resources at the necessary time and location.

To maintain an efficient workflow and properly allocate personnel to project tasks, a structured Resource Management Plan was developed. This plan was created using information gathered from the project charter, work breakdown structure, and available budget, ensuring optimal resource utilization throughout the project's lifecycle.

Plan Resource Management

The project organization chart provides a visual breakdown of the resources needed for the Broadband Expansion and Affordability Project, as shown in Chart 17. The organizational chart will offer staff a clear understanding of the project's chain of commands, ensuring transparency in roles and reporting structures. Each department involved in the project will be responsible for fulfilling their assigned roles and responsibilities, ensuring effective coordination and collaboration with other teams. This includes aligning departmental objectives with the overall project goals, maintaining clear and open communication channels, and actively participating in project planning, execution, and monitoring activities.

Chart 17: Project Resource Breakdown (Source: Karen Novelo, January 2025)



The Responsible, Accountable, Consulted, and Informed (RACI) model will be used to clearly define and structure the roles and responsibilities within the project. Chart 18 presents the RACI matrix tailored to this project, outlining the specific roles and responsibilities of each team member during project execution.

Chart 18: RACI Matrix (Source: Karen Novelo, January 2025)

Project Activity	Project Manager	Operations Supervisor	Logistics Managers	Marketing Manager	Project Sponsor	Technical Team
Project Management	R	A	A	I	C	A
Infrastructure Development	R	A	A	I	C	A
Training & Capacity Building	R	C	C	A	C	C
Equipment Procurement & Deployment	R	A	A	I	C	A
Service Launch & Implementation	R	A	A	I	C	A

Key:

- **R** – Responsible for completing the tasks
- **A** – Accountable for task completion
- **C** – Consulted when decisions need to be made
- **I** – Informed regarding work performed and decisions made

Estimate Activity Resources

The estimate activities process for the project utilized data derived from the activity attributes and the activity list, which defined the key tasks required to implement the network infrastructure for the broadband expansion. The resource estimation was guided by a cost reference plan and included the projected quantity of fiber optic materials, equipment, and labor needed to execute each task effectively. Historical data from previous similar projects was used as the basis for estimating durations and resource requirements, applying the analogous estimating method.

Key project staff will be provided by the project manager and will maintain oversight across all phases of execution. All field personnel engaged for the project are expected to remain assigned until project completion unless released from duty by the project manager. Project outlining roles, responsibilities, and timelines will be signed prior to project engagement.

The activity resource illustrated in chart 19, included in the following section outlines the primary activities, assigned personnel, necessary resources, and expected duration for each activity to ensure timely and efficient delivery of the project.

Chart 19: Activity Resource Chart (Source: Karen Novelo, January 2025)

Activity ID	Activity Name	Duration	Resources	Responsible Personnel
1	Project Management	10 days	Planning tools, documents	Project Manager
2.1	Infrastructure Development	15 days	Fiber cables, trenching tools	Field Technicians, Engineers
2.1.1.1	Fiber Optic Planning	15 days	GIS tools, network maps	Fiber Technicians
.2.2.1	Pricing Model Development	5 days	Cost modeling sheets, market data	Marketing Manager, Logistics Managers, Project Manager
2.3.1	Community Outreach	7 days	Brochures, speaker systems	Outreach Team, Marketing
3.2	Mass Rollout	5 days	Installation kits, vehicles	Technicians, Logistics Managers
3.4	Closeout	2 days	Final reports, sign-offs	Project Manager, Sponsor

Acquire Resources

Resource Materials

Based on the data compiled from the Activity Schedule, Work Breakdown Structure (WBS), and estimated cost breakdown, a monthly work forecast was developed to guide project execution. Both material and human resource requirements are identified and procured at least one month in advance of their scheduled use. This proactive approach, managed by the project team, ensures that all necessary resources are in place prior to the start of each project phase.

In cases where certain resources, such as specialized equipment, network components, or materials with longer delivery timelines, are required later in the project, the Project Manager will initiate long-lead procurement at the beginning of the project, at least three months in advance, to prevent delays during critical phases of execution.

Resource Personnel

In alignment with the material acquisition process, resource personnel will be confirmed and scheduled one month in advance of their assigned activities. These personnel will remain actively involved until the completion of their tasks or the overall project, unless otherwise directed.

A projectized team composed of staff from the internal departments (Logistics, Operations, Marketing, and Management) will be assembled specifically for this initiative. This team will be responsible for monitoring progress, coordinating resources, and overseeing the successful delivery of project objectives.

The project manager and logistics managers will be accountable for managing day-to-day operations. This includes supervising the on-the-ground workforce, coordinating with project team members, and ensuring the physical rollout of broadband services is executed efficiently and according to plan.

Develop Team

The success of the project relies on the integration of key persons from various departments and a diverse range of skills. To ensure effective collaboration and unity, the Project Manager should foster a team-oriented environment that encourages coordination, mutual respect, and shared accountability.

Regular team meetings were used as a platform to communicate progress updates, clarify project expectations, and resolve any issues that may arise. These sessions are structured to promote brainstorming, encourage proactive problem-solving, and support a collaborative culture where all contributions are valued.

During the planning and design stages, the core project team met bi-weekly to discuss planning progress, align on deliverables, and address emerging challenges. The Project Manager facilitated open and solution-oriented discussions to maintain momentum and ensure alignment with project objectives.

As the project moved into execution, team interaction increased, particularly among the operations, logistics, technical, and marketing units. Weekly coordination meetings are held to review upcoming tasks, address constraints, and support cross-functional integration. Additionally, monthly project progress meetings are held and led by the Project Manager. These sessions bring together department heads and the Project Sponsor to review the overall progress, assess risks, and agree on any adjustments needed to stay on course. These meetings are essential to maintaining strategic alignment and transparency across the organization.

Manage Team

Throughout all phases of the project, the Project Manager is actively responsible for tracking the performance and progress of each team. This involves close monitoring of tasks, adherence to project timelines, and quality of output as outlined in the work packages.

For field and technical teams involved in installation and testing, weekly briefings are held to align on goals, identify potential risks, and ensure smooth execution. The Project Manager conducts weekly virtual check-ins, during which progress is reviewed and any concerns are documented and addressed promptly.

Performance assessments are conducted regularly, and weekly work performance reports are compiled to summarize key achievements, highlight delays, and evaluate team output against planned milestones. These insights help ensure that team members remain focused, motivated, and aligned with the project goals.

The Project Manager also evaluates the effectiveness of the project management support team to ensure that strategic coordination and communication are maintained across all departments.

Control Resources

The control of resources is an ongoing process carried out by the Project Manager throughout the project lifecycle. Ensuring that both material and human resources are available and optimally utilized is critical to the success of the project.

The use of resources is monitored weekly and compared against the resource allocation schedule outlined in the project management plan. This includes tracking the availability and deployment of equipment, tools, and personnel, and ensuring that resource usage aligns with the activity timelines.

In cases where additional resources are needed due to unforeseen changes or increased workload, the Project Manager will coordinate with department heads to reassign or supplement existing resources without affecting core operations.

Delays or resource shortages are documented in an issues log, and any corrective actions required must be reviewed and approved by the Project Manager. All issues, resolutions, and actions taken are recorded in the monthly project progress reports to ensure accountability and facilitate continuous improvement.

This approach ensures that the project maintains momentum and can respond dynamically to any challenges that arise during implementation.

Sponsor acceptance

Approved by the project sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

4.7 Project Communications Management

The Project Management Institute describes Project Communications Management as the processes necessary to ensure that the information needs of the project and its stakeholders are met through development of artifacts and implementation of activities designed to achieve effective information exchange (2017, pp. 359). Project Communications Management consists of developing a strategy to ensure communication is effective for stakeholders and carrying out the activities necessary to implement the communication strategy. The Project Communications Management processes are:

- Plan Communications Management
- Manage Communications
- Monitor Communications

Plan Communication Management

Effective communication is essential for the success of this broadband expansion project. Both the information shared, and the communication methods used will play a key role in ensuring smooth coordination among stakeholders.

Most project-related communication will take place via email to ensure timely updates and coordination among team members. Project documents and reports will be stored on the organization’s secure data server, ensuring accessibility for key stakeholders.

The maintenance of hardware responsible for storing and accessing project documents, as well as any non-project-related software, falls outside the project's scope and remains the responsibility of the organization. The specific communication requirements for this project are detailed in Chart 20.

Chart 20: Communication Matrix (Source: Karen Novelo, January 2025)

Communication Type	Objective of Communication	Medium	Frequency	Audience	Owner	Deliverables	Format
Kickoff Meeting	Introduction of project team members. Review project objectives, scope, and approach.	Face-to-Face	Once	Project Sponsor, Project Team	Project Manager	Agenda and Meeting Minutes	Agenda has been previously emailed to all participants. All documents were saved on the Internal Shared Folder.
Project Team Meetings	Discuss project progress, challenges, and next steps.	Face-to-Face & Virtual	Weekly	Project Team	Project Manager	Agenda, Meeting Minutes, Updated Project Schedule	Agenda has been previously emailed to all participants. All documents were saved on the Internal Shared Folder.
Project Status Meetings	Provide updates on project progress and milestones.	Face-to-Face & Virtual	Monthly	Project Sponsor	Project Manager	Status Report & Meeting Minutes	Agenda has been previously emailed to all participants. All documents were saved on the Internal Shared Folder.
Project Progress Reports	Track and document progress of broadband expansion efforts.	Emails	Biweekly	Project Team	Project Manager	Project Progress Report	Agenda has been previously emailed to all participants. All documents were saved on the Internal Shared Folder.
Technical Setup Meetings	Define and monitor technical specifications, network deployment, and service readiness.	Face-to-Face, Email & Virtual	Weekly	Project Team	Project Manager	Technical Status Report & Meeting Minutes	Agenda has been previously emailed to all participants. All documents were saved on the Internal Shared Folder.

Manage Communications

Project communication will primarily be conducted via email, project reports, meetings (virtual and in person), and online collaboration tools. All project documents will be stored in a secure internal system accessible to project team members and stakeholders. The project will utilize existing communication tools where possible, with minimal disruption to current workflows.

The maintenance of project-related communication infrastructure, including hardware and software licenses, falls outside the project scope and remains the responsibility of the organization.

A project team directory was created as it is essential for ensuring clear and efficient communication throughout the project. It includes key contact details for team members and stakeholders. This directory depicted in chart 21 will serve as a primary reference for coordinating project updates, resolving issues, and maintaining seamless communication.

Chart 21: Project Team Directory (Source: Karen Novelo, January 2025)

Name	Title	Department	Email Address	Phone Number
Adrian Lizarraga	Project Sponsor/ CEO	Executive	alizarraga@centraltv.bz	670-4462
Adelissa Pulido	Logistics Manager, Headquarters	Logistics	apulido@centraltv.bz	670-2253
Neisy Pott	Logistics Manager, Southern Area	Logistics	npott@centraltv.bz	880-4200
Jennie Moguel	Marketing Manager	Marketing	jmoguel@centraltv.bz	880-4200
Ivanna Richards	Operations Supervisor	Operations	irichards@centraltv.bz	670-2296

Project Meeting Guidelines

To ensure consistency and efficiency in project meetings, the following guidelines have been established. These principles will help standardize meeting procedures, enhance productivity, and maintain clear communication among all participants.

1. Meeting Chair : The meeting chair is responsible for scheduling meetings and inviting attendees. They will oversee discussions and maintain the meeting's focus on key agenda items.

2. Meeting Agenda : A structured agenda will be shared with all participants at least two days before the meeting. The agenda must include a recap of the previous meeting.

3. Action Item Tracking: All action items discussed must be documented, will include a deadline and will be assigned to an individual responsible for follow-up.

4. Meeting Minutes : Meeting minutes should be recorded and distributed to all attendees promptly after each meeting. These minutes serve as a reference for tracking tasks.

5. Minutes Secretary : The minutes secretary will take notes and ensure accurate documentation. They are also responsible for distributing the minutes to all relevant stakeholders.

Monitor Communications

Project Communication Standards

To maintain consistency, the project will adhere to standardized communication protocols. This includes the use of official templates, a uniform document naming convention, and a designated storage location for project files.

- The project manager will ensure that meeting invitations, minutes, and reports are formatted using the organization's standard letterhead.
- All project progress reports will be documented and shared following the organization's communication policies.

Stakeholder Communication Requirements

The project manager will engage with stakeholders to determine their preferred frequency and method of communication. This information will be documented in the Stakeholder Register and incorporated into the Communications Matrix. Standard

project communications will follow predefined guidelines, but personalized updates may be provided where necessary.

All stakeholders must have access to the appropriate communication channels, whether through secure internal systems or external platforms. The project team will ensure that all necessary access is granted and maintained.

Communication Escalation Process

Despite structured communication channels, some challenges may arise. If an issue cannot be resolved within the project team, it should be escalated based on the Communication Escalation Matrix outlined in Chart 22:

Chart 22: Communication Escalation (Source: Karen Novelo, January 2025)

Priority	Definition	Decision Maker	Resolution Window
1 - Critical	A major impact on the project or timeline, preventing further progress.	Project Manager, Project Sponsor , Logistics Manager HQ	4 to 6 business hours
2 - High	A significant issue affecting the project timeline.	Project Manager, Logistics Manager HQ	One working day
3 - Medium	A moderate impact on the project or timeline.	Project Manager, Logistics Manager HQ	Two working days
4 - Low	A minor issue with little to no impact on the project timeline.	Project Manager	Addressed during project reviews

Approved by the project sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

4.8 Project Risk Management

To address risk, a risk management plan is essential to guide the identification, mitigation, or avoidance of potential risks. The key activities in the project's risk management phase include risk identification, qualitative risk analysis, and quantitative risk analysis. The project manager will actively monitor risks, which were initially identified during the development of the project charter and are documented in the risk register.

Plan Risk Management

Risk Strategy

To support the success of the project, the project team adopted a proactive and strategic approach to risk management. This involved gathering relevant information through expert judgment, the Delphi technique, brainstorming sessions, and a review of historical project data. This process enabled the early identification of potential risks that could impact project success. Root cause analysis was then used to understand the underlying causes of these risks. Many of the initial risks were recognized during the development of the project charter.
Once preliminary risks were identified, the team evaluated their potential impact and explored appropriate responses, whether by mitigating, eliminating, or converting them into opportunities.

All identified risks were documented in the risk register, categorized according to their potential impact on the project. This risk register, along with the Risk Breakdown Structure (RBS) in Chart 23, form part of the project's risk management plan and is included in the project documentation.
As the project progresses, the risk register and RBS will be reviewed and updated regularly to reflect newly emerging risks and changes in risk exposure.

Chart 23: Risk Breakdown Structure (Source: Karen Novelo, January 2025)

RBS level 0	RBS level 1	RBS level 2
All sources of the project risks	1. Technical Risk	- Equipment malfunction or incompatibility
		- Unforeseen network configuration issues
		- Inaccurate data during site assessment
		- Software or firmware glitches during installation
	2. Management Risk	- Inadequate resource planning or scheduling
		- Misalignment between departments (Logistics, Marketing, Operations)
		- Ineffective communication within the project team
		- Delays in internal decision-making
		- Insufficient monitoring of performance and task completion
	3. Commercial Risk	- Budget overrun due to fluctuating costs of equipment
		- Unexpected costs related to community engagement or marketing
		- Inaccurate forecasting of subscriber uptake
		- Unclear ROI in low-income rural areas
	4. External Risk	- Weather-related delays (e.g., heavy rain or flooding in rural areas)
		- Limited access to rural sites due to poor infrastructure
		- Resistance or lack of cooperation from local communities
		- Supply chain disruptions (e.g., delay in delivery of imported materials)

Risk Strategy During Deployment Stage

During the deployment stage of the project, the risk landscape shifts to focus on service activation, customer interaction, and infrastructure performance in real-world conditions. To mitigate potential disruptions, the project team will maintain close oversight on the rollout activities, monitoring issues such as system malfunctions, customer dissatisfaction, communication gaps, or logistical delays.

Any anomalies observed during deployment will be documented and reviewed during weekly team check-ins. These insights will be compiled into a report by the Project Manager and presented during monthly progress meetings. All risks identified will be evaluated based on their severity and likelihood, and appropriate mitigation strategies will be developed and executed according to the established risk management framework.

Risk Analysis Team

The Risk Analysis Team, consisting of the project manager, project team, and the project sponsor, will meet on the weekly and monthly scheduled basis or as needed. The role of the risk analysis team is to assess deployment-related risks, ensure proactive problem-solving, and support continuous improvement during the service rollout phase.

Identify Risks

As the project advances through its phases, new risks may emerge, each with the potential to impact scope, timeline, cost, or quality. Continuous monitoring allows the team to detect these risks early and respond in line with the risk management procedures established. To understand the underlying causes, the Risk Analysis Team must conduct a Root Cause Analysis, examining contributing factors in detail or a SWOT Analysis to evaluate the internal and external factors that may influence decision-making. This comprehensive assessment helps the team develop practical, targeted responses to minimize or eliminate the risk's impact.

Perform Qualitative Risk Analysis

Identified risks are analyzed in terms of their likelihood of occurrence and potential impact using a qualitative risk assessment approach. This evaluation helps prioritize risks within the Risk Register, ranking them from high to low based on their overall risk value. Since risk is dynamic and may evolve as the project progresses, this analysis is not a one-time event. Instead, it is repeated iteratively throughout the project to ensure risks are consistently monitored and managed. Proactive engagement and timely reassessments are critical to maintaining control and ensuring project success.

Chart 24: Risk Probability and Impact Matrix (Source: Karen Novelo, January 2025)

Risk	Probability (P)	Impact (I)	P × I Risk Value	Risk Level
Equipment malfunction or incompatibility	3	4	12	High
Unforeseen network configuration issues	4	4	16	Very High
Inaccurate data during site assessment	3	4	12	High
Software or firmware glitches during installation	5	4	20	Very High
Inadequate resource planning or scheduling	3	4	12	High
Misalignment between departments	2	1	2	Low
Ineffective communication within the project team	2	1	2	Low
Delays in internal decision-making	2	3	6	Medium
Insufficient monitoring of performance and task completion	3	4	12	High
Budget overrun due to fluctuating costs of equipment	3	5	15	Very High

Unexpected costs related to community engagement/marketing	3	3	9	Medium
Inaccurate forecasting of subscriber uptake	3	4	12	High
Unclear ROI in low-income rural areas	4	4	16	Very High
Weather-related delays	4	3	12	High
Limited access to rural sites	4	4	16	Very High
Resistance/lack of cooperation from local communities	3	4	12	High
Supply chain disruptions	3	5	15	Very High

The project will utilize a probability and impact scale to assess risk events based on their likelihood and potential impact, using a five-point scale ranging from very low to very high. The results of this assessment will help prioritize risks and determine their criticality in the overall ranking. Below is the probability and risk matrix

Chart 25: Risk Probability and Impact Scale (Source: Karen Novelo, January 2025)

Probability						
	5- Very High	5	10	15	20	25
	4-High	4	8	12	16	20
	3- Moderate	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very Low	1	2	3	4	5
		1- Very low	2- Low	3- Moderate	4- High	5- Very High

Impact

Chart 26: Risk Level Definition Key (Source: Karen Novelo, January 2025)

Risk Level	Expectation of Response
Low	*Acceptable Risk Level* Monitor and Manage
Medium	*Tolerable Risk Level* Implement appropriate controls and consider corrective action
High	*Tolerable Risk Level with Strict Controls and Oversight* Implement mitigating and corrective actions with routine monitoring and oversight
Very High	*Intolerable Risk Level* Implement mitigating and corrective actions. Engage higher levels of management

Risk Register

The Risk Register developed for this project will serve as a centralized log of all identified risks for the broadband expansion and affordability project. Each risk was categorized, assessed for its impact and probability to the project, and assigned a corresponding risk level using the Probability and Impact Matrix.

This register was initially created during a project risk management session led by the Project Manager, where the project team collaboratively identified and categorized potential risks. Each risk was evaluated and documented along with a proposed mitigation strategy to address or reduce its impact.

The Risk Register as illustrated in Chart 27 will be reviewed periodically throughout the project lifecycle to ensure effective monitoring and response planning.

Chart 27: Risk Register (Source: Karen Novelo, January 2025)

Risk ID	Risk Description	Consequence	Impact Level	Probability Level	Risk Level	Mitigation Measures	Responsibility
R1	Equipment malfunction or incompatibility	Delays in service activation and additional costs	3	4	High	Test all equipment prior to deployment; maintain backup units	Project Manager & Logistics Managers
R2	Unforeseen network configuration issues	Service interruptions and rescheduling of installations	4	4	Very High	Conduct thorough pre-configuration testing and validation	Project Manager & Logistics Managers
R3	Inaccurate data during site assessment	Incorrect planning and potential rework	3	4	High	Verify data through multiple assessments and use GIS mapping	Project Manager & Logistics Managers
R4	Software/firmware glitches during installation	Service disruption and customer dissatisfaction	5	4	Very High	Pre-installation updates and sandbox testing of all firmware	Project Manager & Logistics Managers
R5	Inadequate resource planning or scheduling	Delays and missed deadlines	3	4	High	Use project scheduling tools and conduct weekly review meetings	Project Manager
R6	Misalignment between departments	Miscommunication leading to inefficiencies	2	1	Low	Establish regular interdepartmental syncs and shared dashboards	Project Manager
R7	Ineffective communication within the project team	Reduced team performance and confusion	2	1	Low	Implement communication protocols and regular team check-ins	Project Manager
R8	Delays in internal decision-making	Delays in tasks execution	2	3	Medium	Define decision pathways and assign clear authority levels	Project Manager
R9	Insufficient monitoring of performance and task completion	Overlooked issues, late detection of problems	3	4	High	Weekly progress reviews and KPIs tracking	Project Manager

R10	Budget overrun due to fluctuating equipment costs	Project exceeds financial limits	3	5	Very High	Monitor market prices and include in contingency budget	Project Manager
R11	Unexpected community engagement/marketing costs	Budget strain, affecting other areas	3	3	Medium	Allocate funds in contingency budget for stakeholder engagement	Project Manager & Marketing Manager
R12	Inaccurate forecasting of subscriber uptake	ROI may not be realized, affecting sustainability	3	4	High	Use conservative estimates; review data on past similar projects	Project Manager & Project Team
R13	Unclear ROI in low-income rural areas	Project viability concerns and limited stakeholder buy-in	4	4	Very High	Conduct a cost-benefit analysis	Project Manager & Project Team
R14	Weather-related delays (e.g. heavy rain, flooding)	Postponed activities and access issues	4	3	High	Inevitable but monitor weather forecasts	Project Manager & Logistics Managers
R15	Limited access to rural sites due to poor infrastructure	Delays and difficulty transporting equipment	4	4	Very High	Schedule early visits; consider alternative transportation routes	Project Manager & Logistics Managers
R16	Resistance from local communities	Lack of cooperation, leading to delays or rework	3	4	High	Engage communities early through awareness campaigns	Project Manager & Marketing Manager
R17	Supply chain disruptions	Delay in material delivery, halting progress	3	5	Very High	Identify alternative suppliers and maintain buffer stock	Project Manager & Logistics Managers

Perform Quantitative Risk Analysis

Quantitative Risk Analysis involves the numerical assessment of the potential impact of risks on the project's objectives, such as cost, schedule, and scope. However, given the nature of the risks identified in this broadband expansion and affordability project, many of which are qualitative or difficult to quantify, this method was not applied in this instance. The project

team determined that most risks were better managed through qualitative analysis and ongoing monitoring.

Plan Risk Responses

Based on the identified risks, appropriate response strategies were developed and documented in the Risk Respone Plan as illustrated in Chart 28. These responses aim to reduce or eliminate the impact of threats and, where possible, turn them into opportunities. If a selected mitigation or contingency strategy proves ineffective, the risk analysis team, comprising the project manager and project team, will reconvene to reassess the situation and adjust the response accordingly. Since risk management is an iterative process, the plan will be continuously reviewed and updated to reflect evolving project conditions and emerging risks throughout the implementation of the broadband and affordability project.

Chart 28: Risk Response Plan (Source: Karen Novelo, January 2025)

Risk ID	Risk	Trigger Events	Category	Strategic Response Type	Response Details
R1	Equipment malfunction or incompatibility	Use of outdated or incompatible devices during deployment	Technical	Mitigate	Perform compatibility tests prior to deployment; have backup equipment on site.
R2	Unforeseen network configuration issues	Misconfiguration during setup or integration	Technical	Avoid	Conduct pre-configuration simulations and peer reviews; allocate network specialists to oversee setup.
R3	Inaccurate data during site assessment	Human error or lack of proper assessment tools	Technical	Mitigate	Train assessment team; cross-check site data before project execution.
R4	Software or firmware glitches during installation	Unexpected bugs in software or firmware	Technical	Mitigate	Test firmware/software in controlled environments prior to rollout; ensure vendor support availability.
R5	Inadequate resource planning or scheduling	Overlapping tasks or missing resources	Management	Avoid	Use project management tools for resource allocation and weekly tracking meetings.

R6	Misalignment between departments	Lack of coordination or conflicting schedules	Management	Mitigate	Weekly interdepartmental coordination meeting.
R7	Ineffective communication within the project team	Incomplete or delayed updates	Management	Mitigate	Follow the communication protocols.
R8	Delays in internal decision-making	Bureaucratic bottlenecks or unavailable approvers	Management	Escalate	Set predefined approval timelines; escalate prolonged decisions to sponsor.
R9	Insufficient monitoring of performance and task completion	Absence of performance KPIs or tracking tools	Management	Mitigate	Implement weekly progress reviews and assign task accountability leads.
R10	Budget overrun due to fluctuating equipment costs	Price volatility or poor forecasting	Commercial	Mitigate	Include contingency budget; negotiate fixed-price contracts when possible.
R11	Unexpected costs for community engagement or marketing	Community pushback or increased outreach requirements	Commercial	Accept	Allocate a flexible buffer in the budget for outreach; adjust marketing plan accordingly.
R12	Inaccurate forecasting of subscriber uptake	Unreliable demographic or market data	Commercial	Mitigate	Conduct additional surveys and adjust uptake assumptions based on early trends.
R13	Unclear ROI in low-income rural areas	Low subscription or usage rate	Commercial	Accept	Use pilot programs and surveys to validate business model
R14	Weather-related delays	Heavy rainfall or flooding in rural zones	External	Accept	Build weather delays into project schedule; monitor forecasts and adjust work accordingly.
R15	Limited access to rural sites	Poor road infrastructure or blocked paths	External	Transfer	Site visits/logistics teams familiar with terrain and access.
R16	Resistance or lack of cooperation from communities	Community misinformation or distrust	External	Mitigate	Conduct awareness campaigns and involve local leaders in the planning stage.
R17	Supply chain disruptions	Delay in imported materials or local shortages	External	Transfer	Use multiple suppliers and maintain buffer stock of critical materials.

Implement Risk Responses

As risks emerge during the implementation of the broadband expansion and affordability project, the project team will activate the corresponding response strategies outlined in the risk management plan. Each response will be applied based on the nature and severity of the identified risk. An evaluation of the impact on project scope, timeline, and resources will be conducted, and any significant findings or adjustments will be documented as updates to the risk register and risk management plan.

Monitor Risks

Throughout the project lifecycle, the project manager and team will actively monitor the progress of all activities, with a focus on identifying potential risks. Weekly reviews will be conducted to track any deviations, irregularities, or unplanned events. Collected risk data will be analyzed and compiled into weekly reports, which will inform ongoing decision-making and guide any necessary adjustments to ensure the project remains on track.

Expected Monetary Value

As mentioned in the Project Budget, the Expected Monetary Value (EMV) was used to assess the probability and financial impact on various risks. By calculating the probability of each risk and its associated cost, we determined the contingency reserve needed to mitigate these risks. The calculated EMV depicted in Chart 29 will guide project budgeting and financial planning, ensuring that the project is adequately funded to handle uncertainties and unforeseen circumstances.

Chart 29: EVM Calculation for the Project (Source: Karen Novelo, January 2025)

Risk	Probability	Cost Impact (USD)	EMV (USD)
Equipment malfunction or incompatibility	5%	$5,000	$250
Unforeseen network configuration issues	5%	$3,000	$150
Inaccurate data during site assessment	5%	$4,500	$225
Software or firmware glitches during installation	20%	$2,000	$400
Inadequate resource planning or scheduling	25%	$6,000	$1,500
Misalignment between departments	15%	$2,000	$300
Ineffective communication within the project team	10%	$2,500	$250
Delays in internal decision-making	10%	$3,000	$300
Insufficient monitoring of performance and task completion	20%	$4,000	$800
Budget overrun due to fluctuating equipment costs	20%	$5,000	$1,000
Unexpected costs for community engagement or marketing	10%	$5,000	$500
Inaccurate forecasting of subscriber uptake	6%	$2,500	$150
Unclear ROI in low-income rural areas	6%	$3,000	$180
Weather-related delays	4%	$3,000	$120
Limited access to rural sites	4%	$2,000	$80
Resistance or lack of cooperation from communities	5%	$4,000	$200
Supply chain disruptions	20%	$3,000	$600
		Total EMV	$7, 005.00

Approved by the project sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

4.9 Project Procurement Management

Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. Project Procurement Management includes the management and control processes required to develop and administer agreements such as contracts, purchase orders, memoranda of agreements (MOAs), or internal service level agreements (SLAs) (Project Management Institute, 2017). It is important to note that individual project team members are not authorized to conduct procurement activities independently. The procurement activities will adhere to established procurement policies and procedures. Items and services essential to the project will be identified, along with the necessary contract types and vendor selection criteria.

Plan Procurement Management

The procurement management process for this project will be led by the Project Manager. The procurement list and scope of work were collaboratively developed by the project team.

Once the contract is awarded, the contractor will be required to initiate contact with suppliers of networking equipment, cabling infrastructure, and installation materials. This process must begin within one week of the contract award. The contractor will utilize the approved procurement list and scope of work provided to coordinate the timely acquisition of required materials for each deployment phase. To ensure timely project execution, all materials and service providers must be secured at least one month in advance of their scheduled deployment.

The procurement of long-lead items, such as specialized networking hardware and custom equipment not readily available locally, must be initiated by the Project Manager prior to field deployment at least three months in advance. These specialized items need to be sourced from overseas suppliers based on specifications detailed in the project’s technical design documents.

All procurement activities will be monitored to ensure compliance with the project's timeline, budget, and quality standards.

Procurement Statement of Works

The expansion of the broadband infrastructure requires a range of essential materials and technical services to support successful implementation. The Project Manager, in collaboration with the project team, developed a procurement list identifying all necessary items and services needed for execution. This list ensures that all resources required for installation, connection, and community engagement are properly accounted for and sourced in a timely manner.

Types of Contracts

Procurement for this project will be based on fixed-price contracts. Signed contracts will serve as the foundation for vendor agreements and procurement accountability. The accounts department will manage vendor proposals and award contracts based on predefined selection criteria. The standard contract term will be one year, with an option for extension in six-month increments.

Data Analysis

To support effective decision-making, the project management team conducted a make-or-buy analysis to determine whether key materials and services should be sourced externally or provided in-house. This analysis involved comparing the costs, benefits, and feasibility of outsourcing versus utilizing internal resources.

Based on the outcome, a procurement list and statement of works were developed, outlining the specific materials and services necessary for the broadband expansion project. These documents serve as the foundation for coordinating with external suppliers and service providers.

Chart 30: Procurement List (Source: Karen Novelo, January 2025)

Item #	Item Description	Specification / Use	Estimated Quantity	Unit	Remarks
1	6C Fiber Optic Cable	Main distribution line (backbone + drops)	1,500	ft	Includes slack for splicing, routing
2	Fiber Drop Cables (pre-terminated)	Connections from distribution point to home	40	pcs	One per household
3	Fiber Dead Ends / Anchors	Termination/strain relief for aerial cable	40	pcs	For pole/mounts
4	Splice Enclosures	Fiber splicing and protection	10	pcs	For mainline & split points
5	Termination Boxes (CPE)	Wall-mounted fiber outlet at home	40	pcs	Indoor installation
6	Conduit Accessories	PVC conduits, couplings, bends, etc.	Lump Sum	1	For underground and building entry
7	40' Wooden Utility Poles, Class 3	Aerial cable support structure	10	pcs	If trenching is not used throughout
8	Pole Planting Services	Labor & machinery to install poles	10	services	Coordination with utility company
9	Trenching	Underground cable route preparation	1	service	For entry or road crossings
10	ONT Devices (Customer Premise Equipment)	Fiber to Ethernet conversion	40	pcs	Optional: maybe part of ISP package
11	Fiber Optic Splitter (1:8 or 1:16)	Signal distribution to multiple homes	3	pcs	Depends on layout; centralized cabinet

Conduct Procurements

Procurement of Materials

Following the contract award, the contractor will initiate the sourcing of suppliers to secure the necessary materials for the broadband expansion project. Using the procurement list as the

reference, a detailed draft of the required equipment and materials will be shared with potential suppliers to obtain pricing proposals and evaluate delivery capacity.

With oversight from the Project Manager, two suppliers will be selected: a primary supplier and a secondary (backup) supplier. Selection will be based on product quality, compliance with technical specifications, and cost-effectiveness. Once approved by the Project Manager, the contractor will formalize a procurement agreement with the primary supplier.

Initial procurement will cover materials required for the first two months of project deployment. A detailed material forecast document outlining the work schedule, quantities, and required timelines will be submitted to the supplier to facilitate timely delivery of resources for field operations.

To support ongoing rollout activities, the contractor will submit monthly forecasts of material requirements to ensure sufficient stock is available to meet the upcoming project milestones.

Procurement of Services

Before the commencement of the project, the Project Manager and the project team will collaborate to compile a set of sub-contractual service packages. These may include network design and configuration services, trenching and pole installations, community liaison services, and specialized network testing and commissioning support.

These service needs will be publicly advertised through appropriate communication channels to invite bids from qualified vendors. The project team will then conduct a structured evaluation of bid submissions based on technical capability, pricing, and service reliability.
Successful vendors will enter into binding agreements, which will include detailed service specifications, pricing structures, delivery timelines, performance benchmarks, penalties for non-compliance, inspection and acceptance criteria, payment terms, and clauses related to change management, termination, or amendments.

Control Procurements

To ensure the timely procurement of materials and services required for the broadband expansion rollout, the contractor will be responsible for submitting updated procurement documentation, including supplier confirmations and material availability, at least one month prior to the start of scheduled deployment activities. This ensures that all critical resources are acquired and accessible ahead of forecasted works.

Procurement of Materials

The contractor will engage in bi-weekly meetings with material suppliers to review equipment availability, delivery timelines, outstanding payments, and compliance with technical specifications and quality standards. This includes fiber optic cables, installation hardware, and networking components essential for service activation. The outcomes of these discussions will be compiled into a procurement status report, which will be submitted to the Project Manager for review and discussion during monthly project meetings or as needed.

Procurement of Services

For service-based procurements such as subcontracted installation teams, network configuration specialists, and testing personnel, performance will be closely monitored to ensure that deliverables align with the project's contractual and technical requirements. Both the quality of work and adherence to scheduled milestones will be evaluated through bi-weekly inspections. These inspections will be followed by update meetings to assess progress, document findings, and raise any concerns. All insights will be captured in a service performance report and presented to the Project Manager during monthly progress meetings or as necessary.

Recognizing that all projects face uncertainties, the potential for contract modifications remains a possibility. The data collected from procurement reports, inspections, and update meetings will support proactive oversight and allow the Project Manager to recommend adjustments to project scope, cost, schedule, or contract terms using the established change management protocols.

Approved by the project sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

4.10 Project Stakeholder Management

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

The processes support the work of the project team to analyze stakeholder expectations, assess the degree to which they impact or are impacted by the project, and develop strategies to effectively engage stakeholders in support of project decisions and the planning and execution of the work of the project.

Identify Stakeholders

Stakeholders were identified using brainstorming sessions with the project team. Each stakeholder was assessed based on their role, interest, and potential impact on the successful delivery of the project.

Stakeholders were then categorized using a power-interest grid, which enabled the project team to better understand their level of influence and degree of interest. This analysis supports the development of appropriate engagement strategies to ensure clear communication and alignment throughout the project lifecycle.

The stakeholder list below in Chart 31 outlines the key stakeholders involved in the project and summarizes their primary interests and expectations regarding the expansion of broadband services to underserved households.

Chart 31: Stakeholder List (Source: Karen Novelo, January 2025)

Name/Organization	Interests (Benefit)	Project Impact	Priority
Project Sponsor	Successful delivery, brand reputation, increased market share	High	1
Rural Community Residents	Access to affordable, high-speed internet, educational and economic opportunities	High	1
Project Manager	Timely and successful project execution	High	1
Installation Technicians & Contractors	Job opportunities, successful project implementation	Low	4
Project Team	Timely and successful project execution	High	1
Schools and Learning Centers	Reliable internet for online learning, e-learning platforms	Medium	3
Equipment & Material Suppliers	Sales opportunities, long-term business relationship	Low	3
Community Liaison Officer	Ensure community voices are heard and issues communicated	Medium	3

The priority scale ranges from a 1-5 scale: 1 - highest priority & 5 – lowest priority

The stakeholder register in Chart 32 below provides contact information and details on methods of communication for each stakeholder identified in the stakeholder list

Chart 32: Stakeholder Register (Source: Karen Novelo, January 2025)

Item #	Name/Organization	Role	Contact Info (Email Address)	Communication Type	Communication Medium
1	Project Sponsor	Sponsor	alizarraga@centraltv.bz	-Reports -Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face
2	Rural Community Residents	Beneficiary	N/A	-Announcements -Meetings	Phone, Face to Face
3	Project Manager	Specialist	knovelo@centraltv.bz	-Reports -Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face
4	Installation Technicians & Contractors	Specialist	N/A	-Reports -Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face
5	Project Team	Specialist	apulido@centraltv.bz irichards@centraltv.bz jmoguel@centraltv.bz npott@southerncable.bz	-Reports -Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face
6	Schools and Learning Centers	Beneficiary	N/A	-Announcements -Meetings	Email, Phone, Virtual Meetings, Face to Face
7	Equipment & Material Suppliers	Supplier	N/A	-Reports -Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face
8	Community Liaison Officer	Consultant	N/A	-Meetings -Personal Communications	Email, Phone, Virtual Meetings, Face to Face

Manage Stakeholder Engagement

To ensure continued support and minimize resistance throughout the project, the Project Manager along with the project team will engage with key stakeholders through scheduled monthly meetings. These sessions are designed to provide updates on project progress, clarify objectives and deliverables, communicate potential risks, and reinforce the long-term benefits of expanding broadband access to underserved communities.

During these meetings, the Project Manager will also invite feedback from stakeholders, addressing concerns and gathering insights that may influence the execution of the project. Within seven (7) days after each meeting, the project team will convene to review the feedback received, identify action items, and brainstorm practical solutions to any challenges or risks that emerged during the previous reporting period.

All meeting discussions are formally documented in the form of minutes and circulated to relevant stakeholders via email by the end of the week. Any decisions or proposed changes resulting from these meetings must adhere to the project's established change control process. Recognizing that local community members may not be direct participants in high-level stakeholder meetings, a designated community liaison, appointed by the project manager, will represent their interests. This liaison will serve as a communication bridge between the community and the project management team, ensuring that grassroots concerns and feedback are properly considered and addressed.

Monitor Stakeholder Engagement

To assess the effectiveness of stakeholder interactions, the project team will continuously review data collected through progress meetings, informal discussions, community feedback, and day-to-day communication. These inputs will be evaluated against predefined stakeholder engagement metrics.

The Project Manager will use these insights to monitor the levels of stakeholder involvement, satisfaction, and responsiveness. Based on the findings, necessary adjustments will be made to the project's stakeholder engagement strategy and communication plan to improve collaboration and ensure that stakeholder needs and expectations remain aligned with project goals.

Approved by the project sponsor:

_____ Date: _____

Adrian Lizarraga
Chief Executive Officer

5 CONCLUSIONS

1. Since Central TV & Internet does not have a dedicated Project Management Office (PMO) or certified project managers, the Project Management Plan for the Expansion of Broadband Infrastructure and Feasibility Study for Affordable Service Models in Rural Areas was developed using the PMBOK Guide and PMI standards as a reference. This approach ensures adherence to industry's best practices, though it requires additional effort to align project processes with PMI methodologies.

2. To fulfil the first objective, the project management plan was created. The implementation of this project is essential to bridge the digital divide in rural areas, providing low-income users with reliable and affordable broadband services. This initiative aligns with the organization's strategic objective to drive digital inclusion. The Project Charter was created to document business needs, scope, project risks, deliverables, milestones, and budget estimates, and it was formally approved by the Project Sponsor to authorize project initiation.

3. To fulfill the second specific objective, the scope management plan was developed using templates, industry standards, and input from project stakeholders. It defines the project scope and Work Breakdown Structure (WBS), providing a comprehensive view of the project's deliverables. The plan ensures clarity and prevents scope creep by outlining clear boundaries for the project.

4. For the third specific objective, the schedule management plan was developed, including the activity list, schedule network diagram, and project schedule. These tools ensure that project activities are properly identified, sequenced, and scheduled to meet project deadlines. The project's Gantt chart was designed based on the Scope Management Plan, enabling the efficient coordination of activities and timely completion.

5. To achieve the fourth specific objective, the cost management plan was developed. Market research was conducted to identify potential costs associated with broadband

deployment, equipment, and labor. The plan includes budget estimates, cost control measures, and a financial management approach to ensure the project remains within budget.

6. The fifth specific objective was addressed through the quality management plan, which outlines quality requirements, assurance, and control measures. This plan ensures consistent delivery of high-quality broadband services that meet industry standards and customer expectations.

7. For the sixth specific objective, the resource management plan was developed. The plan identifies roles, responsibilities, and required skills for the project team. It includes a project organization chart and describes how human resources will be managed throughout the project lifecycle. Since the project leverages internal resources, the plan provides flexibility for team members to transition back to regular duties upon completing their tasks.

8. To fulfill the seventh specific objective, the communications management plan was created to ensure clear and effective communication throughout the project. The plan details the roles and responsibilities of the project team, communication methods, frequency, and formats. While formal communication plans are outlined, the organization's culture may rely on informal communication for routine updates.

9. For the eighth specific objective, the risk management plan was created using a risk register template. Risks were identified, analyzed, and prioritized, with appropriate response strategies outlined. A qualitative risk analysis was performed, but quantitative analysis was not conducted as it was not deemed necessary due to the scope of the project.

10. To meet the ninth specific objective, the procurement management plan was developed. Meetings were conducted to evaluate potential solutions for procurement protocols. The plan outlines the procurement approach, contract types, approval processes, and management strategies to ensure transparency and efficiency.

11. For the tenth specific objective, the stakeholder management plan was developed to identify key stakeholders, analyze their interests, and develop engagement methods. The plan ensures stakeholders are adequately informed and involved throughout the project, addressing concerns and maintaining support.

12. Given the organization's evolving digital strategy, the Project Management Plan and supporting documents serve as a foundation for future initiatives. These plans offer a structured approach to managing infrastructure upgrades and expansions, promoting efficient service delivery while minimizing disruption.

13. The absence of a dedicated PMO or certified project managers posed challenges in implementing PMI methodologies. However, using standardized templates, conducting stakeholder consultations, and adhering to project management best practices ensured a structured and effective approach. Future projects would benefit from establishing a PMO and formalizing project management processes.

6 RECOMMENDATIONS

1. Considering the complexity and long-term impact of expanding broadband infrastructure, the organization should establish a PMO to standardize project management practices, ensure consistent delivery, and oversee future broadband expansion and other strategic initiatives.
2. It is recommended that team members, particularly those involved in managing broadband projects, receive formal project management training. This will enhance their ability to apply industry's best practices and effectively manage project scope, schedule, cost, and risks.
3. To ensure seamless project execution, departments such as Logistics, Network Engineering, Sales, and Customer Service should be actively involved in broadband projects, contributing their expertise and fostering a culture of collaboration.
4. Project-related documents, including plans, reports, templates, and lessons learned, should be stored on a secure, centralized platform accessible to authorized personnel. This will facilitate knowledge sharing and provide a reference for future projects.
5. Every three months, the organization should conduct project performance reviews to assess progress, identify areas for improvement, and make necessary adjustments. These reviews will ensure that project objectives are met and support continuous improvement.
6. Adopt standardized templates and procedures for project initiation, planning, execution, monitoring, and closure. This approach will enhance consistency, simplify project management, and ensure alignment with industry standards.
7. After project implementation, monitor the performance of broadband services in rural areas regularly to identify service gaps, optimize delivery, and enhance customer satisfaction. Feedback from users and stakeholders should guide future upgrades.

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

The execution of the Project Management Plan for Expanding Broadband Infrastructure and Assessing the Feasibility of Affordable Broadband Models for Low-Income Users in rural areas establishes a direct relationship with the global digitalization movement which aims to empower marginalized groups, enabling them to fully engage in digital platforms, expand their skill sets, and enhance their socio-economic standing. The expansion of broadband infrastructure would entrail creating a framework that focuses on broadband network design and deployment while identifying cost-effective and suitable technological models to provide internet access in rural areas, ensuring the process is conducted using sustainable methods. The critical services that support development, like hospitals, schools, energy, and agriculture, all run on connectivity and data (World Bank, 2021). Therefore, it is imperative that infrastructure and platforms that assist the deployment of broadband connections are available and affordable for all residents. The execution of this project would assist over 200,000 residents that reside in rural areas (macrotrends, 2024).

During the execution phase, the project manager will emphasize the importance of energy-efficient and environmentally friendly practices, such as deploying technologies that minimize ecological disruptions. The deliverables will include a resilient and scalable broadband infrastructure designed with energy-efficient components to reduce its ecological footprint. The project supports SDG 9: Industry, Innovation, and Infrastructure by improving technology development and communication in underserved rural areas, SDG 10: Reduced Inequalities by providing equitable access to essential digital resources and providing better health, educational

and commerce opportunities and SDG 11, Sustainable Cities and Communities by developing a broadband model that is resilient and is sustainable (The Global Goals, 2024) .

Adopting a circular economy approach will ensure that obsolete equipment is either recycled or repurposed, minimizing waste and supporting sustainability goals. The results of the project contribute significantly to socio-economic regeneration by enhancing access to technology, which promotes economic growth, education, and healthcare in rural areas. The internet access reduces the digital divide and inequalities by encouraging social equality in the form of jobs and fostering digital opportunities that empower local communities.

The P5 impact analysis framework—focusing on People, Planet, Prosperity, Processes, and Products (Green Project Management, 2024). Using the P5 Impact Analysis Framework, we can comparatively analyze that the project will deliver a comprehensive assessment of its contributions to sustainability. The project positively impacts People by enhancing access to technology and improving quality of life. It supports the Planet by incorporating environmentally friendly practices, while contributing to Prosperity through the economic empowerment of rural communities. The project's Processes emphasize efficient and adaptive implementation strategies, and its Products ensure durable and the most energy-efficient infrastructure.

The project management plan will be comprised of key subsidiary management plans, including integration, scope, schedule, cost, quality, resource, communication, risk, procurement, and stakeholder management plans that will be the guiding principles for executing the project in a regenerative and sustainable manner. Ultimately, the Project Manager

will execute the project aiming for synergy between regenerative development and sustainability to contribute meaningfully to global SDGs and foster long-term ecological and social well-being.

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APPENDICES

Appendix 1: FGP Charter

CHARTER OF THE PROPOSED
FINAL GRADUATION PROJECT (FGP)

1. Student name

Karen Anel Novelo

2. FGP name

Project Management Plan for Expanding Rural Broadband Coverage and Assessing Feasibility of Affordable Broadband Models for Low-Income Users.

3. Application Area (Sector or activity)

Telecommunications/ Digital Infrastructure

4. Student signature

5. Name of the Graduation Seminar facilitator

Carlos Brenes Mena

6. Signature of the facilitator

7. Date of charter approval

8. Project start and finish date

October 28, 2024	December 8, 2024

9. Research question

What project management framework and affordable service models can effectively support the expansion of rural broadband coverage and make it accessible for low-income users?

10. Research hypothesis

Is it feasible to implement a tailored project management plan that effectively expands rural broadband infrastructure and provides affordable service models, ensuring accessibility for low-income users while maintaining project sustainability and cost efficiency?

11. General objective

To develop a project management plan for expanding broadband infrastructure and evaluating the feasibility of affordable service models for low-income users in rural areas.

12. Specific objectives

1. To develop an integration management plan for managing project activities effectively throughout the project lifecycle.
2. To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.
3. To develop a schedule management plan that defines the timeline for project tasks and ensures that the project is completed on time.
4. To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.
5. To develop a quality management plan that ensures that the project meets the required standards and quality control processes.
6. To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.
7. To develop a communications management plan that ensures effective communication among all stakeholders.
8. To develop a risk management plan that involves identifying potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.
9. To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner.

10. To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.

13. FGP purpose or justification

For the Final Graduation Project, a project management plan with Project Management Institute (PMI) standards was developed to create a comprehensive document with detailed information on implementing the methodologies effectively. Utilizing a project management plan provides clear guidance and direction to project team members regarding project activities and progress.

The Final Graduation Project focuses on the expansion of rural broadband coverage and the feasibility of affordable broadband models for low-income users which is essential to improving digital inclusivity and reducing socioeconomic disparities. Currently, rural communities face limited access to high-speed internet, which restricts educational and economic opportunities. By expanding broadband coverage and creating affordable packages, the project aims to provide underserved populations with access to essential services that support a better quality of life.

The project's expected benefits extend beyond economic growth to include enhanced access to education. According to the Statistical Institute of Belize, approximately 45,000 students from preschool to tertiary level reside in rural areas (2023). These students in the rural areas will benefit from stable and improved broadband access and online learning platforms. By improving access to these areas, the project aims to create measurable, lasting impacts on the social and economic wellbeing of rural communities.

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

Final Graduation Project
1. Graduation Seminar
1.1 FGP Deliverables
1.1.1 Charter
1.1.2 WBS
1.1.3 Chapter I: Introduction
1.1.4 Chapter II: Theoretical framework
1.1.5 Chapter III: Methodological framework
1.1.6 Annexes: Bibliography & FGP Schedule
1.2 Graduation Seminar approval

2. Tutoring Process
2.1 Tutor
2.1.1 Tutor Assignment
2.1.2 Communication
2.2 Adjustments of previous chapters
2.3 Charter IV. Development
2.4 Chapter V: Conclusions
2.5 Chapter VI: Recommendations
3. Reading by reviewers
3.1. Reviewers adjustment request
3.1.1 Adjustment of two reviewers
3.1.2 Communication
3.2. Reviewers work
3.2.1 Reviewer 1
3.2.1.1 FGP Reading
3.2.1.2 Reader 1 report
3.2.2 Reviewer 2
3.2.1.1 FGP Reading
3.2.1.2 Reader 2 report
4. Adjustments
4.1 Report for reviewers
4.2 FGP update
4.3 Second review of FGP by reviewers
5. Presentation to Board of Examiners
5.1 Final review of FGP by board
5.2 FGP grade report

15. FGP budget

The budget is composed of travel, focus groups/ interviews, data analysis software, and printing costs for the FGP project management plan. Costs have been converted from the local currency (Belizean dollars) to United States Dollars. (USD $1 = BZD $2)

Item	Estimated Cost
Travel (Transportation, Lodging)	$ 250.00
Focus Groups/Interviews	$ 50.00

Data Analysis Software	$	250.00
Miscellaneous Costs (Printing, etc.)	$	50.00
Contingency Fund	$	100.00
Total Estimated Budget (USD)	**$**	**700.00**

16. FGP planning and development assumptions

- It is assumed that the student will cover all necessary expenses, including research, materials, software, and any other resources required to complete the project.
- It is assumed that the project management plan will be completed by the time frame provided by the University.
- It is assumed there will be expert judgment provided by the tutor to guide the development of the FGP.
- It is assumed that there is sufficient information, tools, and templates to facilitate the development of the Final Graduation Project Plan. This includes access to project management frameworks, and any necessary documentation to ensure the plan is thorough and well-structured.

17. FGP constraints

- There is a limited timeframe of 7 weeks to complete the project management plan.
- Ensure to stay within budget
- The availability of project management software to create the FGP schedule.
- Readily available feedback to make corrections to the Final Graduation Project.

18. FGP development risks

- Lack of access to information related to the Final Graduation Project.
- Unavailability of tutors and reviewers to provide guidance and evaluation.
- Failure to achieve the minimum required score of 70% in the graduation seminar.
- If the project is not completed on time, the FGP will not be approved, and the student will not be eligible for graduation.

19. FGP main milestones

Deliverable	**Finish Estimated Date**
Project start	Oct.21, 2024
Annexes: Project charter & WBS	Oct. 29, 2024
Chapter I: Introduction chapter	Nov. 4, 2024
FGP schedule completion	Nov. 4, 2024
Chapter II: Theoretical framework	Nov. 18,2024
Chapter III: Methodological framework	Nov. 25 , 2024
Annexes: Bibliography & FGP Schedule	Dec. 2, 2024
Graduation Seminar approval	Dec. 8, 2024
Assign tutor	Dec.9, 2024
Adjustments of previous chapters	Dec.9, 2024
Integration management plan development	January 13, 2025
Scope management plan development	January 20, 2025
Schedule management plan development	January 27, 2025
Cost management plan development	February 3, 2025
Quality management plan development	February 17, 2025
Resource management plan development	February 24, 2025
Communications management plan development	March 3, 2025
Risk management plan development	March 10, 2025
Procurement management plan development	March 17, 2025
Stakeholder management plan development	March 24, 2025
Chapter V: Conclusions	March 31, 2025
Chapter VI: Recommendations	March 31, 2025
Approval by tutor	March 3, 2025
Assignment of two reviewers	March 3, 2025
Submission of FGP to reviewers	April 7, 2025
FGP readers reading reports	March 14, 2025
Adjustment report for reviewers	March 14, 2025
FGP update	March 17, 2025
Second review of FGP by reviewers	March 31, 2025
Final review of FGP by board	April 14, 2025
FGP grade report	April 16, 2025
FGP Completion	April 18 , 2025

20. Theoretical framework

20.1 Estate of the “matter”

The lack of broadband access in rural Belize presents a significant barrier to equitable opportunities in education, healthcare, and economic development, deepening the digital divide between urban and rural areas. This disparity has hindered the ability of rural communities to participate in modern digital activities, limiting their potential for growth and integration into a rapidly digitizing world. The COVID-19 pandemic highlighted the critical need for reliable broadband infrastructure, as remote learning, telecommuting, and digital public services became essential. In response, the Belizean government recognized the importance of addressing these gaps and introduced the National Digital Agenda, which outlines strategic objectives to expand connectivity, modernize public services, and promote digital skills and innovation (2022).

The agenda focuses on three key pillars: ICT and Technological Enablers, aimed at establishing robust digital infrastructure and improving rural connectivity; Digital Government, which emphasizes improving e-services, digital identity, and cybersecurity; and Digitalization for Recovery, which seeks to mitigate the impacts of the pandemic through digital solutions, skills development, and economic recovery in priority sectors like education, healthcare, and tourism. Proposed interventions include affordable broadband pricing models, programs to enhance digital literacy, and educating rural populations on the benefits of broadband in improving access to essential services and economic opportunities.

Previous research conducted by the Department of E-Governance and Digitalization analyzed the country's digital footprint, challenges, and the potential pathways for digital transformation. The findings emphasized the need for a comprehensive, integrated approach to address infrastructure gaps, build digital resiliency, and foster equitable access to digital services. This research forms the foundation for the proposed project management plan, which seeks to expand broadband access in rural areas, improve digital literacy, and ensure sustainable models for internet affordability and accessibility. By implementing these strategies, Belize can significantly reduce the digital divide and enable rural communities to thrive in the digital age.

20.2 Basic conceptual framework

Project Management, Broadband Infrastructure, Internet Access, Feasibility Study, Sustainability, E-learning

21. Methodological framework

Objective	Name of deliverable	Information sources	Research method	Tools	Restrictions
To develop an integration management plan for managing project activities effectively throughout the project lifecycle.	Project integration management plan.	**Secondary**: PMBOK, PMI **Primary**: Project initiation documents, Interviews with project stakeholders, Review organizational policies and guidelines	**Qualitative:** Interviews **Quantitative** Surveys	Project Charter, Project Management Plan, Change Control System	Limited budget and time constraints.
To create a scope management plan that outlines how the project's scope will be defined, validated, and controlled.	Scope management plan	**Secondary**: PMBOK, PMI **Primary**: Stakeholder requirements documents, Project charters and agreements, Workshops or brainstorming sessions with stakeholders	**Qualitative:** Focus groups **Quantitative:** Survey **Analytical :** Review scope management approaches in similar projects.	Work Breakdown Structure (WBS), Scope Baseline Scope Validation	Scope creep due to shifting priorities.
To develop a schedule management plan that defines the timeline for	Schedule Management Plan	**Secondary**: PMBOK, PMI **Primary**:	**Qualitative:** Interviews	Microsoft Project or Project Scheduling Software Gantt Charts	Timely availability of resources, and

project tasks and ensures that the project is completed on time.		Project schedules research, Expert judgment from project managers, Project team availability calendars	**Quantitative:** Data from similar projects on installation times and resource needs. **Analytical :** Analyze similar projects schedules to identify best practices and risks.	Critical Path Method (CPM)	approvals without delays
To develop a cost management plan for estimating, budgeting, and controlling costs within the project to ensure that the project stays within its financial constraints.	Cost Management Plan	**Secondary**: PMBOK, PMI **Primary**: Research on budget forecasts and estimates, procurement bids	**Qualitative:** Interview **Quantitative:** Survey **Analytical :** Review cost management strategies in similar projects.	Cost Estimation Tools, Budgeting Tools	Limited financial resources
To develop a quality management plan that ensures that the project meets the required standards and quality control processes.	Quality Management Plan	**Secondary**: PMBOK, PMI **Primary**: Quality standards or regulations applicable to the project, Quality audits and reports,	**Qualitative:** Focus groups **Quantitative:** Survey **Analytical :** Analyze quality management practices from	Quality Metrics Quality Audits Control Charts	Lack of quality measurements/standards

		Stakeholder quality requirements, Benchmarks from previous projects	similar projects.		
To develop a resource management plan that focuses on identifying, acquiring, and managing the necessary resources required to complete the project.	Resource Management Plan	**Secondary**: PMBOK, PMI **Primary:** Skills required, Vendor and contractor agreements, Historical data on resource utilization	**Qualitative:** Interviews **Quantitative:** Survey data **Analytical :** Analyze resource management strategies from similar projects.	Resource Allocation Software , Team Development Tools	Limited availability of equipment and tools.
To develop a communications management plan that ensures effective communication among all stakeholders.	Communications Management Plan	**Secondary**: PMBOK, PMI **Primary:** Stakeholder analysis reports, Organizational communication policies, Feedback from stakeholders on communication preferences, Records and communication logs	**Qualitative:** Interviews **Quantitative:** Surveys. **Analytical :** Analyze communication strategies from similar projects.	Communication Matrix Stakeholder Analysis	Not having a proper communication plan in place.
To develop a risk management plan that involves identifying	Risk Management Plan	**Secondary**: PMBOK, PMI **Primary:**	**Qualitative:** Focus groups **Quantitative:** Survey	Risk Register Risk Breakdown Structure (RBS)	Lack of proper planning and contingency plan.

potential risks, assessing their impact, and identifying ways to mitigate, avoid, or control risks.		Expert judgment or interviews, Environmental and regulatory risk assessments, Organizational risk tolerance policies	**Analytical :** Review risk management practices from similar projects.		
To develop a procurement management plan that ensures procurement is done in a timely and cost-effective manner. .	Procurement Management Plan	**Secondary**: PMBOK, PMI **Primary:** Procurement requirements and specifications, Vendor proposals and contracts, Market research on suppliers	**Qualitative:** Interviews **Quantitative:** Quantitative data on typical procurement timelines and costs. **Analytical:** Analyze procurement strategies from similar projects.	Procurement Management Tools, Contract Templates, Supplier Evaluation Tools	Lack of procurement information such as shipping costs, and availability of critical materials or components are not available.
To develop a stakeholder engagement plan that outlines strategies for managing stakeholder expectations and communication throughout the project.	Stakeholder Engagement Plan	**Secondary**: PMBOK, PMI **Primary:** Stakeholder interviews and surveys Stakeholder communicatio n logs Historical engagement plans from similar projects	**Qualitative:** Focus groups. **Quantitative:** Survey. **Analytical:** Analyze stakeholder engagement methods from similar projects.	Stakeholder Register, Stakeholder Engagement Assessment Matrix, Communication Plan	Stakeholder cooperation and resistance.

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

How is the FGP to comply with the concepts of the regenerative and sustainable development?

The project focuses on expanding broadband access in rural areas, which supports key Sustainable Development Goals (SDGs) such as SDG 9 (Industry, Innovation, and Infrastructure), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities). The project promotes sustainable technologies like energy-efficient infrastructure, ensuring equitable access to essential digital resources, fostering job creation, and contributing to the socio-economic stability of remote areas.

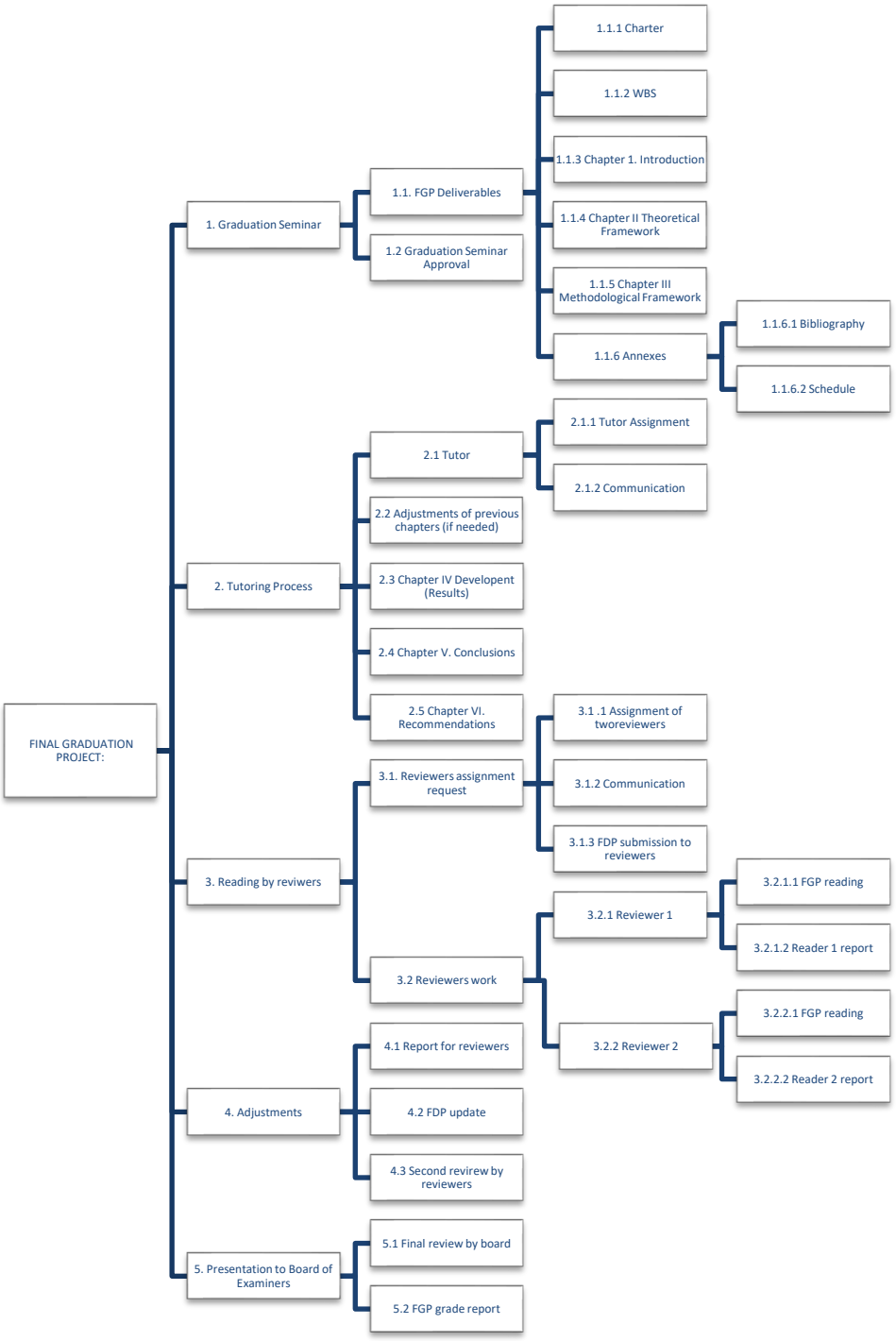
How has the proposed project add to the regenerative and sustainable development?

The project fosters sustainable development by addressing the digital divide and promoting equitable access to digital resources. By providing broadband connectivity in rural areas, the project improves access to education, healthcare, and economic opportunities, which are key elements for socio-economic development. The integration of circular economy principles, such as reusing materials and reducing e-waste, further enhances the sustainability of the project. Furthermore, it contributes to regenerative development by integrating sustainable practices that protect and restore the environment. For example, the installation of fiber-optic infrastructure will adopt techniques that minimize environmental disruptions and promote ecosystem preservation. The use of renewable energy solutions for broadband operation will reduce carbon footprints and ensure the long-term sustainability of the network.

Include potential indicators and ways to measure them.

This project targets an entire community that needs digital and technological improvement. The P5 Impact Analysis Framework can be used as an indicator for measuring the sustainability and regenerative outcomes of a project. Some of the major potential indicators are job creation, economic growth and e-learning in the schools. Other measurable indicators are the number of people who sign up for the service . We can have a clear number of households, schools, businesses and NGOs who are utilizing the service. Overall, the percentage of the population with broadband access can be monitored and measured.

Appendix 2: FGP WBS



Appendix 3: FGP Schedule

WBS	Task	Duration	Start Date	End Date
	Final Graduation Project	130d	10/21/24	04/18/25
	FGP Start	0	10/21/24	10/21/24
1	**Graduation Seminar**	25d	10/21/24	11/22/24
1.1	FGP Deliverables	20d	10/21/24	11/15/24
1.1.1	Charter	5d	10/21/24	10/25/24
1.1.2	WBS	5d	10/21/24	10/25/24
1.1.3	Chapter I: Introduction	5d	10/28/24	11/01/24
1.1.4	Chapter II: Theoretical Framework	5d	11/04/24	11/08/24
1.1.5	Chapter III: Methodological Framework	5d	11/11/24	11/15/24
1.1.6	Annexes	15d	10/28/24	11/15/24
1.1.6.1	Bibliography	5d	11/11/24	11/15/24
1.1.6.2	Schedule	5d	10/28/24	11/01/24
1.2	Graduation Seminar Approval	5d	11/18/24	11/22/24
2	**Tutoring Process**	65d	11/25/24	02/21/25
2.1	Tutor	3d	11/25/24	11/27/24
2.1.1	Tutor Assignment	1d	11/25/24	11/25/24
2.1.2	Communication	2d	11/26/24	11/27/24
2.2	Adjustments of previous chapters	5d	11/28/24	12/04/24
2.3	Charter IV. Development	47d	12/05/24	02/07/25
2.4	Chapter V: Conclusions	5d	02/10/25	02/14/25
2.5	Chapter VI: Recommendations	5d	02/17/25	02/21/25
	Tutor Approval	0	02/21/25	02/21/25
3	Reading by reviewers	15d	02/24/25	03/14/25
3.1	Reviewers assigment request	5d	02/24/25	02/28/25
3.1.1	Adjustment of two reviewers	2d	02/24/25	02/25/25
3.1.2	Communication	2d	02/26/25	02/27/25
3.1.3	FGP submission to reviewers	1d	02/28/25	02/28/25
3.2	Reviewers work	10d	03/03/25	03/14/25
3.2.1	Reviewer 1	10d	03/03/25	03/14/25
3.2.1.1	FGP reading	9d	03/03/25	03/13/25
3.2.1.2	Reader 1 report	1d	03/14/25	03/14/25
3.2.2	Reviewer 2	10d	03/03/25	03/14/25
3.2.2.1	FGP reading	9d	03/03/25	03/13/25
3.2.2.2	Reader 2 report	1d	03/14/25	03/14/25
4	Adjustments	20d	03/17/25	04/11/25
4.1	Report for reviewers	9d	03/17/25	03/27/25
4.2	FGP update	1d	03/28/25	03/28/25
4.3	Second review of FGP by reviewers	10d	03/31/25	04/11/25
5	**Presentation to Board of Examiners**	5d	04/14/25	04/18/25
5.1	Final review of FGP by board	2d	04/14/25	04/15/25
5.2	FGP grade report	3d	04/16/25	04/18/25
	FGP Completion	0	04/18/25	04/18/25

Appendix 4: Preliminary bibliographical research

1. World Bank. (2019). *World Development Report 2019: The Changing Nature of Work*. Retrieved from https://www.worldbank.org/en/publication/wdr2019

This report explores how technological advancements, including digital connectivity, are reshaping labor markets and economic opportunities worldwide. The sections on digital infrastructure and broadband access provide information for designing affordable broadband models aimed at enhancing digital inclusion, especially in inaccessible or rural areas.

2. World Bank. (2024). *Broadband Infrastructure, Access and Use*. Retrieved from https://www.worldbank.org/en/topic/digital/brief/digital-infrastructure

This article from the World Bank depicts the critical challenges and solutions related to broadband access in inaccessible regions. It provides information regarding affordable service models and funding mechanisms for rural broadband expansion, making it a crucial resource for understanding the complexities of digital infrastructure and access disparities.

3. International Telecommunication Union (ITU). (2020). *Measuring Digital Development: Facts and Figures*. Retrieved from https://www.itu.int/en/ITU-D/Statistics/pages/facts/default.aspx

These articles offer data on global broadband access, helping to justify the need for affordable broadband solutions tailored to low-income users and underserved communities.

4. Alliance for Affordable Internet (A4AI). (2019). *The Affordability Report*. Retrieved from https://a4ai.org/wp-content/uploads/2021/12/A4AI_2021_AR_AW.pdf

This report provides insights on affordability thresholds and policies that can guide the feasibility of broadband models aimed at low-income populations.

5. Project Management Institute. (2017). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – 6th Edition*.

The Guide to the Project Management Body of Knowledge is imperative for guiding and explaining how project management framework can be implemented for all projects including broadband infrastructure expansion.

6. Friederici, N., Ojanperä, S., & Graham, M. (2020). *Digital Inequality and Development in the Global South*. Retreved from https://www.tandfonline.com/doi/full/10.1080/02681102.2022.2068492#d1e141
This article examines the impact of mobile broadband on reducing digital divides in rural areas, highlighting the specific barriers faced by rural communities in the Global South. It discusses policy implications and practical strategies for improving mobile broadband access.

7. Inter-American Development Bank (IDB). (2020). *Broadband policies for Latin America and the Caribbean: A digital economy toolkit*. Retrieved from https://publications.iadb.org/en/publications/english/viewer/Broadband-Policies-for-Latin-America-and-the-Caribbean-A-Digital-Economy-Toolkit.pdf
This toolkit provides comprehensive guidelines and policy recommendations for developing broadband strategies in Latin America and the Caribbean.It offers practical insights into the implementation of broadband initiatives aimed at increasing access and affordability, especially for low-income populations.

8. United Nations Conference on Trade and Development (UNCTAD). (2017). *Broadband for all: A roadmap for affordable broadband access*. Retrieved from https://unctad.org/system/files/non-official-document/dtl_eWeek2017c06-isoc_en.pdf
This document outlines strategies and recommendations for achieving affordable broadband access globally, with a focus on minorities. It provides insights into policy frameworks and implementation strategies that can be applied to expand broadband coverage in low-income communities, including those in the Caribbean.

9. United Nations Economic Commission for Latin America and the Caribbean (CEPAL). (2020). *Connectivity in the Caribbean: Challenges and Opportunities*. Retrieved from

https://repositorio.cepal.org/server/api/core/bitstreams/57ff2925-b621-47d3-b30f-01bf16090a64/content
This document analyzes the challenges and opportunities related to connectivity in the Caribbean, emphasizing the need for improved broadband infrastructure. It provides relevant information into the socio-economic impact of enhanced connectivity on low-income populations, making it a valuable resource for assessing strategies to expand broadband access in remote communities, including Belize.

10. Inter-American Development Bank (IDB). (2022). *At least 77 million rural inhabitants have no access to high-quality internet services*. Retrieved from https://www.iadb.org/en/news/least-77-million-rural-inhabitants-have-no-access-high-quality-internet-services
This article discusses the significant lack of access to high-quality internet services for rural populations in the Americas, highlighting the urgency of expanding broadband infrastructure. It provides essential context and statistics that underscore the challenges faced by low-income users in rural areas, making it relevant for evaluating the feasibility of affordable broadband models and making a notable need for project management frameworks required for expanding broadband coverage in the Caribbean.

11. Government of Belize (2022). *Belize National Digital Agenda-Towards A Digital Belize: Belize's National Digital Agenda.* Retrieved from https://digitalagenda.gov.bz/wp-content/uploads/2022/05/NATIONAL-DIGITAL-AGENDA-FINAL.pdf
This article discusses the digital agenda for Belize. This article discusses the digital agenda for Belize. It aims to foster digital transformation by addressing infrastructure, governance, and recovery through innovative ICT tools. Its three pillars—ICT and Technological Enablers, Digital Government, and Digitalization for Recovery—focus on expanding connectivity, modernizing public services, and building digital resilience post-COVID-19. Key goals include bridging the digital divide, enhancing government efficiency with e-services and cybersecurity, and promoting digital skills, innovation, and economic recovery in priority sectors.

Appendix 5: Philologist Letter

Philologist Letter

Academic Advisor
Master's Degree in Project Management (MPM)
Universidad Para La Cooperacion International (UCI)

April 17, 2025

Dear Academic Advisor,

I hold a Master of Arts degree in English from Southern New Hampshire University. I am currently the Communications and Media Manager at The National Channel, and from March 2023 to March 2025, I served as the Operations Manager of the same organization. I also serve as an adjunct lecturer in English in the Faculty of Arts, Science & Technology (FAST) at Galen University in Belize.

I have reviewed Karen Novelo's Final Graduation Project, and she has made grammatical corrections where I have advised. In my opinion, the document meets and surpasses the literacy and linguistic standards expected of a student for a degree in the Master's Level. Please find a copy of my degree attached for your reference.

Dale McDougall, M.A.
dmcdougall@tnc.bz
673-1925

Southern New Hampshire University

Be it known that the Board of Trustees, by the authority vested in it under the laws of the State of New Hampshire and upon recommendation of the faculty does hereby confer upon

Dale Anthony McDougall

the degree of

Master of Arts
English

in recognition of fulfillment of the requirements for that degree with all the Rights, Honors and Privileges pertaining thereto.

Given at Manchester, New Hampshire this first day of February, two thousand and twenty.

Chairman of the Board of Trustees

SOUTHERN NEW HAMPSHIRE UNIVERSITY

President