GOVERNMENT OF GHANA

MINISTRY OF ENERGY
IN COLLABORATION WITH
LAND USE AND SPATIAL
PLANNING AUTHORITY

PETROLEUM HUB STRUCTURE PLAN

MAY, 2021

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FOREWORD

The Government of Ghana's agenda of creating employment opportunities to absorb its youthful population gave birth to the "Agenda for Jobs". Amongst the strategies and programs developed under this policy is the creation of an enabling environment through fiscal and non-fiscal means to attract both domestic and foreign investments into Ghana's oil and gas industry. To meet this objective, the government intends to develop its Petroleum and Petrochemical Industry by establishing a Petroleum Hub. The development of the Petroleum Hub is envisaged to accelerate the economic growth of the country as well as increase the recognition of Ghana in the Sub Saharan region and beyond with respect to the oil and gas industry.

It is against this backdrop that the Land Use and Spatial Planning Authority under the Ministry of Environment, Science, Technology and Innovation, in collaboration with the Ministry of Energy developed spatial plans (i.e, Structure and Local plans) for a Petroleum Hub in the Western Nzema Traditional Area of the Jomoro Municipality. The development of the Spatial Plans was guided by international and domestic policies including the UN's Sustainable Development Goals, National Spatial Development Framework, Western Regional Spatial Development Framework, Energy Policy, the Petroleum Hub Infrastructure Master Plan, Manuals for the Preparation of Spatial Plans, Planning Standards and Zoning Regulations, the Riparian Buffer Policy just to mention a few.

The Structure Plan is to guide and co-ordinate the allocation of land for various uses including key infrastructure such as Jetties, Storage Tanks, Refineries, Liquefied Natural Gas (LNG) Facility, Power Plant; Ancillary Infrastructure such as Water Treatment Facilities, Waste Management Centre, Commercial Services; and other social amenities within the proposed Petroleum Hub enclave.

The Local Plans will on the other hand provide details of land use patterns showing individual plots of land for specific uses, open spaces, circulation, energy, water, and drainage systems among others. It is worthy of mentioning that the Structure and Local Plans have received statutory approval from the Spatial Planning Committee of the Jomoro Municipal Assembly.

With the completion of the plan preparation process and consequent approval, it is expected that development will proceed according to the proposals made in the Spatial Plans. These plans are important documents that will shape not only the development of the Petroleum Hub but also communities that are within the immediate neighborhood of the Petroleum Hub.

Finally, I would like to express my sincere thanks to all who worked and contributed to the development of the Spatial Plans for the Petroleum Hub.

HON. DR. MATHEW OPOKU PREMPEH (MP)
Minister, Ministry of Energy

ACKNOWLEDGMENTS

The preparation of the Spatial Plans (Structure and Local Plans) for the Petroleum Hub in the Western Region could not have been successful without the support of all Stakeholders at the National, Regional and the District levels. The Land Use and Spatial Planning Authority gratefully acknowledges the individuals and organizations that contributed their time, energy and views in shaping the spatial plans.

The commitment and support received from staff of the Ministry of Energy is duly appreciated. Special appreciation goes to the Minister, Hon. Dr. Matthew Opoku Prempeh and Deputy Ministers, Hon. Dr. Mohammed Amin Adam , Hon. Owuraku Aidoo, and Hon. Egyapa Mercer for their support and leadership. Appreciation also goes to Hon. John Peter Amewu (former Minister) and Hon. Joseph Cudjoe (former Deputy Minister in charge of Finance and Infrastructure) for part in initiating preparation of this report.

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The preparation of the Spatial Plans could not be done without the direction and input of the Petroleum Hub Implementation Committee's Technical Team made up of Mr. Jacob Amoah (then Director for Petroleum Downstream), Madam Anita Lokko (then Director for Legal), Mr. Ali Nuhu (Deputy Director for Petroleum Downstream), Ms. Nancy Ayiku-Botchway (Executive Assistant), Mr. Joseph Yankson (Legal Counsel), Mr. Obed Kraine Boachie (then Head for Petroleum Downstream Distribution and Marketing Unit) and Nana Damoah (then Communication Officer) all of the Ministry of Energy as well as Mr. Charles Owusu (then Technical Advisor to the Minister for Finance) and Dr. Eric Yeboah (then Land Policy Advisor, Office of the Senior Minister),

We are also grateful to the National Technical Working Groups, Institutional Heads and Representatives from Ministries, Department and Agencies, for their unlimited support throughout the preparation of the Structure and Local Plans for the Petroleum Hub.

Our sincerest appreciation goes to Hon. Kwabena Okyere Darko Mensah the Western Regional Minister, the Western Regional Coordinating Council, and relevant Sector Agencies from the Western Region. Special appreciation goes to His Royal Highness Awulae Annor Adjaye III and the Western Nzema Traditional Council for their immense support and contribution in the preparation of the plans.

We are particularly grateful to Hon. Ernest Coffie and Madam Joyce Angmorteh, MCE and MCD of Jomoro Municipal Assembly respectively, Members of the JMA Spatial Planning Committee and Technical Sub Committee, Departments and Staff of the JMA, Assembly Members and all Community Members for their commitment and support throughout the process.

Lastly, the tireless effort and dedication of the Project Team from the Land Use and Spatial Planning Authority are duly acknowledged. We express our thankfulness to Messrs Lawrence Dakurah (the Immediate Past Chief Executive Officer of LUSPA), Kwadwo Yeboah (Chief Executive Officer, LUSPA), Chapman Owusu-Sekyere (Director for Spatial Planning Directorate), Patrick Apraku (Director for Standards and Compliance Directorate), Miss Celestine Deku (Project Liaison Officer), Eugene Nyansafo, Benedict Arkhurst and Nada Tandoh (Sub Team Leaders), Prosper Detornu, Judith Derry, Abena Apeaa Adu, Ebenezer Ntsiful, Mohammed Munzamil, Stephen Nana Essuman, Peter Dery, Ama A. Boadu, Doagbodzi Amanda Selasie, Elvis Mensah, Achebah Enock, Silas Achidago, Abigail Amankwah, Sheila A. N Humphrey-Ackumey, Sarah Gyogluu, Stella Ama Agyemang Fenteng, Dennis Quarcoo Nii Noi (Sub Team Members) and all Staff of LUSPA Head Office. Special thanks go to the Western Regional Director and Staff of LUSPA and all other LUSPA Regional Heads and Staff.

The view, comments and inputs received during the stakeholder consultations are reflected in the document.

LAWRENCE APAALSE
Chief Director, Ministry of Energy

JOMORO MUNICIPAL ASSEMBLY

PLAN NAME: PETROLEUM HUB LOCAL PLAN (PHASE ONE)

PLAN NO.:

APPROVAL DATE: 28TH MAY 2021

CHAIRMAN: Hon. Ernest Kofie

SIGNATURE: _____

SECRETARY: Richmond Kwame Obiri

SIGNATURE: _____

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ABBREVIATIONS

CHPS	- Community Health Planning Services
CSO	- Civil Society Organization
CWS	- Community Water and Sanitation
DACF	- District Assembly Common Fund
DDF	- District Development Fund
ECG	- Electricity Company of Ghana
EPA	- Environmental Protection Agency
GES	- Ghana Education Service
GFS	- Ghana Fire Service
GHA	- Ghana Highway Authority
GHS	- Ghana Health Service
GoG	- Government of Ghana
GPHA	- Ghana Ports and Harbour Authority
GPS	- Ghana Police Service
GRIDCO	- Ghana Grid Company Limited
GWCL	- Ghana Water Company Limited
IA	- Intervention Area
JHS	- Junior High School
JMA	- Jomoro Municipal Assembly
KM	- Kilometres
L.I	- Legislative Instrument
LNG	- Liquefied Natural Gas
LUSPA	- Land Use and Spatial Planning Authority
MAD	- Municipal Agriculture Department
MMDA	- Metropolitan, Municipal and District Assembly
MoEn	- Ministry of Energy
MoFA	- Ministry of Food and Agriculture
MOH	- Ministry of Health
GEA	- Ghana Enterprises Agency
NGO	- Non-Governmental Organizations
PHDC	- Petroleum Hub Development Corporation
PIMP	- Petroleum Infrastructure Master Plan
PPD	- Physical Planning Department
PPP	- Public-Private-Partnership
SEA	- Strategic Environmental Assessment
SPA	- Structure Plan Area
VRA	- Volta River Authority

EXECUTIVE SUMMARY

The discovery and subsequent exploration of oil and gas in the Western Region of Ghana has contributed immensely to Ghana's economic growth and development through job creation opportunities, oil and gas investment, and strategic planning of existing and future land use. The development of a Petroleum Hub in the Jomoro Municipality in Ghana adds to its competitive advantage over its neighbouring countries which are also into downstream oil and gas exploration. In bringing to fruition the vision of the government of Ghana to develop a Petroleum Hub in the Jomoro Municipality of the Western Region of Ghana, the Ministry of Energy (MoEn) through a Memorandum of Understanding (MoU) between the Ministry and the Land Use and Spatial Planning Authority (LUSPA) committed to the preparation of a Structure Plan and a Local Plan as a blueprint to spatially organize the various proposals and activities in space.

The decision to site the hub in the Domunli enclave as indicated in the Petroleum Infrastructure Master Plan is in consonance with the vision of the National Spatial Development Framework (NSDF),Western Regional Spatial Development Framework (WRSDF) and the Jomoro Spatial Development Framework (JSDF). These plans promote job creation, balanced human settlement development and sustainable use of natural resources whilst ensuring environmental sustainability and form the basis for the preparation of the Structure Plan (SP). The Structure Plan would ensure that patterns and intensities of existing and proposed developments are coordinated to enable efficient use of resources, services, and facilities. The SP will also provide guidance and certainty to prospective developers, government and the general public regarding permissible and prohibited land uses in the project area.

The Petroleum Hub Structure Plan is situated within the Western Nzema Traditional area of the Jomoro Municipality. The total estimated land size for the entire structure plan area is 51, 252 acres while the Petroleum Hub (Intervention Area) is estimated to cover 20,000 acres. The Petroleum Hub Structure Plan area accommodates major investments of national and international significance by the private sector through sustainable financing arrangements facilitated by the government of Ghana. Investments will include refineries, petrochemical industries and oil and gas tank farms, waste treatment plants among others. Apart from the Intervention Area which will see major investments by expected investors/developers, the Structure Plan Area encompasses twenty-three (23) settlements that are expected to experience major settlement growth and developments as a result of the Petroleum Hub in the next fifteen (15) years.

As part of the preparation of the Structure Plan, extensive primary and secondary data was collected and analysed by the Planning Team from LUSPA. This exercise established the existing situation in the entire 51,252 acres that includes the twenty-three (23) established settlements. After establishing the existing situation, stakeholder consultative workshops were organised to develop the vision, strategic goals and objectives.

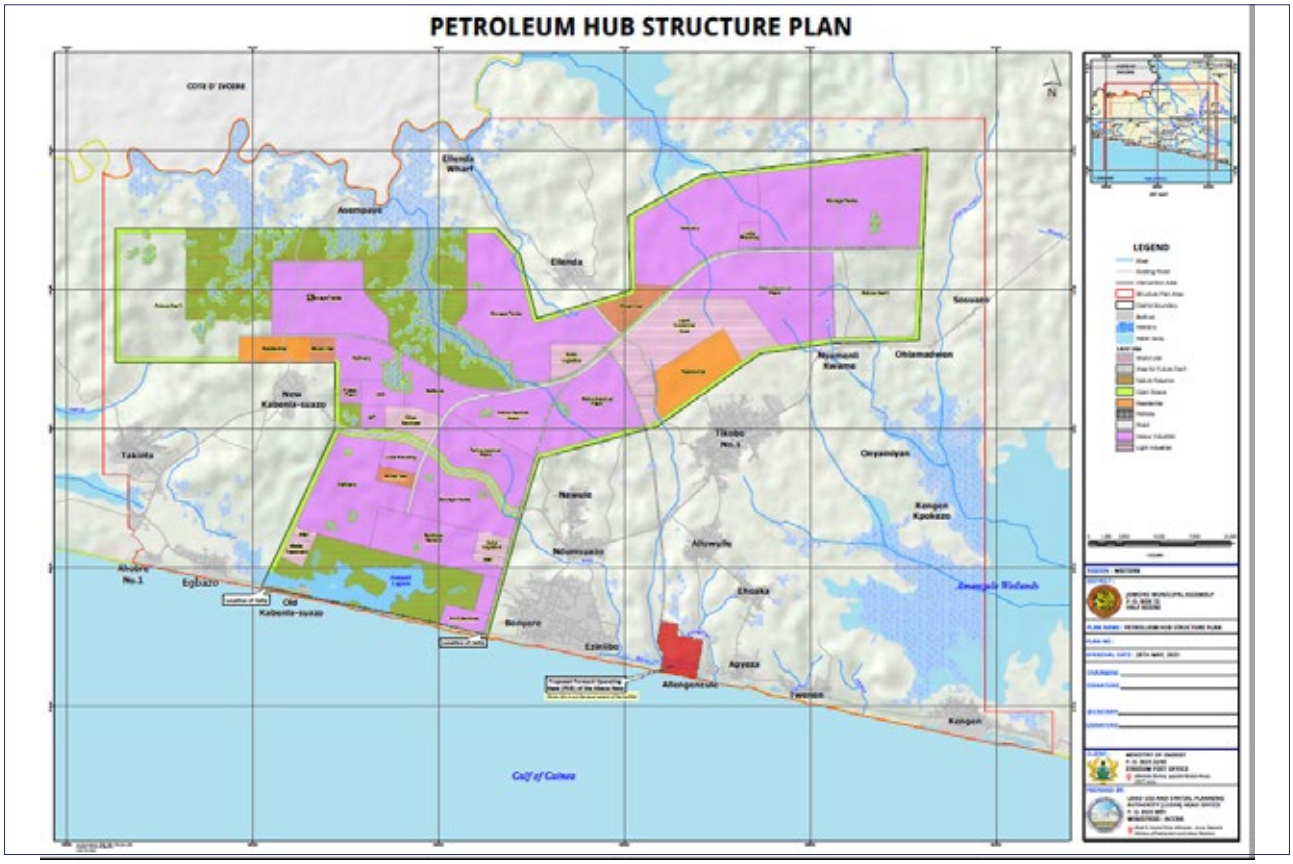
The vision of the Petroleum Hub Structure Plan is;

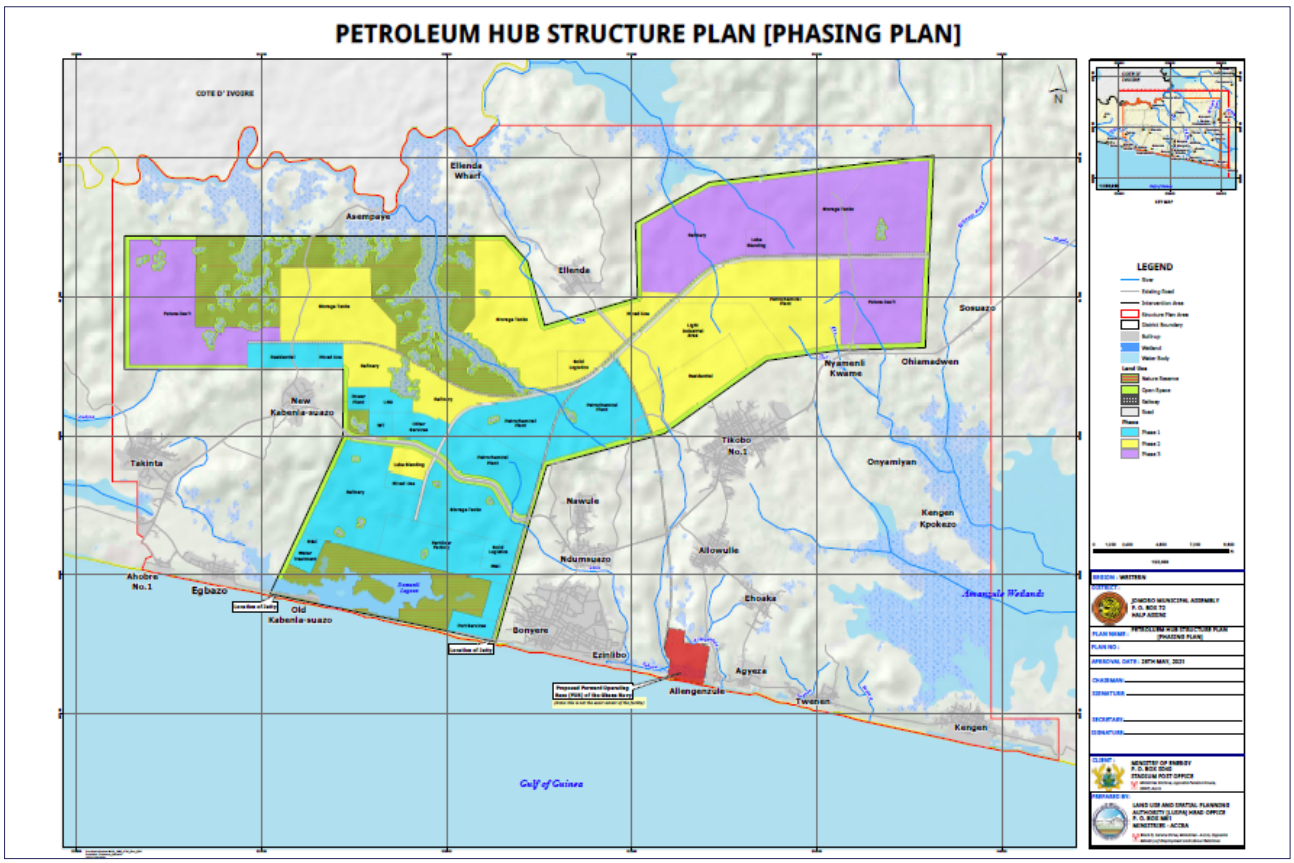
"To be a competitive destination in the sub-region for refined petroleum, petrochemical products and services to spur Ghana's industrialization agenda while ensuring orderly spatial development and sustainable environmental management"

To realise the vision of the Structure Plan, four (4) key Strategic Goals and Objectives were developed. They are;

1. Strategic Goal One: To enhance competitiveness of Ghana's oil and gas industry through sustainable industrial development.
   a. Strategic Objectives
   - To create an enabling environment to attract domestic and foreign investments into the oil and gas industry through fiscal and non-fiscal measures.
   - To contribute in achieving competitive pricing of petrochemical products and services within the African sub-region by developing oil and gas infrastructure.
   - To create an enabling environment for effective administrative and institutional collaboration for the implementation of the plan
2. Strategic Goal Two: To develop spatially organized and well-coordinated infrastructure systems within a safe and secured Petroleum Hub
   a. Strategic Objectives
   - To develop integrated spatial plans and infrastructure systems using land use and engineering plans.
   - To provide safe and well secured infrastructure systems for the petroleum and petrochemical hub.
   - To establish sustainable safety protocols and framework to guide the effective and safe operation within the Petroleum Hub.
   - To develop an efficient road and rail infrastructure to link the Petroleum Hub to other oil and gas infrastructure and services.
3. Strategic Goal Three: To promote integrated and sustainable management of the natural and built environment and settlements.
   a. Strategic Objectives
   - To ensure protection of environmentally sensitive areas in the Petroleum Hub using buffers and remote monitoring systems.
   - To establish growth boundaries for human settlements in the Structure Plan Area.
   - To ensure orderly development of the settlements and infrastructure within the Structure Plan Area.
   - To improve connectivity and functional linkages between urban and rural areas in the Structure Plan Area
4. Strategic Goal Four: To promote human resource development through diversification of skills.
   a. Strategic Objectives
   - To facilitate skills development in non-agro based sources of livelihood.
   - To promote modernized agriculture and other agro-based industries.
   - To develop highly skilled human resource to participate in the petroleum downstream sub-sector.

Based on the goals and strategic objectives outlines above, two scenarios were developed in consultation with key stakeholders. The two scenarios were critically assessed by all the stakeholders and one was adopted to guide the spatial development within the enclave.





Key among the proposals includes:

- Designated zones for activities related to petroleum and petrochemical products and services;
- Mixed use proposals which include commercial, emergency centre, health facility and other service zones;
- Adequate protective buffers and green spaces for wetlands, rivers, and the Domunli Lagoon;
- Protection of main access roads that traverse the Intervention Area;
- Investment in infrastructure, services, and economic activities in identified growth centres;
- Preparation of spatial plans to guide development of new centres of growth;
- Restriction in the spatial expansion of settlements towards the Intervention Area by providing buffers or green belts around it;
- Establishment of proper waste management systems.

In order to guide the implementation of the proposals in the Structure Plan Area (SPA), the Petroleum Hub Development Corporation Act, 2020 (Act 1053) mandates the Corporation to promote and develop the Petroleum Hub. Other institutions like the Jomoro Municipal Assembly, Traditional Authorities etc. have been assigned roles in the implementation proposals in the Structure Plan. As requested by the Ministry of Energy, the implementation of the Intervention Area have been scheduled in three phases within the ten (10) year implementation period whereas the settlements surrounding the Petroleum Hub will be implemented within fifteen (15) years' timeframe of the Structure Plan. In addition, to ensure the efficiency and adherence to timelines, reporting will be done quarterly considering the anticipated influx of investments and the need to keep track of physical developments within the enclave.

It is anticipated that the Petroleum Hub Development Corporation ensures the effective and efficient implementation of the Structure Plan in collaboration with the Jomoro Municipal Assembly, LUSPA, the Traditional Authority and other key stakeholders.

CHAPTER ONE

GENERAL INTRODUCTION

0.1 BACKGROUND

A Structure Plan is a statutory long-term framework used to guide and define the development, redevelopment and land use patterns of a town or city or a particular area (Manual for the Preparation of Spatial, 2011). It has a time horizon of fifteen (15) years, and defines:

- Future development and land use patterns;
- The layout of trunk (primary distribution networks) infrastructure and main transportation routes, including terminals;
- Conservation and protected areas and natural drainage system; and
- Other key features for managing the direction of development, including upgrading and regeneration.

The scope and extensive nature of the Petroleum Hub requires that a Structure Plan is prepared to guide and coordinate orderly physical development considering its strategic nature in the country's development agenda. The huge investments to be made in the Petroleum Hub require proper coordination and planning to align it with the national, regional and district development frameworks.

The preparation of a Structure Plan, will facilitate the achievements of the vision of the oil and gas industry in Ghana. The Petroleum Hub Structure Plan shall span for a period of fifteen (15) years (2021-2036) and is expected to:

- Ensure that patterns and intensities of existing and proposed development are coordinated to enable efficient use of resources, services and facilities;
- Provide a coordinated approach to the provision of infrastructure and services in the project area and facilitate timely delivery of basic services to the population;
- Provide guidance and certainty to prospective developers, government and the general public regarding permissible land uses in the project area;
- Identify areas suitable for the preparation of local plans in phases and finally;
- Identify areas in need of urban renewal, improvements in community facilities, and protection of conservation areas (threatened habitats and areas of heritage-historic and cultural value).

The report is structured into five (5) chapters. Chapter One presents the rationale for the preparation of the Structure Plan for the Petroleum Hub, the approach, and the key issues emerging from the situational analysis. Chapter Two highlights the vision, the strategic goals, and objectives of the plan. Chapter Three discusses the possible scenarios for the development of the Structure Plan Area. Chapter Four provides an overview of the adopted plan to guide development. Chapter Five examines the implementation and management of the Structure Plan.

0.2 APPROACH AND METHODOLOGY

This section provides the strategies adopted in achieving the overall vision for the implementation of the Petroleum Hub SP. The formulation of the development strategies was guided by district, regional, national, and international policy documents. Key among them are the Manual for the Preparation of Spatial Development Frameworks, Jomoro Spatial Development Framework,

Western Region Spatial Development Framework, the Urban Policy and the Sustainable Development Goals (SDGs).

The development of the structure plan for the Petroleum Hub was informed by;

i. the analysis of the existing situation and future projections of the Structure Plan Area (SPA),
ii. Proposal based on the analysis and future projections.

Two (2) independent scenarios were formulated all aiming at achieving the vision, goals and objectives of the SP.

Stakeholders from public agencies, private companies, Non-Governmental Organisations (NGOs), Civic Society Organisations (CSOs) as well as the Traditional Authorities and community members were identified and consulted at various stages of the plan preparation process.

1.3 KEY ISSUES FROM THE SITUATIONAL ANALYSIS

The key issues identified from the situational analysis include the following:

1.3.1 Natural Environment

The natural environment is an important resource that contributes to sustainable growth and development. To achieve the long-term development aspirations of the Petroleum Hub, effective and efficient management of the environment and natural resources are important to ensuring developments that does not compromise future uses. The Domunli lagoon, the wetlands and the shoreline were all identified as ecologically sensitive areas which are vulnerable to human activities, climate hazards such as sea-level rise and shoreline erosion. Consequently, this threatens the biodiversity and ecosystem of the area as it negatively affects endangered species. It is therefore prudent to consider strategies that protect coastal area within the SPA as well as settlers whose lives and livelihoods are affected by coastal erosion and flooding. Any investment within the SPA must consider the physical and natural environment.

1.3.2 Population Dynamics and Settlement Growth

Population dynamics and development are inextricably linked. To promote the wellbeing of current and future generations within the SPA, there is the need to systematically consider plans for population dynamics and settlement growth. There exist a young and active population within the SPA, hence the availability of labour force to support proposed activities. Again, there is a low age dependency ratio of 1:0.86, which implies that the burden being borne by the active population is less; hence, they could improve their wellbeing. The sparse distribution of settlements implies that development interventions will have to consider how infrastructure will be efficiently distributed to meet the needs of inhabitants.

Based on the data analysis, the SPA has an increasing and urbanizing population. Urban areas differ from each other but most of the settlements are facing problems such as unemployment, inadequate services and infrastructure, inadequate health facilities and inadequate educational facilities and services and poor sanitary condition. When well-managed, urbanization can be a powerful tool for the sustainable economic growth and development of the Petroleum Hub.

1.3.3 Economy

The strategy for national development is to create an enabling environment for the Ghanaian private sector to propel growth and create ample employment opportunities, especially for the youth. The field data revealed that within the SPA, the employment structure shows that the share of services (40.81%) and primary sector (39.04%) are almost equal while the industrial sector (20.15%) has the least share. This structure is consistent with that of the region.

The services sector is dominated by the wholesale, retail, and repair of vehicles (motorcycles etc) which indicates the availability of that market for the SPA. The dominance of petty trading in this sub-sector will also provide readily available services with an anticipated increase in income earning value once the Petroleum Hub is implemented. The industrial sector is dominated by the manufacturing sector which is largely coconut processing related and hence opportunity for processing and associated value chain benefits in the sector. This market needs to be protected especially from demand of coconut fruit from Nigeria which is likely to disrupt the agro-processing value chain.

Based on the hierarchy of settlement in the SPA, Tikobo No. 1 is the highest order settlement with a diverse economy. It hosts the high-end services and industrial sector workers and firms. Future investments and development interventions in the SPA should consider the hierarchy of settlement and its associated infrastructure base.

1.3.4 Social Services

Health

There are inadequate health personnel and logistics to effectively deliver quality health care in the SPA. Communities such as Allengenzule, Ellenda Wharf, Ellenda and Sosuazo do not have access to health facilities. Where they exist, majority of the health facilities including their accommodation are reported to be in bad condition. There is also the absence of ambulance services in the SPA. Additionally, the seasonal nature of fishing activities occasionally increases the population due to in-migration and this puts pressure on the existing health facilities. Indiscriminate disposal of waste poses a major public health nuisance.

Education

Knowledge on accurate school-going population data, needs and projections is essential for decision makers to provide interventions that will ensure quality, inclusive and equitable access to education at all levels. The key issues identified in the education sector primarily relates to the basic level thus KG, primary and JHS. There are inadequate trained private school teachers (13.4 %)especially at the JHS level. This can be attributed to the lack of accommodation for teachers in some communities, such as; Allowule, Egbazo, Ehoaka, Ellenda Wharf, Ellenda, Twene, Old Kabenlasuazo. Also, there are inadequate logistics and office space for administrative work in the schools. Inadequate toilet and water facilities in the basic schools have the potential to limit girl child regular attendance and enrolment which is a strategic development priority. Consequently, this can lead to gender gaps in learning and skills development at the basic level. Globally, ICT is the order of the day; however, thirteen (13) out of seventeen (17) public basic schools lack access to ICT laboratories. Lastly, there is inadequate supervision by the circuit supervisors due to inadequate funding and means of transport.

Water and Sanitation

Safe drinking water, good sanitation and hygiene are fundamental to human health, survival, growth and development. Key issues related to water include;

- Inadequate access to potable water
- Non-functioning and regular breakdown of some water facilities
- Poor management of the water facilities.
- Irregular flow or water supply (Water scarcity in some of the communities)
- Pollution of water bodies (River Tano) by illegal mining activities upstream.

There is indiscriminate disposal of waste; lack of an engineered disposal facility and poor drainage. There is limited number and access to toilet facilities in households, educational institutions and health facilities. This explains the high rate of open defecation in majority of the communities. It is anticipated that the increase in population within the SPA will require effective and efficient provision of water and sanitation facilities and services in the various settlements especially the urban areas.

Information and Communication Technology (ICT)

Most of the communities have internet connectives. It is one of the main spurs of economic growth and social transformation. The key issues under ICT involve; poor mobile network connectivity in most of the rural communities as well as low access to computers. There is also low internet patronage in the SPA. ICT is an important tool for increasing efficiency and effectiveness of organizations.

Civic and Culture

Important civic facilities such as post office and library are not functioning. There is also the absence of durbar grounds needed for numerous social gatherings especially cultural activities. These are potential areas for investment.

Open Space, Sports and Recreation

This sector has the potential to unite the locals, empower individuals and promote the development of inclusive communities. Nonetheless, eighteen (18) out of the twenty-three (23) settlements do not have access to parks for active recreation. The existing sports and recreational facilities are underdeveloped. This is a potential area for investment by the private sector considering the development of the Petroleum Hub which is underway. There is the presence of cemeteries along the beaches. Nonetheless, the clean and sandy beaches along the SPA are a potential area for investment to generate jobs in the hospitality industry. Again, the beaches are favourable nesting habitat for endangered species such as turtles which are of global conservation interest.

Safety and Security

Safety and security are of critical importance in ensuring sustainable development. It is important to ensure that the achievement of human development in the SPA is just, reasonable, and safe. With the exception of Tikobo No.1 and Bonyere, there is no police station in the SPA. Inadequate personnel, office space, logistics and the lack of incentive for security personnel have affected effective and efficient service delivery. Marine surveillance through the proposed establishment of the Forward Operating Base (FOB) in the SPA will consolidate the security of investments and developments in the Petroleum Hub enclave. It is prudent to note that youth development is very much a function of having safe and peaceful communities and vice versa.

1.3.5 Housing, Energy and Transport

Housing

Currently, there is poor quality of housing stock and insanitary housing conditions in most of the settlements in the SPA. Within the Petroleum Hub enclave, there is a potential for population influx and the propensity for informal settlement development. Appropriate housing interventions should be considered to meet the housing needs of each of the income groups. There is opportunity for private real estate development to meet the housing needs.

Energy

Sustainable and continuous supply of energy is required for effective and efficient operation of the Petroleum Hub. Currently, there is extensive electricity connectivity in the SPA despite inadequate infrastructure resulting in power fluctuations and interruptions. Fuelwood and charcoal and coconut husk are the main source of energy for cooking. Alternative energy sources such as the use of LPG is limited in the SPA. The Rural LPG Program presents opportunities for some communities in the SPA to benefit from Corporate Social Responsibility as well as availability of gas for cooking.

Transportation

Transportation is an important component of the economy of the SPA and a common tool used for development. Road is the major mode of transport. Currently, motorcycles are the commonest mode of transportation; however, the transport system is geared towards vehicular traffic. Poor road conditions limit mobility, with large parts of the plan area becoming unmotorable especially during the rainy season. Consequently, this affects the cost of transportation and ease of physical access to the limited health and educational facilities. In summary mobility from the rural to the urban centres like Tikobo No 1 is a challenge. Developing these transport and logistics networks is a core focus of economic transformation strategies in the SPA.

CHAPTER TWO

VISION, GOALS AND OBJECTIVES

2.1 INTRODUCTION

The vision of the Petroleum Hub Structure Plan mirrors the strategic vision of the Petroleum Infrastructure Master Plan, the Jomoro Spatial Development Framework and the Western Region Spatial Development Framework (WRSDF). The strategic objective of creating a Petroleum Hub in Ghana is necessitated by Ghana's central location in the sub-region, stable political climate, access to the sub-regional market, proximity to international shipping routes, and favourable macroeconomic stability. The Structure Plan therefore envisages the Petroleum Hub enclave to attract foreign and domestic investments in petroleum and petrochemical services, and to leverage on the industrialization drive of the government in a responsible and efficient way.

This chapter underscores the strategic vision, goals and objectives towards a clear trajectory and realization of the Petroleum Hub. The broad development vision, goals and objectives provide the framework for the formulation and evaluation of scenario options for the development of the Petroleum Hub.

2.2 VISION OF THE PETROLEUM HUB STRUCTURE PLAN

The vision of the Petroleum Hub Structure Plan is;

"To be a competitive destination in the sub-region for refined petroleum, petrochemical products and services to spur Ghana's industrialization agenda while ensuring orderly spatial development and sustainable environmental management"

2.3 STRATEGIC GOALS AND OBJECTIVES

The realization of the vision of the Petroleum Hub Structure Plan is dependent on an explicit set of goals and objectives with desired outcomes within the fifteen (15) years lifespan of the Structure Plan. There are four (4) key goals and objectives aimed at the actualization of the vision of the Structure Plan, as well as shaping the future development of the Petroleum Hub.

Strategic Goal One: To enhance competitiveness of Ghana's oil and gas industry through sustainable industrial development.

Strategic Objectives

- To create an enabling environment to attract domestic and foreign investments into the oil and gas industry through fiscal and non-fiscal measures.
- To contribute in achieving competitive pricing of petrochemical products and services within the African sub-region by developing oil and gas infrastructure.
- To create an enabling environment for effective administrative and institutional collaboration for the implementation of the plan

Strategic Goal Two: To develop spatially organized and well-coordinated infrastructure systems within a safe and secured Petroleum Hub

Strategic Objectives

- To develop integrated spatial plans and infrastructure systems using land use and engineering plans.
- To provide safe and well secured infrastructure systems for the petroleum and petrochemical hub.
- To establish sustainable safety protocols and framework to guide the effective and safe operation within the Petroleum Hub.
- To develop an efficient road and rail infrastructure to link the Petroleum Hub to other oil and gas infrastructure and services.

Strategic Goal Three: To promote integrated and sustainable management of the natural and built environment and settlements.

Strategic Objectives

- To ensure protection of environmentally sensitive areas in the Petroleum Hub using buffers and remote monitoring systems.
- To establish growth boundaries for human settlements in the Structure Plan Area.
- To ensure orderly development of the settlements and infrastructure within the Structure Plan Area.
- To improve connectivity and functional linkages between urban and rural areas in the Structure Plan Area

Strategic Goal Four: To promote human resource development through diversification of skills.

Strategic Objectives

- To facilitate skills development in non-agro based sources of livelihood.
- To promote modernized agriculture and other agro-based industries.
- To develop highly skilled human resource to participate in the petroleum downstream sub-sector.
- To develop a Technical and Vocational Education and Training
- To develop a Technical University

CHAPTER THREE

DEVELOPMENT OPTIONS

3.1 INTRODUCTION

The development of scenarios involved simulation of land uses in space by taking into consideration the various or different means of implementation to achieve the set development vision. The project team developed two (2) alternative scenarios, which aimed at achieving the vision of the Petroleum Hub. The key features and the broad land use of each option have been briefly discussed. These options were evaluated in collaboration with stakeholders to come out with a preferred option.

3.2 DEVELOPMENT SCENARIO ONE (1)

Scenario one (1) of the Petroleum Hub is hinged on the aggregation of similar activities to mitigate likely risk from the anticipated industrial activity. This scenario is premised on the safe and sustainable growth of the Petroleum Hub and adjoining settlements around the enclave. This section highlights the guiding principles and proposals for the future growth of the Petroleum Hub and adjoining settlements that define the Structure Plan Area.

3.2.1 Guiding Principles

A welcoming environment for users of the Petroleum Hub has been created to give distinctive character and a sense of place to enhance the effective functioning of the Intervention Area and the surrounding communities. The following guiding principles aided in the design of the scenario one.

Integration

The principle of integration in the design of the Petroleum Hub Structure Plan is to match the location criteria of various activities to the topography and ecosystems of the site. This took into consideration the natural and built environment while ensuring the protection and enhancement of natural ecosystems. For instance, the Domunli Lagoon and its adjoining wetlands is the only coastline available within the boundary of the Petroleum Hub. It is imperative that the siting of port services within the neighbourhood of the Domunli enclave does not adversely affect the ecosystems in the area. The siting of refineries at the north western part of the hub also leaves the area moderately protected.

Efficiency

The diversity of industrial activities in the Petroleum Hub provides the opportunity to develop synergies between industries such as refineries, storage tanks and by-product management. The industrial strategy indicated in the Petroleum Infrastructure Master Plan enabled the Project Team to locate and position synergistic industries in relation to each other to optimise the shared use of by-products. A key feature of this was the clustering of heavy industrial activities, which include refineries, storage tanks, petrochemical plants, fertilizer plants, power plants and the water treatment plant.

Cost Effectiveness

This principle allowed for the clustering of industrial activities around the heavy industrial area in such a manner as to promote easy transfer of solid and liquid materials, gas, and energy between and among activities or uses. This is expected to be mirrored with 'smart' infrastructure that enables industries to easily interface with each other.

3.2.2 Phasing of the Industrial Activities

The Petroleum Infrastructure Master Plan specified several activities that must be sited within the first, fifth, seventh and tenth year of implementation. Thus, the implementation of the Petroleum Hub is in phases. For instance, an initial 1,000,000m³ capacity storage depot is expected to be established within the first (1st) phase,, 4,000,000m³ in the second (2nd) phase and 5,000,000m³ in the third (3rd) phase. A total of 10,000,000m³ storage capacity will be constructed by the end of the project period in 2030. It is expected that one out of the proposed three refineries with a capacity of 300,000bpsd, a petrochemical plant, jetty and port infrastructure, utilities, other ancillary infrastructure, transport infrastructure, residential, commercial, a fertilizer plant, and other social amenities will be set-up in the first phase of implementation. Therefore, it is necessary in the design to consider the phasing of the activities of the Petroleum Hub.

Compatibility

In allocating land uses within the Structure Plan Area, the Zoning Guidelines and Planning Standards served as a guide in determining land uses which are permissible and prohibited within each zone. For instance, it was imperative to separate residential land uses from heavy industrial use and allow for permissible uses which are complementary in operational impact. In the land allocation process, it was identified that some land uses may have potential conflicts with adjacent uses, thus as a remedy, the conduct of an Environmental Impact Assessment (EIA) is recommended at the implementation stage to minimize impacts and conflicts in such situations. An example is the siting of the waste treatment plant in the mixed-use zone.

3.2.3 Proposal for Intervention Area

In designing scenario one (1) consideration was given to the topographic and the ecological nature of the area in the allocation of land uses. The following discusses the various broad uses in scenario 1.

Industrial Uses

The industrial landuse areas are expected to accommodate several industrial activities or establishments. The industrial use in the Petroleum Hub has been categorised into Heavy, Medium and Light. It is anticipated that investors will finance all the services and activities. The industrial activities can influence safety and offer economic benefit to the surrounding environment or communities. It is paramount to consider the safety of the activities within the Petroleum Hub due to the combustible nature of inputs and products. Accidents in this area can usually result in serious damage to the environment thus safety precautions are pivotal. A buffer of 50 metres has been delineated around the boundary of the Intervention Area to separate the surrounding communities from the activities of the Hub. The industrial activities that are anticipated in the hub and among others include:

- 10,000 000 m³ storage infrastructure
- Development of three (3) refineries
- Five (5) Petrochemical plant
- Jetties and Port Infrastructure
- 450,000 m³ LNG storage tank and regasification infrastructure

- Lube Blending Plant
- Utilities (waste, water, desalination etc.)
- Other ancillary infrastructure

In addition, the proposed gas pipeline which passes through the hub to La Cote D'Ivoire was considered in the siting of the power plant.

Residential Uses

This zone comprises of residential land use and other basic amenities for workers in the Petroleum Hub. The housing density for the hub has been proposed to be medium density of about 16 to 30 dwellings per hectare. The development in the zone will comprise a mixture of detached, semi-detached and terraced houses. Commercial developments would be permissible in the zone. Areas have also been designated as public open spaces. The total area allocated to residential development is about 600 acres. To enhance the operations of the Petroleum Hub, Bokakole Nkwanta community, Asempaye, Old Kabenla-suazo and the Northern part of Nyamenli Kwame will be considered for resettlement.

Mixed Use

The mixed-use development in the hub comprises Commercial Services, Security and Emergency Response Centres, a Health Facility and a Research and Development Institution.

Transportation (Road, Air, Port and Railway)

The transport sector is an important component of the economy and a tool for development. Efficient transport systems provide economic, social opportunities and benefits that result in positive multiplier effects. The following proposals were considered for transportation in the Petroleum Hub;

- The existing road from Tikobo No.1, Nawule and New Kabenla- suazo upgraded to 90 m (300ft) highway
- Major arterial roads of 60m (200ft) proposed within the Petroleum Hub to serve as the main distribution road from the highway
- Minor arterial road of 30m (100ft) proposed to connect the existing road to the port area.
- Block access traversing through the plan area to Asempaye
- Cordon off the Nawuley - New Kabenla-Suazo and Tikobo No. 1 – Ellenda stretch of road.
- Railway network proposed to connect the hub to the Takoradi railway.
- A total of 675.06 acres proposed for an airstrip
- A total land area of 375.68 acres proposed for port services.

Environment

The design took into consideration the protection of ecologically sensitive areas. The structure plan designated protected and conservation areas around wetlands, rivers, and the lagoon. The Riparian Buffer Zone Policy for Managing Freshwater Bodies in Ghana was the adopted standard in determining and assigning buffers. Ecologically, buffers can serve as carbon sinks, aid in the production of oxygen, provide a cooling effect on both terrestrial and aquatic habitats by shielding them from harmful direct sun rays, and impact positively on local climate. Based on the recommended design standards in the policy the following were recommended:

- 15 meters buffer for rivers
- 70 meters buffer for lagoon
- 30 metres for wetlands

3.2.4 Proposals for Settlements

The proposals for the existing settlements around the Petroleum Hub are premised on promoting sustainable development in a way that complements the proposed investment in the Hub. The following are the major proposals for various thematic areas.

Economy

- Pursue a strategy that will link agriculture to manufacturing and services;
- Invest in infrastructure, services, and economic activities in identified growth centres.

Health

- Provide Health Post/Clinic at Ellenda
- Provide Health post at Ezinlibo
- Upgrade CHPs compound at Takinta into a Health Centre
- Upgrade Clinic at Bonyere to a Health Centre
- Upgrade existing Health Centre at Tikobo No. 1 to a Polyclinic
- Extension of mobile health service to Ohiamadwen, Sosuazo and Onyamiyan

Education

- Provide basic school (KG, Primary and JHS) at Onyamiyan and Kengen
- Enhance the skills of the youth through vocational & technical training in the SPA

ICT

- Provide additional number of telecommunication mast to improve quality of communication within the SPA.
- Provide additional internet service centres.

Water Supply

- Repair 2 non-functional overhead water tanks at Allengenzule and Twenen
- Increase water supply to overhead water tanks at Nyameli Kwame
- Provide overhead tanks at Ehoaka, Ahobre No.1, Kengen, and Ellenda
- Provide boreholes for Kengen Kpokezo.

Sanitation

- Provide one (1) additional skip bin at Tikobo No. 1
- Provide skip bins for all the twenty-three (23) communities
- Construct additional two (2), public toilet facilities at Bonyere and one (1) at Ezilinbo, Ellenda, Kengen Takinta, New Kwabenla-suazo and Tikobo No. 1
- Rehabilitate one (1) public toilet facility at Bonyere, Ezilibo and Allowule
- Promote and educate residents on good sanitary practices for all communities.

Housing

Improve quality of housing through subsidised home improvement programms. The following indicate the recommended land size proposed for the development of new housing areas in the four major settlements within Spatial Plan area.

	Name Land	**Land Area (acres)**	**Area (hectares)**
1.	Tikobo No. 1	420.52	170.18
2.	Bonyere	357.94	144.85
3.	Takinta	230.14	93.13
4.	Ezinlibo	216.18	87.48

Road Transport

- Upgrade existing 60km tarred feeder road to trunk road
- Upgrade, all roads within the SPA to tarred roads (bituminous) based on the Ghana Infrastructure Plan (GIP) for a 10-year period (2016-2026)
- Upgrade Feeder roads within the 5 most populous areas to urban road status (2016-2026)

Energy

- Promote the distribution of cylinders to all households
- Ensure 100% electricity coverage to all settlements within the SPA (especially Onyamiyan and Kengen Kpokezo)

3.2.5 Strengths and Weaknesses of Scenario One (1)

The strengths and weaknesses of Scenario One (1) are presented below;

Strengths

- It promotes economies of agglomeration and scale
- Propels urbanization and development
- It enhances infrastructure investment and its development
- Promotes skills development and diversification of economy
- Promotes environmental sustainability

Weaknesses

- Loss of farm lands and likely loss of livelihood especially in the primary sector
- Cultural diffusion

3.2.6 Scenario One Map

The scenario one map was prepared based on the guiding principles and the proposed broad land uses and activities recommended for the scenario as indicated above. See figure 1 for details.

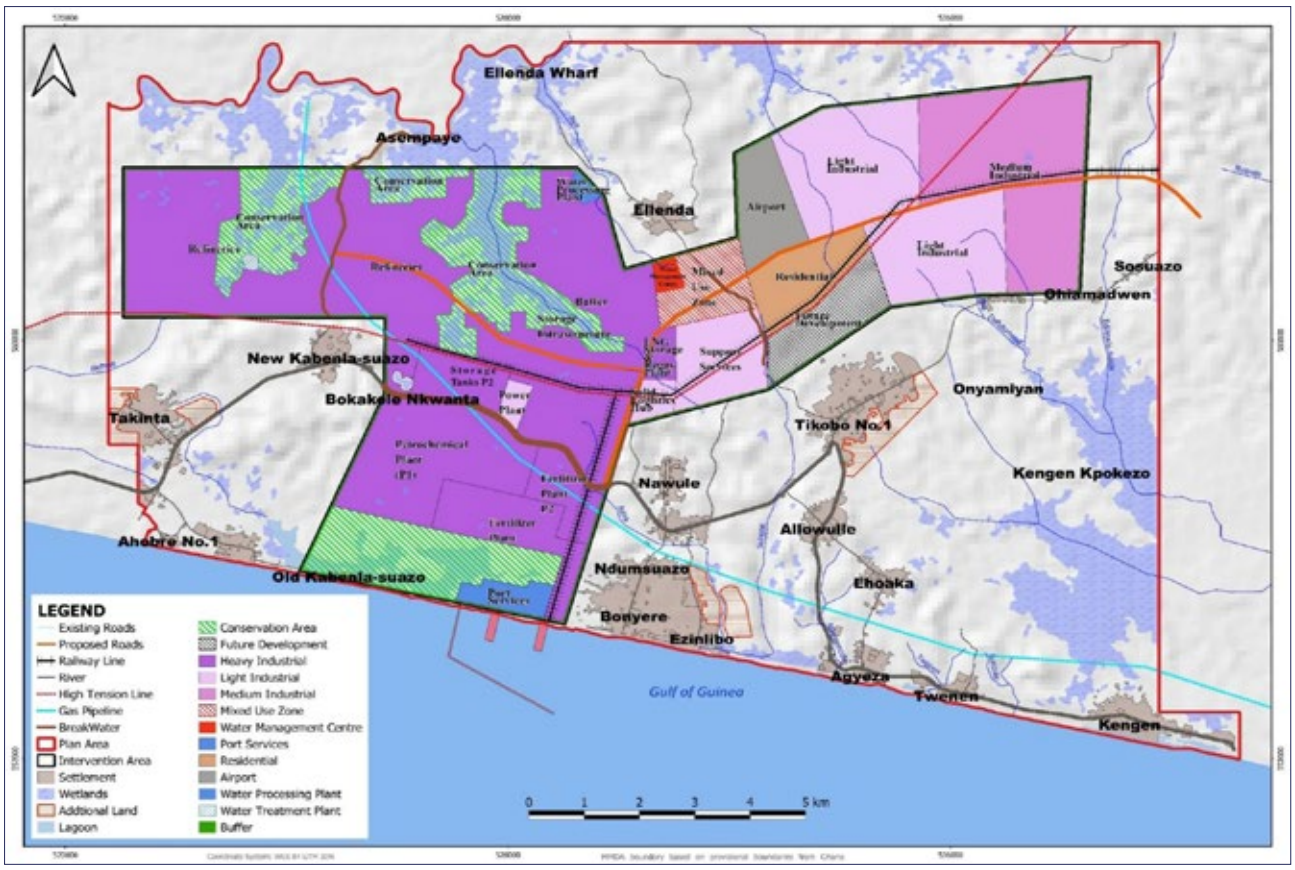


Figure 2.1: Structure Plan for the Petroleum Hub Scenario One

Source: LUSPA, 2020

3.3 SCENARIO TWO (2)

Scenario two is premised on the assumption that the Petroleum Hub will share port services with the Naval Forward Operating Base (FOB). The option envisages concurrent spatial improvement and sustainable growth of the adjoining settlements around the enclave. This section highlights the guiding principles and proposed future development within the Petroleum Hub and adjoining settlements that fall within the Structure Plan Area.

3.3.1 Guiding Principles

The guiding principles that underpin the design of scenario two (2) subsequently informed the proposed land uses and activities. These guiding principles were conceived with considerations to the proposed development vision and goals. The principles are discussed below;

Environmental Protection

Environmental protection was vital in the design. The ecological sensitivity of the enclave and the industrial nature of the activities in the Petroleum Hub require a plan that adheres and promotes environmental sustainability. This principle ensures that an activity posing a threat to the environment is prevented from adversely affecting it and thereby preserving the natural environment through responsible industrial development.

Effectiveness

The principle of cost effectiveness was also given due consideration in relation to siting complimentary land uses in close proximity. The application of this principle culminated

in creation of three clusters centred around the refineries in the PIMP. This ensures that complementary facilities and uses are sited close to each other to ensure cost effectiveness in infrastructure development and efficient operation of the Petroleum Hub.

3.3.2 Phasing

This consideration informed the siting of facilities such that, phase-1 facilities were sited close to the shoreline to make use of infrastructure such as port services and jetties.

Topography

Topography and slope analysis were a key consideration in the design of the scenario. It ensured that the design fit in the landscape of the SPA.

Safety

The principle of safety was paramount considering combustible nature of the proposed industrial activities. Multiple clusters of the scenario promotes scattering of risk in contrast to cumulative risk.

3.3.3 Proposals for Intervention Area

The key proposals for Scenario Two were informed by the Petroleum Hub Masterplan, the vison, goals, and guiding principles as well as other relevant policy documents. The following are the proposals for the Intervention Area:

Environment

The proposals in this theme are predominantly informed by the Riparian Buffer Zone Policy. The following were adapted.

- 15 meter buffer for all rivers
- 70 meter buffer for the Domunli lagoon
- 30 meters buffer for the wetlands
- Designation of areas as nature reserves
- Allocation of 355 acres open space to serve as buffer in the Intervention Area.

Transport and other Infrastructure

- Reserve 200m (656.2ft) right of way for the Essiama - Half Assini road which traverses the plan area. This includes 90m (295.3ft) width of road and 110m (360.9ft) for protective buffer (Open Space).
- Reserve 50m (164ft) right of way linking existing settlements; Tikobo No.1 and Ellenda Wharf. This road passes through the Intervention Area to settlements with lower population.
- Allocate 50m (164ft) right of way for internal roads and 18.3m (60ft) for roads within the residential areas
- Allocate 65m (213.25ft) right of way within the Intervention Area.
- Allocate 800 acres of land for the development of an airport
- Allocate 40m (131.2ft) right of way for a proposed railway line
- Bury or divert high tension line running through the Petroleum Hub Intervention Area
- Reserve land at the coast for two jetties
- Allocate space for the establishment of Interconnecting Pipelines to link the primary infrastructure to the Storage Facilities.

Heavy Industrial Uses

- Allocate 528 acres for the establishment of Fertilizer factory
- Allocate 2,250 acres for the establishment of three Oil Refineries with each refinery taking a space of 750 acres.
- Allocate 4,000 acres for the establishment of storage infrastructure (Tank farms)
- Allocate 100 acres for the establishment of a Liquefied Natural Gas (LNG) onshore Storage and Regasification Infrastructure
- Allocate 97.10 acres for the establishment of Lube Blending Plant
- Allocate 48 acres for the development of a Waste Treatment Plant
- Allocate 100 acres for the development of a Water Treatment Plant
- Allocate 42 acres for the development of a Power Plant
- Allocate five (5) sites of 500 acres for the establishment of a Petrochemical plants
- Allocation of 103 acres at the coast for port services

Light Industrial Uses

- Designate 857 acres for light industrial uses
- Allocate 103 acres for solid logistics

Mixed Uses

- Allocate 328 acres for the development of other services
- Allocate 700 acres for emergency and security services such as Police, Fire, Ambulance Services and Military Installation as well as commercial services such as Banking and Finance, Telecommunications, Logistics, Offices for the Petroleum Hub Development Corporation and Shopping in the Intervention Area

Residential

- Allocate 989 acres for medium density residential development

3.3.4 Proposals for Established Settlements

The proposals for the existing settlements around the Petroleum Hub are premised on promoting sustainable development in a way that complements the proposed investment in the enclave.

Environment and Settlement Growth

- Create buffers to protect the rivers and wetlands
- Restrict the growth of the Egbazo, Ellenda Wharf, Asempaye and Kengen towards adjoining wetlands.

Economy

- The development of Tikobo No.1, Bonyere, Ezinlibo and Takinta as Service Centres
- Upgrade markets and health centres (polyclinics) in the Service Centres
- Provide Police and Fire stations in the Service Centres
- Improve road networks in the Service Centres

Agriculture

- Organise skills development training in alternative sources of livelihood (e.g. Aquaculture)
- Train farmers (crop/livestock) on improved agricultural practices
- Establish centres for cassava and coconut processing

Health

- Provide Polyclinic at Takinta, Bonyere and Tikobo No.1
- Provide clinic at New Kablensuazo and Ellenda
- Provide CHPS compound at Ohiamadwen
- Equip existing health facilities with adequate health personnel, logistics and consumables

Education

- Construct 24 number boreholes in schools without water facilities
- Renovate classroom units at Tikobo 1 D/A, Egbazo D/A and Takinta D/A, Ehoaka D/A, Ellenda D/A and Allowule D/A
- Provide a basic school for Ohiamadwen and a Primary school for Ellenda Wharf
- Provide Kindergarten/Nursery school for Onyamiyan and Twenen
- Provide toilet facilities for schools that lack such facilities
- Provide ICT laboratory for all schools

Water and Sanitation

- Undertake feasibility assessment of water sources for long term supply to communities and the Intervention Area
- Use solar power to pump water to the overhead tanks
- Repairs of broken-down standpipes and boreholes
- Provide boreholes for Old Kablensuazo and Kengen Kpokezo communities
- Provide overhead tanks for Kengen, Ellenda, Ahobre No. 1 and Ehoaka communities
- Rehabilitate overhead tanks for Twenen, Allegenzule and Nyamenle Kwame communities
- Provide skip bins for all communities
- Encourage the construction of individual household toilet facilities through a subsidy scheme
- The assembly can engage development partners to assist in the provision of household toilet facilities

ICT

- Encourage the telecommunication service providers to construct additional mast to improve on both voice and data communication

Sports and Recreation

- Provide community parks for some communities.
- Provide durbar grounds in all communities

Transport and Energy

- Upgrade existing Half Assini - Esiama road to a Trunk road status
- Upgrade 159km of internal roads to urban status (Ghana Infrastructure Plan)
- Improve water transport between Asempaye and Ellenda Wharf
- Extend electricity to Asempaye, Onyamiyan, and Kengen Kpokedzo

Safety and Security

- Provide adequate offices and accommodation for security personnel
- Increase security personnel within the SPA
- Provide adequate logistics

- Provision of streetlights in the communities
- Strengthen inter border checks

3.3.5 Strengths of Scenario Two (2)

- The scenario upholds the principles of environmental sustainability by maintaining the ecological sensitivity of the area amidst heavy industrial development
- The scenario promotes social integration and sustainable management of established settlements along with the Petroleum Hub
- The scenario promotes strong maximization of industrial facilities through the dispersal of similar land uses throughout the plan
- The scenario ensures the spatial linkage of the Intervention Area with the established settlements through the development of an integrated transport and infrastructure network
- The scenario ensures the spread of risks and externalities through the distribution of the land uses in the event of major industrial accidents

3.3.6 Weakness of Scenario Two (2)

- The dependence of the Phub on the Naval FOB poses a major risk on the success of the hub if the proposal for share facilities does not materialize.

3.3.7 Composite Scenario Two (2) Plan

The figure below presents the composite Structure Plan of Scenario Two having overlaid all the recommendations and proposed activities.

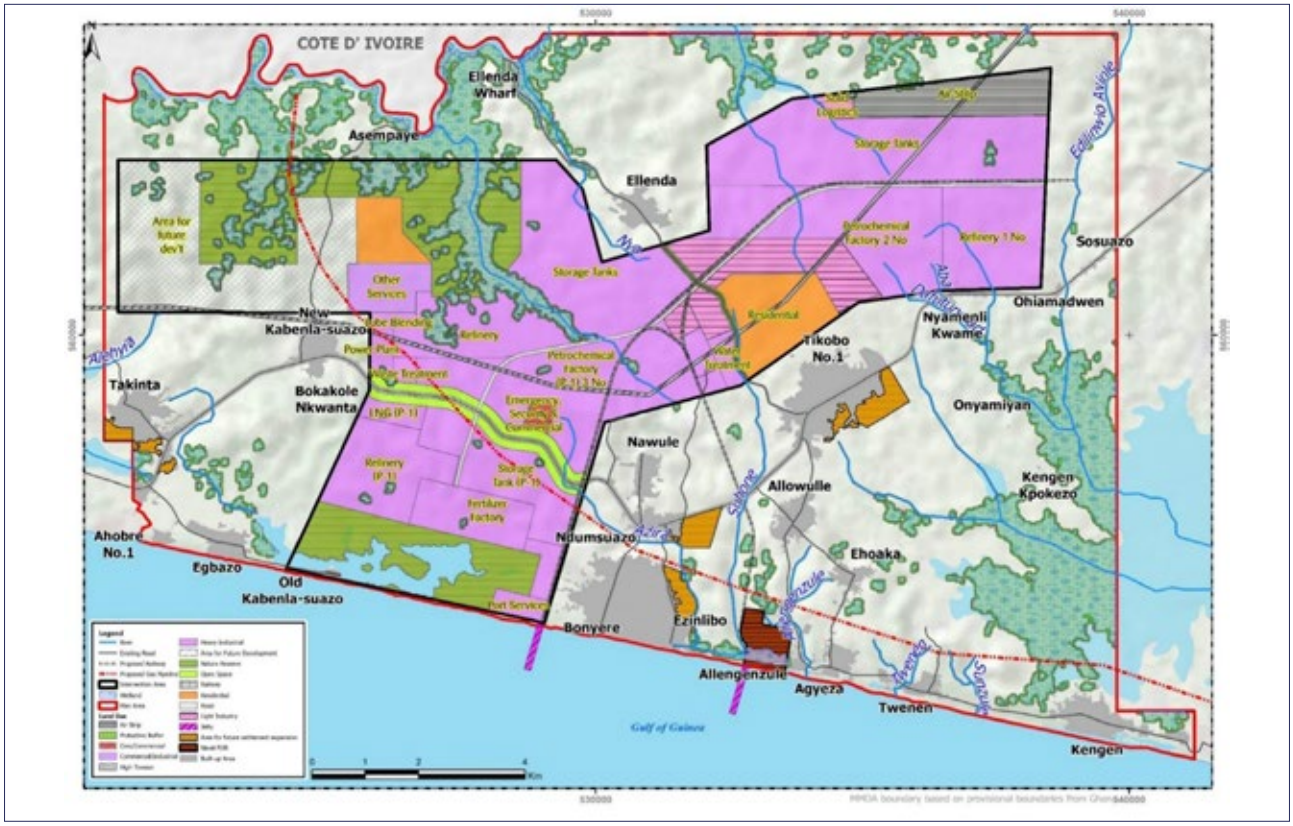


Figure 3.1: Structure Plan for the Petroleum Hub Scenario Two

Source: LUSPA, 2020

CHAPTER FOUR

ADOPTED STRUCTURE PLAN

4.1 INTRODUCTION

Following extensive deliberations with stakeholders at the National, Regional and District Levels on the two (2) development scenarios, a preferred option for the development of the Petroleum Hub was agreed upon. The adopted Draft Structure Plan incorporated all stakeholder inputs and recommendations taking into considerations the strengths of the two development options. The details of the preferred scenario are presented in this chapter.

4.2 INTERVENTION AREA

The detailed proposals for the Intervention Area (Petroleum Hub Enclave) are highlighted in the proceeding sections as per the requirements in the Petroleum Infrastructure Master Plan.

4.2.1 Industrial Uses (Heavy and Light)

The dominant land uses for the Petroleum Hub is Heavy and Light Industrial uses. These have been designated for activities related to petroleum and petrochemical products and services. The activities have been phased into three, with majority of phase one (1) activities located relatively close to the shoreline. The proposed activities and functions were distributed taking into consideration the topography of the area and proximity to complementary facilities.

Proposed ancillary services are expected to facilitate the smooth operations of the Hub. They include; Solid Logistics Hub, Water Treatment Facilities, Waste Management Centre and other support services.

Proposed key industrial uses as well as complementary infrastructure include;

A. Phase 1

Key Infrastructure

1. Oil Refinery - 300,000bpsd capacity
2. Storage Tanks - 1,000,000m3 capacity
3. Petrochemical Plants (3: DAP, Urea, Ammonia) – 1 MTPY capacity each
4. Jetty and Port Infrastructure

Ancillary Infrastructure

1. Utility Facilities (Heat, Water, Desalination, Waste, Power, etc)
2. Solid Logistics Area
3. Access roads and basic transportation infrastructure
4. Residential, Commercial, and other facilities

Social Amenities

1. Educational Facilities
2. Health Facilities
3. Security and Emergency Installations

B. Phase II

Key Infrastructure

1. Oil Refinery - 300,000bpsd capacity
2. Storage Tanks - 4,000,000m3 capacity
3. Petrochemical Plants (1) - 1 million Tons Per Year (MTPY) capacity
4. Jetty and Port Infrastructure
5. LNG (Onshore) Infrastructure
6. Lube Blending Plant

Ancillary Infrastructure

1. Access roads and basic transportation infrastructure
2. Residential, Commercial and other facilities

C. Phase III

Key Infrastructure

1. Oil Refinery - 300,000bpsd capacity
2. Storage Tanks - 5,000,000m3 capacity

Ancillary Infrastructure

1. Access roads and basic transportation infrastructure
2. Residential, Commercial, and other

4.2.2 Residential Uses

The Petroleum Hub and its associated activities are anticipated to bring in a relatively large workforce. To meet the housing needs of the hub, a 635.78-acre land has been proposed for residential development taking into consideration the expected population of about 8,233 people for the hub. In siting the residential use, the following factors were considered:

a. Topography
b. Proximity to existing settlements (promote integration)
c. Compatibility with adjoining land uses
d. Economic viability

4.2.3 Mixed-Uses

The mixed-use proposal includes commercial and civic and culture (emergency centre, health facility, administrative, security services, training and development centre and other service zones). Contemporary planning concepts seek to promote mixed use zones to increase proximity to various services and reduce travel time. This encourages walkability and environmentally friendly transport systems. These mixed-use zones have been distributed evenly across the Intervention Area to ensure that industrial activities are satisfactorily supported with these services.

4.2.4 Nature Reserve, Open Space, and Water Bodies

To protect the environment and ensure its sustainability, adequate protective buffers and green spaces have been proposed based on the Riparian Buffer Zone Policy. The entire project area, wetlands, rivers, the lagoon and main access roads that traverse the Intervention Area have been buffered. Moreover, all ecologically sensitive areas (wetlands and lagoon) have been

designated as nature reserve. A buffer of 100 metres has been delineated around the boundary of the Residential Area to separate the surrounding communities from the activities of the Hub. Where an ecologically sensitive area falls within other zoned land uses, it is recommended the following protective buffer is maintained;

- 15 metres buffer for rivers within the SPA
- 70 metres buffer for lagoon within the SPA
- 30 metres for wetlands within the SPA

4.2.5 Transportation and Communication

The role of transportation is indispensable in any economic development. An effective transportation system in the hub will facilitate the movement of people, goods, and services and improve access to local and international markets. The modes of transportation for the Petroleum Hub are via air, sea, road, and rail. Recommendations have been made for the installation of fibre optic cables to enhance internet connectivity and access within the road corridor.

4.2.6 Road Infrastructure

Major arterial roads have been proposed to facilitate movement of goods and services to and fro in the hub. The existing highway from Nawule to New Kabenlasuazo is proposed to be upgraded to a 90 metre right of way. .The road hierarchy and right of ways within the hub are as follows;

- Major arterial 65 meters
- Distributors 50 meters
- Access roads 18.3 meters (Residential area)

In ensuring safety, it has been proposed that, the high tension traversing the Petroleum Hub Area be realigned along the Half Assini – Accra Road. The high-tension line was originally intended to provide power to the Volkagen factory. It is recommended that further discussions should be held with GRIDCO to advice on the realignment of the high tension.

4.2.7 Rail Infrastructure

The road network within the Intervention Area is complemented by a rail network which connects key activity zones to the Takoradi railway line. Additional rail network has been proposed from the Intervention Area to the proposed FOB within the Structure Plan Area.

4.2.8 Port Facilities

Consultations with the Ghana Ports and Harbour Authority revealed that government has designated the Takoradi Port as an Oil and Gas Hub. It is recommended that dry dock services proposed for the Phub should be carried out at the Takoradi Port whilst the remaining services (jetties, navigation maritime services, etc) should be provided for at the hub. It is recommended that further engagements are made at higher levels to streamline all the anticipated oil and gas port activities and infrastructure both at the Takoradi Port and the Petroleum Hub to promote complementarity of functions and avoid duplication.

4.2.9 Airport

The initial recommendation for an airport within the Phub as per the PIMP could not materialise. Following consultations with the Ghana Civil Aviation and the Ghana Airports Company it was stressed that an airport could not be sited within the SPA. This was due to the fact that, the historical orientation of the country's run ways have been dependent on the North-East, South-West wind direction. Again, the proximity of the Petroleum Hub to the borders of Cote D'Ivoire poses a challenge as this might result in aircrafts invading international airspace.

It was also indicated that the Ministry of Transport and the Ghana Civil Aviation Authority as part of government's policy to establish regional airports have undertaken several feasibility studies in the Western Region. The areas studied include Shama Komenda West Central, Ampowa Mpoho, Princess Town, Dixcove, Kejebir, Sekondi Takoradi (Polytechnic) and Axim. These studies could inform the selection of an appropriate site close to the SPA for an airport to serve the Petroleum Hub and the Region as a whole.

That notwithstanding, it was recommended that provision could be made for an airstrip within the hub subject to further assessment by the Ghana Civil Aviation Authority in collaboration with the Ministry of Transport and Ghana Airport Company Limited. After the completion of the assessment, the Structure Plan would be revised or rezoned to accommodate the airstrip.

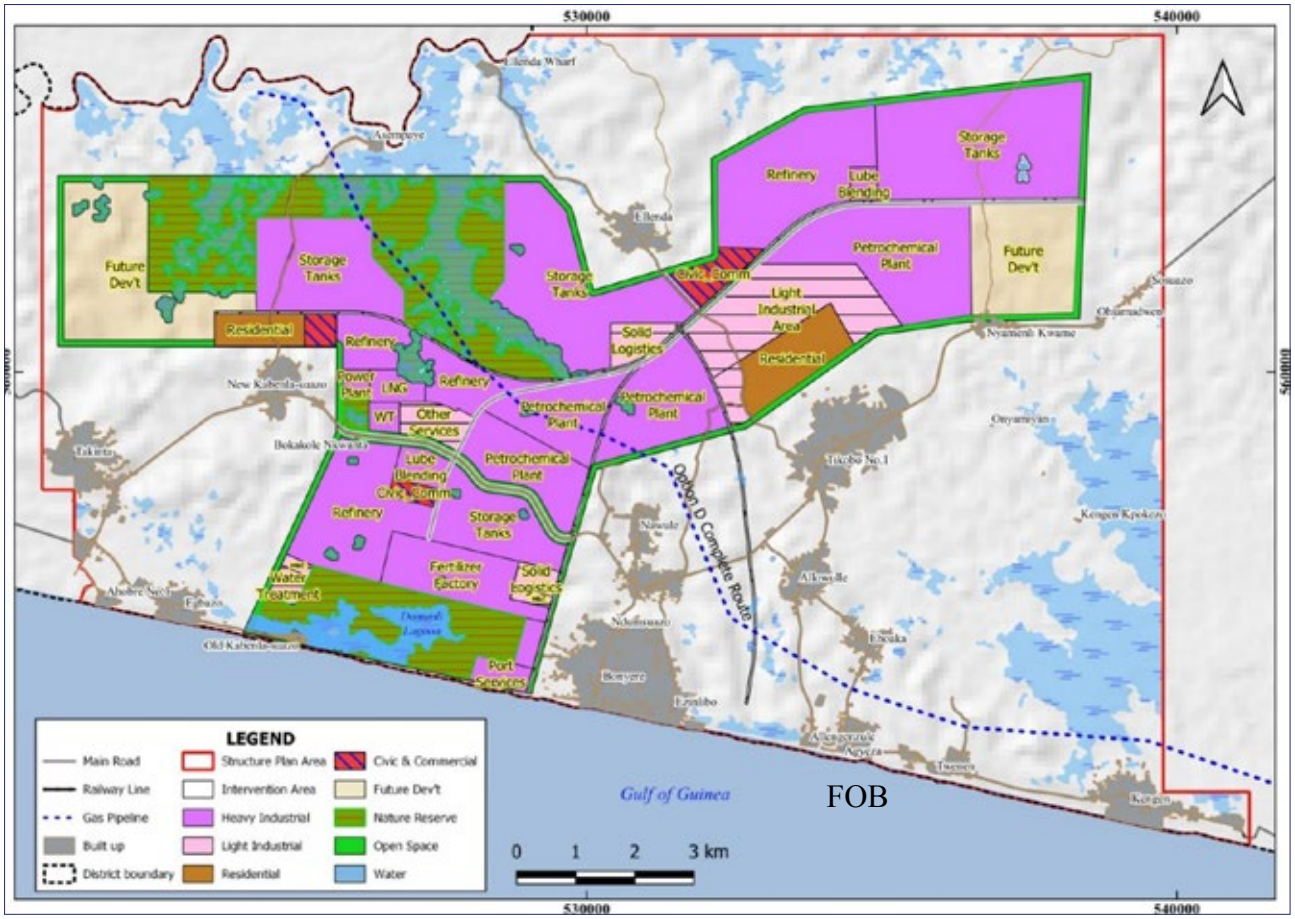
4.2.10 Distribution of Proposed Land Uses

The distribution of proposed land uses is depicted in Table 4.1 and Figure 4.1

Table 4.1: Distribution of Land Uses in the Intervention Area

NO.	LAND USE	ACREAGE	PERCENT (%)
1.	Industrial	11,754.39	56.47
2.	Nature Reserve	3,817.63	18.34
3.	Open Space	1,761.98	8.46
4.	Future Development	1,969.47	9.46
5.	Residential	635.78	3.05
6.	Mixed Use (Commercial Civic and Culture	311.42	1.50
7.	Transportation	565.43	2.70
	Total	20,861.96	100.00

Figure 4.1: Adopted Structure Plan for the Petroleum Hub



Source: LUSPA, 2021

4.3 SETTLEMENTS AREA

The following discusses the proposals for the established settlements. These were based on the existing situation and needs assessment.

4.3.1 Settlements

With the implementation of the Petroleum Hub, it is anticipated that adjoining communities will assume certain roles to compliment the activities within the hub. By the end of the plan period, four (4) settlements namely; Tikobo No. 1, Bonyere, Takinta and Ezinlibo are envisaged to be growth centres to drive growth and development within the SPA. These projected growth areas are characterized by a natural increase in population. It is also anticipated that because of their proximity to the Intervention Area, three of these communities would experience general increase in population due to in-migration.

Table 4.2: Proposals for the Top 4 Settlements in the SPA

Community	Population		Roles	Key Proposals	Additional Land Required by 2035 (Acres)
	2020	2035			
Tikobo No. 1	9,824	15,146	Commercial and administrative centre	1. Upgrading Health Centre to Polyclinic 2. Refurbish and operationalise Post Office 3. Provide Fire Service Station 4. Provide standard sanitation facilities	187.87
Bonyere	8,362	12,892	Dormitory town	1. Upgrade Clinic to Health Centre 2. Construct 2 No. Public toilets 3. Upgrade Police Post to Police Station to serve both Bonyere and Ezinlibo. 4. Provide Fire Service Station	163.77
Ezinlibo	5,376	8,289	Dormitory town	1. Provision of a Health post 2. Construct 1 No. Public toilet. 3. Provide Fire Service Station	83.95
Takinta	5,050	7,786	Dormitory town	1. Upgrade CHPS to a Health Centre 2. Construct 1 No. Public toilet 3. Provide a Police Post 4. Provide Fire Service Station	89.39

Other general proposals for the SPA include;

- Invest in infrastructure, services, and economic activities in identified growth centers.
- Prepare spatial plans to guide development of new centers of growth.
- Restrict the spatial expansion of settlements towards the Intervention Area by providing protective buffers or green belts.
- Establish proper waste management systems.
- Construct roads and improve existing transport networks
- Promote agriculture in the SPA
- Adopt and apply the emerging planning and development instruments.

4.3.2 Resettlement

With the implementation of the Petroleum Hub Project, communities such as Old Kabenlensuazo, Bakakole Nkwanta, Asempaye and the northern portion of Nyamele Kwame will be affected due to their location. These communities fall directly within the area demarcated for the Petroleum Hub. In effect, these communities will have to be moved to another location. The team working on the acquisition of the land will interact with the communities and determine the appropriate area for the communities to be relocated. There is the need to undertake socio-economic assessment of affected communities and prepare resettlement local plan.

4.3.3 Sanitation

Given the expected development and the fast-growing population in the settlements within the SPA, the following are proposed;

- Construct a well-engineered dumpsite.
- Rehabilitate 3 No. public toilets in Allowule, Ezinlibo and Bonyere.

- Construct 7 No. public toilets in Kengen, Ellenda, New Kabenla-suazo, Ezinlibo, Takinta, Bonyere and Tikobo No.1
- Provide skip bins for all communities within the SPA.
- Establish a Municipal waste treatment plant.

4.3.4 Safety and Security

To beef up safety and security within the SPA, the following proposals are recommended;

- Existing Police Station in Tikobo No.1 be adequately resourced with logistics and personnel.
- Existing Police Post in Bonyere be upgraded into a Police Station to serve both Bonyere and Ezinlibo.
- Establish a Police Post at Takinta
- Other settlements within the SPA should be provided with mobile police services.
- Encourage community police service
- Provision of street lights

CHAPTER FIVE

IMPLEMENTATION AND MANAGEMENT PLAN

5.1 INTRODUCTION

This section sets out the framework required to guide the implementation of the proposals in the Structure Plan Area. The recommended activities shall be implemented in three (3) phases over a fifteen (15)-year period. The Management Plan, Funding Sources, as well as plans for Monitoring and Evaluation of activities have been outlined in this section.

5.2 INSTITUTIONAL ARRANGEMENT FOR IMPLEMENTATION

The Petroleum Hub Development Corporation shall be responsible for the implementation of the proposal made in the Structure Plan. It shall also be responsible for monitoring and evaluating the implementation of activities. The Corporation shall undertake this function in collaboration with the MoEn, LUSPA, the Jomoro Municipal Assembly and other relevant government Agencies and Investors.

5.2.1 Petroleum Hub Development Corporation

The Petroleum Hub Development Corporation Act, 2020 (Act 1053) establishes the Petroleum Hub Development Corporation. The Act mandates the Corporation to promote and develop the Petroleum Hub. The Corporation shall among other things perform the following to ensure the implementation of the Structure Plan;

- Spearhead the development of the Petroleum Hub.
- In collaboration with LUSPA, Jomoro Municipal Assembly and other relevant agencies, implement the Structure Plan.
- In collaboration with the Lands Commission, facilitate the acquisition and allocation of land for the development of the Petroleum Hub. The corporation shall ensure that adequate compensations are paid to land owners and affected person.
- Manage, monitor, and evaluate the development of the Petroleum Hub and ensure compliance to the Structure Plan provision.

5.2.2 Ministry of Energy

- Formulation of policies on energy
- Facilitate the mobilization of resources for the acquisition of land and the provision of basic infrastructure
- Monitor policy implementation

5.2.3 Land Use and Spatial Planning Authority

- Advice the Corporation on the implementation of the land use proposals
- Prepare local plans for phases two and three activities
- Provide technical advice, issue spatial planning guidance and monitor development within the Hub

- Issue Land Use Certificate for the various land uses in accordance with the Land Use and Spatial Planning Act, 2016 (Act 925)
- Provide technical support to Jomoro Municipal Assembly to implement proposals within the SPA

5.2.4 Jomoro Municipal Assembly

The Jomoro Municipal Assembly will undertake the following roles in the implementation of the Structure Plan**:**

- Through its Spatial Planning Committee, spearhead the preparation of local plans for the surrounding settlements as designated in the Structure Plan.
- Through the Spatial Planning Committee approve the Petroleum Hub Structure Plan and its derivative local plans for implementation.
- In collaboration with utility service providers both public and private, provide the requisite facilities and services in all the surrounding settlements.
- Upon the adoption and approval of the Structure Plan by the Spatial Planning Committee, liaise with the Petroleum Hub Development Corporation and the Traditional Authority to ensure that all public used spaces including the proposed market, transport terminal, education and health sites are identified, secured and used for the purpose for which they were allocated.
- Collaborate with the Petroleum Hub Development Corporation to ensure orderly and coordinated physical development within the Structure Plan Area.

5.2.5 Traditional Authorities

The effective implementation of the Structure Plan depends to a large extent on the absence of land litigation in the SPA. Customarily, the traditional authorities are the custodians of the land. To ensure smooth implementation of the Structure Plan, the Petroleum Hub Development Corporation together with the Jomoro Municipal Assembly, shall collaborate with the traditional authorities. The Corporation should be in constant dialogue with the traditional authorities, to ensure compliance to the vision, objectives and planned interventions as stipulated in the approved Structure Plan.

5.2.6 Other Relevant Institutions

i. It is recommended that the Corporation collaborate with the underlisted institutions in the implementation of the recommendations of the Structure Plan; Western Regional Coordinating Council
ii. Environmental Protection Agency
iii. Lands Commission
iv. National Development Planning Commission
v. Ministry of Environment Science Technology and Innovation
vi. Ministry of Trade and Industry
vii. Ministry of Local Government and Rural Development
viii. Ministry of Lands and Natural Resources
ix. Ghana Civil Aviation Authority
x. Ghana Airports Company
xi. Ghana Ports and Habour Authority
xii. Ministry of Railway Development
xiii. Ministry of Roads and Highway

xiv. Ghana Navy
xv. Immigration Service
xvi. Ghana National Fire Service
xvii. Ghana Police Service
xviii. Ghana Maritime Authority

5.3 LEGAL FRAMEWORK

The mandate for the preparation and implementation of the Structure Plan is derived from a number of legal sources, as shown in Table 5.1.

Table 5.1: Legal Framework Guiding the Structure Plan

POLICIES	ACTS/ REGULATIONS	STANDARDS, GUIDELINES AND MANUALS
• National Urban Policy (2012) • Riparian Buffer Zone Policy (2011) • Energy Policy (2010) • Rural Policy (2019) • National Spatial Development Framework (2015) • Western Regional Spatial Development Framework (2012) • Spatial Development Framework for Jomoro (2012) • Coordinated Programme of Economic and Social Development Policies (2017)	• Land Use and Spatial Planning Act, 2016 (Act 925) • Local Governance Act, 2016 (Act 936) • Land Act, 2020 (Act 1036).Environmental Protection Agency Act 1994, (Act 490) • Ghana National Petroleum Corporation Law 1983 • Free Zones Act 1995, (Act 504) • Ghana Maritime Authority Act 2002, (Act 630) • Ghana Ports and Harbours Authority Act, 1986 (P. N. D. C. L. 160) • Land Use and Spatial Planning Regulation LI (2384) • Environmental Assessment Regulations, 1999, L. I. 1652 • Petroleum Downstream (Local Content and Local Participation) Draft Regulations • Petroleum Exploration and Production – HSE Regulations 2017 (L.I 2258) • Petroleum Exploration and Production- Data Management Regulation, 2017 (L.I 2257). • Ghana National Fire Service Act, 1997 (Act 537) • Petroleum Hub Development Corporation Act, 2020 (Act 1053)	• Health, Safety, Security and Environment (HSSE) – Manual for Energy Sector Organizations (2019). • Zoning Guidelines and Planning Standards (2011) • Manual for the preparation of Spatial Plans (2011) • Petroleum Measurement Regulations Guidelines, (2016)

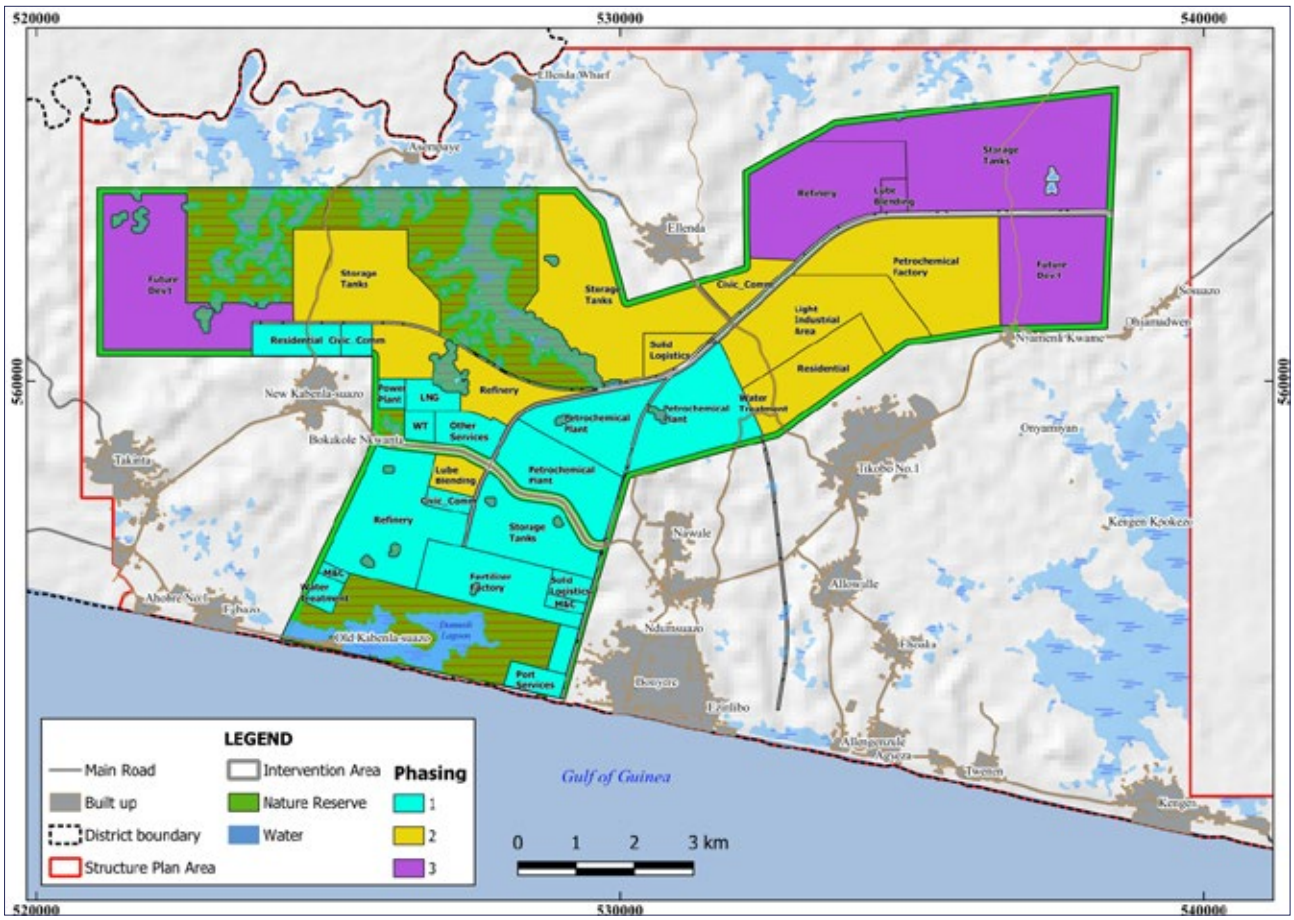
5.4 IMPLEMENTATION SCHEDULE

The implementation schedule outlines the start time and end time of the various developmental activities or proposals as outlined in the Structure Plan. It provides the framework for tracking and monitoring of the sequence and tenure of activities. The summary of activities for various phases of the Petroleum Hub that will be implemented by the end of 2030 are depicted in table 5.2.

Table 5.2: Summary of Proposals for the Petroleum Hub

Development in Phase One	**Development in Phase Two**	**Development Phase Three**
Key Infrastructure	**Key Infrastructure**	**Key Infrastructure**
1. Conduct a series of survey analysis(SEA and other feasibility studies) 2. Oil Refinery - 300,000bpsd capacity 3. Storage Tanks - 1,000,000m3 capacity 4. Petrochemical Plants (3: DAP, Urea, Ammonia) – 1 MTPY capacity each 5. Jetty and Port Infrastructure 6. Construction of fertilizer factory 7. Development of 500km transmission infrastructure 8. Development of transmission and storage infrastructure for sub region 9. 8. Realignment of high-tension lines 10. Creation of buffers Ancillary Infrastructure 1. Utility Facilities (Heat, Water, Desalination, Waste, Power, etc) 2. Solid Logistics Area 3. Access roads and basic transportation infrastructure 4. Residential, Commercial and other facilities Social amenities 1. Educational Facilities 2. Health Facilities 3. Security and Emergency Installations	1. Oil Refinery - 300,000bpsd capacity 2. Storage Tanks - 4,000,000m3 capacity 3. Petrochemical Plants (1) - 1 Million Tons Per Year (MTPY) capacity 4. Jetty and Port Infrastructure 5. LNG (Onshore) Infrastructure 6. Lube Blending Plant Ancillary Infrastructure 1. Access roads and basic transportation infrastructure 2. Residential, Commercial and other facilities	1. Oil Refinery - 300,000bpsd capacity 2. Storage Tanks - 5,000,000m3 capacity Ancillary Infrastructure 1. Access roads and basic transportation infrastructure 2. Residential, Commercial and other

Figure 5.1: Phasing of Proposed Activities



Source: LUSPA, 2021

Figure 5.1 depicts phasing of activities and the proposed facilities. Phase one activities are depicted in green, phase two activities are in yellow and phase three activities are depicted in purple. Phase one activities will cover a total land area of 6,590.8 acres, with phase two activities covering 5,361.36 acres and phase three which is the final phase covering a total land area of 4,615.92 acres.

The table below sets out detailed phasing for implementing the proposals in the Structure Plan. It will be used to establish indicators in the monitoring and evaluation process, which will be periodically reviewed.

Table 5.3: Phasing of Proposals for the Intervention Area

S/N	PROPOSED ACTIVITIES	TIME FRAME														
		PHASE ONE					PHASE TWO					PHASE THREE				
INTERVENTION AREA																
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1	Conduct a series of survey analysis (SEA, and other feasibility studies)	■	■													
2	Construction of Jetties and port infrastructure	■	■	■	■	■	■	■	■							
3	Construction of 10,000000m3 storage infrastructure	■	■	■	■	■	■	■	■	■	■					
4	Construction of five petrochemical plants	■	■	■	■	■	■	■	■							
5	Development of three refineries	■	■	■	■	■	■	■	■	■	■					
6	Development of 500km hub transmission infrastructure	■	■	■	■	■										
7	Development of Transmission and storage infrastructure for sub region	■	■	■	■	■										
8	Construction of Lube Blending Plant				■	■	■	■	■							
9	Construction of 450,000m LNG storage tank and regasification infrastructure				■	■	■	■	■							
10	Development of transportation infrastructure	■	■	■	■	■	■	■	■	■	■					
11	Development of Residential area	■	■	■	■	■	■	■	■	■	■					
12	Provision of ancillary services	■	■	■	■	■	■	■	■	■	■					
13	Development of Light to medium industrial area						■	■	■	■	■					
14	Construction of fertilizer factory	■	■	■	■	■										
15	Realignment of high tension lines	■	■	■	■	■										
16	Creation of buffers around lagoon, rivers, wetlands, roads and the border of the Intervention Area	■	■	■	■	■										
17	Establishment of mixed uses						■	■	■	■	■					

Table 5.4: Phasing of proposals for the established settlements

NO.	PROPOSED ACTIVITIES	TIME FRAME														
		PHASE ONE					PHASE TWO					PHASE THREE				
ESTABLISHED SETTLEMENTS																
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	20233	2034	2035
1	Prepare local plans for settlements															
2	Establish Tikobo No.1, Bonyere/Ezinlibo and Takinta as service centers															
	ECONOMY															
3	Upgrading of existing markets															
4	Upgrading and renovation of roads															
5	Upgrading of health facilities															
6	Skills development															
7	Create agricultural zones															
8	Establishment of coconut and cassava processing centres															
	SOCIAL SERVICES															
9	Upgrade health facilities in Tikobo No.1, Bonyere and Takinta to Polyclinic															
10	Construct clinics at New Kabenlensuazo, Ellenda and Ezinlibo															
11	Construct CHPS facility at Ohiamadwen															
12	Liaise with the health services to post health personnel to the SPA															
13	Provide scholarship opportunities to the youth to attend health training institutions (corporate entities)															
14	Liaise with Ghana Health Service to supply health facilities with consumables and logistics for the SPA															
15	Construct toilet facilities in 18 schools without such facilities.															

NO.	PROPOSED ACTIVITIES	TIME FRAME														
		PHASE ONE					PHASE TWO					PHASE THREE				
ESTABLISHED SETTLEMENTS																
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	20233	2034	2035
16	Construct boreholes in 24 schools without water facilities															
17	Renovate classroom units at Tikobo 1, Egbazo, Takinta, Ehoaka, Ellenda and Allowule D/A schools															
18	Construct basic school (Nursery to JHS 3) at Ohiamadwen															
19	Construct kindergarten at Onyamiyan and Twenen															
20	Construct a primary school at Ellenda Wharf															
21	Provide ICT facilities for all schools															
22	Adopt solar as alternative source of energy for provision of water at Twenen and Allengenzule															
23	Construct boreholes at Old Kabenlensuazo and Kengen Kpokezo															
24	Provide overhead tanks at Kengen, Ellenda, Ahobre No.1, and Ehoaka															
25	Repair overhead tanks at Twenen, Allengenzule and Nyamele Kwame															
26	Provide skip bins for all settlements															
27	Construct an engineered landfill site at Tikobo No. 1															
28	Allocate sites for recycling of waste.															
29	Encourage community to construct household toilets															
30	Create space for community parks and durbar grounds															

NO.	PROPOSED ACTIVITIES	TIME FRAME														
		PHASE ONE					PHASE TWO					PHASE THREE				
ESTABLISHED SETTLEMENTS																
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	20233	2034	2035
31	Construction of fire service centers at Tikobo No.1, Bonyere/ Ezinlibo and Takinta															
32	Construct a police station at Takinta															
33	Upgrading of police post at Bonyere to a police station															
34	Construct a police post at Twenen															
	Provision of street lights															
35	Increasing of security at border (Immigration, military, police, and Customs)															
36	Provide logistics, offices and accommodation for security personnel.															
	TRANSPORT															
37	Upgrading of the Half Assini-Esiama road to a trunk road															
38	Upgrading of 159km of internal roads to an urban status															
	ENERGY															
39	Extension of electricity to Asempaye, Onyanmiyan, Kengen Kpokezo and newly developing sites															
	HOUSING															
40	Zoning of areas for residential use															
41	Embark on public education to encourage good sanitary practices and improve housing quality															

5.5 FINANCING THE PETROLEUM HUB

The main source of funding for the Petroleum Hub is expected to be derived from the private sector supported by the Government of Ghana. It is estimated that the total cost of developing the requisite infrastructure in the hub will be US$60 billion. The development of the Petroleum Hub will be private sector led. The government will facilitate the implementation of the project by acquiring the land for development and also facilitate the provision of basic infrastructure.

According to the PIMP the anticipated US$60 billion investment in the Petroleum Hub is expected to yield US$1.56 billion in export tax and a 130% increase in Gross Domestic Product (GDP) by the year 2030. The table below explicitly indicates the financing schedule for both the Intervention Area and surrounding settlements.

Table 5.5: Financing Schedule for the Intervention Area

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
INTERVENTION AREA									
1	Conduct a series of survey analysis (SEA and feasibility studies)	IA	SEA	TBD			TBD	EPA	LUSPA Water Resource Commission MOEn
2	Construction of Jetties	IA	Jetties for transporting petroleum products	TBD	TBD		TBD	PHDC	GPHA Investors
3	Construction of 10,000,000m storage infrastructure	IA	Storage tanks	TBD	TBD	10,000,000m	TBD	PHDC	Investors
4	Construction of 450,000m LNG storage tank and regasification infrastructure	IA	LNG tanks	TBD	TBD	450,000m	TBD	PHDC	Ghana Gas Company Limited Investors
5	Development of three refineries	IA	Refineries for refining crude oil	TBD	TBD	3	TBD	PHDC	Investors
7	Transmission and storage in-frastructure for sub region	IA	Transmission lines from the hub to storage facilities I the regions	TBD	TBD		TBD	PHDC	
8	Lube blending plant	IA	Lube blending infrastructure	TBD	TBD		TBD	PHDC	Investors

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
9	Five petrochemical plants	IA	5 petrochemical factories	TBD	TBD	5	TBD	PHDC	Investors
10	Transportation infrastructure	IA	Roads, railways and airport	TBD	TBD		TBD	PHDC	Ghana Highway Authority Ghana Railway Authority Urban roads Investors
11	Residential area	IA	Housing units for staff	TBD	TBD		TBD	PHDC	Investors
12	Ancillary Services	IA	Security and Emergency Services, Support Services, Logistic hub, Power plant, Water treatment plant and Waste treatment plant	TBD	TBD		TBD		
13	Light to medium industrial area	IA	Supporting services	TBD	TBD		TBD	PHDC	Investors
14	Construction of fertilizer factor	IA	Fertilizer factory	TBD	TBD	1	TBD	PDHC	Ghana Gas Company Limited MOFA

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
15	Realignment of high tension	IA	High tension line relocated	TBD	TBD		TBD	PHDC	GRIDCO
16	Creation of buffers around lagoon, rivers, wetlands, roads and the border of the intervention area	IA	Protective buffer	TBD	TBD		TBD	PHDC	Community JMA EPA NGO Ghana Wildlife
17	Construction of Airport	IA	Airport Facility	TBD	TBD	1	TBD	PDHC	Ghana Civil Aviation
18	Establishment of mixed uses	IA	Mixed uses facility	TBD	TBD		TBD	PDHC	Investors
19	Preparation of Phase 2 and 3 Local Plans	IA	2 Local Plans	TBD	TBD	9000 acres	TBD	LUSPA	PHDC, JMA, MoEn

Table 5.6: Financing Schedule for the established settlements

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
ESTABLISHED SETTLEMENTS									
1	Prepare local plans for settlements	SPA	Local plans to guide development	TBD	TBD		TBD	JMA	PPD
2	Establishment of Tikobo No.1, Bonyere/ Ezinlibo and Takinta as service centres	Tikobo No.1, Bonyere/Ezilinbo and Takinta	Service centres	TBD	TBD		TBD	JMA	Investors
	ECONOMY								
3	Upgrading of existing markets	Tikobo No.1, Bonyere/Ezilinbo and Takinta	Improved market centres	TBD	TBD		TBD	JMA	Investors Community
4	Upgrading and renovation of roads	SPA	Improvement in accessibility	TBD	TBD		TBD	GHA	Investors
5	Upgrading of health facilities	SPA	Improved health services	TBD	TBD		TBD	MOH	GHS
6	Skills development	SPA	Improvement in livelihood	TBD	TBD		TBD	JMA	NBSSI NGO
7	Create agricultural zones	SPA	Improvement in agriculture produce	TBD	TBD		TBD	JMA	PPD MAD
8	Establishment of coconut and cassava processing centres	SPA	Agrobased industries	TBD	TBD		TBD	JMA	MAD Investors
	SOCIAL SERVICES								
9	Upgrade health facilities in Tikobo no.1, Bonyere and Takinta to Polyclinic	Tikobo No.1, Bonyere/Ezilinbo and Takinta	Improvement in health Service	TBD	TBD			GHS	Community

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
10	Construct clinics at New Kabenlensuazo, Ellenda and Ezinlibo	New Kabenlensuazo, Ellenda and Ezinlibo	Improvement in health service	TBD	TBD			GHS	Community
11	Construct CHPS facility at Ohiamadwen	Ohiamadwen	Improvement in health Service	TBD	TBD			GHS	Community
12	Liaise with the health services to post health personnel to the plan area	SPA		TBD	TBD				
13	Corporate entities should provide scholarship opportunities to the youth to attend health training institutions	SPA	Improvement in health services	TBD	TBD			JMA	NGO Cooperate organizations
14	Liaise with health service to supply health facilities with drugs and logistics	SPA	Improvement in health services	TBD	TBD		TBD	GHS	NGO Cooperate organizations
15	Construct toilet facilities in 18 schools without such facilities.	SPA	Improvement in sanitation in schools	TBD	TBD		TBD	GES	NGO Cooperate organizations
16	Construct boreholes in 24 schools without water facilities	SPA	Improvement in water supply in schools	TBD	TBD		TBD	GES	NGO Cooperate organizations
17	Renovate classroom units at Tikobo 1, Egbazo, Takinta, Ehoaka, Ellenda and Allowule D/A schools	Tikobo 1, Egbazo, Takinta, Ehoaka, Ellenda and Allowule	Improvement in classroom conditions	TBD	TBD		TBD	GES	NGO Cooperate organizations
18	Construct basic school (Nursery to JHS 3) at Ohiamadwen	Ohiamadwen	Improvement in education	TBD	TBD		TBD	GES	NGO Cooperate organizations

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
19	Construct kindergarten at Onyamiyan and Twenen	Onyamiyan and Twenen	Improvement in education	TBD	TBD		TBD	GES	NGO Cooperate organizations
20	Construct a primary school at Ellenda Wharf	Ellenda Wharf	Improvement in education	TBD	TBD		TBD	GES	NGO Cooperate organizations
21	Provide ICT facilities for all schools	SPA	Improvement in education	TBD	TBD		TBD	GES	NGO Cooperate organizations
22	Adopt solar energy as alternative source of energy for pumping water	SPA	Improved water supply	TBD	TBD		TBD	CWS	NGO Cooperate organizations
23	Construct boreholes at Old Kabenlensuazo and Kengen Kpokezo	Kabenlensuazo and Kengen Kpokezo	Improved water supply	TBD	TBD		TBD	CWS	NGO Cooperate organizations
24	Provide overhead tanks at Kengen, Ellenda,Ahobre No.1, and Ehoaka	Kengen, Ellenda,Ahobre No.1, and Ehoaka	Improved water supply	TBD	TBD		TBD	CWS	NGO Cooperate organizations
25	Repair overhead tanks at Twenen, Allengenzule and Nyamele Kwame	Twenen, Allengenzule and Nyamele Kwame	Improved water supply	TBD	TBD		TBD	CWS	NGO Cooperate organizations
26	Provide skip bins to all the settlements	SPA	Improved sanitary conditions	TBD	TBD		TBD	Environmental Health Department	NGO Cooperate organizations
27	Construct an engineered landfill site	SPA	Improved sanitary conditions	TBD	TBD		TBD	Environmental Health Department	NGO Cooperate organizations
28	Allocate sites for recycling of waste.	SPA	Improved sanitary practices	TBD	TBD		TBD	JMA	investors

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
29	Encourage community to construct household toilets	SPA	Improved sanitary conditions	TBD	TBD		TBD	Environmental Health Department	NGO Cooperate organizations
28	Create space for community parks and durbar grounds	SPA	Improvement in recreational facilities	TBD	TBD		TBD	JMA	Community
29	Construction of fire service centres at Tikobo No.1, Bonyere/ Ezinlibo and Takinta	Tikobo No.1, Bonyere/Ezinlibo and Takinta	Improvement in safety and security	TBD	TBD		TBD	JMA	GFS Community
30	Construct a police station at Takinta	Takinta	Improvement in safety and security	TBD	TBD		TBD	JMA	GPS Community
31	Upgrading of police post at Bonyere to a police station	Bonyere	Improvement in safety and security	TBD	TBD		TBD	JMA	GPS Community
32	Construct a police post at Twenen	Twenen	Improvement in safety and security	TBD	TBD		TBD	JMA	GPS Community
33	Provision of street lights	SPA	Improvement in safety and security	TBD	TBD		TBD	JMA	ECG
34	Increasing of security at border (Immigration, military, police and Customs)	SPA	Improvement is safety and security	TBD	TBD		TBD	JMA	Security services
35	Provide logistics to security personnel	SPA	Improvement in safety and security	TBD	TBD		TBD	JMA	Security services
36	Provision of offices and accommodation for security personnel.	SPA	Improvement in safety and security	TBD	TBD		TBD	JMA	Security services
	TRANSPORTATION								

S/N	PROPOSED ACTIVITIES	LOCATION	OUTPUT INDICATORS	FINANCING OPTIONS				ORGANIZATIONS AND KEY ACTORS	
				LOCAL	EXTERNAL	NO. OF UNITS	ESTIMATED COST	LEAD	COLLABORATORS
37	Upgrading of the Half Assini-Esiama road to a trunk road	SPA	Improvement in accessibility	TBD	TBD		TBD	GHA	Cooperate organizations
38	Upgrading of 159km of internal roads to an urban status	SPA	Improvement in accessibility	TBD	TBD		TBD	GHA	Cooperate organizations
	ENERGY								
39	Extension of electricity to Asempaye, Onyanmiyan, Kengen Kpokezo and newly developing sites	Asempaye, Onyanmiyan, Kengen Kpokezo and newly developing sites	Improvement in electricity supply	TBD	TBD		TBD	ECG	GRIDCO
	HOUSING								
40	Zoning of areas for residential use	SPA	Improvement in housing infrastructure	TBD	TBD		TBD	JMA	
41	Embark on public education to encourage good sanitary practices and improve housing quality	SPA	Improvement in the environment	TBD	TBD		TBD	GOG	NGO

5.6 MONITORING AND EVALUATION

Monitoring and evaluation is critical for plan implementation to ensure effectiveness, efficiency, and adherence to time-lines. It will also ensure that the implementation of the plan is checked for consistency with set goals and objectives, and emerging issues identified and resolved appropriately. Monitoring shall be a continuous process and should form the basis for major decision making. Thus, findings from monitoring exercises should become the justification for making decisions.

In this regard, a Monitoring and Evaluation Team should be established by the PHDC to ensure constant and effective monitoring of activities.

The following among other appropriate factors shall be used for monitoring:

- Extent to which set objectives have been achieved
- Extent to which SP proposals and projects have been achieved
- Keeping with time schedules
- Quality of work
- Overhead cost against budgets
- Emerging issues/problems
- Extent of stakeholder participation

Evaluation involves measuring the achievement of objectives or the impacts and outcomes of the projects proposals. After the implementation of any major activity or project is completed, a review of all project documentation and reports should be done in support of evaluation activities. Suggested Monitoring and Evaluation Tools include:

- Physical survey
- Reports of implementing bodies
- Expert judgement
- Aerial photos

It will also be useful to monitor and evaluate the performance of all the institutions involved in the implementation of the Structure Plan. The effectiveness of the institutions is paramount to the success of the process. Therefore, an assessment of their performance can strengthen the benefits of their activities.

The monitoring and evaluation of institutions should focus on the following;

- Organizational capacity (how well are we doing, carrying out our tasks?)
- Partnerships (how well are we working with others?)
- Effectiveness (are our objectives being achieved?)
- Impact (what is our influence on people and our environment?)
- Other identified relevant factors.

4.7 CONCLUSION

The Structure Plan which covers a period of fifteen (15) years, is a legal binding document which will guide the development of the SPA. Ultimately, the SP is intended to help bring to reality government's agenda of becoming a Sub Regional giant in the oil and gas industry. The Structure Plan will serve as the basis for the preparation of the local plan and the provision of infrastructure to ensure an organized and coordinated development.

Key proposals aiming at achieving this vision includes key infrastructure (jetties, storage tanks, refineries, transmission infrastructure, power plants, LNG Facilities); Infrastructure for offshore

activities (nautical services, repair and maintenance); Ancillary Infrastructure (water treatment facilities, waste management centre, commercial services, residential areas, security and emergency response centre, solid logistics, transportation networks, light-medium industrial zones); and Social Amenities (education and training facilities, etc)

The vision of the Structure Plan can only be achieved by adhering to the set out proposals. This can be done through the cooperation of all stakeholders involved in the implementation of the Structure Plan. The Petroleum Hub Development Corporation, the Jomoro Municipal Assembly, the Traditional Authorities and all other stakeholders should work together to ensure compliance to the Structure Plan and in effect promote the petroleum and petrochemical industry in the country. Further to the implementation of the Petroleum Hub, it is imperative that feasibility studies are carried out concerning the siting of an airstrip and water treatment plant hydrological assessment is undertaken, flood analysis is conducted, amongst others to ensure the overall success of the Hub.