GOVERNMENT OF GHANA

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

PETROLEUM HUB LOCAL PLAN PHASE 1

MAY, 2021

MINISTRY OF ENERGY

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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.

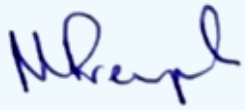
It is against this backdrop that the Land Use and Spatial Planning Authority under the Ministry of Environment, Science, Technology and Innovation, in collaboration with the Ministry of Energy developed spatial plans (i.e, Structure and Local plans) for a Petroleum Hub in the Western Nzema Traditional 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.



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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.

We would also like to thank Hon. Dr. Kwaku Afriyie (Minister), Professor Frimpong Boateng (former Minister) and Mrs Cynthia Asare –Bediako (Chief Director) of the Ministry of Environment, Science, Technology and Innovation for their immense support.

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.

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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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EXECUTIVE SUMMARY

Government's vision to leverage Ghana's energy potential through the development of a petroleum hub will be achieved through this flagship project. The Local Plan for Phase One (1) of the Petroleum Hub Project covers a total expanse of 6,590.8 acres. Among other purposes, the Local Plan provides a physical development plan that will attract and promote investment as well as guide development of phase one activities within and around the designated Petroleum Hub enclave. As an offshoot of the Petroleum Hub Structure Plan, the Local Plan for the phase one (1) of the Hub has considered several factors and is a result of a robust stakeholder engagement and feedback. Safety and environmental conservation underpinned the design of the Local Plan.

The Local Plan is in the Jomoro Municipaity and the phase one (1) can be specifically located at the southern section of the Structure Plan abutting the sea, with a total land size of 6,590.8 acres. Communities such as Nawule, Asempaneye, New Kabenlesuazo, Ndumsuazo and Egbaazo abut the Local Plan Area whiles two communities, i.e Bokakole Nkwanta and Old Kabenle-suazo are located within the area. Although the Sea, Dumunli Lagoon and other connecting roads exists as accessible routes within the area, the main Takoradi Half Assini Road is noted to be one of the prominent roads within the Local Plan Area.

The area has a mean monthly temperature of 26° C, a high humidity level and a double maxima rainfall pattern. The vegetative cover is predominantly coconut plantation. The establishment of industrial activities within the Local Plan Area will reduce the large vegetative cover especially coconut plantations which may affect livelihoods.

A major ecologically sensitive area within the LPA is the Domunli Lagoon. It provides habitat for species such as the slender snouted crocodile, white naped mangabey, geoffroys black & white colobus, the dwarf crocodile and hooded vultures and could be developed for tourism.

In general, the area is uniformly flat at the coast and northern parts with undulating high levels at the central part of the Local Plan Area. The Fluvisols and Arenosols soils have been identified within the area and is expected to support construction activities.

The major proposed land use for the Local Plan is industrial. Ancillary uses have been proposed to complement the major land uses in the industrial and residential areas. Over twenty percent (20%) of the entire plan area has been zoned for environmental protection and green areas.

The enforcement of the various Zoning Regulations is paramount to the success of this plan and must be adhered to in all phases of the local planning period. Critical ones are those related to safety and environmental protection.

The Local Plan makes provision for an implementation strategy which spells out the key institutions and their roles, as well as institutions responsible for Monitoring and Evaluation (M&E) and the step-by-step approach required for a successful implementation of the Local Plan.

CHAPTER ONE

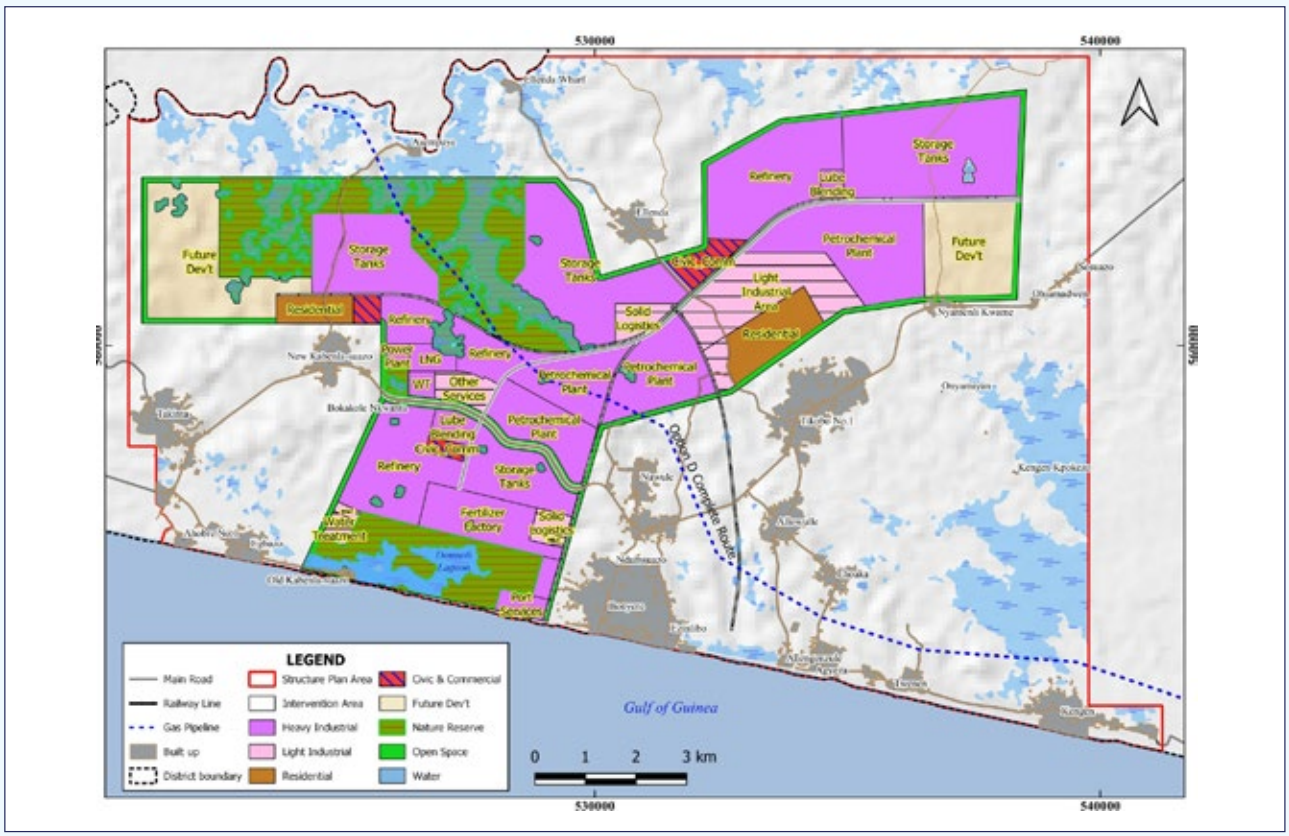
BACKGROUND

1.0 INTRODUCTION

The Government of Ghana has a vision of developing an energy economy, in addition to facilitating access to adequate, reliable, and cost-effective petroleum products. In achieving this vision, the government plans to increase the national crude oil refining capacity, through the establishment of a Petroleum Hub. This will serve not only Ghana but also the West African sub-regional market and beyond. The creation of the Petroleum Hub will expand the national refinery capacity, through the provision of refinery and processing facilities, port discharge, storage tanks, distribution, and transportation facilities as well as trading of petroleum products. In selecting a site for the Petroleum Hub located at the Domunli enclave in the Western Nzema Traditional Area of Jomoro Municipality, the Ministry of Energy considered land availability, land suitability, environment, and proximity to the shoreline.

The development 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 investments to be made in the hub demands proper coordination and planning which must be in line with the National, Regional and District Development Frameworks. After following through the planning process in the preparation of the structure plan, two scenarios were developed and a preferred optioned was selected and subsequently approved as shown in ***Figure 1.1***

Figure 1. 1Structure Plan for the Petroleum Hub



Source: LUSPA 2021

The Structure Plan set the tone for the preparation of Local Plans. The Local Plan provides details on land use patterns showing individual parcels of land, open spaces, facilities, transportation systems, energy, water, and drainage systems among others. It translates into space and in much greater details the designated zoning classification and broad land uses as proposed in the Structure Plan (SP).

Implementation of the Petroleum Hub is in three (3) phases according to the Petroleum Infrastructure Master Plan (PIMP). Each of the phases will have similar use (facilities) over the course of the PIMP period. Phase one is expected to kick start the development of the Petroleum Hub Project. This Local Plan focuses on the first phase of the implementation of the hub.

1.1 CONTEXTUAL SCOPE

Th Local Plan depicts the first phase of the petroleum hub project. This plan defines in terms of parcels, areas for the various infrastructure to be developed in Phase-1 of the project. This plan is predominantly industrial with some residential and mixed-uses. It provides for storage infrastructure, port facility with multiple berths, refineries, petrochemical plants, residential, mixed uses, amongst others.

1.2 OBJECTIVES OF THE LOCAL PLAN

The overarching aim of this Local Plan is to translate the broad proposals made for the area at the structure plan level into tangible actions. Phase one of the Petroleum Hub Local Plan seeks to achieve the following specific objectives;

i. Guide physical development within the Hub.
ii. Provide development guidelines and regulations to inform development control.
iii. Issuance of permit for specific developments
iv. Ensure that ecologically sensitive lands are preserved to protect biodiversity;

1.3 APPROACH AND METHODOLOGY

The project team followed the step by step process for the preparation of the Local Plan as prescribed in the Manual for Preparation of Spatial Plans.

1.3.1 Review of Existing Policies

In preparing this Local Plan, relevant government policies and documents were reviewed. The documents outlined (though not exhaustive) were considered and proposals were made in accordance with their provisions where applicable.

a. Petroleum Infrastructure Master Plan, 2018
b. Petroleum Hub Development Corporation Act, 2020 (Act 1053)
c. Draft Petroleum Hub Structure Plan, 2021.
d. National Spatial Development Framework (NSDF, 2015- 2035)
e. Western Regional Spatial Development Framework (WRSDF, 2012-2032),
f. Jomoro District SDF (2012 -2032)
g. Structure Plan for the Coastal Districts in the Western Region, 2021
h. The National Infrastructure Plan (Draft NIP)

i. Medium Term Development Plans for Jomoro Municipal (2017-2021)

j. National Urban Policy and Action Plan (2012)

k. The Energy Sector Strategy and Development Plan (2010)

l. The Gas Master Plan (2016)

1.3.2 Reconnaissance Survey, Data Collection and Analysis

The project team conducted a reconnaissance survey and extensive data collection as part of the process of preparing the Local Plan. Visit to the Western Regional Coordinating Council (RCC), Jomoro Municipal Assembly, and the Western Nzema Traditional Council were conducted. The purpose of the visit was to introduce the Team to stakeholders and familiarize with the project communities and its environs.

The next activity that was carried out was data collection. Upon completion of the desk study, the project team generated a list of required information which was requested and obtained from various stakeholders. Data collection was carried out in August, 2020. Thematic data gathered were on health, education, economy, agriculture, among others. Data gathered and analysed established the existing conditions, potentials, opportunities, and challenges, as well as proposed projects.

1.4 DESIGN PROCESS OF THE LOCAL PLAN

Designing of the Local Plan was guided by recommendations of the Structure Plan, review of existing plans and the analyses of primary and secondary data. In addition, consultations were held with several stakeholders. Their inputs were captured and thus factored into the preparation and design of the Local plan. Guidelines, such as the Manual for the preparation of spatial plans, Zoning regulations and planning standards among others also guided the design of the Plan.

1.4.1 Stakeholder Consultation

As part of the process, extensive engagement with various stakeholders were undertaken at the national, regional and district levels. This includes several government agencies, private sector, civil society organizations, traditional authorities, community members and leaders amongst others. The active involvement and support of these stakeholders ensured project success. Key institutions engaged are discussed subsequently under 1.6.

1.4.2 Adoption and Approval

Considering the spatial scale and complexity of the project it was necessary to have stakeholder consultations and validation at both national, regional and district levels for stakeholder buy-in. The validated final plan shall be submitted for consideration and approval by the Jomorro Municipal Spatial Planning Committee. As part of the planning process, technical working groups and committees were set up to facilitate and ensure optimum project output. These have been explained briefly in the next section.

1.5 KEY INSTITUTIONS IMPACTING THE SUCCESS OF THE PLAN

The following identified key institutions play critical roles in the preparation and implementation of the Local Plan.

1.5.1 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 Local Plan;

- Spearhead the development of the Petroleum Hub.
- In collaboration with LUSPA, Jomoro Municipal Assembly and other relevant agencies, implement the Local 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 Local Plan provision.

1.5.2 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

1.5.3 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 LP

1.5.4 Jomoro Municipal Assembly

Once approved and adopted by the Jomoro Municipal Assembly (JMA) the Local Plan will form the basis for JMA to grant or refuse development permits and to ensure effective control of physical development within the area.

1.5.5 Traditional Authorities

The effective implementation of the Local Plan depends to a large extent on the absence of land litigation in the LP. Customarily, the traditional authorities are the custodians of the land. To ensure smooth implementation of the Local 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 Local Plan.

1.5.6 Other Relevant Institutions

It is recommended that the Corporation collaborate with the underlisted institutions in the implementation of the recommendations of the structure plan;

i. 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 Harbour 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

CHAPTER TWO

SITE ANALYSIS

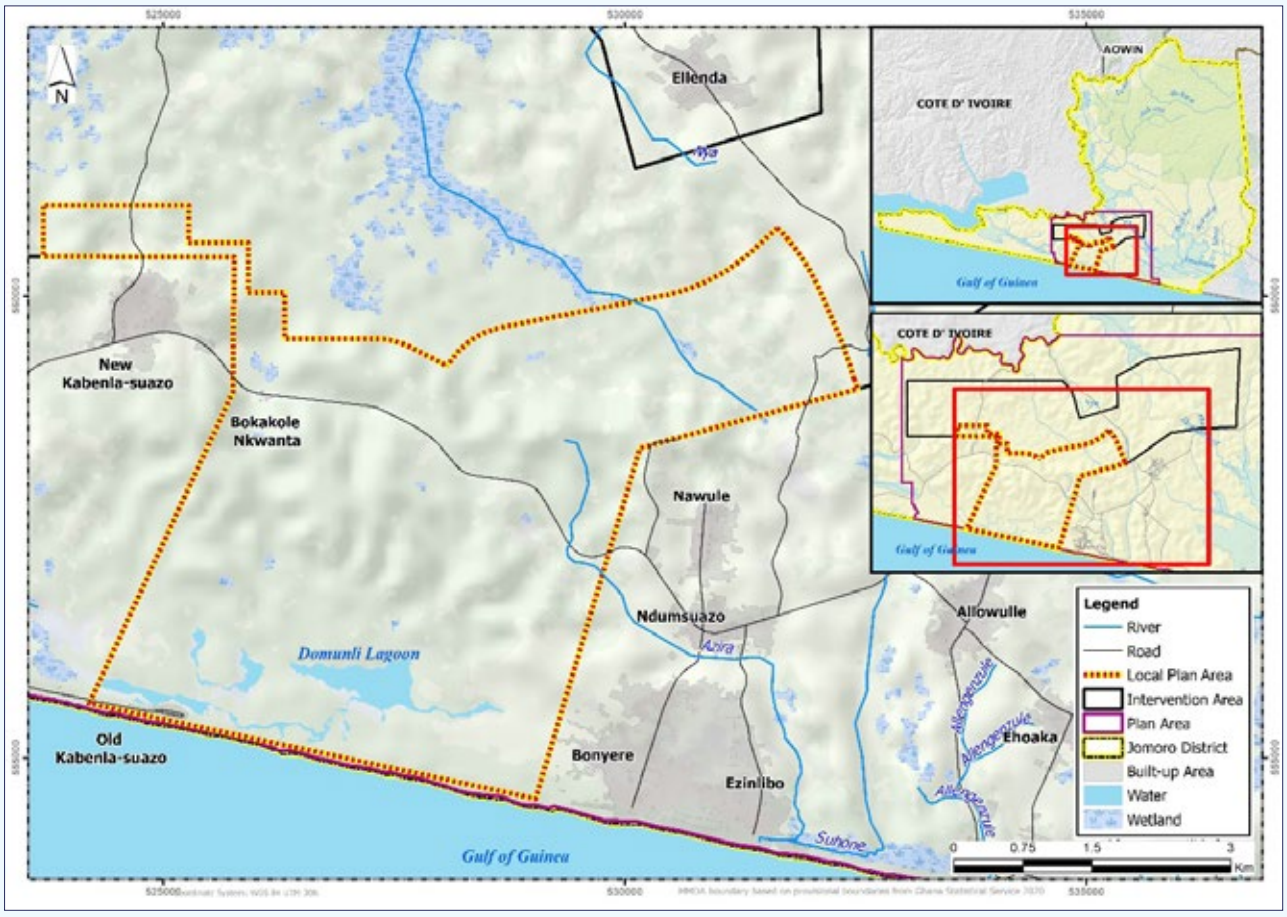
2.0 INTRODUCTION

This chapter describes the physical characteristics of the Local Plan Area focusing on location and size of the land, accessibility to the plan area, climate and vegetation, relief and drainage and geology and soils. It further discusses the impact and interdependence of the Petroleum Hub activities on the existing and adjoining communities and vice versa.

2.1 LOCATION AND SIZE OF THE LOCAL PLAN AREA

Geographically, the Local Plan Area is in the Western Nzema Traditional Area of the Jomoro Municipality in the Western Region of Ghana as illustrated in ***Figure 2.1.*** The proposed Phase One Local Plan is situated at the southern section of the Intervention Area within latitude 005^0 01′ 00″ N to 005^0 04′ 31″ N and longitude 002^0 47′ 10″ W to 002^0 42′ 21″. It covers a land area of 6,590.8 (33%) acres out of 20,000 acres. Two (2) communities namely; Bokakole Nkwanta and Old Kabenla-suazo falls within the Local Plan Area. It is bounded to the south by the Gulf of Guinea, to the west by Egbazo and New Kabenlasuazo communities, to the east by, Nawule Ndumsuazo and Bonyere communities and to the North by Ellenda community as illustrated in ***Figure 2.1***

Figure 2.1 Local Plan in District and Structure Plan Context

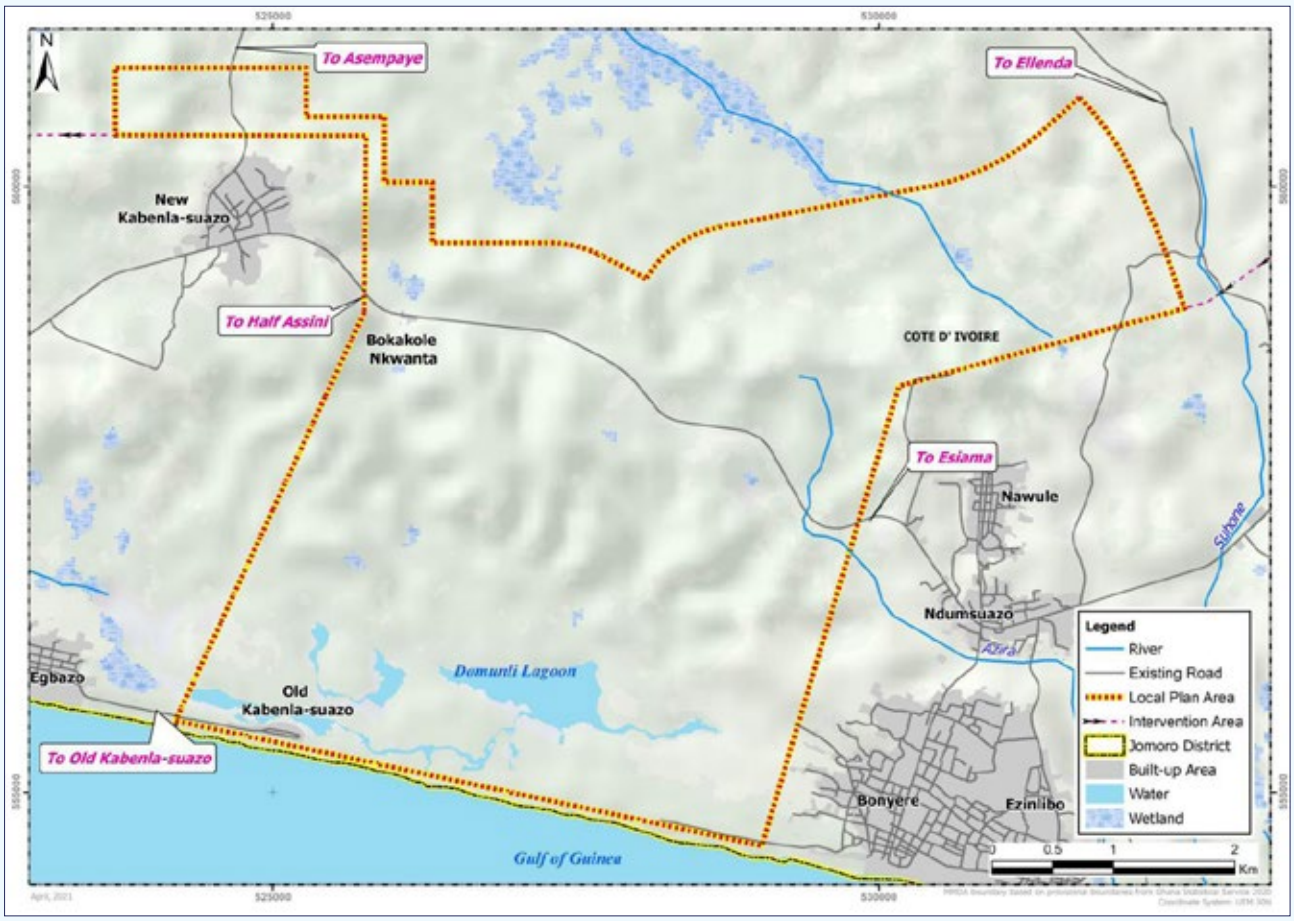


Source: LUSPA, 2021

2.2 ACCESSIBILITY TO THE LOCAL PLAN AREA

The Local Plan Area can be accessed by the main Half Assini-Accra Road. It traverses the central part of the Local Plan Area through Ndumsuazo and traverses Bokakole Nkwanta and New kwabenlasuazo. The north-western part of the plan area can be accessed by a feeder road from New Kabenla-suazo to Asempaye. The southern part of the area can be accessed by the sea and the roads from Bonyere (east) and Egbazo (west) as shown in ***figure 2.2.*** However, they terminate at about 1km due to the waterlogged nature of the land. Feeder roads and un-tarred roads exist mainly as means of road transport in the entire Local Plan Area. Apart from road transportation, the sea (Gulf of Guinea) and the Domunli Lagoon are used as means of transport.

Figure 2.2 Accessibility to the Local Plan Area



Source: LUSPA, 2021

2.3 CLIMATE AND VEGETATION

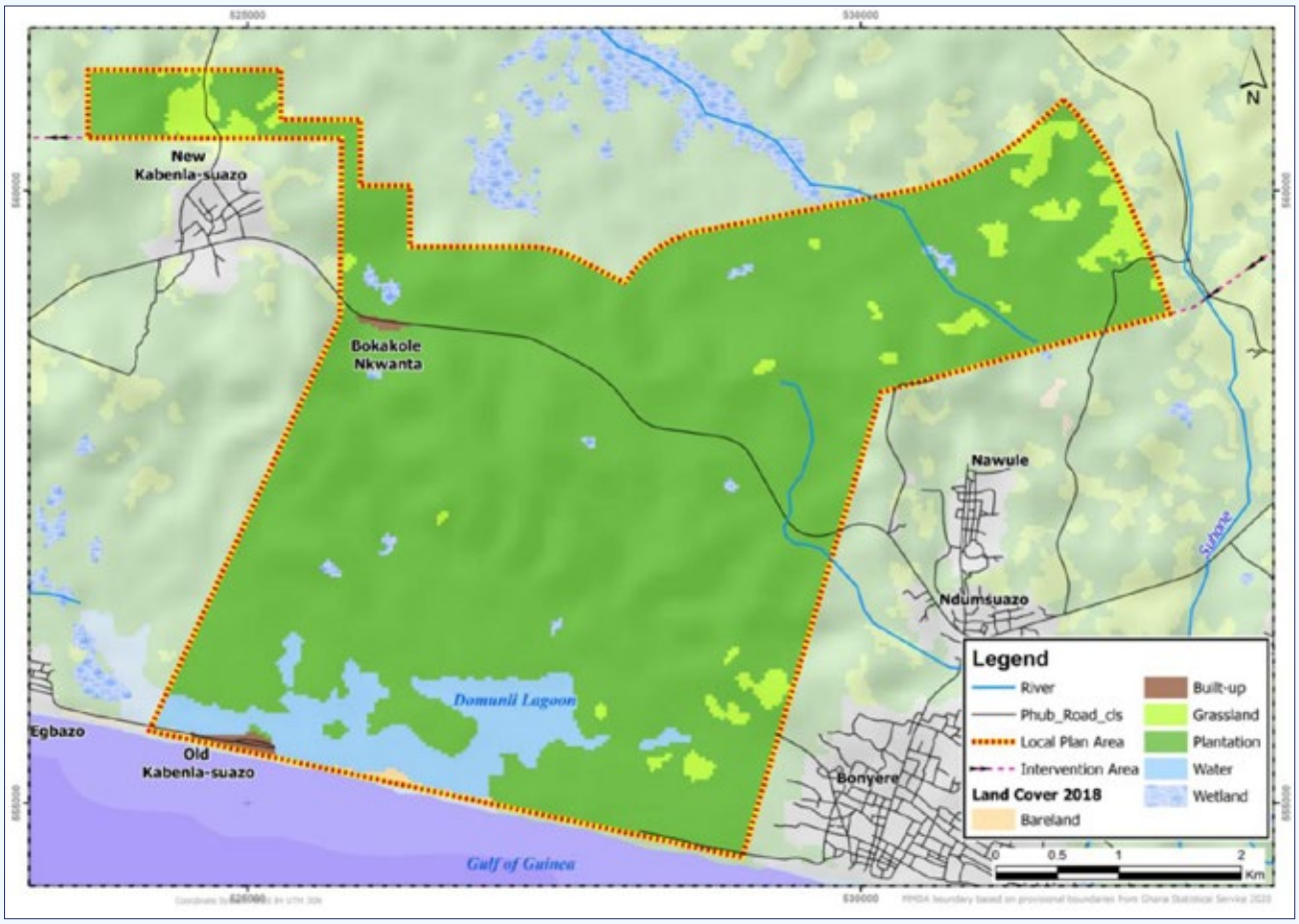
The Local Plan Area falls within the equatorial climatic zone with temperature, ranging from 22°C to 34°C. The temperature is uniform across the Local Plan Area. With a monthly mean temperature of 26° C throughout the year, temperatures sometimes drop to 20°C in August. High humidity is experienced throughout the year, about 90% during the night and falling to about 75% when temperature rises in the afternoon.

Plate 2.1 Vegetative Cover of Local Plan Area

Source: LUSPA, 2021

There are two wet seasons that have the double maxima rainfall pattern all year round, which is synonymous with Jomoro Municipality. Within the Plan Area the highest monthly mean rainfall occurs between May and June. Rainfall peaks in July and October followed by short spells of relatively dry season. Rainfall in the Plan Area averages about 1380 mm with maximum amounts of about 1700 mm occurring during the months of March and July.

Figure 2.3 Land Cover (2018)



Source: LUSPA 2020, based on USGS Database

The vegetative cover is predominantly coconut plantation (see Plate 2.1 and figure 2.3) with few (about 5) adjoining settlement areas. The establishment of the petroleum hub and its infrastructure coupled with the urbanization rate, is likely to cause an expansion in the built-up area to over 40% by the end of 2035 all things being equal. This expansion will adversely impact the plantation cover (coconut plantation) which will significantly impact livelihoods especially agriculture and the industrial (coconut oil manufacturing) sub-sectors. In effect, diversification of the economic activities within the plan area would have to be exploited to avoid negative impacts. However, adequate mitigation measures have been proposed in the structure plan to sustain livelihood in and around the Hub.

2.4 RELIEF AND DRAINAGE OF THE LOCAL PLAN AREA

The coastline is linked to rivers, estuaries, and the greater part of the vast ecologically sensitive Domunli lagoon ***(Plate 2.2 and 2.3 and figure 2.4)*** that provides habitats and species such as the slender snouted crocodile, white naped mangabey, the Dwarf crocodile and hooded vultures. Hence, the lagoon will be preserved due to its irreplaceability, strong linkage to the livelihoods of the residents and ability to generate tourism if properly developed.

Plate 2.2 Domunli Lagoon Estuary

Source: LUSPA, 2021

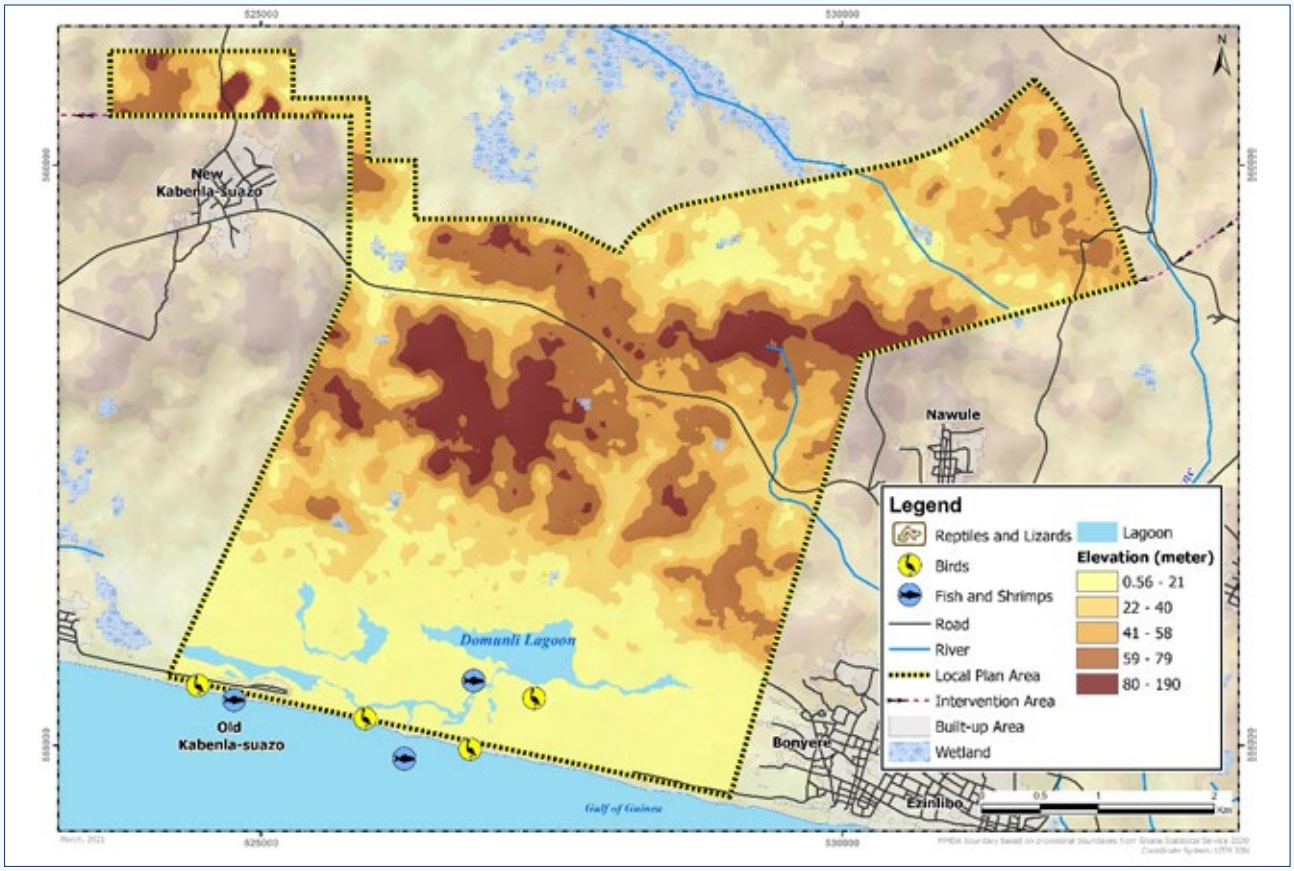
Within the plan area, coastal vulnerability to climate-related hazards of the settlements threatens nesting habitats for marine turtles and the hospitality industry in the plan area.

The area is drained by a tributary of River Tano and the Domunli Lagoon. The Plan reserves a 15 meter buffer as a protection area on each side of the river in the Local Plan. The Lagoon is protected with a buffer of 70 meters all around. Approximately 616 acres of land have been designated as nature reserve in this Local Plan Area. Figure 2.4 depicts the relief and drainage of the Local Plan Area.

Plate 2.3 Artisanal Fishing in Domunli Lagoon

Source: LUSPA, 2021

Plate 2.4 Arenosols soil type at the coast



Source: LUSPA, 2021

2.5 ELEVATION OF THE LOCAL PLAN AREA

The Local Plan Area is undulating with the highest point occurring at the central part of the Local Plan Area around Bokakole Nkwanta community ***(Figure 2.4).*** The lowest point is also located at the southern part of the Local Plan Area along the shoreline which is at the southern part of the lagoon. The elevation data available confirm that, the highest contour in the area is 190m and the lowest, 0.56m above sea level. In general, the area is uniformly flat at the coast and northern part with undulating high levels at the central part of the Local Plan Area.

2.6 GEOLOGY AND SOIL

The Local Plan Area is largely characterized by Fluvisols and partially by Arenosols as shown in ***figure 2.5.***

Plate 2.5 Fluvisols soil type within the LPA

Source: LUSPA, 2021.

Arenosols covers about 20% of the Local Plan Area spanning from the coast line and across the entire catchment of Domunli lagoon. Arenosols is a type of soil classified by the Food and Agriculture Organization (FAO) to consist of sandy soils, mostly developed within areas of usually weathered rocks or quartz-rich soil leaving behind residual sands within the weathered area. They are developed in recently deposited sands as found along beaches ***(see Plate 2.4).*** Hence, it poses no threats to construction development and suitable for the proposed zoning (conservation areas) for the area.

Plate 2.5 Fluvisols soil type within the LPA

Source: LUSPA, 2021

The most abundant soil type (80%) in the plan area is Fluvisols. It is a type of soil classified by the Food and Agriculture Organization (FAO) to be mostly brown (Plate 2.5 and 2.6), found in areas of high rainfall mixed with circulating air thorough and mixed with water in the soils. The colour differs to grey in waterlogged areas. All two phenomenon are prevalent in the plan area.

Fluvisols has a deeper soil horizon which are mostly liable to water saturation cycles under the influence of the high level of the groundwater table. Due to the elevation and vegetation of the plan areas, the soils are often affected by seasonal water-logging and found along areas with low river terraces. This situation is as a result of the rainfall patten leading to seasonal fluctuation of the water table.

Hence, there is the presence of Potential Acid Sulphate (PAS) in the soil due to tidal influence to the coast. Drainage in coastal areas causes strong acidification. Moreover, there is soft mud in the soil hindering the ripping of PAS due to the vegetation. Flooding during raining season may cause damage to the infrastructure. Engineering problems arise during construction since soil acidity attacks steel and concrete structures.

Plate 2.6 Erosion of Fluvisols soil type within the LPA

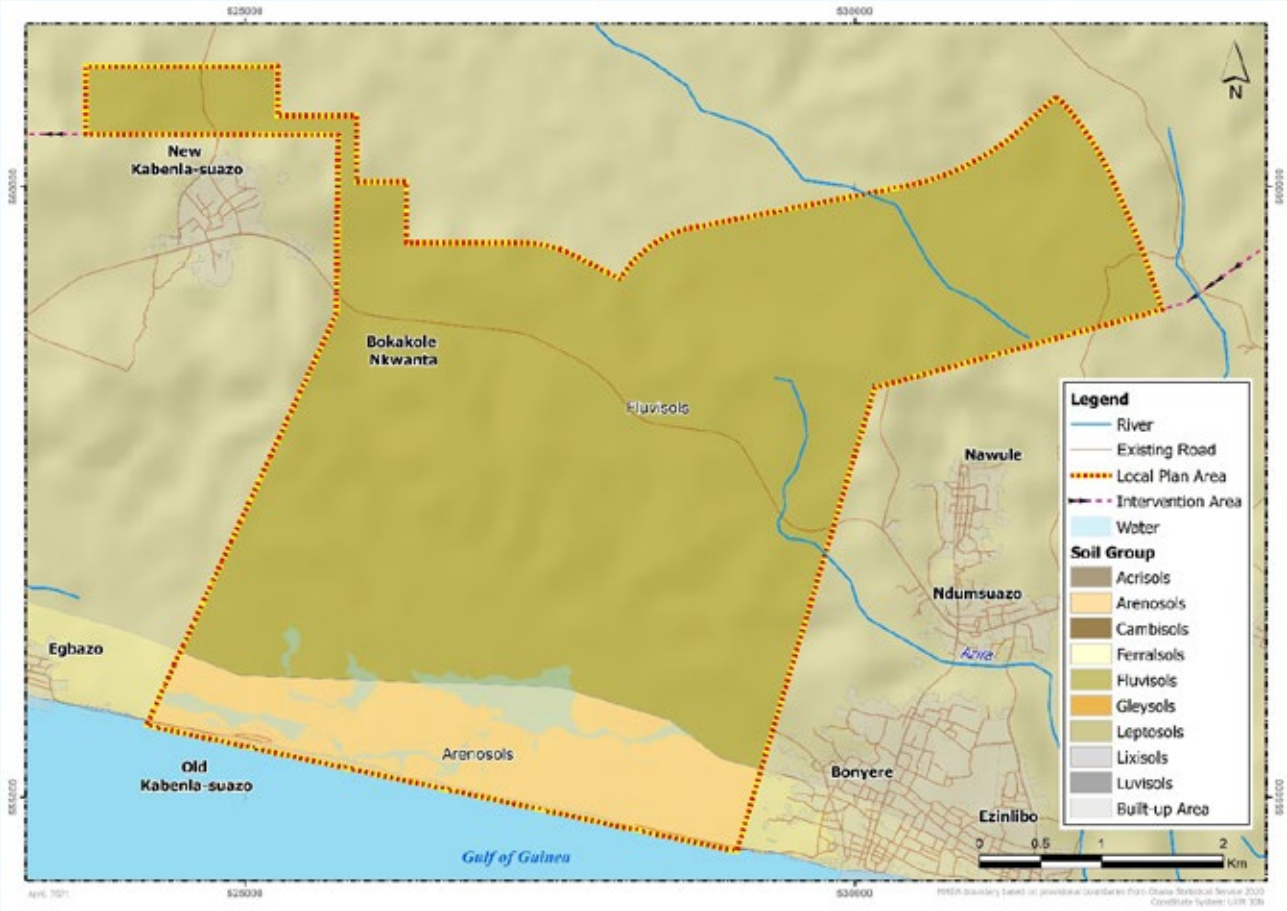
Source: LUSPA, 2021

There are two strategies for reclaiming and using Potential Acid Sulfate Soils:

Strategy 1: Draining and oxidization of the soil. This process involves draining, oxidizing, and flushing of acidity in the soil. Then the soil is leached with brackish water or saline the problem is entirely solved. This strategy has been applied with some success in Sierra Leone, Senegal, and the Netherlands.

Strategy 2: Reduction of pyrite oxidation in the soil. The rationale behind this strategy is maintaining the water table at a higher level which will automatically reduce pyrite oxidized from the soil. This process is dependent on sufficient water. However, the acidification danger will persist but with minimal or no impact to petrochemical infrastructure. This process is widely practiced in the tropics and temperate zones mostly in synchronization with local adaptation measure.

Figure 2.5 Soil Map

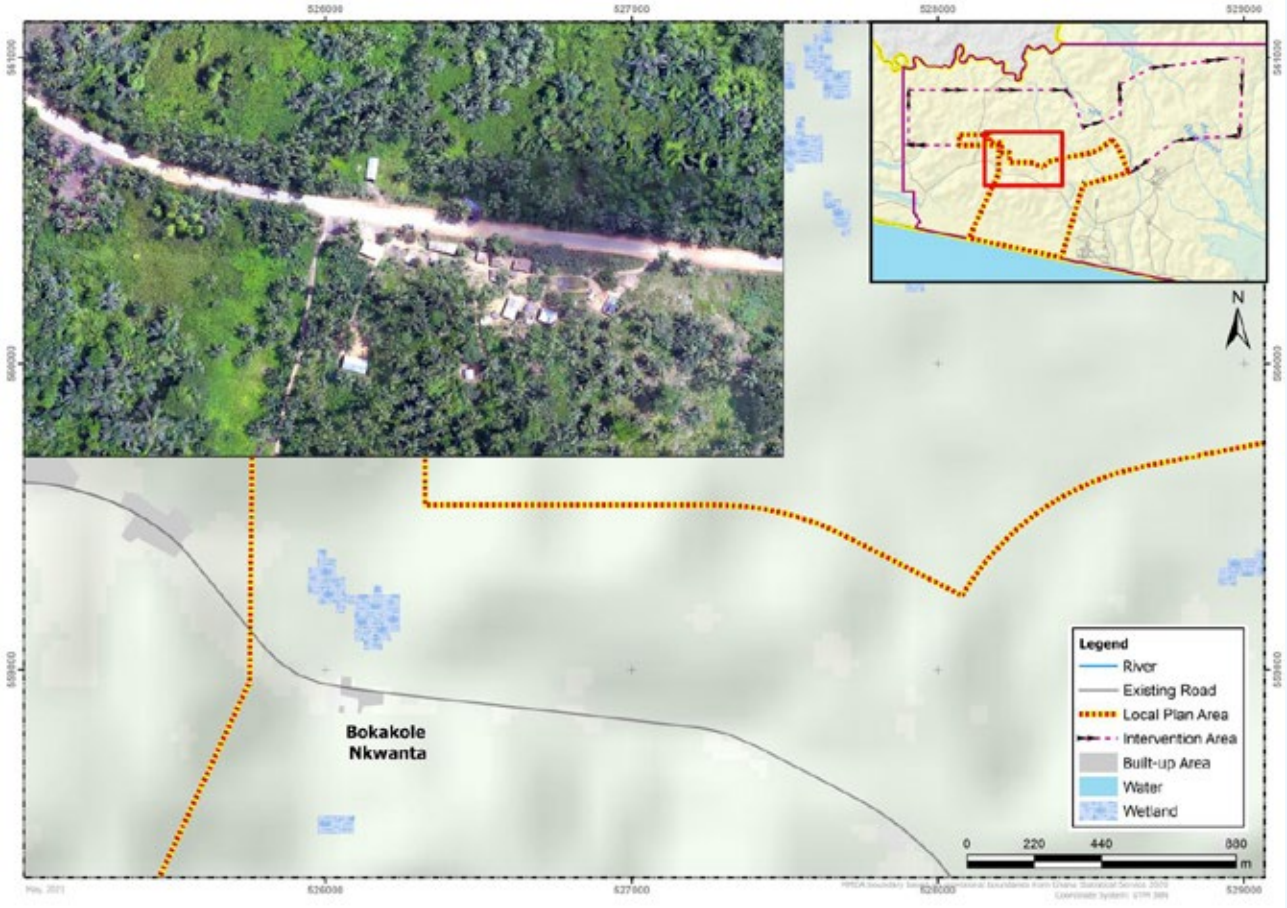


Source: LUSPA, 2021

2.7 EXISTING & ADJOINING COMMUNITIES

Two communities (Bokakole Nkwanta and Old Kabenle-suazo) fall within the Local Plan Area and have been recommended for resettlement. Five adjoining communities (Bonyere, Nawule, Ndumsuazo, New Kabenla-suazo and Egbazo) may be negatively impacted by activities within the hub. It is therefore necessary to take put in measures to mitigate the possible impact.

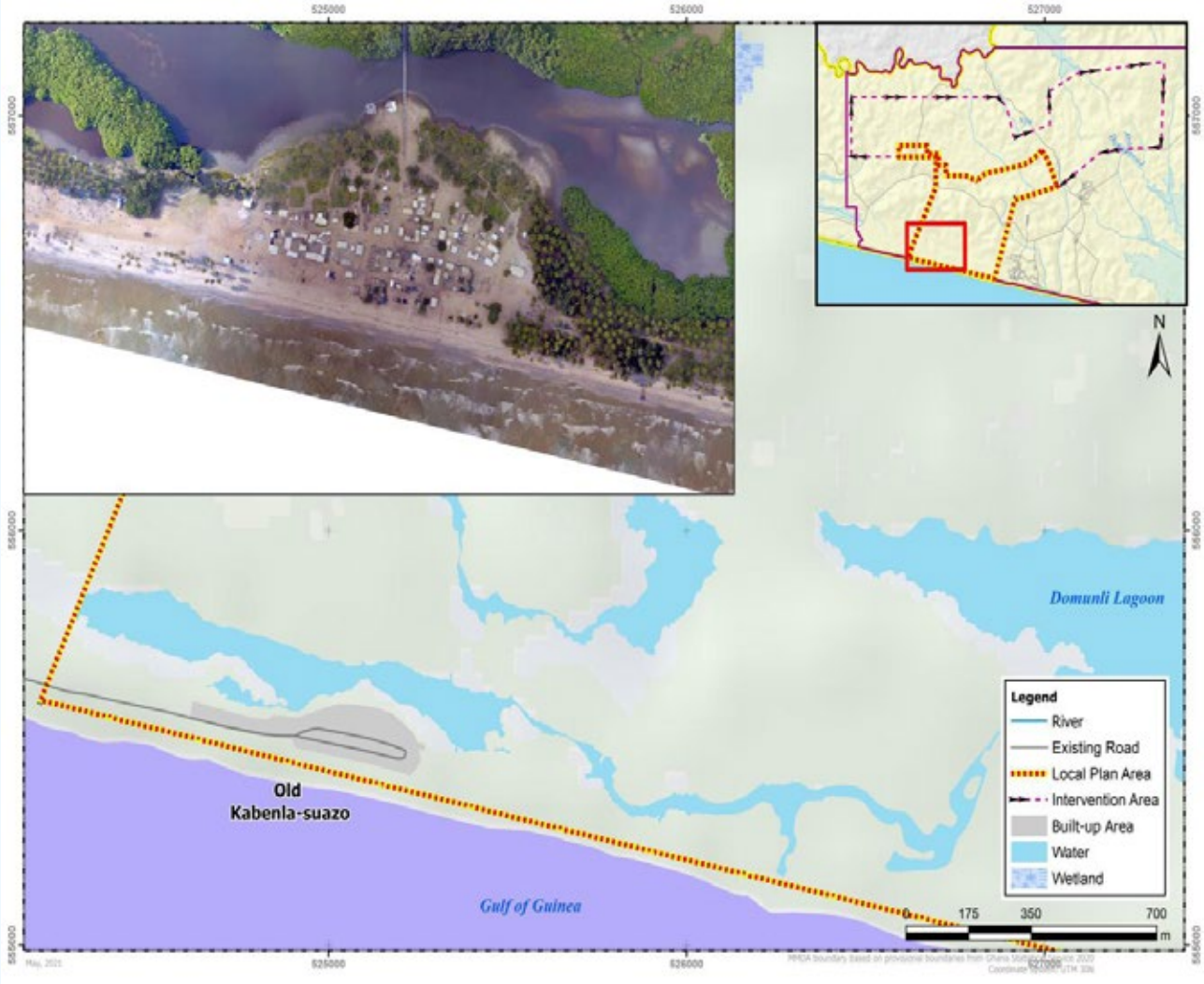
Figure 2.6 Existing Community, Bokakole Nkwanta



Source: LUSPA, 2020

Boakakole Nkwanta is a farming community within the Local Plan Area. It is located at the north western part of the area along the Half – Assini – Takoradi Road with a total population of about 50 and 10 houses (LUSPA- field survey, 2021). Engagements with some residents indicated that, most of them have relocated to New Kabenla-suazo because of the lack of electricity for both residential and commercial use.

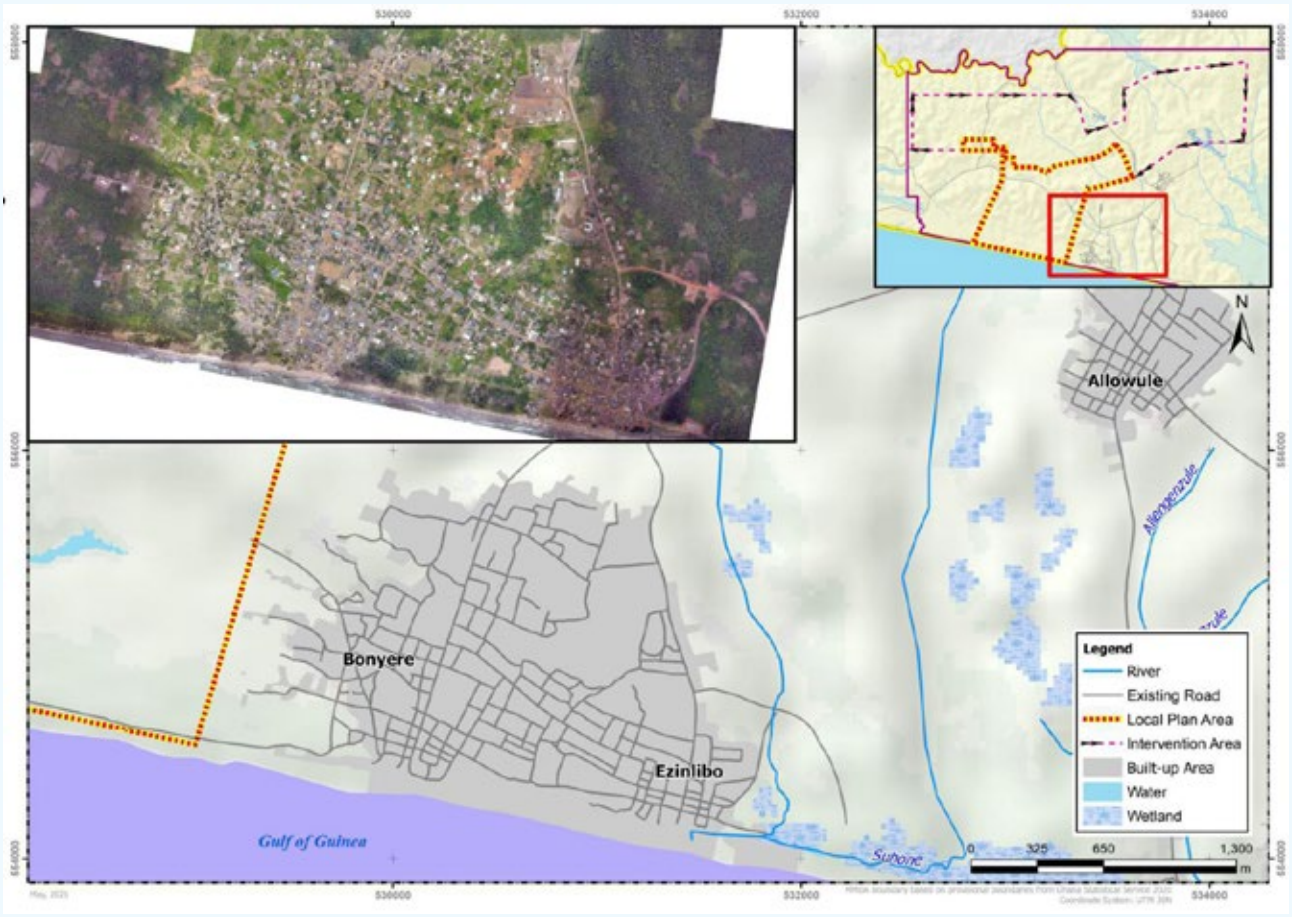
Figure 2.7 Existing Community, Old Kabenle-suazo



Source: LUSPA, 2021

Old Kabenle-suazo also within the intervention area and is located at the coast sharing boundary with the Gulf of Guinea, to the north with Domunli lagoon to the east by the Domunli Lagoon estuary and to the west by Egbazo. It is one of the smallest communities within the SPA with an estimated population of 120 during dry season when people move in and as low as 20 people during the wet season when there is incidence of flooding. There were about 70 houses in the community as at 2021 (LUSPA- field survey, 2021). However, the community is dying off due to its location between the sea and the Domunli lagoon. Sea erosion and seasonal fluctuation of the Domunli lagoon is gradually submerging the community through flooding. The only road that links the community to Egbazo is on the west and this also gets flooded during the raining season making it unmotorable for vehicular and human traffic. This has resulted in most of the people relocating to New Kabenla-suaso northward.

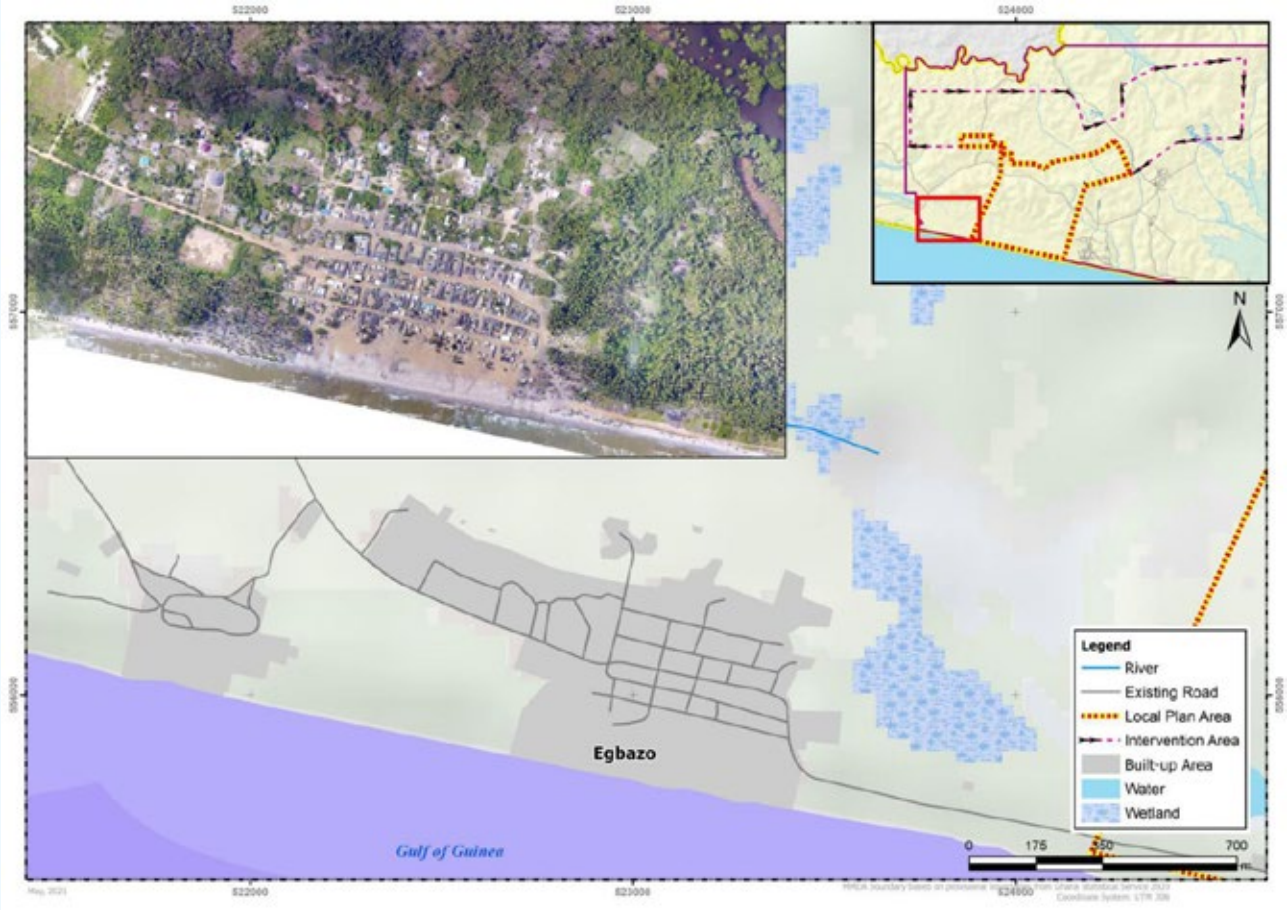
Figure 2.8 Adjoining Community, Bonyere



Source: LUSPA, 2021

Bonyere is the largest community abutting the LPA to the east along the shoreline. It is approximately 100m away from the boundary of the LPA. It has an estimated population of about 8,362 (2020) and They are predominantly involved in farming, livestock raring and coconut oil processing. It is the second most urbanised settlement with the SPA. It has expanded over the years to join with Ezinlibo to the East making the two settlements virtually indistinct. The only direction of growth left for Bonyere is to the West and North where it is constrained by the stream Azira and Ndumsuazo which is also growing southwards towards the stream ***(see figure 2.5).*** There is therefore the need to put in adequate planning and development control measures to manage the growth of Bonyere in order to prevent developments being in close proximity to the Petroleum Hub that will raise the critical issues of safety.

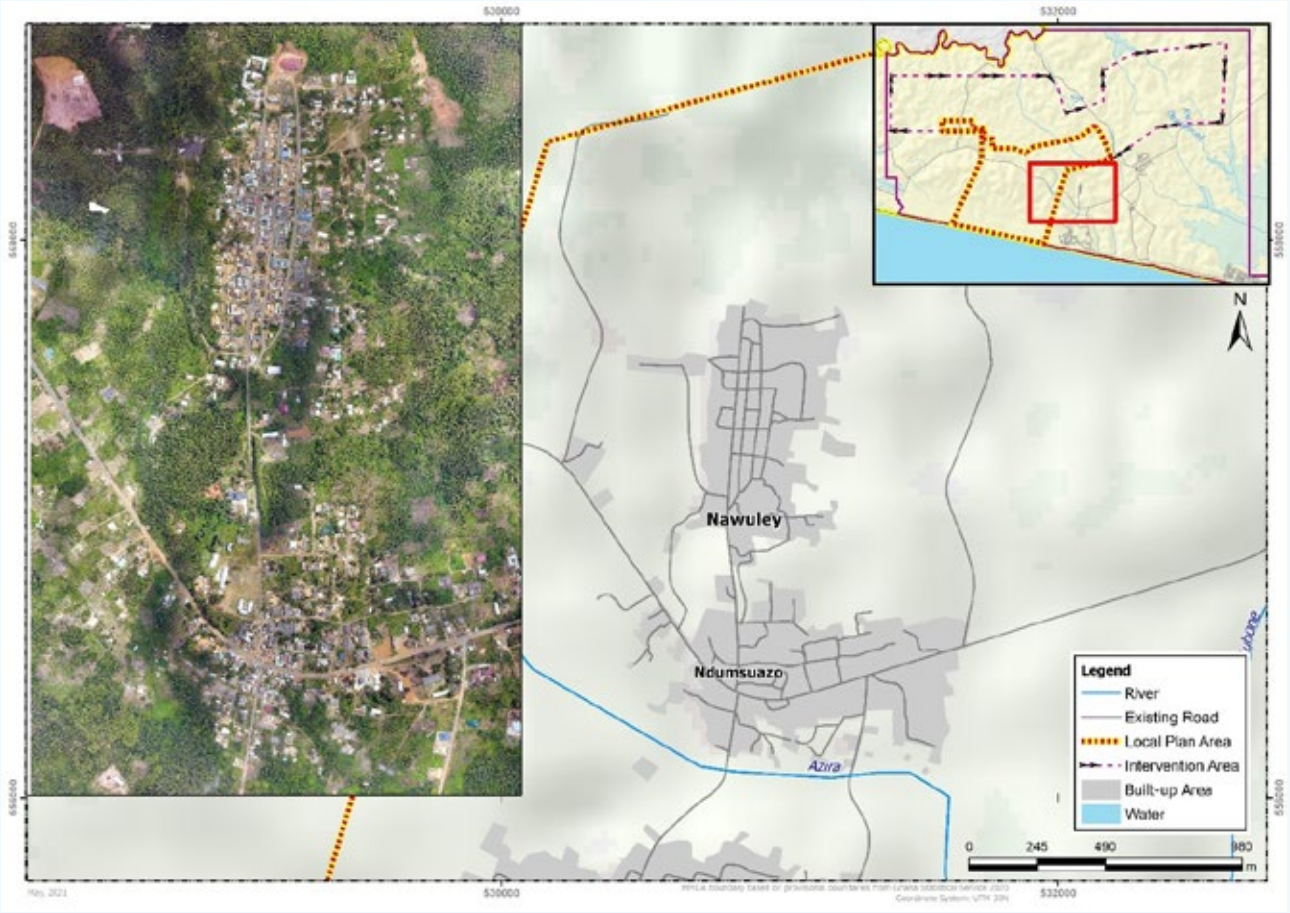
Figure 2.9 Adjoining Community, Egbazo



Source: LUSPA, 2021

Egbazo abuts the LPA to the west along the shoreline. It is approximately 700m from the Local Plan boundary and has a projected population of 2,570 (2020). However, from the field visits and orthophotos, the actual population of may be lower than estimated. The dominant economic activity is fishing, livestock production (piggery) and coconut farming. Being a coastal community, it is also experiencing coastal erosion which is taking its toll on the coconut tree stock along the shoreline. Egbazo has a few social amenities such as CHPS compound and a basic school (primary to JHS) which serve both Ahobre No.1 and Old Kabenla-suazo.

Figure 2.10 Adjoining Community, Nawuley and Ndumsuazo

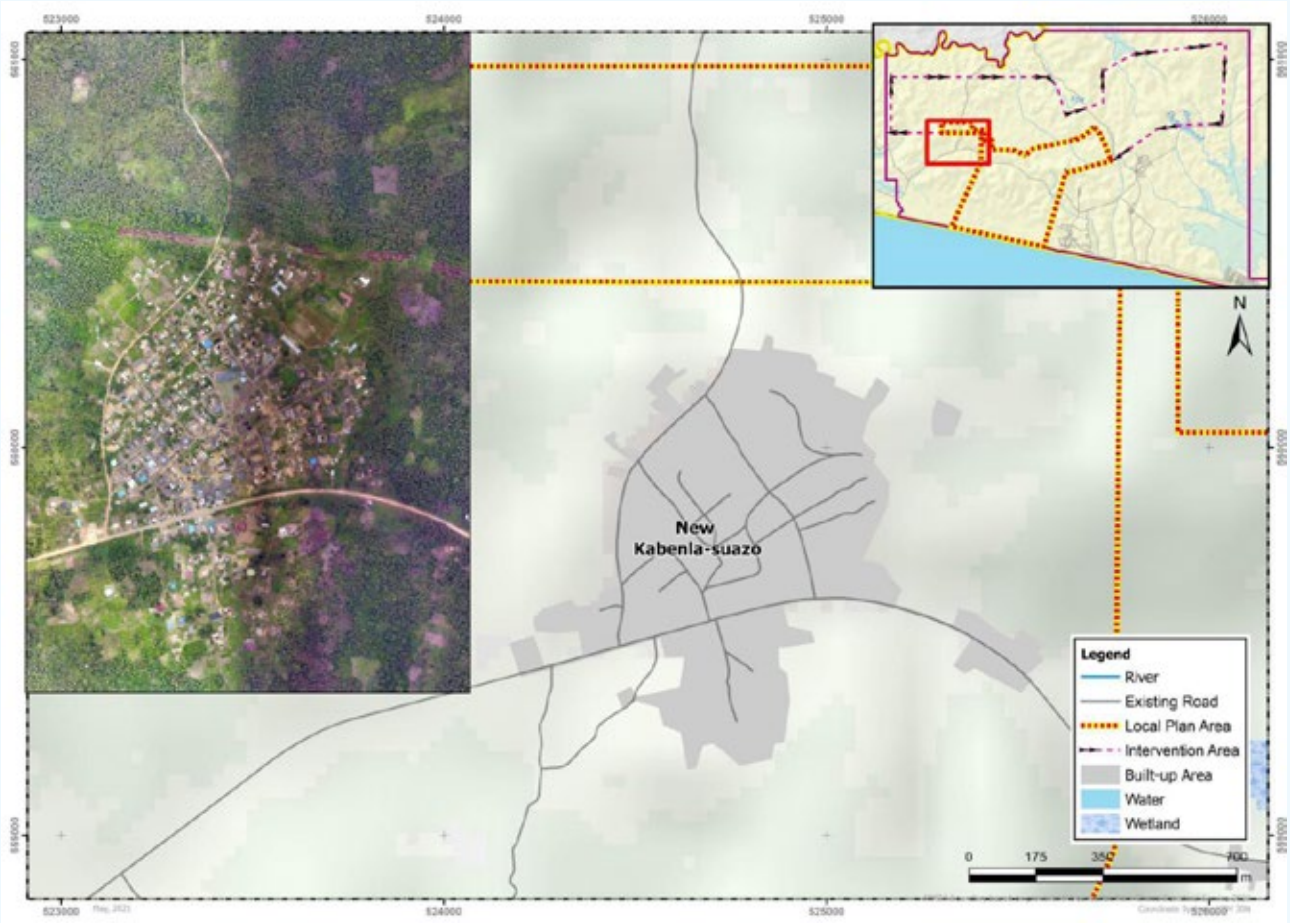


Source: LUSPA, 2020

Nawuley is a predominantly farming community with an estimated population of 2,929 (2020). It adjoins the LPA on the east (approximately 500m from the LP boundary) and is to the North of the Half Assini – Takoradi highway. It has few socio-economic facilities such as schools and a market. Residents however, make use of health facilities in Ndumsuazo

Ndumsuazo is also on the east of the LPA (approximately 800m from the LP boundary) and is traversed by the Half – Assini – Takoradi highway and has an estimated population of 3,342 (2020). The closest development to the LP boundary is an eye clinic 400m away. It is also a predominantly farming community but has relatively more socio-economic facilities compared to Nawuley. It has relatively pronounced commercial activities along the Half – Assini – Takoradi highway because of high accessibility.

Figure 2.11 Adjoining Community, New Kabenle-suazo



Source: LUSPA 2020

New Kabenla-suazo is a farming community adjoining the LPA to the west along the Half Assini – Takoradi Highway. It is approximately 170m away from the boundary of the LPA. It has an estimated population of 4,498 (2020) It is the preferred resettlement location for residents of Bokakole Nkwanta and Old Kabenla-suazo. It has basic socio-economic facilities such as CHPS compound, market and a basic school. As has been identified earlier there is the need for planning interventions to manage the growth of all settlements within the SPA but particularly those adjoining the LPA

CHAPTER THREE

LAND USE DESIGN AND DISTRIBUTION

3.0 INTRODUCTION

This chapter focuses on the targeted infrastructure/facilities of Phase 1, principles that guided the design of the Local Plan and the distribution of land uses. The land use distribution indicates the spatial distribution of land uses and gives credence to the function of the Local Plan Area. The land use proposals in this Local Plan have been carefully designed taking into consideration the general planning principles. These are Health & Safety, Economy, Convenience, Harmony and Aesthetics. Moreover, site description and analyses and other relevant guidelines and standards that impact the plan were considered.

3.1 TARGETED INFRASTRUCTURE

The list of Phase 1 facilities for the Local Plan based on the Petroleum Infrastructure Master Plan are indicated as follows;

3.1.1 Key Infrastructure

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

3.1.2 Ancillary Infrastructure

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

3.1.3 Social amenities

- Educational Facilities
- Health Facilities
- Security and Emergency Installations

3.2 DESIGN PRINCIPLES

The following are the specific principles that guided the design of the Local Plan. Also, brief descriptions regarding how these principles have been incorporated is given:

3.2.1 Environmental protection

- Areas have been designated as nature reserves and buffers to protect ecologically sensitive areas such as wetlands, rivers and the lagoon
- Areas have been designated as open spaces for recreation as well as for scenic value

3.2.3 Cost effectiveness

- Parcels have been designed and oriented in a way to make optimum use of land, roads and other infrastructure
- Land uses have been integrated to ensure economy of scale.

3.2.4 Safety

- There are designated protective buffers to minimize possible negative impact of industrial activities on other uses.
- Road intersections have been designed in a manner to provide optimum visibility of oncoming traffic.

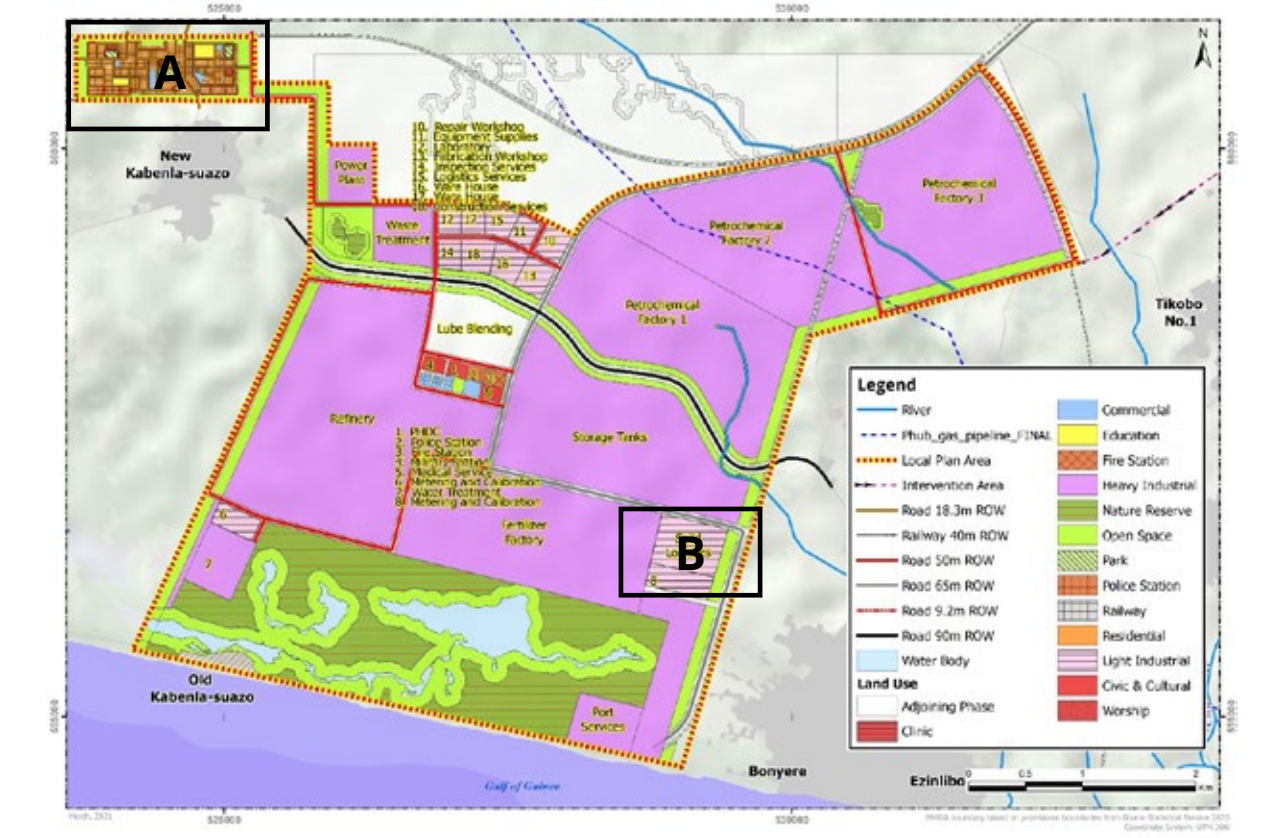
3.2.5 Integration

- Existing road networks and adjoining settlements have been incorporated into the design of the Local Plan.

3.3 LAND USE DISTRIBUTION FOR PHASE ONE

The land use distribution of the Local Plan was informed by the targeted infrastructure. It considers all the proposed land uses (facilities) with a careful application of the afore-mentioned design principles which are meant for harmonious development of the Petroleum Hub area within the next 5 years subject to review. ***Figure 3.1*** depicts the Local Plan for the Phase 1 of the Petroleum Hub.

Figure 3.1 Local Plan Phase One



Source: LUSPA, 2021

Additionally, table 3.1 shows the land use proportions that have resulted from the Local Plan. From the table, 61% (4,024.5 acres) of the land area is allocated for both heavy and light industrial uses (see table 3.2 and 3.3 for details). This goes to underpin the function of the Hub area as an industrial enclave. Also, 26.6% of the Local Plan Area has been zoned to be preserved in its natural state. These have been designated as Nature Reserve, Open Space and Water bodies (see table 3.7 for details). The purpose is to minimize the impact of proposed development on ecologically sensitive areas as well as adjoining communities.

Table 3.1 Land Use/Cover Distribution for Phase 1 – Local Plan

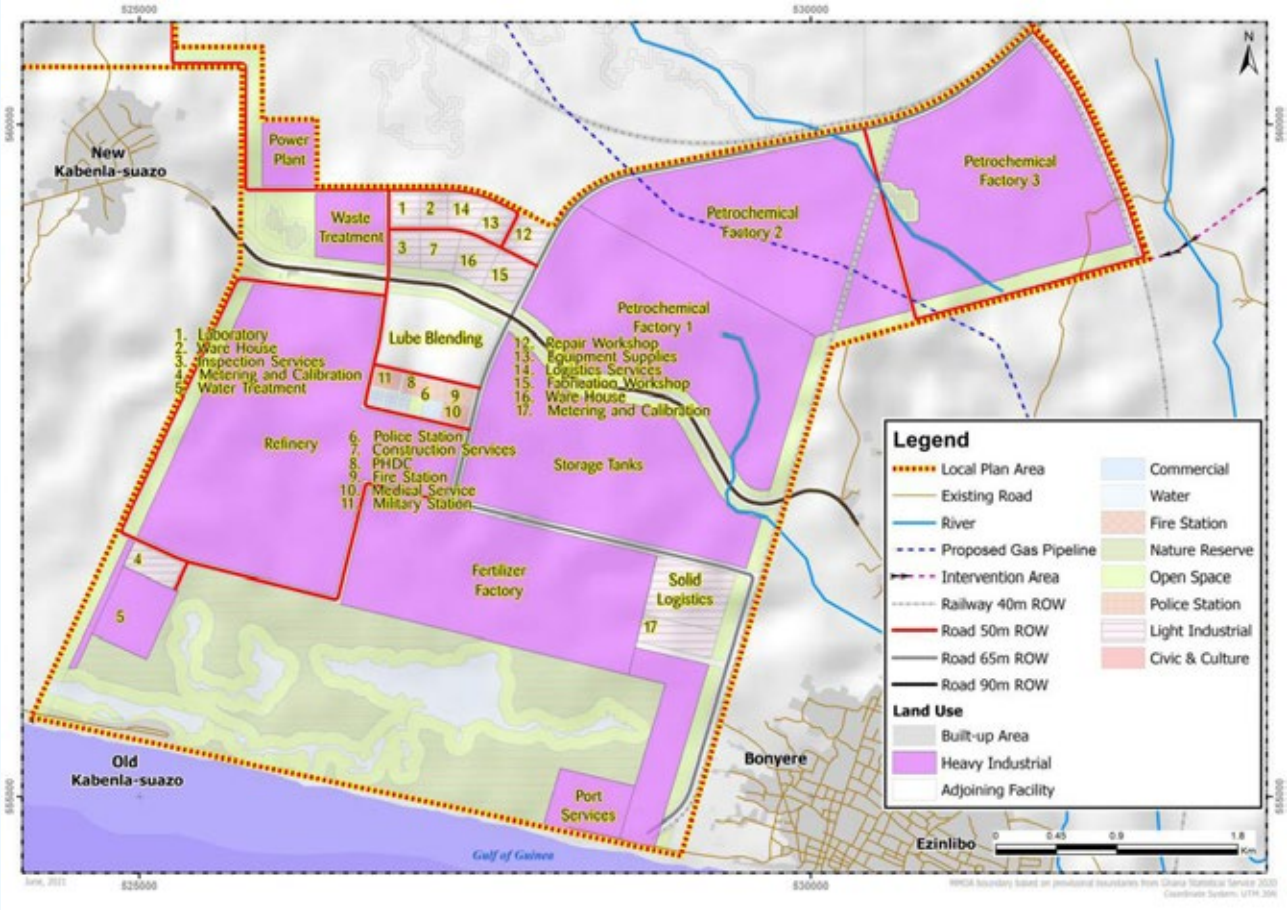
Land Use/Cover	Size (Acre)	Percent (%)
Built-up	20.9	0.3
Civic	45.3	0.7
Commercial	11.6	0.2
Education	6.8	0.1
Heavy Industrial	3,765.4	57.1
Light Industrial	259.1	3.9
Nature Reserve	593.5	9.0
Open Space	976.0	14.8
Residential	83.1	1.3
Water	185.9	2.8
Circulation	646.3	9.8
Total	6,590.8	100.0

Source: LUSPA, 2021.

3.3.1 Heavy Industrial Uses

These uses are a reflection of the Key Infrastructure as indicated under section 3.1. They represent the major activities within Phase 1 of the Petroleum Hub. Figure 3.2 depicts the spatial distribution of the Heavy Industrial Uses while table 3.2 details the land area per facility.

Figure 3.2 Heavy Industrial Uses



Source: LUSPA, 2021

Table 3.2 Details of Land Area per Facility (Heavy Industrial Uses)

Component	Size (Acre)
Storage Tanks	486.6
Port Services	62.9
Power Plant	50.4
Waste Treatment Centre	64.8
Water Treatment Centre	61.8
Refinery	765.9
Petrochemical Factory 1	507.2
Petrochemical Factory 2	505.3
Petrochemical Factory 3	530.4
Solid Logistics	65.0
Fertilizer factory	493.6
Other industrial	131.8
Total	**3,528.90**

3.3.2 Light Industrial Uses

These are predominantly services rendered to support operations of the heavy industrial activities within the Hub. The constituents of the Light Industrial uses and the associated land intake is depicted in Figure 3.3, ***Figure 3.4*** and table 3.3 respectively.

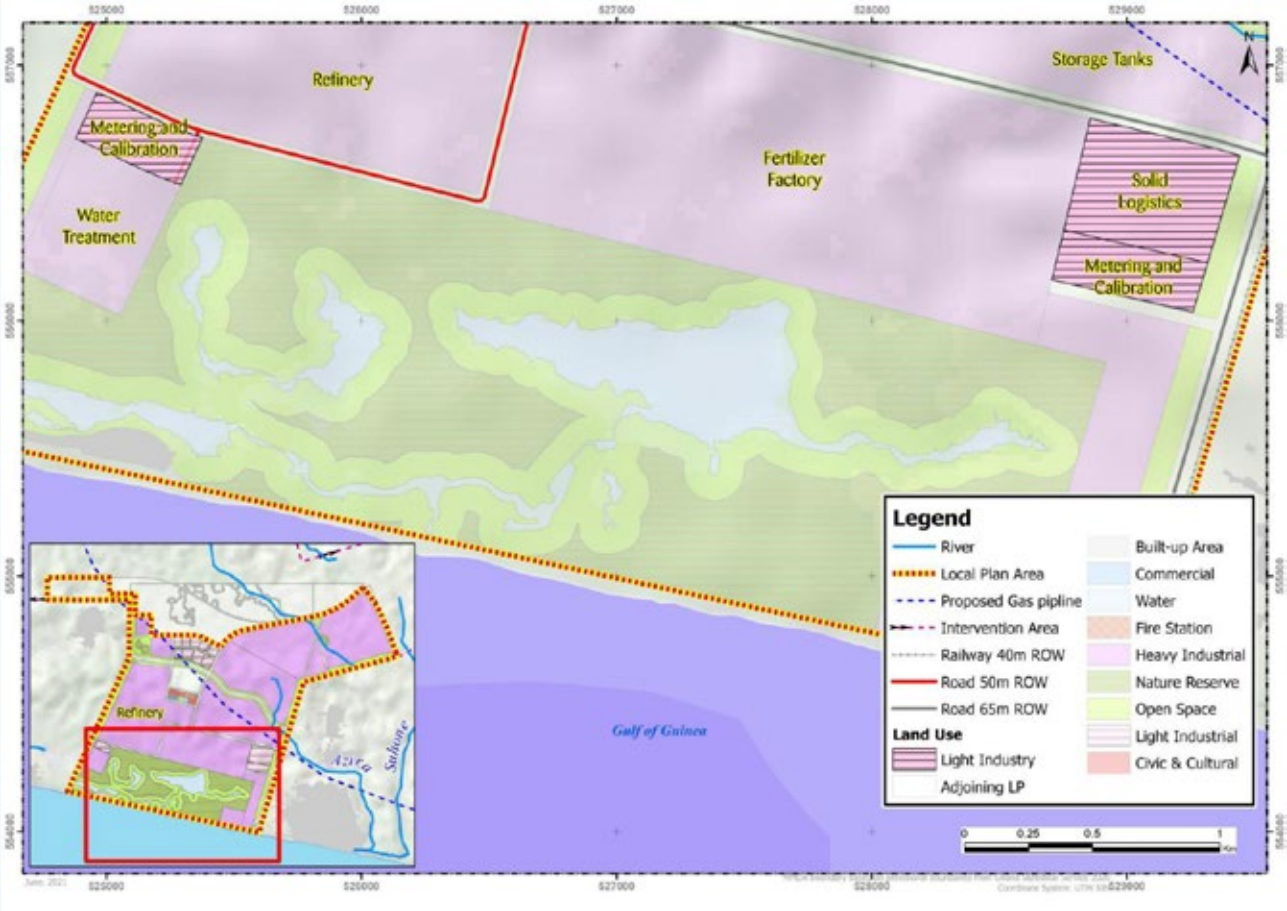
Figure 3.3 Light Industrial Uses (Map A)

Source: LUSPA, 2021

Table 3.3 Details of Land Area per Facility (Light Industrial Uses

Components	Size (Acres)
Laboratory	12.4
Ware House	32.9
Logistics Services	15.4
Equipment Supplies	12.4
Repair Workshop	17.6
Inspection Services	13.4
Construction Services	19.5
Metering and Calibration	50.5
Fabrication Workshop	19.9
Solid Logistics	65.0
TOTAL	**259**

Figure 3.4 Light Industrial Uses (Map B)

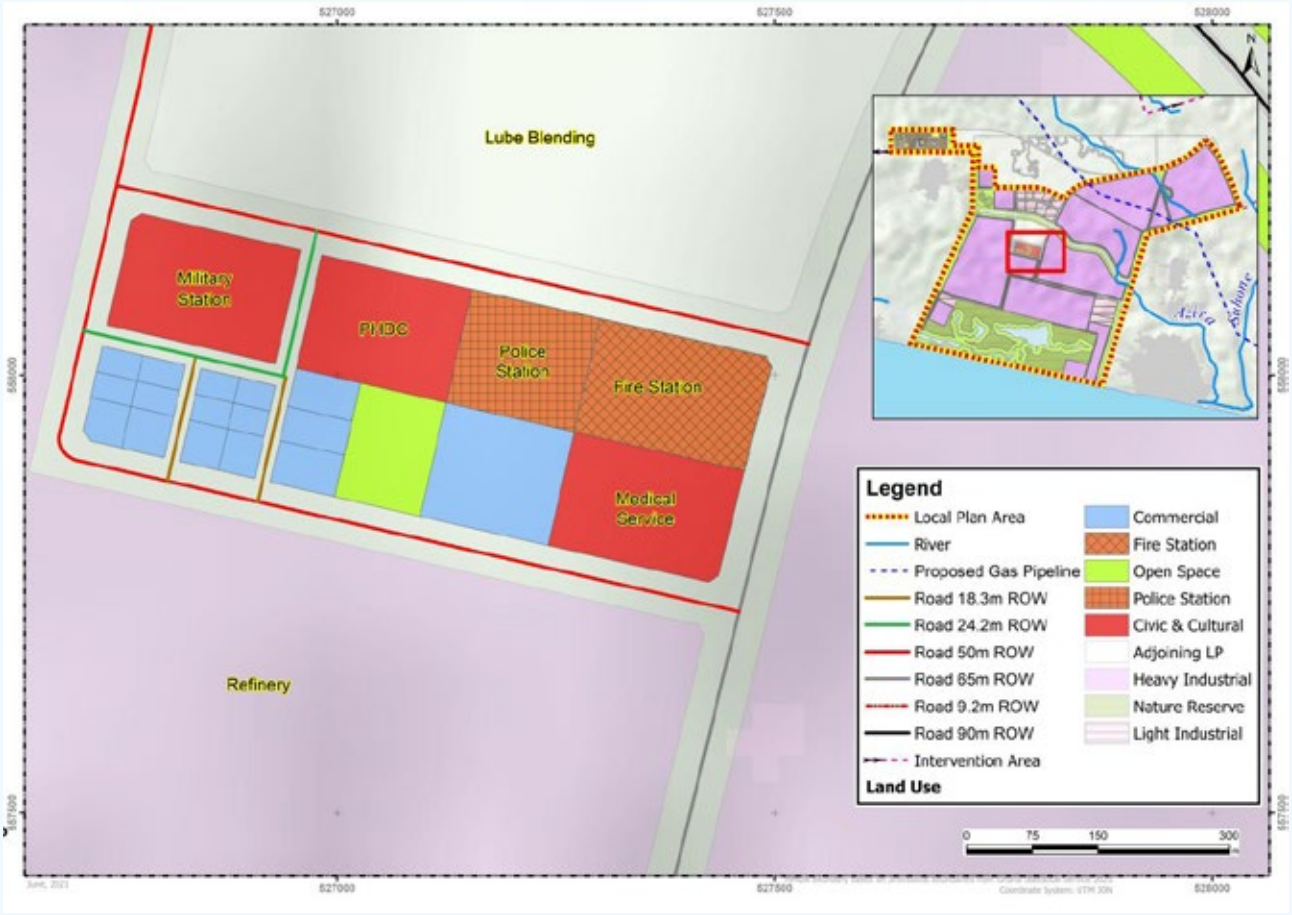


Source: LUSPA, 2021

3.3.3 Civic and Commercial Uses

The Civic and Cultural as well as Commercial uses are depicted by figure 3.5 and table 3.4. These refer to the ancillary uses within the active industrial zone required for the proper functioning of the Hub.

Figure 3.5 Civic and Commercial Uses



Source: LUSPA, 2021

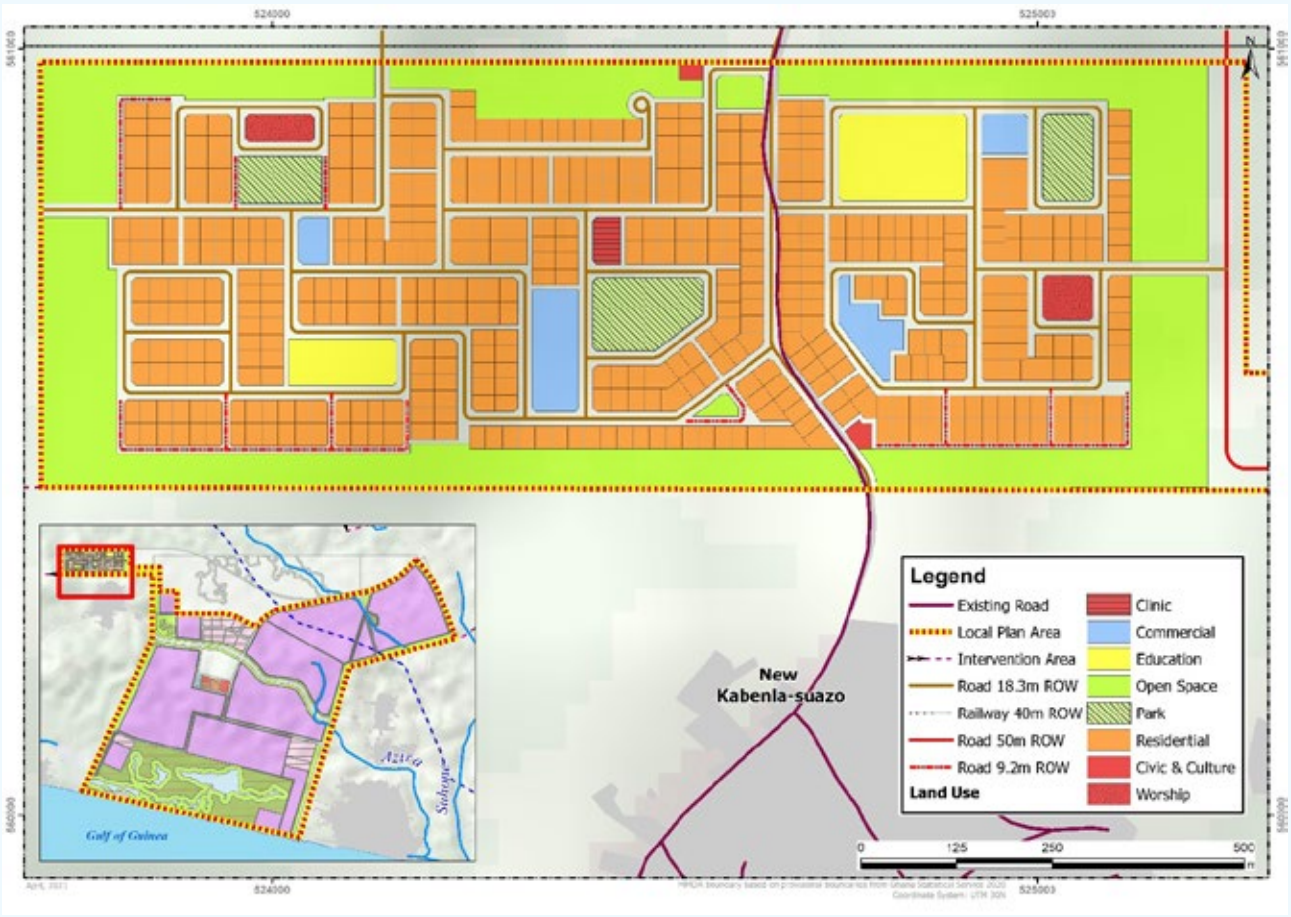
Table 3.4 Details of Land Area per Facility (Civic and Commercial)

Components	**Size (Acre)**
Military Station	6.5
Police Station	4.9
Fire Station	6.6
Medical Services	6.5
Petroleum Hub Development Corporation	5.8
Open Space	3.3
Commercial	12.4
TOTAL	**45.8**

3.3.4 Residential Uses

The residential area covers other pertinent ancillary uses (as indicated at 3.1.2) required for the functioning of the Hub. The residential zone was designed with the intention of promoting walkability, safety and convenience within the residential area as well as aesthetics. In terms of walkability and convenience, other uses within the residential zone such as commercial, civic and cultural uses amongst others have been designated within a distance of 500m. This promotes walking and cycling as alternatives to vehicular transport. Safety concerns have been addressed by ensuring that straight road segments are relatively short (within 400m) and curves have also been introduced into longer segments with the intention of reducing traveling speeds of vehicles. The open spaces provided are both active (parks) and passive to promote active life styles and create an aesthetically pleasing environment whiles preserving the environment to continue playing its ecosystem functions. The spatial distribution and the land intake have been depicted in figure 3.6 and table 3.5.

Figure 3.6 Residential Area of Local Plan



Source: LUSPA, 2021

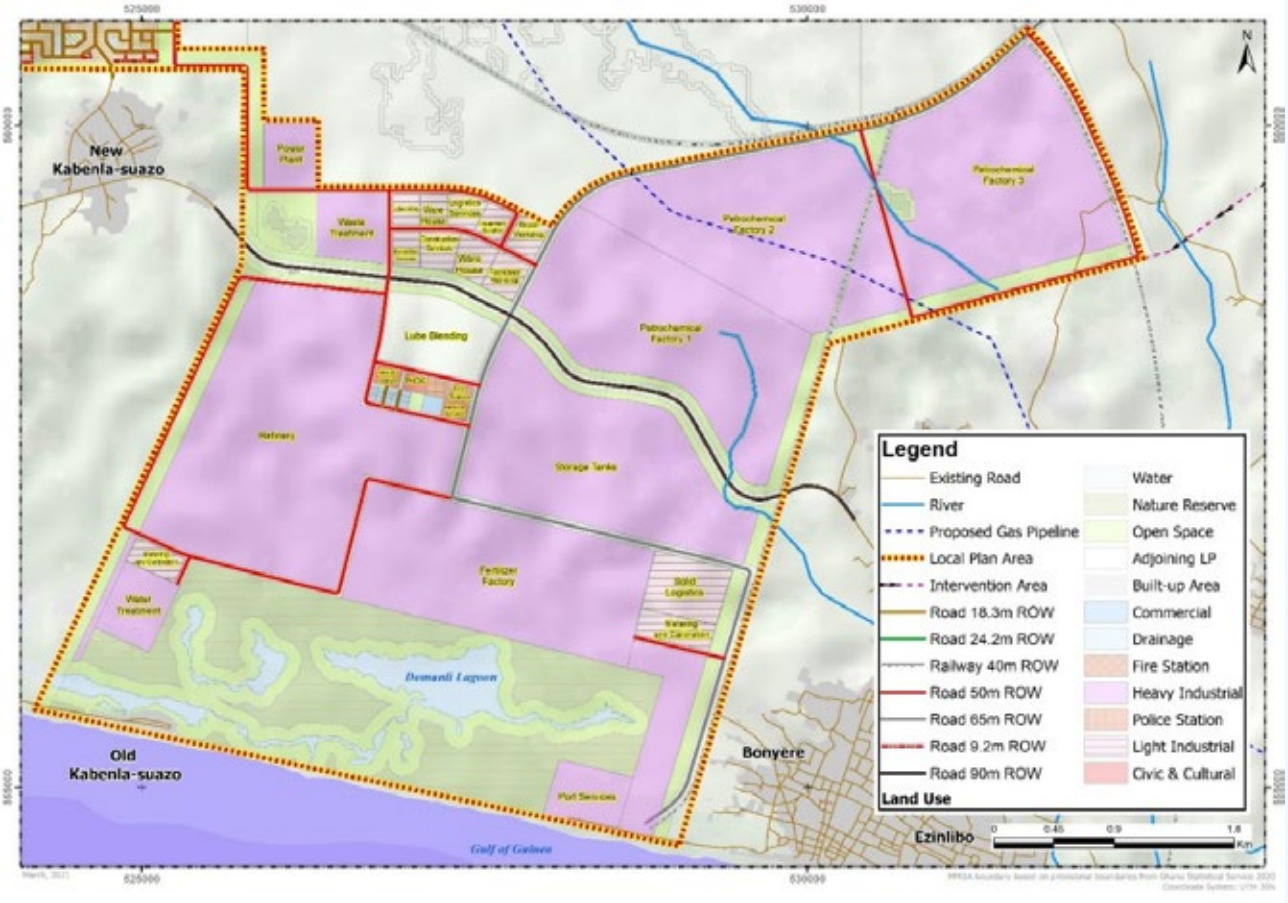
Table 3.5 Details of Land Uses (Residential Area)

Land Uses	Size (Acres)
Residential	83.1
Civic and Cultural	2.6
Commercial	5.1
Educational	6.8
Open Space	64.9
Total	**162.5**

3.3.5 Transportation

This land use addresses transportation in terms of Road and Railway for the entire Local Plan Area for Phase I. Road transport relate to major arterials, distributers and the trunk road which can be found in the predominantly Industrial area as well as access roads and lanes within the residential area. The mode of transport and their respective Right of Ways (ROW) is illustrated by ***figure 3.7, figure 3.8*** and table 3.6.

Figure 3.7 Transportation Modes with the Industrial Area of Local Plan

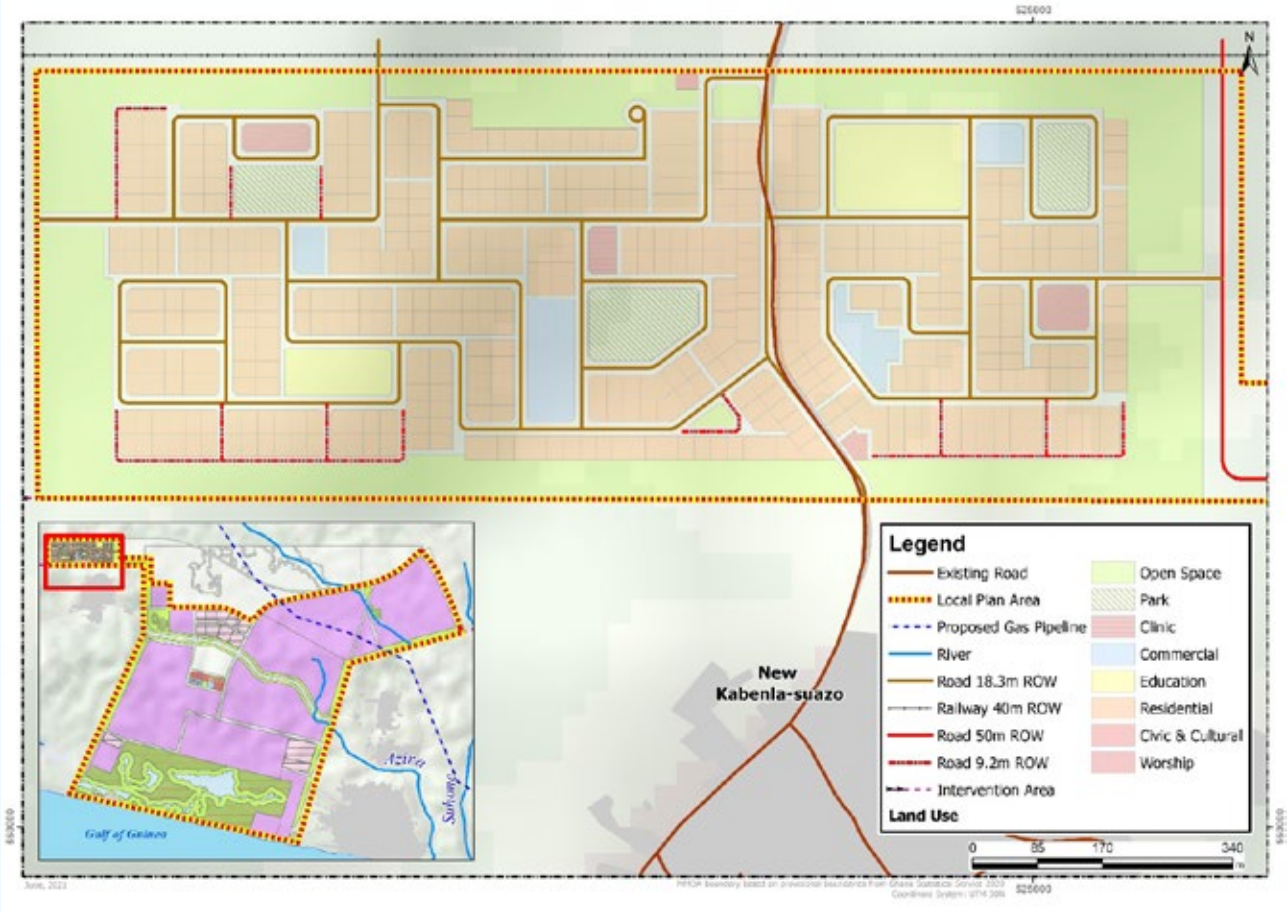


Source: LUSPA 2021

Table 3.6 Details of Transportation mode for the LP

Component	(ROW) Metres	(Length) Kilometres
Major Arterials	65	20.0
Distributers	50	20.3
Trunk	90	4.8
*Access road	18.3	9.3
*Lanes	9.1/6.1	1.7
TOTAL		**56.1**
Railway	**40**	**7.9**

Figure 3.8 Transportation within the Residential Area of Local Plan

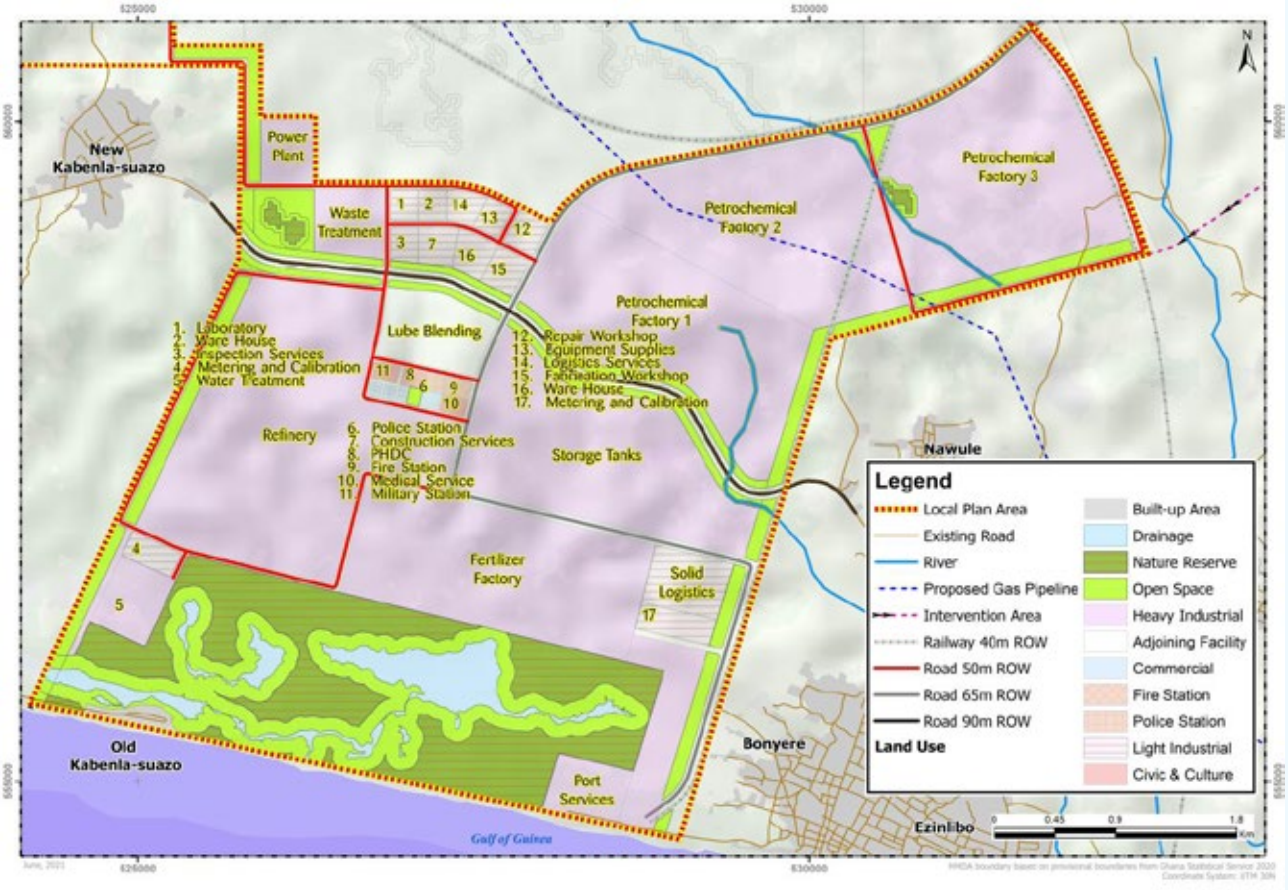


Source: LUSPA, 2021

3.3.6 Nature Reserves and Open Spaces

Areas designated as Nature Reserves, as indicated in section 3.2.1 and table 3.7, are for the purposes of protecting ecosystems such as wetlands, rivers and the Domunli Lagoon. Illustrated in ***figures 3.9 and 3.10*** are open spaces representing both protective buffers and recreational areas within the industrial and residential areas respectively.

Figure 3.9 Nature Reserve and Open Spaces (Industrial Area)



Source: LUSPA, 2021

Table 3.7 Details of Open Spaces

Components	**Size (Acres)**
Nature Reserve	593.4
Open Space	908.0
Lagoon	185.9
TOTAL	**1,720**

Figure 3.10 Recreational Areas and Open Spaces (Residential Area)

Source: LUSPA, 2021

3.4 IMPLEMENTATION OF PROTECTIVE BUFFERS

This is to guide the implementation of the above buffers to ensure its optimum benefits. The following are the various instances:

Situation A

The area concerned is shown by ***figure 3.1*** (Black rectangle – A) adjoining New Kabenla-suaso which is the second major urban settlement in the vicinity of this Local Plan. ***Figure 3.11*** depicts a cross section through the entire residential area of the LP. Starting from the right end shows the protective buffer, then the residential area, the second protective buffer and then the road after which other industrial activities take place. The buffers are providing protection from activities within the Hub area and also serves as a barrier between the Hub area and activities outside the Hub.

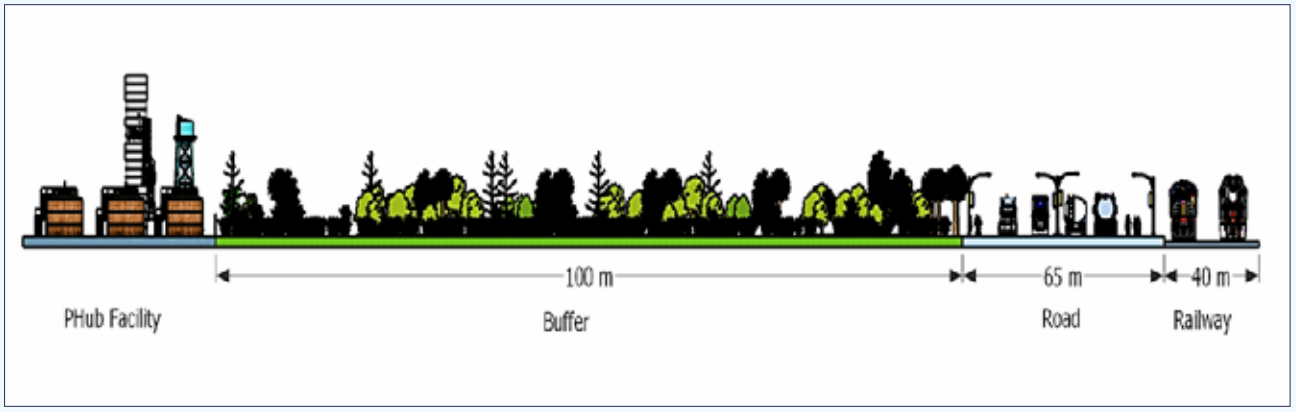
Figure 3.11 Protective Buffers (Situation A)

Source: LUSPA, 2021

Situation B

The area concerned is shown on figure 3.1 (Black rectangle - B) adjoining Bonyere which is the major urban settlement in the vicinity of this Local Plan. Figure 3.12 depicts a cross section through the portion highlighted by the rectangle. Starting from the right end shows the railway, the road, the protective buffer and then the facilities within the Hub. This approach of implementing the buffer is designed with the intention of increasing the distance between industrial activities within the Hub and developments outside the Hub area.

Figure 3.12 Protective Buffers (Situation B)



Source: LUSPA, 2021

CHAPTER FOUR

LOCAL PLAN ZONING REGULATIONS AND PLANNING STANDARDS

4.0 INTRODUCTION

This chapter deals with zoning regulations and management of the Local Plan with emphasis on planning standards relating to land use zoning, permissible ancillary uses, height zoning, greening and permissible plot sizes. In addition, demarcation of parcels, roads and other levels of infrastructure has also been discussed.

4.1 ZONING REGULATIONS AND PLANNING STANDARDS

Land use zoning deals with proposed land use activities in a specified area. The broad uses were designed based on key planning principles of safety, harmony, convenience and environmental sustainability. The allocation of various land uses was carried out based on the Petroleum Hub Master Plan and other ancillary facilities. The dominant land use in the petroleum hub is industrial.

4.1.1 Regulations on setbacks

All proposed development will comply with setback regulations of a minimum of three (3) meter in front, side and rear for the residential enclave. The setback for industrials areas shall be in accordance with acceptable international standards.

4.1.2 Height zoning

The proposed height zoning for the residential zone of the Local Plan will be up to two storeys in the residential enclave (not more than 18m high from ground level). The height zoning for other land uses will be determined based on the nature of anticipated projects and other technical considerations.

4.1.3 Protective Buffers and Open Spaces

Greening or buffering of a minimum of 50 meter between residential areas and other land uses is required within and around the hub ***(see figure 3.11 and figure 3.12).*** Open spaces which are designated as protective buffers should as much as possible have majority of the area covered with vegetation (tree with wide canopy) to serve as windbreaks, noise barrier, passive recreation, among others. In this regard, it is recommended that trees with such properties are deliberately planted to serve this purpose. This must be managed well to ensure its scenic value and its sustainability.

Additionally, open spaces have been designated to serve as recreational areas, to promote predominantly active recreational activities (example, sporting activities) and contribute to aesthetics.

Areas designated as nature reserves are meant to primarily preserve the Domunli lagoon and other wetlands in their natural state. There is the need to manage these areas properly especially the nature reserve around the Domunli Lagoon by engaging relevant stakeholders to promote tourism use as well as conserve it. Physical developments are therefore to be prohibited in this area.

4.1.4 Minimum Parcel size

The minimum parcel size in the residential area is 652.7square meters or 0.16acres (30.5m x 21.4 or 100ft x 70ft). This is to achieve the medium residential density as proposed in the structure plan. The minimum plot sizes will vary for the other land uses depending on the type of facility and other technical considerations.

4.1.5 Utilities

Road reservations as required, have been designed to accommodate utility services such as water, electricity, telecommunication, amongst others. Additionally, pipe lines for the transmission of petroleum and gas products have also been catered for in the road reservations.

4.1.6 Demarcation and Pillaring of Parcels

Demarcation and pillaring of parcels will be based on the Local Plan and will take place after its approval by the Jomoro District Assembly. The period for demarcation of parcels including roads and will take up to a minimum of three months.

4.1.7 Recommendations

The following are recommendation on activities to be to be undertaken

1. A comprehensive hydrological and hydrogeological study should be undertaken to determine the capacity of both underground and surface water sources to make appropriate recommendations for its usage.
2. There is the need for the preparation of a Drainage Plan to ensure flooding does not become a recurring problem due to the generally low elevation of the land.
3. Studies should be undertaken for the port services and its associated facilities like the jetties.
4. A traffic impact assessment should be undertaken on the Half-Assini -Tarkoradi to determine the impact of the project on traffic and vice versa.

The enforcement of the various zoning regulations is paramount to the success of this plan and must be adhered to in all phases of the local planning period. Critical ones are those related to safety and environmental protection.

CHAPTER FIVE

LOCAL PLAN IMPLEMENTATION, MONITORING AND EVALUATION

5.1 INTRODUCTION

The Local Plan implementation is an important component of the planning process and it is regarded as paramount in ensuring orderly development and the realisation of the object of the plan. This chapter contains the implementation, monitoring and evaluation strategy for executing the Local Plan. The recommended approach for monitoring key performance indicators for monitoring and evaluation are also highlighted in this chapter.

5.2 IMPLEMENTATION

The Petroleum Hub Development Corporation (PHDC) will lead the overall implementation of the Local Plan with advisory services from the Land Use and Spatial Planning Authority (LUSPA). The first stage of implementation will involve the opening up of major access routes, and provision of utility services (water, electricity, telecommunication, amongst others). The investment portfolio will be coordinated by the PHDC. Development Permits shall be granted by the Jomoro Spatial Planning Committee. All other permits shall be granted by relevant regulatory institutions.

5.2.1 Key Institutions

The PHDC as established in 2020 by Act 1053 has the sole objective of promoting and developing a Petroleum and Petro-chemical Hub in the country. It is the main institution that will lead the implementation and management of the Local Plan in collaboration with other institutions. Table 5.1 indicate the key institutions and their roles in the implementation of the Local Plan

Table 5.1 Key institutions and their roles

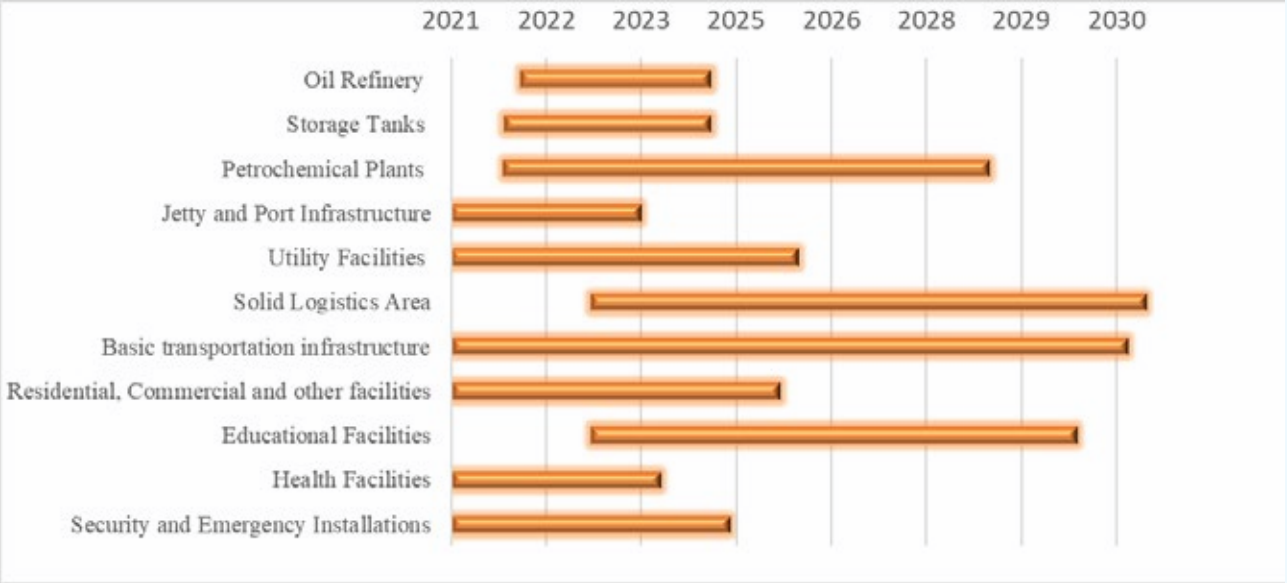
Institution	Roles
Petroleum Hub Development Corporation	Coordinate with other relevant institutions to ensure the successful implementation of the Local Plan
	Facilitate the provision of the utility services for the development of the Hub.
	Undertake monitoring and evaluation of the Local Plan in collaboration with Jomoro District assembly and other relevant institutions
	Collaborate with investors to develop the hub.
Jomoro Municipal Assembly (SPC)	Coordinate with the PHDC in regulating physical development.

LUSPA	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
	Provide guidelines for spatial planning
EPA	Grant Environmental Permits
Investors/ Developers	Undertake physical developments / investment in the plan area
	Comply with zoning regulations of the Local Plan as well as other development regulations and standards pertaining to the type of physical development to be undertaken.
Utility Service Providers	Provide facilities and services to facilitate the development of the plan area such as water and electricity.

5.2.2 Implementation Plan

The Gantt chart in Figure 5.1 shows the timeframe and duration for the implementation of key infrastructure in the Local Plan. The duration of implementation is tentative and can be modified when the need arises.

Figure 5.1 Gannt Chart showing timeframe and duration



Source: LUSPA, 2021

5.3. MONITORING

Monitoring this plan is mainly aimed at determining;

- Whether implementation is being done according to scheduled plan;
- Whether or not targets are being met;
- How the inputs needed for the execution of the plan are being used.

5.3.1 Recommended Approach for Monitoring

The following is recommended as approach for the monitoring of the implementation process of this plan

i. The PHDC will work closely with relevant stakeholders to prepare a comprehensive monitoring and evaluation plan to guide the M&E process of the Local Plan.

ii. The PHDC in collaboration with LUSPA and Jomoro Municipal Assembly shall form a monitoring team to document work progress and provide quarterly progress reports for different tasks carried out in the implementation schedule. The PHDC shall control resource utilization during the implementation phase. The purpose is to ensure that proposals and activities are completed on time and with the least amount of funding possible.

iii. The PHDC in collaboration with LUSPA, MoEn, JMA and other relevant institutions shall review progress report on the implementation of the plan to assess performance and to track weather activities are in accordance with the schedule.

5.3.2 Indicators for Monitoring

The under listed are some recommended indicators that should form the basis for the monitoring of this plan:

1. Conformity of development applications to requirements for zoning?
2. The extent to which activities planned for have been implemented?
3. Have action plans been initiated to manage protection zones around the rivers and water bodies?

5.4 EVALUATION

Evaluation will involve the periodic review of the relevance, planning, performance, efficiency, effectiveness, feasibility, of the plan in relation to its specified targets. The aim of evaluation is to assess the consistency of what has been implemented in space in relation to the plan's goals and objective.

5.4.1 Indicators for Evaluation

The following are some of the indicators for evaluating the Local Plan in terms of how well the proposals, projects slated in the plan have been achieved in relation to the set targets.

1. Are development applicationsin conformity with the requirements for zoning?
2. Is the plan implementation being monitored?
3. Has any land reservations been encroached upon?
4. Has there been any development that has necessitated a change of land use?

5. Is development management according to plan implementation schedule?
6. Has the plan been revised?

5.4.2 Agencies/Institution for Monitoring and Evaluation

The following institutions shall be responsible for the Monitoring and evaluation of all projects and activities of the plan that shall be implemented.

i. Petroleum Hub Development Corporation
ii. The Jomoro Municipal Assembly (The Spatial Planning Committee)
iii. Land Use and Spatial Planning Authority, (LUSPA)
iv. Ministry Of Energy (MOE)
v. Ministry of Trade and Industry
vi. Environmental Protection Agency (EPA)
vii. National Petroleum Authority (NPA)

4.5 CONCLUSION

Implementation, monitoring and evaluation play an important role in success of any plan. Implementation strategy spelt out the key institutions and their roles, as well as institutions responsible for M&E and the step-by-step approach for monitoring and evaluation. Monitoring is done to ensure that planned activities are executed according to schedule. Evaluation is done to assess its relevance, effectiveness, efficiency and impact of the Local Plan to larger community and other beneficiaries.

The Structure Plan (SP) 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 SP 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 SP 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 SP 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, water treatment plant, hydrological assessment is undertaken, flood analysis is conducted, amongst others to ensure the overall success of the Hub.

APPENDIX 1:

DURATION OF IMPLEMENTATION FOR KEY ACTIVITIES

Category	Activities	Start Date	End Date	Duration (in days)	Duration (working days)	Duration (Years)
Key Infrastructure	Oil Refinery	02/04/2022	30/12/2024	1,003	716	2.75
	Storage Tanks	07/01/2022	30/12/2024	1,088	777	2.98
	Petrochemical Plants	01/01/2022	30/12/2028	2,555	1,825	7.00
	Jetty and Port Infrastructure	05/04/2021	30/12/2023	999	715	2.74
Ancillary Infrastructure	Utility Facilities	06/04/2021	06/04/2026	1,826	1,305	5.00
	Solid Logistics Area	07/04/2023	07/04/2031	2,922	2,087	8.01
	Basic transportation infrastructure	08/04/2021	30/12/2030	3,553	2,538	9.73
	Residential, Commercial and other facilities	09/04/2021	30/12/2025	1,726	1,233	4.73
Social Amenities	Educational Facilities	10/04/2023	10/04/2030	2,557	1,828	7.01
	Health Facilities	11/04/2021	11/04/2024	1,096	784	3.00
	Security and Emergency Installations	12/04/2021	12/04/2025	1,461	1,045	4.00

Source : LUSPA, 2021