REPUBLIC OF GHANA

SRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) REPORT

ON THE DEVELOPMENT OF A PETROLEUM HUB IN GHANA

EXECUTIVE SUMMARY

OCTOBER 2022

Republic of Ghana

STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) ON THE DEVELOPMENT OF A PETROLEUM HUB IN GHANA

REPORT

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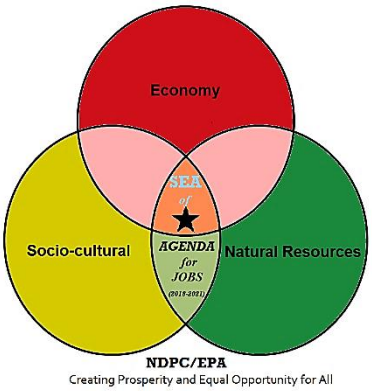

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Table of Contents

Table of Figures

List of Tables

Foreword

The Report summarises the entire process, findings, and recommendations of the Strategic Environmental Assessment (SEA) on the Development of a Petroleum Hub (PHub) in Ghana. The SEA has been conducted to understand and respond to the potential risks, as well as opportunities associated with the development of a Petroleum Hub.

Ghana is well positioned to develop its downstream petroleum sub-sector which will contribute immensely to the economy in terms of revenue generation, job creation, and improved access to petroleum and associated petrochemical products, among others. Upon completion, Ghana would possess enough storage capacity and infrastructure to supply the sub-region and transform the country into a major oil Hub for refined petroleum products in the West African sub-region and Africa.

The SEA has demonstrated the need to strike a balance among the various pillars of sustainability which will be essential to ensuring the sustainability of the downstream petroleum sub-sector. Current global issues such as climate change, health and safety, disaster, and emergency responses, among others in petroleum operations, have been broadly considered in the SEA. Several stakeholders including public and private sectors, Civil Society Organizations (CSOs), traditional authorities, affected communities, academia, etc. participated and contributed to the SEA process. These stakeholder engagements were crucial in the identification and determination of the key issues and concerns that must be addressed through leadership, effective collaboration, and coordination of all relevant stakeholders.

It is expected that all the recommendations and advisory notes will be implemented to ensure the successful development and operations of the Petroleum Hub.

We extend our deepest appreciation to the SEA Team, collaborating institutions, and other relevant stakeholders for their efforts in completing this task.

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Preface

The EPA commenced the SEA (PHub) at the request of the Ministry of Energy as required by the Environmental Protection Agency Act, 1994 (Act 490) and Environmental Assessment Regulations, 1999 (LI 1652).

The SEA Process involved a broad range of stakeholders. The Assessment was carried out in collaboration with the Ministry of Energy, the Ministry of Environment, Science, Technology and Innovation, and the National Development Planning Commission with technical support from the National Petroleum Authority (NPA), the Land Use and Spatial Planning Authority (LUSPA) and the Lands Commission. The heads of these organizations formed the Steering Committee that provided oversight for the SEA. The SEA covered the period from March – November 2021.

A key outcome of SEAs is the documentation of the process and findings to inform publicly accountable decision-making. Three (3) distinct reports covering this Process Report, Content Report and Executive Summary that highlights the main aspects of the SEA including the findings and recommendations are usually produced in the case of the Ghana SEA. However, in this SEA (PHub), all these aspects have been captured in one.

The SEA (PHub) Report has been structured into eight (8) Chapters with an Executive Summary. Chapter one is the Introduction, Chapter 2 provides an Overview of the Petroleum Hub Development, Chapter 3 examines the relevant Institutional, Policy and Legislative Framework, Chapter 4 outlines the Existing Conditions within and around the proposed area, and Chapter 5 covers the Development of an Issues Register, Chapter 6 looks at the Assessment, Chapter 7 outlines the Recommendations and Advisory Notes for addressing the issues, and Chapter 8 concludes the Report with the Implementation and Monitoring Arrangements.

HON. HENRY K. KOKOFU
EXECUTIVE DIRECTOR
ENVIRONMENTAL PROTECTION AGENCY

Acknowledgement

The SEA (PHub) Report was prepared by the Strategic Environmental Assessment (SEA) Team and under the direction and support of the Inter-ministerial Steering Committee.

The Environmental Protection Agency (EPA) is grateful to all stakeholders who participated and contributed to the processes that have led to the successful completion of the SEA. The names of all the participating stakeholder institutions are published and annexed to the SEA (PHub) Report.

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List of Acronyms

AESL	Architectural and Engineering Services Limited
AGI	Association of Ghana Industries
ATK	Aviation Turbine Kerosene
CREMA	Community Resource Management Area
CSOs	Civil Society Organizations
CWSA	Community Water and Sanitation Agency
DFI	Department of Factories Inspectorate
DMTDPs	District Medium-Term Development Plans
DoI	Duration of Impact
EC	Economic Pillar
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESF	World Bank Environmental and Social Framework
FC	Forest Commission
FoC	Frequency of occurrence
GCAA	Ghana Civil Aviation Authority
GEA	Ghana Enterprises Agency
GGSA	Ghana Geological Survey Authority
GIS	Ghana Immigration Service
GMA	Ghana Maritime Authority
GNFS	Ghana National Fire Service
GPHA	Ghana Ports and Harbours Authority
GS	Geographical Scope
GSA	Ghana Standards Authority
GSS	Ghana Statistical Service
GVE	Gender, Vulnerable and Excluded
HSD	Hydrological Services Department
IFC	International Finance Corporation
INS	Institutional Pillar
IBMP	Integrated Biodiversity Management Plan
JMA	Jomoro Municipal Assembly
LC	Land Commission
LI	Legislative Instrument
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LUSPA	Land Use and Spatial Plan Authority

MDAs	Ministries, Departments and Agencies
MESTI	Ministry of Environment, Science, Technology and Innovation
MGCSP	Ministry of Gender, Children and Social Protection
MLNR	Ministry of Land and Natural Resources
MMDA	Metropolitan, Municipal and District Assemblies
MoEn	Ministry of Energy
MOFA	Ministry of Food and Agriculture
NADMO	National Disaster Management Organisation
NCCE	National Commission for Civic Education
NDPC	National Development Planning Commission
NPA	National Petroleum Authority
NR	Natural Resource Pillar
NSDF	National Spatial Development Framework
NVTI	National Vocational Technical Institute
PGA	Peak Ground Acceleration
PHDC	Petroleum Hub Development Corporation
PHub	Petroleum Hub
PIMP	Petroleum Infrastructure Master Plan
PWD	People with Disability
RBZP	Riparian Buffer Zone Policy
REGSEC	Regional Security Committee
RR	Regulatory regime
RTS	Relevance to the SEA
SC	Socio-Cultural Pillar
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
TAs	Traditional Authorities
VRA	Volta River Authority
WRC	Water Resources Commission
WRCC	Western Regional Coordinating Council
WREGSEC	Western Regional Security Committee

Domunli Lagoon, *Photo Credit EPA*

1.0 Background

The Government of Ghana seeks to expand the economy and has outlined several strategies to develop a modern, diversified, efficient and financially sustainable energy sector. One such measure is the Petroleum Infrastructure Master Plan (PIMP) which has led to the proposal to develop a Petroleum Hub (PHub) in Ghana.

The establishment of a Petroleum Hub is one of the Government's strategic anchor initiatives that would serve as a new pillar of growth in the Ghanaian economy. The project will accelerate the growth of Ghana's petroleum downstream sub-sector and make it a major player in the economy. The Petroleum Hub project will increase the presence of major international oil trading and storage companies, create regional trading champions, and encourage joint ventures between local and international companies for knowledge transfer and wealth creation. It will also provide the country with LNG facilities for power production and drive the growth of various industries including petrochemicals. The Petroleum Hub project is expected to transform Ghana's economy and create over 780,000 direct and indirect jobs by 2030. This will also accelerate the growth of Ghana's petroleum downstream sub-sector.

The Petroleum Hub will house refineries, processing, storage, distribution and transportation facilities, jetties, etc. This will facilitate the trading of petroleum products within the West African sub-regional market and beyond. The proposed area for the development of the petroleum hub is the Western Nzema traditional area which is in the Jomoro Municipality of the Western Region. This area was selected based on specified criteria after considering two other alternative areas namely, the Anyinase-Atuabo area in the Ellembele District of the Western Region, and the Saltpond area in the Mfantsiman West District of the Central Region.

2.0 Legal Framework for the SEA

The Strategic Environmental Assessment (SEA) process is aimed at determining the potential environmental risks and opportunities that are likely to be associated with the development of a Petroleum Hub. It is in line with existing legal frameworks for Environmental Assessment in Ghana including Environmental Protection Agency Act, 1994 (Act 490); Environmental Assessment Regulations, 1999 (LI 1652); Petroleum Hub Development Corporation Act, 2020 (Act 1053), the National Development Planning System Regulations, 2016 (LI 2232) and best industry practice guidelines. Relevant details of the institutional, policy and legal framework governing the SEA are presented in Chapter 3.

3.0 Purpose of this SEA

The main purpose of the SEA (PHub) is to guide decision-makers in addressing the opportunities and risks associated with the development of a Petroleum Hub within the Western Nzema Enclave of the Jomoro Municipality, its adjoining districts, as well as the applicable laws and regulations relevant to the development of the oil and gas sector in the study area. More particularly, there is the need to have a holistic view of environmental2 opportunities and risks that may arise because of the Petroleum Hub development.

The purpose of this SEA is, therefore, to ensure that environmental issues are considered in all key decisions concerning the development of the petroleum hub at the earliest stage to achieve the following:

i. Enhance socio-economic opportunities for all including the vulnerable, excluded, women and children.
ii. Protect and enhance the natural resources (ecologically sensitive areas, etc.) on which communities depend for their livelihoods, as well as the survival of the entire ecosystem.
iii. Reduce risks associated with the establishment of the Petroleum Hub, particularly concerning potential conflicts, among others.
iv. Improve the health and well-being of inhabitants by eliminating pollution and reducing accidents. 5. Strengthen local content and participation.
v. Create institutional systems that allow for broad participation in decision-making processes. 7. Enhance the achievement of the African Union (AU) Agenda 2063 targets and related
vi. Sustainable Development Goals (SDGs).

The findings of the SEA would feed into the key elements at the project phase of the implementation as well as the preparation of land use and spatial plans, among others. The SEA will also influence the District Medium-Term Development Plans (DMTDPs) of the Jomoro Municipal Assembly and to some extent, other neighbouring District Assemblies.

3.1 Specific Objectives of the SEA (PHub)

The specific objectives of the SEA are to:

1. Integrate environmental and social considerations in the development of the Petroleum Hub to ensure sustainable development.
2. Identify environmentally sensitive areas and provide guidance for protecting such resources as they coexist with the PIMP.

3. Determine the environmental opportunities and risks associated with various stages of development and present guidelines that will enhance opportunities and minimize risks.
4. Outline mitigation and monitoring requirements and objectives that establish best practices and ensure effective management of the Petroleum Hub.
5. Consider all potential environmental issues and concerns and ensure that they are addressed at the earliest stage of the decision-making process.
6. Compile baseline information on the natural resource, socio-cultural, economic, and institutional conditions of the communities that are likely to be affected.
7. Ensure wider stakeholder participation and involvement in decision-making.

3.2 SEA Approach and Methodology

The SEA (PHub) was conducted based on five (5) main steps illustrated in Figure ES1.0.

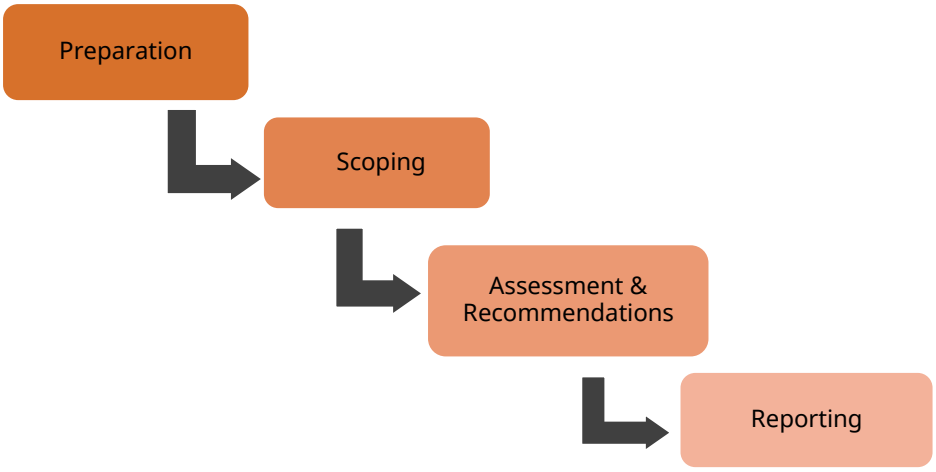


Figure ES1.0: SEA (PHub) Steps

As part of these steps, all stakeholders involved were equipped with basic information on the development of the petroleum hub through the development, evaluation, and communication of development scenarios, among others. Stakeholders engaged in the SEA (PHub) were drawn from relevant Ministries Departments and Agencies (MDAs), Metropolitan, Municipal and District Assemblies (MMDAs), private sector, Traditional Authorities (TA), academia, affected communities, opinion leaders, Civil Society Organizations (CSOs), etc.

4.0 Justification for the Development of a Petroleum Hub in Ghana

Ghana has major advantages which include being a central location in the sub-region, politically stable, access to the sub-regional market, closeness to international shipping routes and macroeconomic stability. In terms of political stability, Ghana has had four successful transitions where different political parties handed over power.

There is an independent judiciary as well as a democratically elected parliament that actively debates national issues, with a vibrant press and civil society. The nation is matured in terms of democratic governance and the rule of law is practised with relative ease. This creates an atmosphere conducive for business enterprises to thrive which serves as a good foundation for trading activities in a Petroleum Hub. Using the most common political and economic indicators such as peace and stability, democratic governance and the rule of law, corruption, macroeconomic stability, poverty reduction and social contract, Ghana has been highly successful in its political and economic development, relative to other developing countries or countries in sub-Saharan Africa.

Currently, it takes a minimum of two weeks to ship petroleum products from Petroleum Hubs in Europe, Asia, and the Americas into the sub-region and in case of a crisis, the sub-region would have no security of supply. From Ghana, a vessel can easily reach any of the countries in the sub-region within forty-eight (48) hours. This situation makes Ghana an ideal destination for the development of a Petroleum Hub. Ghana can provide the platform required for making a trading Hub for petroleum products successful. This includes a network of traders, human capital, financial and trading platform, legal, regulatory and tax framework, infrastructure for physical delivery of products, and a generally conducive business environment. Upon completion, Ghana would possess enough storage capacity and infrastructure to supply the sub-region (including land-locked countries) and transform the country into a major oil Hub for refined petroleum products in the West African sub-region and Africa.

4.1 Description of the Petroleum Hub

The Petroleum Hub is to be situated within the Western Nzema Traditional Area in the Jomoro Municipality of the Western Region of Ghana. The Hub will require a total land size of about 20,000 acres to accommodate the various types of infrastructure necessary for its operations. The Ministry of Energy in collaboration with the Land Use and Spatial Planning Authority (LUSPA) has prepared a spatial plan for the development of the Hub enclave.

The new infrastructure will be developed within and around the Hub to facilitate operations. The infrastructure has been categorized into four (4) which include;

i. Key Infrastructure - Jetties, Storage tanks, Refineries, LNG Facility, Hub transmission infrastructure, Power plant, Petrochemical plant, Lube blending plant, and Transmission and Storage Infrastructure for the land-locked countries.

ii. Infrastructure for Offshore Activities to support Nautical Services, Repair and Maintenance, Exploration and Rig Equipment Servicing, and would also include facilities such as Off-Dock Yard and Dry-Dock Facilities for Vessel Repair, Engineering and Decommissioning.
iii. Ancillary Infrastructure i.e., water treatment facilities, Waste Management Centre, Commercial Services, Residential Area (with Social Amenities), Security and Emergency Response Centre, Solid Logistics, Transportation Network, Laboratory, and a Light to Medium industrial area.
iv. Social Infrastructure including health, educational and training facilities among others.

The key infrastructure has been detailed in the Petroleum Infrastructure Master Plan which would be implemented over 12 years (2018-2030) and would be executed in three (3) phases. This will be preceded by preparatory activities such as land acquisition, the establishment of the development corporation, and the preparation of requisite legal and regulatory frameworks, among others.

Currently, the Petroleum Hub Development Corporation (PHDC) has been established by an Act of Parliament herein referred to as the Petroleum Hub Development Corporation Act, 2020 (Act 1053) to oversee the development, implementation, and management of the Hub. The Corporation will facilitate the acquisition of all the necessary licenses and permits to enable developments to commence. The Hub will be designated as a Free Zone enclave.

4.2 Objectives of the Petroleum Hub

The development of the Petroleum Hub is premised on the following objectives:

a) Create an enabling environment to attract domestic and foreign investments into the oil and gas industry through fiscal and non-fiscal measures.
b) Achieve competitive pricing of petrochemical products and services within the African sub-region by developing oil and gas infrastructure.
c) Provide safe and well-secured infrastructure systems for the petroleum and petrochemical hub.
d) Establish sustainable safety protocols and frameworks to guide effective and safe operation
e) within the Petroleum Hub.
f) Develop highly skilled human resources to participate in the petroleum downstream sub-sector.

This strategic level environmental assessment was carried out on the Petroleum Infrastructure Master Plan by the EPA. Project-level Environmental Impact Assessment (EIA) will also be carried out during the construction, operational, and decommissioning stages of the hub.

Three potential sites were considered, using criteria such as land availability, land suitability, environment and proximity to the sea for the siting of the Hub among other things. Based on the outcomes of extensive stakeholder engagements, the MoEn selected the Domunli enclave, located in the Western Nzema Traditional Area in the Jomoro Municipal Assembly to site the Petroleum Hub. This is in line with the District Spatial Development Framework (SDF) which seeks to strategically position the Jomoro Municipal Area to attract Oil and Gas Investments.

5.0 Baseline Conditions

The SEA generally assessed the baseline conditions within and around the proposed area for the Petroleum Hub area. A baseline study was carried out with the following objectives in mind:

i. provide information on the current status quo in terms of demographics, social amenities and infrastructure, climate characteristics, economic conditions, security and the services sector amongst others
ii. determine the current state of aspects of flora and fauna within the proposed area
iii. assess the ecological importance of the elements of biodiversity.
iv. assess the current land use and land cover status within the proposed area.

5.1 Jomoro Municipal Assembly

The Jomoro Municipal Assembly is one of the 14 districts in the Western Region of Ghana. The Jomoro District was upgraded to Municipal Status in 2017 by Legislative Instrument 2285. The capital town of the Municipality is Half Assini. The total population of the Jomoro Municipality as of 2017 was 187,795; with a projection of 193,901 at the end of 2018. The major occupations of the people in the municipality are farming, fishing and petty trading. The Jomoro Municipality is in the Southwestern part of the Western Region and covers an area of 1,344 square kilometres, which is about 5.6% of the total land area of the Western Region. It is bounded to the south by the Gulf of Guinea, to the west by the Ellembele District, to the east by Cote D'Ivoire and to the north by Aowin and Wassa Amenfi Districts. It lies between latitudes 4°58' N & 5°25'N and between longitudes 2°28'W & 3°7'W.

5.2 Rainfall, Temperature and Humidity

The Petroleum Hub area and its environs experience two wet seasons with year-round rainfall that has double maxima rainfall pattern just like the Jomoro Municipality. The highest monthly mean rainfall occurs between May and June. Rainfall peaks in July and October followed by short spells of the relatively dry season. The Jomoro District is believed to be the wettest part of the country, with its average rainfall exceeding 1,732 millimetres. The rainfall records a double maximum, usually registered from April to July and from September to November. It has a short dry period in August and a much longer dry period from December through January (JMA, 2021).

The district has a monthly mean temperature of 26oC with relative humidity throughout the district being very high at about 90% during the night and falls to about 75% when the temperature rises in the afternoon. The temperature conditions in the area readily support the cultivation of tropical crops such as cassava, oil palm and maize.

5.3 Relief and Drainage

The south-central part of the district including the Ankasa Forest Reserve is an area of undulating granite topography consisting of frequent steep-sided small round hills rising to 61 - 183m above sea level. Around the coastal area, the relief is lower consisting of flat upland areas and steep valleys. A minor relief feature is the one formed by a ridge of highland running northwest to southeast from the Tano to Western Nzema area that terminates on its northern side in the Nawule scarp. The Tano, Ankasa, Suhwen, Elloyin and Amanzulle Rivers and their tributaries drain the municipality. There are several lagoons in the Jomoro Municipality and the largest ones such as the Domunli, the Amanzule and the Dwenye Lagoons are located within the Petroleum Hub area. These water bodies provide an immense support system to the residents as sources of livelihood (through fishing), irrigation, transportation, and other ecosystem services.

5.4 Vegetation

The Jomoro Municipality lies within the tropical forest belt of Ghana, with coastal vegetation being largely mangrove swamps. The original vegetation in the interior parts of the district was the Tropical Rain Forest type characterized by its evergreen scenery with a vast variety of plant species. The Municipality is currently made up of forest vegetation and houses the Ankasa Conservation Area, which is characterized by high forest. There are designated areas of fallow land and tree crops, and farms/plantations There are also major areas of swampy forest, which have not seen much cultivation because of their waterlogged nature for most times of the year (JMA MTDP, 2014).

The vegetation is evergreen, which has influenced edaphic and physiographic factors to create conditions suitable for the growth of various plant species, as well as the cultivation of crops in the area. Two distinct vegetation types corresponding to the terrestrial and coastal habitats were identified in the Hub area and its environs namely the Coastal Grassland and the Terrestrial vegetation.

5.5 Coastline Profile

The Jomoro Municipality has a 61km stretch of coastline which forms about 11% of Ghana's total coastline (550km). The 61km stretch of the coastline consists of 28 settlements including Half Assini, the district capital with most of the settlements being rural. It is characterized by a 50 km stretch of relatively flat sandy beaches and dune systems with an elevation below 10 meters. The Petroleum Hub area covers approximately 5km, representing 8% of the Jomoro Municipality's 61 km coastline. The coastline is linked to rivers, estuaries and the greater part of the vast ecologically significant Amanzule wetland and Domunli lagoon complex. These provide habitats for diverse flora and fauna which are worth preserving. Additionally, they provide essential ecosystem services which are critical for maintaining a healthy fishery. Most of these ecosystems are of national and international significance and hence more efforts are needed to preserve these ecosystems due to their irreplaceability and strong linkage to the livelihoods of the residents.

The rich and largely undisturbed wetlands, estuaries, lagoons and nationally identified ecologically sensitive areas that are in the district have the potential of diversifying the economy via tourism development if properly developed. Due to the action of wind, waves, current and rising sea levels in recent decades, most barrier beaches in Ghana are retreating at a rate of about 1m per year and in the Western region, are estimated to be retreating at 2m per year on average. Erosion, sea-level rise, and sand winning from the beach can all result in land loss and the inland movement of the shoreline. (Coastal Resources Centre, 2013).

5.6 Coastal Dynamics

Due to the action of wind, waves, current and rising sea levels in recent decades, most barrier beaches in Ghana are retreating at a rate of about 1m per year. Within the Petroleum Hub Area, it is estimated to be retreating at 2m per year on average. Erosion, sea-level rise, and sand winning from the beach result in land loss and the inland movement of the shoreline. While the rate of erosion slightly varies from one coastal community to the other, sections of the shoreline within the Municipality are noted to have eroded by approximately 50 meters over the past 2 decades, causing the disappearance of buildings, farmlands, and other properties (Coastal Resources Centre, 2013). Communities experiencing major coastal erosion include Old Kabenlansuazo, Western Nzema, Ezinlibo, Agyeza, Allengenzule, Egbazo and Twenen.

5.7 Wind

A synoptic wind speed record from Axim (a nearby weather station of the proposed site) from 1986 - 2020, ranged from 0.4 - 5 m/s. This range together with air temperature variations over the area largely falls under Pasquil atmospheric stability classes of Class A, Class B, and Class F (Class A – Extremely unstable, Class B – Moderately unstable, Class F – Moderately stable).

5.8 Population

The Jomoro Municipality has an estimated population of 214,438 which represents 7.4% of the total population of the Western Region (LUSPA 2020 based on GSS 2010) It is a 1.05 percent point increase from the previous census year of 150,107 in 2010. The Municipality has a population density of 96 persons per square kilometer (Ghana Statistical Service, population housing census, 2010). The Jomoro Municipality constitutes about 6.3% of the size of the Western Region's population. (Composite Budget for 2019-2022, Programme Based Budget Estimates for 2019, Jomoro Municipal Assembly). The current estimated population of the Petroleum Hub area is 61,663 and is projected to reach 71, 125 by 2025 and 82,410 by 2030 at a growth rate of 15%.

5.9 Economy

The Municipality has 22% of its population in extreme poverty compared with 7.6% for the Western Region. The unemployment rate for the Municipality equals that of the Western Region at 4%. The agricultural sector employs 40% of the population, with manufacturing, wholesale/retail and other sectors employing 18%, 16% and 26% respectively. The major food crops grown in the Municipality include cassava, plantain, rice, cocoyam, yam and maize, with cassava having the highest production at 57,608 tonnes/annum and yam being the lowest at 110 tonnes/annum. Coconut and oil palm are the dominant cash crops cultivated in both the municipality and the Petroleum Hub area. About 37,000 tonnes/annum of coconuts are produced, whilst oil palm accounts for 987 tonnes/annum. Coconut production has a very significant impact on the local economy as it has important value-chain linkages. Coconuts are used in the production of coconut oil, pig feed, charcoal production, door-mat production, and brush production to name a few.

6.0 Development of Issues Register

The development of issues for the SEA was compiled through a systematic process guided by the four (4) pillars of sustainability (i.e., natural resources, socio-cultural, economic, and institutional). All the issues generated relate to the implementation of the Petroleum Infrastructure Masterplan (PIMP). These issues were gathered from various activities including desktop reviews, expert judgement, scenario development and analysis, and stakeholder consultations among others.

6.1 Stakeholder Engagements

The following stakeholder engagements were held as part of the issue's development process:

- Municipal Consultations, Jomoro Municipal Assembly (JMA) – Half Assini
- Community Consultations, Tenack Beach Resort & Hotel - Benyin
- EA Kick–Off/Stakeholder workshop, Movenpick Ambassador Hotel - Accra

6.2 Scenario Development

The development of scenarios is used to facilitate discussions leading to the identification of issues related to the potential risks and opportunities associated with the development of the Petroleum Hub. The scenarios describe planned developments within the Hub based on parameters derived from available information. Assumptions were made in the development of the scenarios. They were categorized into favourable and unfavourable as indicated in Table ES1.0.

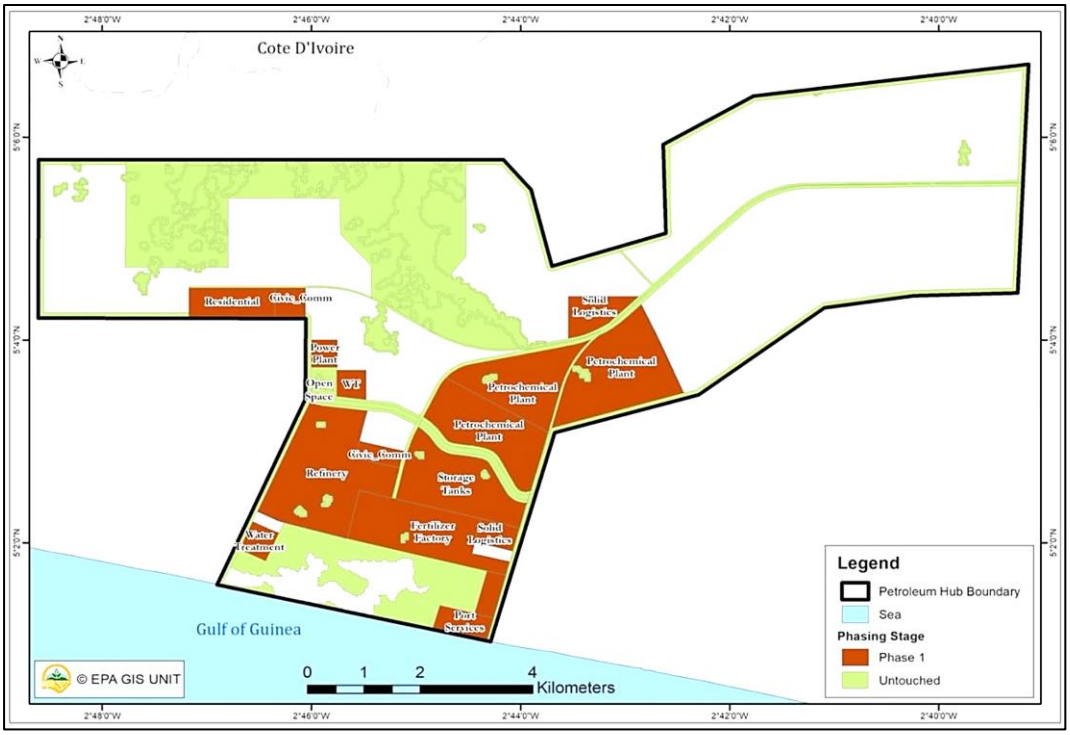
Table ES1.0: Assumptions underlying the Development of Scenarios

Favourable Assumptions	Unfavourable Assumptions
• Political stability • Favourable/preferred investment destination • Adequate and well-defined legal and regulatory framework • Independent judicial system • Availability of litigation-free land • Availability of labour force • Adequate Security	• Shifting investments from hydrocarbons to renewal energies • Low oil and gas prices • Potential transboundary conflicts • The risk of flooding, fire, and explosion • Potential regional threats (terrorism, civil strife, etc.) • Global health threats (COVID-19 Pandemic, HIV, etc.)

Three (3) key scenarios were considered for the petroleum hub development. Scenario 1 – Low Development ("Breaking Grounds"), Scenario 2 – Medium Development ("Home Stretch") and Scenario 3 – High Development ("Crossing the finish line").

6.2.1 Scenario 1 – Low Development ("Breaking Grounds")

This scenario focuses on initial infrastructure development which captures Phase 1 of the Petroleum Hub development. Key infrastructure considered in scenario 1 includes storage tanks, oil refineries, petrochemical plants, jetty and port infrastructure as indicated in Figure ES2.0.

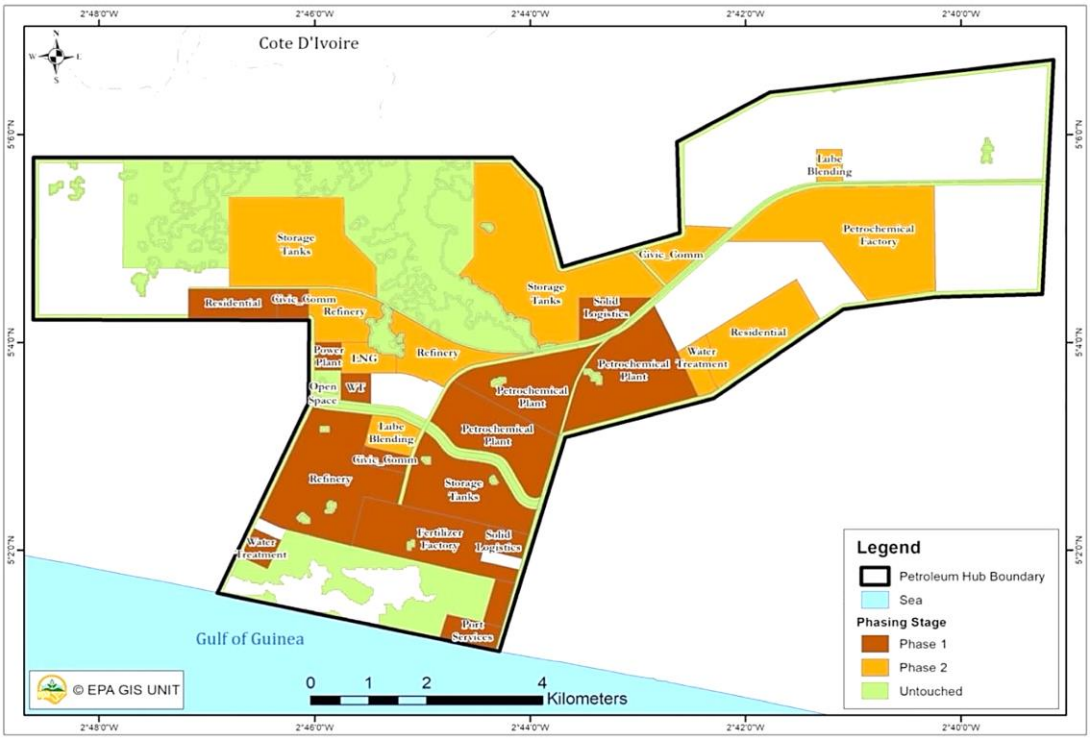


Source: EPA, 2021

Figure ES2.0: Scenario 1 - Low Development ("Breaking Grounds")

6.2.2 Scenario 2 – Medium Development ("Home Stretch")

This scenario focuses on the 2nd phase of the Petroleum Hub development and further incorporates the assumptions of Scenario 1. Key infrastructure in this scenario includes LNG (Onshore) Infrastructure and Lube Blending Plant as indicated in Figure ES3.0.

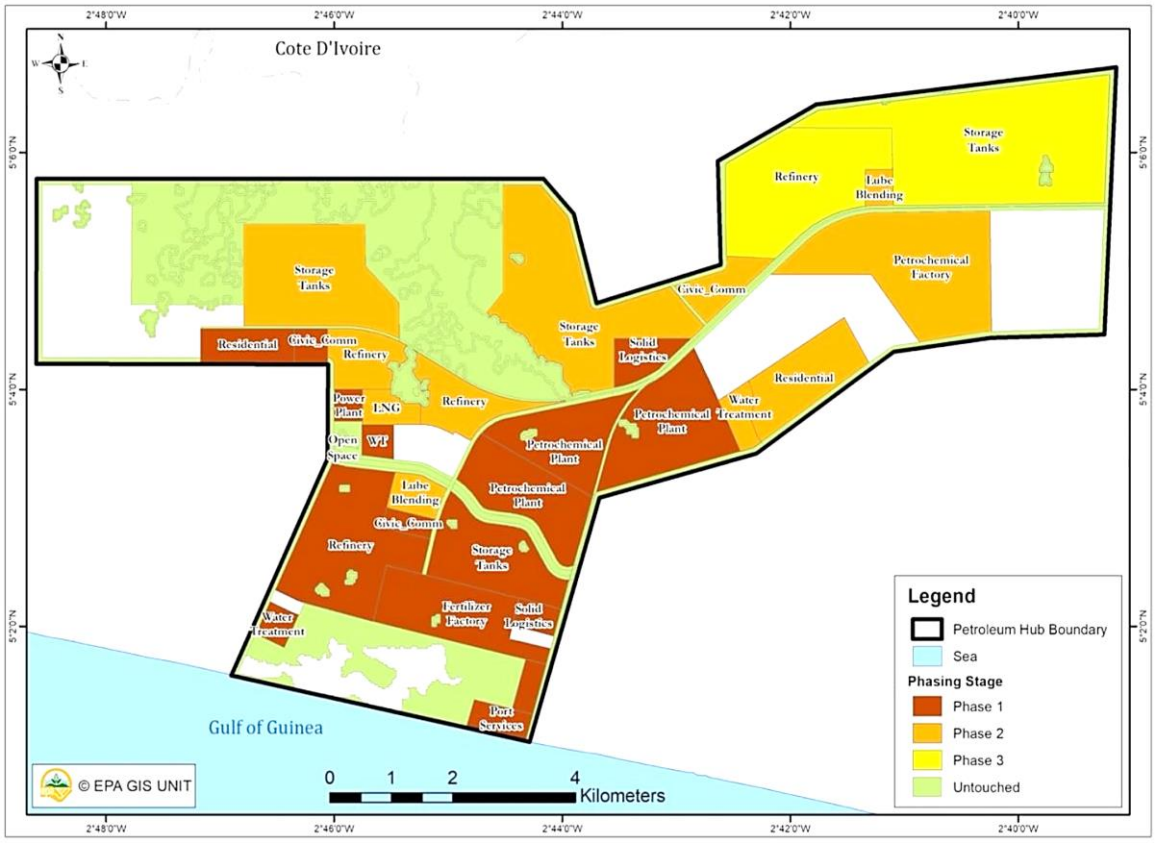


Source: EPA, 2021

Figure ES3.0: Scenario 2 – Medium Development ("Home Stretch")

6.2.3 Scenario 3 – High Development ("Crossing the finish line")

This scenario focuses on the 3rd phase of the Petroleum Hub development and further incorporates the assumptions of Scenarios 1 and 2. Key infrastructure that characterizes scenario 3 includes Oil Refinery - 300,000bpsd capacity, Storage Tanks - 5,000,000 m^3 capacity, and other infrastructure including roads, residential, commercial, and other facilities as indicated in Figure ES4.0.



Source: EPA, 2021

Figure ES4.0: Scenario 3 – High Development ("Crossing the Finish Line")

6.3 Transboundary Impacts

The distance of the enclave to the Ivorian border is approximately 500 m. This proximity to the Ivorian border introduces a high likelihood of transboundary issues related to the following:

- Air Emissions
- Oil Spill
- Fire and Explosion
- Water Pollution
- Invasive Alien Species
- Security threats

There is a need for increased bilateral cooperation in this regard to deal with any potential conflicts that may arise from the hub activities.

7.0 Compilation of Issues Register

Several issues and concerns generated from the scenario development and analysis, document review as well as stakeholder engagement processes were similar. These issues were evaluated, consolidated, and compiled to arrive at the Issues Register. A total of twenty-eight (28) issues were compiled based on the four (4) pillars of sustainability (Table ES2.0).

Table ES2.0: Issues Register

No	Pillars of Sustainability			
	Natural Resources	**Socio-cultural**	**Economic**	**Institutional**
1	Loss of Biodiversity	Migration, in-migration and associated social vices	Limited diversity of jobs (due to the loss of some traditional economic activities such as farming, fishing, etc.)	Weak institutional coordination and collaboration
2	Pollution (Water, Land, Air and Noise)	Impacts on Eco-tourism	Inadequate capacity of Locals to participate in the development and implementation of Petroleum activities.	Inadequate capacity of institutions to enforce existing laws
3	Climate Change Issues	Health and Safety Issues	Creation of Jobs and job losses	Haphazard physical development of adjoining communities
4	Coastal Erosion	Resettlement and compensation including land ownership, acquisition, and conflicts	High Cost of Living	Lack of waste management infrastructure (hazardous and non-hazardous waste)
5	Oil Spills and Leakages	High expectations of locals	Gender marginalisation especially women, children, the vulnerable and excluded	Skills and technology transfer
6	Hazard risks (flooding, fire, and explosion)	Alternative livelihood opportunities		Transboundary conflicts
7	Discharges of ballast water and associated invasive alien species, etc.	Inadequate infrastructure (Schools, water, electricity, hospitals, etc.)		Increased maritime traffic
8		Food insecurity		
9		Cultural/Religious Issues (cultural heritage, chance finds, festivals, cemeteries, etc.)		

7.1 Determination of Key Issues and Level of Significance

The issues gathered from the different processes including document review, scenario analysis by expert inputs and stakeholder consultations were compiled into an Issues Register of twenty-eight (28) issues. Further analysis was carried out to determine the most significant issues that require attention in the SEA. The level of significance of each issue was determined based on the following criteria:

- Frequency of occurrence (FoC) refers to the number of times the issue was raised
- Relevance to the SEA (RTS) refers to the strategic importance of the issue (High relevance issues are strategic, whereas Low relevance issues are project-related and can be handled by EIA)
- Geographical Scope (GS) refers to the coverage of the issue i.e., international, national, regional, district or local. NB: International is the highest geographical scope in the evaluation
- Duration of Impact (DoI) refers to the time duration that the impact arising from the issue will persist. Extended duration is more than 5 years, and Short is less than 5 years
- Impact Evaluation refers to the perceived magnitude (intensity, severity, etc.) of the impact, which is classified as high, medium, or low
- Regulatory regime (RR) refers to the priority of the issue to conventions, laws, customary laws (taboos, values, and norms) and regulations

The level of significance for the different issues was finally determined by the consideration of all the above criteria. The results were classified as **High (Red), Medium (Yellow), or Low (Green)**. A total of fourteen (14) out of the twenty-eight (28) issues were determined to be of high significance (key issues). Details of the evaluation are presented in Table ES3.0.

Table ES3.0: Determination of Issue Significance

No.	Issues	Source of Issue			FoC	RTS	GS	DoI	Impact Evaluation			RR	LS
		LUSPA	Scenario	Stakeholder Engagements					H	M	L		
Natural Resources													
1.	Loss of Biodiversity	x	x	x	39	x	I	E	x			x	High
2.	Pollution (water, land, air, and noise)	x	x	x	36	x	I	E	x			x	High
3.	Climate Change Issues	x		x	12	x	I	E	x			x	High
4.	Coastal erosion	x		x	3	x	N	E		x		x	Medium
5.	Oil spills and leakages			x	4	x	I	E	x			x	High
6.	Hazard risks (Flooding, fire, and explosion)	x		x	6	x	I	E	x			x	High
7.	Discharges of ballast water and associatedInvasive Alien species, etc.			x	6	x	I	E		x		x	Medium
Socio-cultural													
1.	Migration, in-migration and associated socialvices	x	x	x	35	x	I	E	x			X	High
2.	Impacts on Eco-tourism	x		x	16	x	I	E		x		X	Low
3.	Health and Safety Issues	x	x	x	45	x	I	E	x			X	High
4.	Resettlement and compensation includingland ownership, acquisition, and conflicts		x	x	34	x	L	S		x		X	High

No.	Issues	Source of Issue			FoC	RTS	GS	DoI	Impact Evaluation			RR	LS
		LUSPA	Scenario	Stakeholder Engagements					H	M	L		
5.	High expectations of locals		x	x	7	x	R	E	x				High
6.	Alternative livelihood opportunities	x	x	x	7	x	L	S		x			Medium
7.	Inadequate infrastructure (Schools, water,electricity, hospitals, etc.)	x	x	x	41	x	D	E		x		X	Medium
8.	Food insecurity		x	x	16	x	D	S		x		X	Medium
9.	Cultural/Religious Issues (cultural heritage,chance finds, festivals, cemeteries, etc.)	x			6	x	L	S			x	X	Low
Economic													
1.	Limited diversity of jobs (due to the loss of some traditional economic activities such as farming, fishing, etc.)	x		x	20	x	D	E		x			Medium
2.	Inadequate capacity of Locals to participate in the development and implementation of the Petroleum activities.			x	13	x	N	E	x			x	High
3.	Creation of Jobs and job losses		x	x	10	x	N	E	x			x	High
4.	High Cost of Living			x	18	x	R	E		x			Medium
5.	Gender marginalization especially women, children,the vulnerable and excluded			x	7	x	L	E		x		x	High

No.	Issues	Source of Issue			FoC	RTS	GS	DoI	Impact Evaluation			RR	LS
		LUSPA	Scenario	Stakeholder Engagements					H	M	L		
Institutional													
1.	Weak institutional coordination and collaboration			x	15	x	N	E		x		x	Medium
2.	Inadequate capacity of institutions to enforce existing laws	x		x	16	x	I	E		x		x	Medium
3.	Haphazard physical development of adjoining communities			x	8	x	D	E		x		x	Medium
4.	Lack of waste management infrastructure (Hazardous and non-hazardous waste)	x	x	x	12	x	I	E	x			x	High
5.	Skills and technology transfer		x		3	x	I	E		x		x	Medium
6.	Transboundary conflicts		x		1	x	I	E	x			x	High
7.	Increased maritime traffic		x		1	x	I	E		x		x	Medium

8.0 Recommendations of the SEA (PHub) & Monitoring Plan

Issues	Recommendations	Indicators	Responsible Institution	Remarks
Natural Resource				
Loss of Biodiversity	1. Implement the Riparian Buffer Zone Policy for the management of water bodies and wetlands within the Petroleum Hub.	• Level of compliance withall the prescribed buffer allowances in the Spatial Plans for the Hub • Number of projects thathave complied with theprescribed buffer allowances	**Lead:** PHDC **Collaborators:** Water Resource Commission (WRC), EPA, FC, JMA, TAs, Local Communities, Forestry Commission, NADMO, MOFA, CREMA Committee	The compliance should be based on the buffer widths of the RBZP
	2. Develop and implement an Integrated Biodiversity Management Plan (IBMP) with consideration for Gender, the Vulnerable and Excluded (GVE).	• Integrated Biodiversity Management Plan developed • Level/ extent ofImplementation • The extent of the role of women inthe implementation	**Lead**: PHDC **Collaborators:** MESTI, NDPC, EPA, MLNR, MGCSP, FC, TAs, JMA, CSOs, Local Communities, Department of Social Welfare & Community Development, CREMA Committee.	Percentage of implementation
	3. Ensure compliance with industrial pollution control limits	• The level of compliance with industrial pollution	**Lead:** EPA **Collaborators:** PHDC, WRC, National Petroleum Authority (NPA), Local Communities, Petroleum Commission, Energy Commission, Ghana Maritime Authority (GMA), CREMA Committee	The pollution limit control will be measured by the standards of the Ghana Standard Authority (i.e., GS 1236, 2019 etc.).

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	4. Monitor and evaluate emissions levels.	• Frequency of monitoring emission levels • Number of evaluations conducted • Impacts of levels of emissions	**Lead:** PHDC **Collaborators:** EPA, WRC, JMA, TAs, CSOs	Levels of measurement within the permissible limit
	5. Establish a Biodiversity Offsetting System (BOS) for Petroleum Hub activities with special consideration for women, children and the vulnerable	• Biodiversity Offsetting System with a focus on thevulnerable established	**Lead:** EPA **Collaborators:** PHDC, NDPC, MESTI, MLNR, MGCSP, FC, TAs, JMA, CSOs, Local Communities, CREMA Committee	Several segments of the system might take a while to establish. The key ones such as the biodiversity off-setting plan can be measured from the onset
	6. Ensure coordination andcollaboration among all stakeholders within the Petroleum Hub	• Level of collaboration and extent of coordination	**Lead:** PHDC **Collaborators:** EPA, JMA, NPA, Women Groups, Identifiable Groups, TAs, CSOs	Criteria such as the number ofmeetings, MOUs signed, etc. can be used. Efforts should be made to include women representatives and the vulnerable in all engagements
	7. Explore options for sustaining various uses of resources and benefits obtained from the ecosystems with consideration for gender, thevulnerable and the excluded	• Number of sustained resource use and benefits from ecosystem services	**Lead:** PHDC **Collaborators:** WRC, NPA, MESTI, EPA, Forestry Commission, Women Groups, CSOs, Ministry of Gender, Children and SocialProtection (MGCSP)	Several sustainable resource use/benefit activities linked to the existing CREMA should co-exist with the Hub i.e., organic coconut virgin oil production, coconut charcoal, livestock farming, etc. Efforts should be made to disaggregate results for the

Issues	Recommendations	Indicators	Responsible Institution	Remarks
				various groups as measured by the indicators
Pollution (Water, Land, Air, and Noise)	1. Implement the Riparian Buffer Zone Policy for the management of water bodieswithin the Petroleum Hub	• Level of compliance withall the prescribed buffer allowances in the spatial plans for the Hub • Number of projects that have complied with the prescribed buffer allowances	**Lead:** PHDC, **Collaborators:** EPA, WRC, JMA	The compliance should be based on the buffer widths of the RBZP. The focus is on pollution.
	2. Ensure compliance with maritime, and industrial pollution control limits	• Level of compliance with industrial pollution control limits	**Lead:** PHDC **Collaborators:** EPA, WRC, NPA, GMA`	The pollution limit control will be measured by the standards of the Ghana Standards Authority (GS 1236, 2019; GS 1222, 2018; GS 1212, 2019) Levels of measurement within the permissible limit
	3. Ensure compliance with developed land use and zoning plans to protect or conserve ecological or biological sensitivity areas within and outside the	• Level of compliance with Spatial Plans	**Lead:** PHDC **Collaborators:** LUSPA, EPA, WRC, JMA, FC, CSOs	

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	boundaries of the Hub.			
	4. Monitor cumulative impacts of all emissions and effluent from all industries within the Hub enclave	• Frequency of monitoring cumulative impacts	**Lead:** PHDC **Collaborators:** EPA, WRC, NPA, FC, CSOs	
	5. Ensure compliance with Ghana Standard for Environmental Protection – Requirements for Effluent Discharge (GS 1212, 2019).	• Level of compliance with Requirements for Effluent Discharge (GS 1212, 2019)	**Lead:** PHDC **Collaborators:** EPA, WRC, NPA, and Ghana Standards Authority (GSA)	
	6. Ensure compliance with Ghana Standard for Environment and Health Protection -Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236, 2019).	• Level of compliance with Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236, 2019)	**Lead:** PHDC **Collaborators:** EPA, WRC,NPA, GSA	
	7. Ensure compliance with Ghana Standard for Health Protection – Requirements for Ambient Noise Control (GS 1222, 2018)	• Level of compliance with Requirements for Ambient Noise Control (GS 1222, 2018)	**Lead:** PHDC **Collaborators:** EPA, WRC,NPA, GSA	

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	8. Ensure collaboration with neighbouring countries that may be affected by activities of the Petroleum Hub.	• Extent of collaboration	**Lead:** PHDC **Collaborators:** NPA, EPA, Ministry of Foreign Affairs and Regional Integration, GMA	Some of the parameters /Criteria will be protocol, agreement, MOU, etc.
Climate Change Issues	1. Adopt and implement a low carbon growth strategy including afforestation for operations in the Petroleum Hub with consideration for Gender, the Vulnerable and the Excluded (GVE).	• Low carbon growth strategy adopted	**Lead:** PHDC **Collaborators:** MESTI, EPA, Ministry of Finance (National Designated Authority).	This should be supported by documentation. Efforts must be made tointegrate GVE considerations
	2. Mainstream climate change issues into all activities within the enclave with consideration for Gender, the vulnerable and the excluded.	• Extent/level of climate change issues mainstreamed	**Lead:** PHDC **Collaborators:** NDPC, MESTI, EPA, MGCSP, Ministry of Finance (National Designated Authority).	Mainstreaming has several segments that are evident in policy framework, planning, budget and implementation, monitoring and evaluation
Hazard risks (Flooding, fire, and explosions)	1. Put measures in place to minimize the impact of coastal erosion and potential sea-level rise	• Number of measures in placeto minimize the impact of coastal erosion and potential sea-level rise	**Lead:** PHDC **Collaborators:** Hydrological Services Division (HSD), GGSA, EPA, JMA, LUSPA, NADMO and Fisheries Commission	The measures to be developed should consider GVE

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	2. Ensure robust, resilient, and green infrastructure to withstand potential floods, earthquakes, and tremors	• Approval and certification of the infrastructure designs • Intensity of supervisions • The extent to which infrastructure conforms to Codes and Standards	**Lead:** PHDC **Collaborators:** GGSA, NADMO, Ghana HighwaysAuthority, Department of Urban Roads, NDPC, JMA,AESL, GPHA, Ghana Railway Development Authority, NPA, LUSPA, Ghana Civil Aviation Authority (GCAA), Ghana Institution of Engineers and other relevant bodies,	Ghana Building Code Shorelines should be reinforced Structures should withstandthe PGA 0.25 concerning earthquake The human factor should be critically looked at.
	3. Minimize the risks from fire and explosions	• Robust operations and integrity management systems established for theHub • Number of events/incidents related to fire and explosion emergencies	**Lead:** PHDC **Collaborators:** NPA, EPA, Ghana National Fire Service, NADMO, JMA, Ghana Police Service	Developing strategies to manage the risks must take into consideration GVEs
	4. Develop a system to minimize the impact of emissions on nearby local communities and areas beyond our national borders	• System to minimize theimpact of emissions developed • Level of compliance with emissions requirements	**Lead:** PHDC **Collaborators:** EPA, GSA,NPA, JMA	System to include stack designs, etc.

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	5. Develop an Ecosystem-based Disaster ManagementPlan for the Petroleum Hub	• Ecosystem-based Disaster Management Plan developed and operationalized	**Lead:** PHDC **Collaborators:** NADMO, JMA, EPA, NPA, GNFS, Ghana Ambulance Service, Ghana Police Service, Ghana Armed Forces, FC, WRC	
Socio-cultural				
Migration, in-migration and associatedsocial vices	1. Investments must be made inthe provision of social infrastructure such as water supply, toilet facilities, hospitals, schools, and waste treatment facilities (such as incinerators, and engineered landfill sites) among others with consideration for GVE	• Quantum of investments intothe provision of social infrastructure • Level of investments into the provision of social infrastructure • Number of women, children and the vulnerable benefitingfrom the investment	**Lead:** Jomoro Municipal Assembly (JMA) **Collaborators:** Community Water and Sanitation (CWSA), Ghana Health Service, Ghana Education Service, PHDC, Investors, NDPC, Ministry of Gender, Children and Social Protection (MGCSP)	The investments should be prioritized within the District Medium-Term Development Plan (DMTDP) and Budgets and the Strategic Plan of the PHDC. The total cost of the social infrastructure is estimated at USD 6 Billion.
	2. Affordable housing schemes should be provided within the Petroleum Hub enclave and surrounding communities with consideration for GVE, and PWD	• Number of affordable housing schemes providedwithin and outside the Hub • Number of Affordable Houses being used • Number of women, children and the vulnerable benefiting from the affordable housing schemes	**Lead:** PHDC, Jomoro Municipal Assembly **Collaborators:** JMA, State Housing Corporation, Department of Rural Housing and Cottage Industries, CSOs, TAs, Workers in the Hub, Ministry of Gender, Children and Social Protection, Real Estate Developers	The involvement of workers in the M&E is key i.e., participatory monitoring In the Municipality, communities' involvement in the M&E is key regarding participatory monitoring Housing designs should be Disability friendly.

Issues	Recommendations	Indicators	Responsible Institution	Remarks
Health and Safety Issues	1. Environmental Assessment Regulation, 1999 (LI 1652), Regulations 5 and 6 on Health and Safety must be fully complied with during project planning and implementation	• Level of compliance of Regulations 5 and 6 of Environmental Assessment Regulation, 1999, LI 1652	**Lead:** EPA **Collaborators:** DFI, National Petroleum Authority, PHDC, Ghana Health Service, Ghana National Fire Service, GSA	
	2. The provisions of the Factories, Offices and Shops Act, 1970 (Act 328) must be fully complied with in all undertakings.	• Level of compliance with the provisions of the Factories, Offices and Shops Act, 1970(Act 328)	**Lead:** DFI **Collaborators:** PHDC, EPA, National Petroleum Authority, DistrictAssemblies, Ghana Health Service, Ghana National Fire Service	Emphasis is on Occupational Health and Safety
	3. The Petroleum Hub Development Corporation (PHDC) must develop specific health and safety guidelines for the Petroleum Hub.	• Number of guidelines developed	**Lead:** PHDC **Collaborators:** EPA, National Petroleum Authority, Ghana Health Service, Ghana National Fire Service, JMA	

Issues	Recommendations	Indicators	Responsible Institution	Remarks
Resettlement and compensation including land ownership, acquisition,and conflicts	1. Ensure the implementation of a sustainable compensation mechanism that spans the lifetime of the Petroleum Hub. Options such as using the lands as equity, providing pension benefits for the aged, etc. could be considered for the compensation of affected persons especially women, the vulnerable and the excluded	• Level/extent of implementation of a sustainable compensation mechanism for affected persons especially women, the vulnerable and the excluded/marginalized.	**Lead:** Lands Commission **Collaborators:** PHDC, JMA, CSOs, Ministry of Gender, Children and Social Protection, TAs	Compensations should focus on intergenerational benefits to the affected persons.
	2. Compensation must beadequate and timely	• Quantum of compensation • Value of the land/property • Turn-around time for administration of compensation	**Lead:** PHDC **Collaborators:** Ministry of Energy, Ministry of Finance, Lands Commission, Ministry of Lands and Natural Resources	Timely payment of compensation is in line with the two (2) year payment period stipulated in section 240 subsection 2of the Lands Act 2020, Act1036.
	3. Alternative Livelihood and Support Schemes such as the Livelihood Empowerment Against Poverty (LEAP) must be extended to cover affected groups and individuals who cannot be trained in alternative livelihood schemes especially the aged, women, the vulnerable and the excluded/marginalized.	• Number of Livelihood Support Schemes made available • Number of gender-disaggregated beneficiaries of Livelihood Support Schemes	**Lead:** PHDC **Collaborators:** CSOs, Private Investors, JMA, NDPC, Ministry of Gender, Children and Social Protection, TAs.	

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	4. Groups or persons whose lands will be affected in the development of the Petroleum Hub and who are employable may be given priority for appropriate employment opportunities within the Hub especially women and the vulnerable.	• Number of affected persons employed	**Lead:** Investors **Collaborators:** PHDC, NDPC, JMA, Ministry of Gender, Children and Social Protection.	Prioritized employment for affected locals The indicator should be disaggregated by GVE,PWD, etc.
High expectations of locals	1. Awareness creation programsshould be instituted to manage the expectations of the locals	• Number of awareness programmes created to manage the expectations ofthe locals • Level of awareness createdto manage the expectationsof the locals	**Lead:** PHDC **Collaborators:** JMA, NCCE, CSOs, Ministry of Gender, Children and Social Protection, TAs	Perception surveys may be used to assess the level of awareness among both men and women.
	2. Grievance and conflict resolution programmes should be instituted	• Number of grievance and conflict resolution programmes instituted • Level of understanding and cooperation among locals • Use of available GRM and Conflict Resolution systems	**Lead:** PHDC **Collaborators:** JMA, NCCE, CSOs, Ministry of Gender, Children and Social Protection, TAs, Local Communities	Perception surveys may be used to assess the level of understanding among men and women as well as the use of available GRM and Conflict Resolution systems

Issues	Recommendations	Indicators	Responsible Institution	Remarks
Economic				
Inadequate capacity of locals to participate in the development and implementation of the Petroleum activities	1. Develop and implement capacity-building programmes including relevant technical and vocational skills for the locals, CSOs, academia, Traditional Authorities (TAs), and Association of Ghana Industries (AGI), among others with consideration for GVE.	• Number of capacity-building programmesdeveloped • Level of implementationof capacity-building programmes • Number of disaggregated beneficiaries of the capacity-building programmes includingthe vulnerable and excluded	**Lead:** PHDC **Collaborators:** JMA, NVTI, NCCE, Traditional Authorities, CSOs, Community, Ministry of Gender, Children and Social Protection, AGI.	These indicators should be disaggregated by GVE, PWD, etc.
Creation of Jobs and Prevention of Joblosses	1. Develop and implement strategies that will empower micro, small, and medium-scale enterprises within Jomoro Municipality to effectively participate in the opportunities presented by the Petroleum Hub with consideration for GVE and PWD.	• Number of the strategies developed to empower micro, small, and medium-scale enterprises within Jomoro Municipality • Level of implementationof the strategy that will empower micro, small, and medium-scale enterprises within Jomoro Municipality	**Lead:** PHDC **Collaborators:** Ghana Enterprises Agency (GEA), JMA, Ministry of Trade, MGCSP, Business Advisory Center (BAC)	The indicators should be disaggregated by GVE, PWD, etc.

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	2. Strategies that ensure coexistence with national and community conservation areas and other eco-tourism-related activities in the area should be implemented during the development of the Petroleum Hub.	• Level of implementation ofthe strategies that ensure coexistence with national and community conservation areas and other eco-tourism-related activities in the area	**Lead:** PHDC **Collaborators:** EPA, Ghana Tourism Authority, JMA, CSOs, Traditional Authorities, Forestry Commission (FC)	
Gender marginalization especially women, children, the vulnerable andexcluded	1. Strategies must be developed to ensure that women, the vulnerable and the excluded as well as persons with disability benefit from all the programmes aimed at empowering the community members to enable them to participate in the economic value chain.	• Strategies to empower women, the vulnerable andexcluded (WVE) and PWDdeveloped and operationalized • Number of WVE/PWD beneficiaries of the programmes	**Lead:** PHDC **Collaborators:** MGCSP, Jomoro Municipal Assembly,GEA, NDPC, adjoining District Assemblies, etc.	The indicator should disaggregate the number of WVE and PWD participating in each initiative

Issues	Recommendations	Indicators	Responsible Institution	Remarks
	2. Women, the vulnerable and the excluded, as well as persons with disability who will be economically disadvantaged because of the development of the Petroleum Hub, should be given priority in various economic empowerment initiatives.	• Number of economic empowerment initiatives provided. • Number of WVE and PWDgiven priority in various economic empowerment initiatives	**Lead:** PHDC **Collaborators:** MGCSP, Jomoro Municipal Assembly, GEA, NDPC, adjoining District Assemblies, etc.	The indicator should disaggregate the number of WVE and PWD participating in each initiative
Institutional				
Lack of waste management infrastructure	1. Establish an integrated waste management system within the JMA and the Petroleum Hub under a framework for zero impact philosophy and maximizing local content.	• Integrated Waste Management Plan for the Hub and the Jomoro Municipality developed	**Lead:** PHDC **Collaborators:** EPA, Jomoro Municipal Assembly, NPA, NDPC.	The emphasis of the SEA is the IWMP. Other components of the IWMS should be covered by project EIA processes The role of women is critical in preparing the Plan
	2. Adhere to strict planning and environmental regulations to prevent the siting of waste management infrastructure in sensitive ecological locations	• Conformity to Spatial Plan in siting waste management infrastructure for the Hub	**Lead:** PHDC **Collaborators:** LUSPA, NDPC, JMA, EPA, NPA	

Issues	Recommendations	Indicators	Responsible Institution	Remarks
Transboundary conflicts	1. Ensure continuous transboundary dialogue to prevent any potential security threats and conflicts.	• Reports on transboundary dialogues/ meetings held	**Lead:** PHDC **Collaborators**: Ministry of Foreign Affairs and Regional Integration, Ghana Immigration Service (GIS), GMA, Ghana Armed Forces, Western Regional Security Committee (WREGSEC), TAs.	
	2. Engineer the facilities in the Petroleum Hub to minimize its cumulative and transboundary impacts	• Approval and certificationof the design • Quality Supervision • The extent to which the facilities conform to Codesand Standards	**Lead:** PHDC **Collaborators:** EPA, NPA, JMA, GSA, Department of Factories Inspectorate (DFI), NDPC	Supervisors should ensure compliance with standards, etc. The design should take into consideration the needsof women

8.1 Advisory Notes of the SEA (PHub)

A. PHDC Environment and Sustainability Unit

To ensure that the development and operation of the PHub conform to the highest standards of sustainability, it is advised that an Environment and Sustainability Unit be established as part of the organizational structure of PHDC. This Unit will be initially responsible for ensuring the implementation of the SEA Recommendations and subsequently all matters concerning environmental sustainability (The VRA operates a similar model that serves as a point of reference).

Lead: PHDC

Collaborators: EPA

B. Project Implementation Standards

The plan has various undertakings i.e., construction, operations, decommissioning, etc. which must conform to several existing standards and safeguards that are enshrined in relevant legislative provisions. It is advised that these standards should be harmonized into a single composite document (Project Implementation Standards Document) and made available to all stakeholders i.e., permitting institutions, developers, inspectors, development partners, investors, etc.

Lead: Petroleum Hub Development Corporation (PHDC)

Collaborators: EPA, NPA, WRC, Forestry Commission, Energy Commission

C. Local Content

The Petroleum Hub activities form part of the downstream sub-sector. Currently, the local content law does not cover downstream activities. It is advised that the ongoing development of the local content legislation for the downstream sub-sector be accelerated.

Lead: Ministry of Energy

Collaborators: Ministry of Justice and Attorney General

D. Institutional Coordination and Collaboration

To give effect to the functions of the PHDC as stipulated in the Petroleum Hub Development Corporation Act, 2020 (Act 1053), there is a need to establish an Intersectoral Committee to support the PHDC.

Lead: PHDC

Collaborators: Ministry of Energy, EPA, NPA, LUSPA, JMA, Forestry Commission, WRC

E. Completion of Baseline Survey

Due to inadequate resources, the baseline survey on fauna and flora within the Petroleum Hub conducted by the EPA was incomplete. It is advised that the PHDC provide funding to the EPA to complete the baseline studies which will be useful to guide other developments in the enclave.

Lead: PHDC

Collaborator: EPA

F. Emergency Response and Risk Management Plan

The individual processing/storage facilities within the enclave have the potential for fire outbreaks and explosions. The aggregation of these facilities increases the likelihood of a spread within the enclave from one facility to the other. Significant volumes of petroleum products (Crude, LPG, LNG, Naphtha, Gasoline, Gasoil, Kerosene, ATK) will be handled for the various stages of the operations of the Hub. The total estimated volume will range from 1,000,000m3 to 10, 000,000m3 from the initial phase to the full production phase respectively.

The risks of fire/explosion will be very high. It is advised that a comprehensive Emergency Response and Risk management plan should be prepared and operationalized before the commencement of operational activities.

Lead: PHDC

Collaborators: NADMO, JMA, AESL, GPHA, NPA, EPA, Ghana National Fire Service (GNFS), GPS, Ghana Ambulance Service

G. Security

The nature of activities which will take place at the Hub, the high levels of investments, the migration and associated social vices including terrorism will pose a high-security risk to the Petroleum Hub. It is advised that security and intelligence systems must be put in place. In addition, there is a need to strengthen security agencies to be efficient in patrolling and securing the area.

Lead: Ministry of Interior

Collaborators: PHDC, Ministry of National Security, Ministry of Defense, WREGSEC, District Security Committee, Ghana Police Service.

H. Coexistence with Cultural Heritage

The location of Petroleum Hub is within a rural community with a rich cultural heritage which must be protected. During the consultative processes, it became obvious that the communities have significant concerns about the implications of the phub activities on their cultural heritage. This includes cultural adulteration, language loss, intrusion of cultural sites such as sacred groves, burial grounds, taboos, norms, and values, etc.

Cultural heritage issues are held in high esteem within the communities and could lead to conflicts if not properly managed. It is advised that the PHDC should work with TAs and local communities to develop unambiguous guidelines on cultural heritage issues to inform potential investors. It is proposed that the PHDC should consider the formulation of relevant regulations consistent with the PHDC Act 2020 (Act 1053) to give effect to the protection of cultural heritage.

Lead: Ministry of Chieftaincy & Religious Affairs
Collaborators: PHDC, TAs, Local communities, JMA

I. Decommissioning

The lifecycle of the Petroleum Hub is estimated at 50 years. At the end of this period, it is expected that the Hub will be decommissioned. The issues involved include site restoration, transfer of landed properties in line with government regulations, post-decommissioning monitoring, etc. It is advised that a decommissioning plan which assigns roles and responsibilities, especially to relevant stakeholders including investors be put in place. It is also important to take cognizance of the potential shift from fossil fuels to renewable energy sources which can lead to a reduction in the lifespan of the Hub, thus triggering early decommissioning.

Lead: PHDC
Collaborators: EPA, JMA, Investors, TAs.

Aerial photo of Kabelensuazo, *Credit EPA*

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