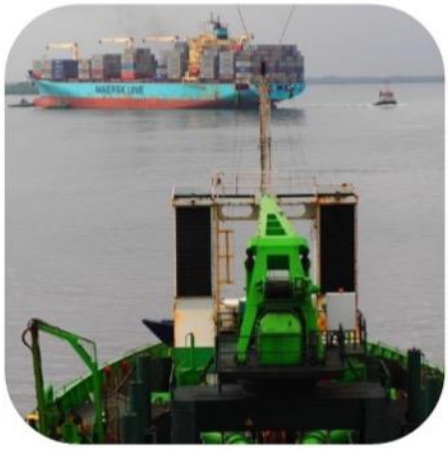

Ghana Ports and Harbours Authority

Consultancy Services for:

Environmental Impact Assessment for the Development of the Port of Keta

Draft EIA Report

Prepared for:

The Director-General
Ghana Ports and Harbours Authority
Headquarters
P.O. Box 150
Tema

17 May 2024

C22007.GD1401

CARES Group

Environmental Impact Assessment for the Development of the Port of Keta

EIA Report

This document has been issued and amended as follows:

Issue	Revision	Date	Description	Prepared by	Checked by	Approved by
1	0.0	17 May 2024	Initial Draft for GPHA Comments	SA-RA-FN-SS-EN-MB	AF	OT

Core Team of EIA Experts

Position and Name	Qualifications / Experience
Environmental Impact Assessment Specialist (Team Leader) **Abdulraheem FAHM**	• MBA Engineering Business Manager • MSc Environmental Engineering • BSc Industrial Chemistry • Chartered Environmentalist, The Society for the Environment • Chartered Scientist (CSci) • Fellow, Geological Society of England • Member, Chartered Institute of Water and Environmental management (MCIWEM) Abdul is an ESIA Specialist with over 20 years' professional experience. **>20 Years' Experience**
Social Impact Assessment Specialist **Satchimo AVUDZI**	• M.Phil. Sociology • B.A. Sociology • Member, Ghana Sociological and Anthropological Association (GSAA) Experienced in ESIA, and urban and rural community development, program implementation and management, Monitoring & Evaluation, leading organizational development and capacity building for farmer cooperatives, land tenure negotiation, conflict management and consensus building. He has conducted socio-economic and household surveys, Environmental and Social Impact Assessment (ESIA), resettlement (including Resettlement Action Plans (RAPs) and livelihood assessments, gender mainstreaming, CSR strategies, behavioural change sensitization and education in irrigation and agribusiness development, and WASH. **>15 Years' Experience**
Environmental Scientist (Environmental Quality Engineering) Specialist **Richmond AMOAKO**	• Sustainable Member, International Association of Impact Assessment (IAIA) • M.Phil. Environmental Science • BSc (Hons) Chemistry • Member / Past Secretary, IAIA Ghana Richmond is an Environmental Specialist with over 20 years' experience in environmental / social safeguards, environmental hydrology, and environmental chemistry consultancy. Richmond has worked as Senior Consultant, Environmental Chemist, Environmental Hydrologist, and Environmental / Social Safeguards Expert and specialises in conducting environmental, strategic environmental assessment and community development projects. **>20 Years' Experience**

Position and Name	Qualifications / Experience
Ecologist / Biologist (Wetlands / Estuarine / Marine / Aquatic) **Francis NUNOO**	• PhD Fisheries Science • M.Phil. Marine Sciences & Coastal Management • MSc Tropical Coastal Management • BSc (Hons) Zoology with Botany • Society for Conservation Biology (SCB) • Environmental Impact Assessment Roster of Experts, Environmental Protection Agency, Ghana. • International Association for Impact Assessment (IAIA) Dr Francis Nunoo has over 20 years' experience as a marine and fisheries specialist, and lecturer. Currently, he works as Chief Director for the Ministry of Fisheries and Aquaculture Development. He specialises in Fisheries Impact Assessment, conduct of fisheries science / coastal zone management research, teaching of marine and fisheries courses, provision of advocacy and extension services to public, and provision of advocacy and extension services to public. Chief Director at the MoFAD during the Feasibility Study for the Keta Port. **>20 Years' Experience**
Coastal Engineer **Dr Steve SPALL**	• PhD Oceanography • MSc Oceanography • BSc (Hons) Oceanography Dr Steve Spall is an experienced ocean modeller and wider MetOcean scientist, providing expertise to a varied range of projects. Manipulating and visualising large datasets is a particular skill, alongside the use of numerical models to support projects. Worked at the Met Office for 9 years, in roles as coastal ocean modeller, climate modelling scientist, business developer for ocean forecasting and seconded to the UK Ministry of Defence to oversee a programme of environmental research. Widely experienced in understanding MetOcean conditions for projects. **>20 Years' Experience**
Archaeologist / Cultural Heritage Expert **Edward NYARKO**	• M.Phil. Archaeology • B.A. A • HND Business Management Edward specialises in Archaeology, Ethnographic and Heritage studies. He has gained over fifteen years of experience working as a Lecturer and Specialist in Archaeology. He has established a strong presence not only in Ghana but also Africa as an Archaeology Expert, having worked on numerous projects such as the Gonja Archaeological project in Buipe, Christiansburg Castle Archaeological and Heritage Project. Archaeology of German Colonial Relics (V.W.) in Lomé Togo, amongst others. **> 15 Years' Experience**

Non-Key EIA Experts

Position and Name	Qualifications / Experience
Technical Manager Ghana CARES Group **Matthew BAKER**	• MSc Sustainable Maritime Operations • BSc Environmental Science (International) • Chartered Environmentalist (CEnv) • Member, Institution of Environmental Sciences (MIEnvSc) • Member, International Association for Impact Assessment-Ghana (IAIA-Gh142) • Practitioner Institute of Environmental Management and Assessment (PIEMA) Matthew is an Environmental Specialist with a focus upon the coast with over 12 years' professional experience. **>12 Years' Experience**
Environmental Engineer CARES Group **Nii Ofori TACKIE-OBLIE**	• MSc. Environmental Engineering. • BSc. Geomatic Engineering. • Member, International Association for Impact Assessment-Ghana Nii is an Engineer with over eight years professional experience. His background is in Environmental and Geomatic Engineering. **>8 Years' Experience**
Associate Director Water and Environment CARES Group **Oliver TAYLOR**	• MSc, Agricultural Development. • MSc, Irrigation Engineering. • BSc (Hons), Engineering Science. • Chartered Member of the Chartered Institution of Water and Environmental Management • Associate Member of the Institution of Civil Engineers • Member of the International Commission on Irrigation and Drainage. Oliver Taylor has over 33 years of experience, covering environmental, water resources and agricultural engineering, much of this in sub-Saharan Africa and particularly in regions of CARES activities. During this time, he has been involved in the project planning, management, evaluation, analysis, design, environmental impact assessment and implementation of major water resources and infrastructure projects. **>33 Years' Experience**

Contents

Tables

Figures

Acronyms and Abbreviations

AfCFTA	African Continental Free Trade Area
AIDS	Acquired Immunodeficiency Syndrome
ANZECC	New Zealand Environment and Conservation Council
AoI	Area of Influence
APHA	American Public Health Association
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BE	Brackish Ecosystem
BMP	Best Management Practices
BOD	Biological Oxygen Demand
CBO	Community-Based Organisation
CHIA	Cultural Heritage Impact Assessment
CHIMP	Cultural Heritage Impact Management Plan
CFS	Container Freight Station
CHRAJ	Commission on Human Right and Administrative Justice
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CPUE	Catch Per Unit Effort
CRM	Customer Relationship Management
CSD	Cutter Suction Dredger
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
DMC	District Magistrate Court
DO	Dissolved Oxygen
DOVVSU	Domestic Violence and Victims Support Unit
EA	Environmental Assessment
EC	Electrical Conductivity
ECFI	Equator Principles Financial Institutions
ECG	Electricity Company of Ghana Limited
EEZ	Exclusive Economic Zone
EHS	Environmental, Health, and Safety
EI	Executive Instrument
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan

EMS	Environmental Management System
EP	Environmental Permit
EPA	Environmental Protection Agency
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FE	Freshwater Ecosystem
FGD	Focus Group Discussion
GBV	Gender Based Violence
GHG	Greenhouse Gas
GIPC	Ghana Investment Promotion Centre
GIPP	Good International Industry Practice
GMA	Ghana Maritime Authority
GMet	Ghana Meteorological Agency
GMMB	Ghana Museums and Monument Board
GPHA	Ghana Ports and Harbours Authority
GPS	Geographic Positioning System
GPS	Global Positioning System
GRIDCo	Ghana Grid Company Ltd.
GRM	Grievance Redress Mechanism
GS	Ghana Standard
GSA	Ghana Standards Authority
GSB	Ghana Standards Board
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Services
GTA	Ghana Tourism Authority
GWCL	Ghana Water Company Ltd.
GWS	Ghana Wildlife Society
HIV	Human Immunodeficiency Virus
IFC	International Finance Corporation
ILO	International Labor Organization
IOT	Iron Ore Terminal
ISPS Code	International Code for the Security of Ships and Port Facilities
KeMA	Keta Municipal Assembly
KII	Key Informant Interview
KVIP	Kumasi Ventilated Improved Pit
LC	Lands Commission
LDC	Less Developed Countries
LEAP	Livelihood Empowerment Against Poverty
LI	Legislative Instrument

LNG	Liquefied Natural Gas
LPG	Liquified Petroleum Gas
LUSPA	Land Use and Spatial Planning Authority
MDA	Ministries, Departments, and Agencies
ME	Marine Ecosystem
MMDA	Metropolitan, Municipal and District Assemblies
MoLNR	Ministry of Lands and Natural Resources
MOT	Ministry of Transport
MoTI	Ministry of Trade and Industry
MPA	Marine Protected Area
NBL	Natural Background Level
NDC	Nationally Determined Contribution
NDPC	National Development Planning Commission
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
NLCD	National Liberation Council Decree
NO_2	Nitrogen Oxide
NRRC	National Resource on Culture
NTU	Nephelometric Turbidity Unit
NWP	National Water Policy
OECD	Organization for Economic Cooperation and Development
OP	Safeguard Operational Policy
OPD	Out Patient Department
OVC	Orphans and Vulnerable Children
PAP	Project Affected Person
PKP	Port of Keta Project
PPE	Personal Protective Equipment
PS	Performance Standards
PSA	Professional Services Automation
QA	Quality Assurance
RAC	Refrigeration and Air Conditioning
RCC	Regional Coordinating Council
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SER	Stakeholder Engagement / Public Consultation Report
SEZ	Special Economic Zone
SH	Sexual Harassment
SHS	Senior High School
STS	Ship-To-Shore
SO_2	Sulphur Oxide
SOP	Standard Operating Procedure

TDS	Total Dissolved Solids
TL	Total Length
ToR	Terms of Reference
TSHD	Trailing Suction Hopper Dredger
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
TWA	Time Weighted Average
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WAJU	Women and Juvenile Unit
WC	Water Closet
WHO	World Health Organization
WIP	Work in Progress
WRC	Water Resources Commission
WUR	Water Use Regulation

1. Executive Summary

1.1. Introduction

The Ghana Ports and Harbours Authority (GPHA) wish to develop the Port of Keta, in a small community called Kedzi, located north of Keta in the Volta Region of Ghana (Figure 2-1). It is understood that the proposed development is being motivated by a combination of factors including the National Development Agenda, international market demands, global and regional trends, and Ghana's ongoing industrial and socio-economic development.

To support this intention, a Feasibility Study and Master Planning Report was commissioned by GPHA and completed by Sellhorn Ingenieurgesellschaft mbH and Inveni Portum Solutions GmbH (SIIPS) in 2021. As part of the continuing port development process, in accordance with Ghana's Environmental Assessment Regulations, 1999, Legislative Instrument (LI) 1652 (enacted under the provisions of the Environmental Protection Agency Act, 1994 (Act 490)) the proposed project falls under the undertakings for which an Environmental Impact Assessment (EIA) (including social aspects) is mandatory. Consequently, CARES Ghana (part of the CARES Group) have been commissioned by GPHA to provide EIA consulting services. This report documents the EIA process.

1.2. Project Description

The detailed project description is provided in Chapter. In summary, the Port of Keta is expected to consist of developing:

- Main and secondary breakwaters.
- Dredging the harbour basins', navigational channel and berths and reclamation to develop land banks.
- Quay walls / piers with berthing furniture.
- Multipurpose cargo storage areas / terminal
- Maintenance and repair workshops.
- Administration building.
- Navy dock and buildings.
- Access roads / highways and other port infrastructure.
- Public utility services systems - water, electricity, telecommunications, etc.;
- Fishing Harbour.
- Shipyard and repair facility.
- Liquid petroleum bulk terminals, tank farms etc.;
- Iron ore terminal and other potential dry bulk handling facilities.
- Marinas (marine side and lagoon side);
- Ferry / cruise passenger terminals; and,
- Port and public transportation facilities.

1.3. Alternative Considerations

An analysis of the alternatives considered is provided in Chapter 5. In summary, the following alternatives have been considered under the Proposed Port of Keta Project:

- **No Action Taken Alternative** - if no action is taken then any potential negative impacts will not occur. Similarly, the intended benefits and any secondary benefits will not be achieved.
- **Site Selection Options** - the site was declared as the site for the Port of Keta through GPHA Act 1986 (PNDC-L 160) and an Executive Instrument (EI) and no other sites are being considered. If the Port of Keta is not built

at this site and consideration was given to another site, then the whole planning process including feasibility studies and master planning would need to start again.

- **Project Phasing Options** - Whilst the port is planned in two phases (Phase 1 and Phase 2), a pre-development phase (Phase 0) with only a few core facilities could be implemented to allow an earlier start date of selected operations and facilities.
- **Site Configuration Options** - Three general configurations (I-Shaped, U-Shaped, and L-Shaped) were evaluated as part of the Feasibility Study. The evaluation considered likely implementation cost as well as environmental issues. The I-Shaped configuration scored the highest in comparison with the other configurations and was therefore chosen for further development.
- **Site Layout Options** - An alternative site layout has the iron ore stockpile located some distance to the port in a remote, vacant area and connected by a long conveyor belt system. A positive effect of relocating the stockpiles is the reduction of potential disturbances to residents by suspended ore dust particles. Another alternative layout has the tank farm located outside the boundaries for the port development - this area would have to be completely reclaimed from the sea, or it would require relocation of some existing settlements. This has been considered as part of the current EIA.

1.4. Environmental Baseline Conditions

A detailed description of the environmental baseline conditions are provided in Chapter . The following paragraphs provide the key highlights.

The Keta Municipality falls within the Dry Coastal Equatorial Climate with an average annual rainfall of less than 1,000mm. Keta experiences a double maximum rainfall pattern, with the major rainy season between March and July, and the minor one beginning in September and ending in November. The dry season generally occurs from December to March, when the highest temperatures are generally observed - although temperatures are appreciably high for most parts of the year.

Baseline wind conditions can be summarised as follows: winds predominantly come from the sector between west and south; winds are predominantly Force 3 or 4 (gentle or moderate breeze); stronger winds can occur sporadically, up to Force 7 (near gale); the strongest winds are associated with localised storms; the strongest winds occur around May / June; and the sea breezes observed at Lomé may not be as dominant at Keta.

Waves come from the south-southwest and the south. This is because they are generated by storms in the southern part of the South Atlantic and propagate northwards. Wave heights are lower between October and March (Southern Hemisphere summer) when storms generating waves will be less frequent and less intense. During the Southern Hemisphere winter, wave heights can reach over 2 metres in the deep water off Keta.

At Keta, the dominant currents are expected to be associated with large scale ocean currents, i.e., the Guinea Current, where the current predominantly flows towards the northeast and east-northeast (although there may be some periods of flow reversal). The surface Guinea Current, appears to spread and become more variable as it reaches the vicinity of Keta Lagoon and does not entirely flow around the corner in the coastline. This may have implications for sediment supply to the Keta coastline.

In the Keta area, east of the Volta estuary, the source of sedimentary material to the coastal zone is expected to be the Volta River. Satellite data suggests that the amount reaching the Keta coast is greatly reduced by the 'fanning out' of the Guinea Current as it reaches the northward turn in the coastline at Keta Lagoon. This may contribute to the starving of sediment along the Keta coast and coastal erosion.

The bathymetry within the project area is relatively uniform and shallow, showing a generally smooth sloping of the ground into the sea. The upper beach profile in the swash zone has a slope of approximately 1:3, while the lower beach is 1:10 to 1:15. The presence of moderate winds and the coarse sediments determines the absence of dunes, and the upper beach barrier is mainly shaped by wave run-up. Depths of -5 m are seen within approximately 200 - 300 m from the shoreline, with depths increasing to -10 m and beyond after approximately 1.5 km.

Topography over the general project area is relatively flat, with maximum ground levels of around +4 m in places along the shore. Slopes in the lagoon are generally flat and ground levels within the small lagoon delimited by the sand ridge and the causeway range from approximately 0 m to 1 m below sea level. Due to its low-lying topography and extremely mild gradients the coastal region of Keta is exposed to the risk of both terrestrial and coastal flooding. It is also exposed to the potential impacts of sea level rise and erosion due to the reduction of sediment supply from the Volta Delta. Consequently, flooding events are experienced by the local communities, including during the exceptional circumstances of October 2023, related to the controlled spilling at Akosombo and Kpong.

Freshwater inflow into the Keta lagoon comes from three main sources: the rivers Tordzie, Aka and Belikpa. The contribution of the Volta River has decreased substantially after the constructions of the Akosombo and of the Kpong dams, and many of the creeks are dwindling in size due to low rainfall, excessive evaporation and siltation. As a result, the volume of water in the lagoon has drastically declined (although fluctuates seasonally). An outlier to this was the exceptional events of October 2023 related to VRA's controlled spillage from the Akosombo and Kpong Dams which temporarily drastically increased the volume in the lagoon and resulted in widespread flooding. Due to this, the flood gates on the causeway and the sand bar at the Port of Keta site were temporarily opened to allow floodwaters to escape.

According to the seismicity map of southern Ghana, Keta lies in Zone 2 of the seismic risk assessment, resembling medium risk. This factor has to be considered in the structural design.

The site is an ecologically sensitive location due to its proximity to the internationally important Keta Lagoon Complex Ramsar site and the Volta River Estuary. The Keta Lagoon is the largest lagoon in Ghana and has rich floral and faunal biodiversity including rodents, monitor lizards, pythons and mammals such as manatees and sea turtles. Five major species of marine turtles are known to deposit eggs on the beaches of Ghana - all of which are threatened and need to be protected. Three of these are often recorded in the project area (Oliver Ridley, Green and Leatherback), whilst the Hawksbill is occasionally encountered (The Loggerhead Turtle is not thought to be encountered in the project area). Marine turtles are known to deposit their eggs in nests on the sandy beaches of the coastline of the Keta area between Anloga and Dzita (especially around Dakordzi and Akplorwotorkor), with one turtle capable of laying approximately 100 eggs which can take three months to hatch.

The Keta Lagoon also supports large numbers of waterbirds. It accounts for over 59% of the bird populations that frequent the wetlands in Ghana - especially, coastal wetlands. The Keta Lagoon Complex Ramsar Site supports over 72 waterbird species with an estimated total population of well over 100,000 including globally significant numbers of 21 species. A total of 46 species of birds were counted during fieldwork conducted between 10 and 16 February 2024 (i.e., post-spillage of the Akosombo and Kpong dams).

Water quality testing was also carried out during this period and compared to pre-spillage water quality. The pH of the water was stable and fell well within the WHO permissible level of 6.5 - 8.5 and the Natural Background Level (NBL) of 7. The level of turbidity for post-spillage were very high compared to pre-spillage. Electrical Conductivity (EC) and Total Dissolved Solids (TDS) for freshwater were within the WHO acceptable lih mits for both pre-spillage and post-spillage. Relatively high EC was recorded for both brackish waters and marine waters, which is typical of coastal waters. The concentrations of DO were good for aquatic life, with the amount of DO in any given water body a good indicator of water quality as the right amount of DO is essential for the survival of aquatic life and within acceptable limits. The concentration of nutrients (nitrate & phosphate) are indicators of water pollution. However, they were below the WHO limit. The sediment composition is primarily sand, and the heavy metals concentrations were low.

Different communities of macroinvertebrates were observed post-spillage. These were predominantly chironomids, oligochaetes, and gastropods - an indication of low to medium pollution of the water. The composition of zooplankton species was comparable at most of the sites. The main difference between pre-spill and post-spillage is the shift to dominance of crustaceans (shrimps and crabs) in the brackish water catch. Post spillage fishers have caught and continue to catch large numbers of the blue swimming crab, *Callinectes amnicola* and *Callinectes pallidus*. Fishers have responded to the shift in species by designing new fishing traps and nets to catch these shrimps and crabs.

The ambient air quality and noise level characteristics at seven selected sites within the proposed Port of Keta Project Area of Influence (AoI) were assessed on 11 March 2024 and 12 March 2024. Ambient air quality measurements were generally below the relevant Ghana Standard (GS) (GS 1236:2019), although some sites had levels of particulate matter that were in exceedance. Specifically, there were three TSP values (396.4 / 250.4 / 194.8 μgm^{-3}) recorded above the GS of 150.0 μgm^{-3}, four PM_{10} values (134.9 / 126.8 / 107.5 / 72.1 μgm^{-3}) recorded above the GS of 70.0 μgm^{-3}, and one $PM_{2.5}$ value (36.9 μgm^{-3}) recorded above the GS 1236:2019 of 35.0 μgm^{-3}. Similarly, noise levels were generally below the relevant GS although some sites were somewhat above the GS.

The Keta Municipality offers great potential for tourism development, with attractions including nesting of sea turtles, sandy beaches, the Keta Lagoon Complex Ramsar Site, Fort Prinzenstein, Atorkor Slave Market, Anlo Military Headquarters, Cape St. Paul Lighthouse, and lots of hotels and guesthouses.

The municipality is part of the Anlo Traditional Area made up of 36 states and headed by Torgbi Sri III, the Awoamefia of Anlo who serves as a symbol of Authority among all people in the Municipality. There are other chiefs with their own AoI who assist the Awoamefia in the promotion of peace and stability. For example, the project site at Kedzi-Havedzi has a paramount chief designated as Dufia of Kedzi, Torgbi Joachim Acolatse V. Cases related to intra community land disputes; river channels / pond disputes are brought directly to the court of the Awomefia.

The Keta Municipality has a homogenous population with ethnic Ewes constituting 95.8% of the population. The most predominant religion is Christianity, constituting 69.5% of the population. The municipality contains 0.26% of the population of Ghana, has a high population density of 177 persons / km^2 and a population growth rate of 2.5%. There are 20,320 households with the average household size of 1.2 and there is a high age dependency with 80 people dependent on every 100 persons in the working groups. Over 12% of the municipality were recorded as being disabled.

Keta Municipality is mainly an agrarian economy, with the majority of the population engaged in crop farming, livestock keeping, fishing and other agriculture related activities and trading. A wide range of industrial activities have been identified in the municipality including ceramics and salt production. The project enclave and the Keta Municipality is known for large-scale salt production in Anlo-Afiadenyigba, Seva, Anyako and some in Havedzi, Kedzi, Vodza, etc.

For drinking water, most people rely on piped Ghana Water Company Ltd. (GWCL) water, whilst boreholes and wells are mainly used for other domestic uses. Within the project communities there were complaints that the GWCL water is not reliable and there is an ongoing project in the municipality to help resolve this. Most parts of the municipality are connected to the national electricity grid, with 88% of respondents having access in their homes. Fuel for cooking is largely charcoal (41%), Liquified Petroleum Gas (LPG) (38%), and firewood (21%). There is poor access to toilet facilities, with only 21% having access to household toilet facilities. With those with no access to household toilets, 74% responded to resorting to open defecation. Similarly, apart from Kedzi and Vodza, with one Zoomlion waste container each, the rest of the project communities openly dump their waste at the outskirts of their communities or dig holes at the beach. Fortunately, most waste generated in the project communities are organic in nature.

Land is the biggest constraint in the Keta area as evident in the linear nature of settlements and population density of the communities. Between Anloga and Keta, the population density is about 500 persons / km^2, which compares with the 609.7 persons / km^2 in Greater Accra. Most lands between Vodza, Kedzi, and Havedzi were reclaimed lands from the lagoon during the Keta Sea Defence Project, with houses built and allocated to some of the impacted families. These settlements along the coast are generally sandwiched between the lagoon and the sea with its attendant regular twin disasters of sea erosion and floodings.

Any planned future expansion of the existing two main access routes, i.e., Dabala-Anloga-Keta Road; and Keta-Kedzi-Denu-Aflao Road, will likely result in huge physical and economic displacement and destruction of cemeteries, buildings, and structures which are located close to the roads. Such a move will possibly create landlessness to affected landowners and may create unnecessary conflict.

The most important land use at the proposed Port of Keta site includes local fishing with landing sites for canoes and drag nets, beach soccer, and community park. Canoe / fishing boat repair, joining, and launching of fishing boats are also done at the beach. Other visible land uses include coconut and oil palm plantations along the sea shore and the coasts of the lagoon and docking bays for smaller canoes used for water transport between island communities. The only crop farming activities observed within the project communities were immediately outside the project boundaries between Kedzi and Vodza. Individuals winning pebbles / stones from the sea were also spotted aggregating stones on the beach whilst fishing net menders were seated at the beach mending nets. Salt mining is also done along the coasts of the lagoon as the water recedes / dries up. The fringes of the port boundaries also have residential / settlements as well as commercial activities such as a taxi station, fishing market at Havedzi, shops / stores, and burial grounds / cemeteries at Kedzi and Havedzi.

Within the immediate project area, there are some shrines that were identified and may require relocation. These included the Togbui Evo along the Kedzi-Vodza project boundary. Kedzi community also identified various clan / ancestral stool houses / shrines known as Togbe Ziwo. This include Dzahli, Togbe Ekpe and Ayayizikpui. Sacrifices and prayers are offered at these shrines for protection, blessings and good fortune by adherents of these shrines. These shrines can be relocated with the appropriate rites performed. Some cemeteries are also in the designated area, notably in Kedzi and Havedzi. No cultural heritage sites were identified within the designated project area. However, cultural heritage resources including, historical buildings, shrines, cemeteries (abandoned and present-day), and palaces in the project communities have been identified and documented / mapped.

1.5. Stakeholder Consultations

During the EIA study, consultations included engagement with the following community stakeholders:

- Traditional Authorities.
- Keta Community Members.
- Kedzi-Agorta Community Members.
- Havedzi and Horvi Community Members.
- Ketu South Municipal Assembly.
- Anloga District Assembly.
- Keta Municipal Assembly.
- Ghana National Fishermen Council, Kedzi
- National Association of Fish Processing and Traders Association (NAFPTA) – Fishmongers / Women of Kedzi-Agorta and Havedzi.
- Youth of Kedzi-Agorta Community.
- Assembly Member and Unit Committee Members of Kedzi-Agorta.
- Elders of Kedzi-Agorta.
- Elders, Assembly Member, and Unit Committee Members of Havedzi.
- Fishmongers and Salt Miners of Horvi and Agavedzi.
- Beach Soccer Team of Havedzi and Horvi.
- Fort Prinzenstein Tour Guide and Assembly Member for Keta Central.
- Vodza and Adzido Community Members.
- District Chief Executive (DCE) of South Tongu.
- Volta Regional Coordinating Council (RCC).
- Oti Regional Coordinating Council (RCC).
- Oti Regional House of Chiefs.
- Volta Regional House of Chiefs.
- Health Directorate, Keta Municipal Assembly.
- Blekusu Community Members.
- Agavedzi and Salakope Community Members.
- Adina and Amutsinu Community Members.
- Sonuto-Agbozume Community Members.
- Tackscorner Community Members.
- Kpedzkope, Dzaglame and Ahorkpoe / Bayikope Community Members.
- Dogbeykope Community Members.
- Awalavi Community Members.
- Assembly Members of Weta Traditional Area
- Abeliakope-Aflao Community Members.

Additionally, consultations included engagement with the following institutional stakeholders:

- Environmental Protection Agency (EPA).
- Ghana Geological Survey Authority (GGSA).
- Ghana Shippers Authority (GSA).
- Ministry of Lands and Natural Resources (MLNR).
- Electricity Company of Ghana (ECG).
- Ministry of Fisheries and Aquaculture (MoFAD).
- Ghana Meteorological Agency (GMet).
- Energy Commission (EC).
- Ghana Navy.
- National Development Planning Commission (NDPC).

- Ministry of Employment and Labour Relations.
- Ghana Tourism Authority (GTA).
- Ghana Railway Development Authority (GRDA).
- Water Resources Commission (WRC).
- Ghana Highway Authority (GHA).
- Ghana Chamber of Telecommunications (GCT).
- Land Use and Spatial Planning Authority (LUSPA).
- Ghana Maritime Authority (GMA).
- Ghana Hydrological Authority (GHA).
- Forestry Commission (FC) – Wildlife Division.
- Ministry of Transport (MOT).
- Ghana Wildlife Society (GWS).
- Ghana National Fire Service (GNFS).
- Department of Factories and Inspectorate (DFI)
- Ghana Grid Company Ltd. (GRIDCo).
- Ghana Museums and Monument Board (GMMB).
- Ministry of Trade and Industry (MOTI).
- Ghana Water Company Limited (GWCL).
- Ghana Standard Authority (GSA).
- Fisheries Commission (FC).

Details of the stakeholder engagement can be found in Chapter 7.

1.6. Potential Environmental / Social Impacts and Risks

The following tables present the adverse / negative impacts identified and evaluated, the proposed mitigation measures, and the approach for monitoring their effectiveness. This is presented in the form of a Preliminary Environmental Management and Monitoring Plan.

Key to Table 1-1, Table 1-2 and Table 1-3					
M	= Magnitude of Impact	N = Negligible	S = Small	M = Medium	L = Large
S	= Sensitivity of Resource / Receptor		L = Low	M = Medium	H = High
Impact	= Impact Significance Rating	Negligible	Minor	Moderate	Major
Residual	= Residual Impact Rating				

Table 1-1 - Preparatory / Pre-Construction Impacts Identified and Evaluated, Mitigation Measures Proposed, and Preliminary Environmental Management and Monitoring Plan

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
PREP / PRE-CONST.										
Land acquisition and designation / demarcation of project areas during survey works and feasibility studies and stakeholder consultations.	Increased land speculation in response to the anticipated project. Suspension of expansion in economic or physical development in fear of project impacts etc. Land tenure agitations, as people try to re-establish their land boundaries in anticipation of benefits from project as well as likely spillover interests generated in community. Anxiety on the part of PAPs / PACs on the extent of likely disruption in livelihood / socio-economic activities, as well as physical assets, homes, cemeteries, shrines, etc. Confrontations / conflicts with locals who may not be in favour of the project or are not aware about proposed project and its related activities.	M	L	Minor	Adequate education and dissemination of information with regards to the scope, schedule and impact of the proposed project. Engage stakeholders early to confirm project boundaries, share project plans and designs, sensitize communities on impact mitigation measures and options available to them, conduct assets inventory for resettlement action plan, prepare and implement resettlement action plan for potentially affected structures, and a livelihood restoration plan for disrupted livelihood activities as fishing, fish mongering, salt mining, tourism, etc. for loss of proven income activities. Develop and implement grievance mechanism as a part of a wider Stakeholder Engagement Plan enabling community concerns to be documented and resolved in a timely fashion. Work closely with local authorities and reps who have established presence and command in the communities. Leverage on WACA project being implemented in the 3 adjoining MMDAs (KeMA, Ketu South and Anloga Districts) for impact mitigation measures.	Minor	Inventory of all potential project affected assets and persons. Inventory of all potential project affected livelihoods/ socio-economic activities. Records / reports of community engagements and consensus on impact mitigation measures. Regular community engagement and sensitization campaigns about project activities. Follow-ups to ensure mitigation measures are duly implemented.	Temporal through project planning phase.	Participatory engagements and meetings, and sensitizations and consensus with project communities to ensure land acquisition and involuntary resettlement compensation and relocation uncertainties delays and communication gaps on project activities are eliminated and project generally accepted with good will. Develop stakeholder engagement plans, GRM, form committees with key focal persons enabling community concerns to be documented and resolved promptly.	GPHA / Client, Port of Keta (PoK) Project Unit, KeMA, Consultants and other Stakeholders
OHS during survey works and feasibility studies – technical teams for consultants and contractors.	Exposure of technical teams carrying out topographical survey works, geotechnical survey, and environmental baseline studies to injury and bites from insects and dangerous reptiles such as snakes, scorpions, bees, ants, etc. Risk of accidents and incidents of drowning. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.	S	L	Negligible	A site-specific health and safety plan to be developed for the surveys. Consultants / contractors must comply with Ghana's OHS Policy, use PPEs for field works, provide first aid kits on site to treat minor ailments, cuts and bruises, insect and snake bites, etc. and promptly refer severe cases to nearby clinics or Keta Government Hospital for treatment. Ensure well-trained and experienced licensed drivers, boat captains and lifeguards are deployed for all field studies. Work closely with local authorities and reps who have established presence and command in the communities.	Negligible	The site-specific health and safety plan should be signed off by GPHA, consultants and contractors.	Monitoring work permits issued by GPHA prior to commencing work.	Work permits issued prior to commencing work.	GPHA, Consultants and Contractors.
Field surveys, office setup and mobilisation to the site.	Fishing livelihoods affected by field survey, office set up and mobilisation to site	N	L	Negligible	Small sized area utilised for initial survey and effective sampling design of survey to minimise disturbance to fishing livelihoods. Standalone Fisheries Impact Assessment (FIA) should be conducted, and mitigation measures implemented.	Negligible	None proposed	During preparatory work and pre-contruction activities.	None proposed.	Team of consultants and contractors.

Table 1-2 - Construction Phase Potential Impacts Identified and Evaluated, Mitigation Measures Proposed, and Preliminary Environmental Management and Monitoring Plan

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
Land take for construction and development activities, its impact upon the shoreline, and following impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	L	L	Major	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	Major	Monitoring carried out in line with the standalone Ecology Management Plan. To monitor that the standalone Ecology Management Plan has been carried out and implemented prior to construction.	Standalone Ecology Management Plan developed prior to construction. Standalone Ecology Management Plan implemented prior to construction and maintained throughout.	Mitigation measures and commitments are properly maintained and implemented.	Contractor / consultant.
Land take for construction and development activities and its impact on project communities.	Loss of lands for housing and other community development projects. Loss of landing beaches for fishermen and fish markets, community parks and playgrounds (venues for beach soccer and Norvikporgbeza Festival at Kedzi-Azizadzi for example) and other social gatherings. Destruction of physical assets such as houses, public buildings such as schools (Kedzi Vocational Technical Institute), churches, etc. Impact / destruction of cultural heritage sites such as public and private shrines, public and private cemeteries, etc. Destruction of crops and economic trees such as coconut trees, oil palm trees, etc. along the shores of the sea and lagoon.	L	H	Major	Reclamation of adequate lands to offset lost community / individual lands prior to commencement of project development. Allocation of reclaimed lands to locals affected by the land take. Resettlement of all PAPs prior to commencement of project development. Preserve / relocate cultural heritage sites, shrines and cemeteries where possible. Adopt new burial approaches (vertical burial / stacked tombs, etc.) that promotes minimal land use. Provide ample time for affected persons to remove crops and structures prior to the start of construction.	Major	Evaluation of RAP implementation with records showing PAP beneficiaries. Reports and follow-ups by consultants and project regulation boards / units.	Monthly.	RAP, resettlement frameworks. Grievance redress reports. Work permits after social impact mitigations are met.	GPHA / Client, PoK Project Unit, KeMA, consultants and other stakeholders
Disruption of livelihoods, and access and usage of roads and pathways by communities.	Disruption of livelihoods / socio-economic activities such as fishing, salt mining, etc. due to restricted access to parts of the sea coast and lagoon. Restricted access and usage of public roads, bridges and access ways, with attendant traffic build ups. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities. Perceptions of unfair or inequitable compensation arrangements for lands or other project benefits resulting in community agitations, obstruction of project activities, vandalization of equipment, public demonstration and violent behaviour.	M	M	Moderate	Community engagements and notice prior to commencement of construction activities. Seek clarity on any rites to perform, any taboos to observe and any shrines / cultural heritage sites that require identification, preservation or relocation. Fair and commensurate livelihood restoration and compensation activities showing affected persons. Alternative routes and traffic management personnel. Work closely with community liaisons, local authorities and reps who have established presence and command in the communities.	Minor	Periodic reporting and monitoring of field and project implementation activities.	Monthly.	Grievance redress reports. Livelihood restoration and RAP implementation reports.	GPHA / Client, PoK Project Unit, KeMA, consultants and other stakeholders.
Labour influx issues affecting local communities.	Speculative job seekers migrating to project communities in search of job putting pressure on existing social	M	M	Moderate	Prepare and implement labour influx management plan to holistically address labour influx issues.	Minor	Periodic reporting and monitoring of field and project	Monthly.	Influx manangement and mitigation measures, priority employment for locals.	GPHA / client, PoK Project Unit, KeMA, consultants and

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
	facilities and could induce anti-social behaviours. Indirect labour influx will result from mainly non-local traders, generating some conflict between them and the locals. Non-compliance with socio-cultural norms of local communities: The tendency for non-local employees not to conform or abide by the sociocultural norms of local communities is high. Labour agitations / issues can result in prolong and costly grievance redress cases, pose security threats and endanger communal cohesion. Community agitations from unmet expectations for benefits such as employment, economic packages and economic livelihoods, resulting in obstruction of workers from carrying out their respective services, vandalization of equipment, public demonstration and violent behaviour.				Engage and sensitize project communities about increases in workforce and potential for influx. Give priority to locals when hiring non-essential and un-skilled workers. Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding labour influx. Develop a feedback and grievance mechanism to collect any feedback or complaints related to labour influx associated with the project. Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions.		implementation activities.			other stakeholders.
OHS and labour issues with workers.	Workers exposed to risks and hazards from operation of construction machinery / equipment, transportation of construction materials, inhalation of dust and fumes, accidents from falling objects, etc. Unhygienic working conditions. Forced and child labour, Sexual Exploitation and Abuse (SEA), discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses – theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	M	M	Moderate	Maintain high standards of OHS and environmental protection at work. Prepare and implement HSE protection at the workplace to guide construction activities to comply with relevant national and international laws and regulations on OHS. Maintain safe plant, machinery and equipment and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. Security at site must be maintained to ensure only authorized persons are allowed into the construction area. Develop a site specific OHS plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on OHS policy. Train elected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged. Only drivers with the	Moderate	Periodic reporting on compliance with OHS safeguard measures, incident reporting. Periodic site supervisions. Workers grievance redress mechanism.	Monthly. Permits to work issued by the client on submission of all required risk assessments.	Worker rights and wellbeing: contractor must develop and implement a Human Resource Policy and Plan that adheres to the requirements of IFC PS2, ILO conventions on labour and human rights including requirements for workers to have contracts, workers grievance mechanism and develop retrenchment plans if there is a requirement for collective dismissals and all in compliance with the Ghanaian Labour Act.	Contractors and Consultants, PoK Project Unit.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
					requisite licenses must be allowed to handle vehicles and earth-moving equipment. Provide workers with PPE and monitor usage compliance. Phasing out of material movements / scheduling material movements.					
Public health & safety issues likely to impact PAC and workers.	Labour / population influx and its attendant sexual behaviour, leading to increased teenage pregnancies HIV / AIDS and other STD infections. Increased open defecation at beaches within the project area. Improperly covered trenches may result in stagnant water and breed mosquitoes. Unsecured excavations may compromise public safety. Improper disposal of sanitary waste Dust inhalation, causing respiratory diseases; dust nuisance resulting in dirt blown on washed clothes on drying lines, windows of residences and offices nearby. Noise nuisance, affecting the peaceful resting and relaxation of people, causing hearing challenges, etc. Air pollution from plant emissions and fumes / dust emissions from use of equipment / machinery / vehicles. Noise and vibration from plant operations and movement of trucks. Water and soil pollution from oil and fuel spills, transport of sediment laden storm-runoffs from the plant site into water with its consequent impact on aquatic life / water ecology.	M	M	Moderate	Preparation of a construction phase health and safety manual and site / task specific health and safety plans. Collaborate with KeMA and Ghana Health Service (GHS) for HIV / AIDS and STIs sensitization campaigns. Provide adequate toilet facilities for construction workers as well public toilets for nearby project communities. Use warning signs, uncovered trenches or deep excavations should be protected using indicator linings or illustrative warning notices or wire mesh to prevent fall hazards. All trenches and excavation must be covered at all times. Caution / warning signs should be placed at vantage points around the project site. Schedule work to ensure that transport of equipment and materials is carried out during low peak periods. Flagmen should be employed to man all major intersections to assist with traffic flow. Announcements and notices for work schedule on affected roads through local FM stations as well as through community leaders and community information centres. Trucks transporting products materials to site should be covered and labelled with appropriate warning signals such as red flag and rotating amber lights. Appropriate speed limits should be instituted, observed and enforced. Carry out regular inspections of haulage roads. In the event of truck failure along haulage routes, such trucks should be towed within 12 hours. Untarred roads have to be watered frequently to suppress dust. Any damaged sections of the roads must be reinstated by the contractor.	Negligible	Periodic reporting on compliance by dedicated safeguards team.	Monthly. / (Weekly during key phases of the construction).	National laws, regulations and policies on the environment and public health, complemented by other internaional performance standards, conventions and practices.	Contractors and consultants, PoK Project Unit

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
					Properly manage oil change on site to prevent oil spills and runoffs into water bodies. Provide proper septic tanks for liquid waste disposal. Use exhaust mufflers to reduce noise from heavy trucks.					
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	S	M	Minor	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to specify procedures to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.	Negligible	Records of the quantities of wastes generated, recycled and disposed. Periodic reporting on compliance by dedicated safeguards team.	Monthly.	National laws, regualtions and policies on the environment and public health, complemented by other international performance standards, conventions and practices.	Contractor / consultant.
Land take / general construction activities.	Fishing activities - especially beach seine fishers adversely affected by construction activities. Fishermen are very localised.	S	M	Minor	Beach seine fishers encouraged to relocate to adjacent landing sites. Standalone FIA conducted and mitigation measures implemented.	Negligible	Numbers of beach seine fishing gears affected.	Weekly throughout construction period	Beach seine fishers able to ply their trade at adjacent beaches.	Contractors / Client Fisheries Liaison Officers / Leadership of Fishers.
Land take / general construction activities.	Fish catch and therefore fish revenue lowered due to impact of construction on fish habitats.	M	H	Major	Construction activities phased over small areas at a time.	Major	Fishing incomes and livelihoods.	Weekly throughout construction period.	Fish spawning and nursery grounds not heavily impacted.	Contractors / Client.
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	M	H	Major	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Major	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.
Dredging (including underwater blasting if	Potential impact to telecommunications (existing	L	M	Major	Further engagement with GCT / various telecommunication	Negligible	None proposed.	N/a	No submarine cable landing site in the project area.	GPHA.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
necessary) and construction of breakwaters.	submarine cable landing sites and telecom towers).				companies to determine if a possible submarine cable landing site is in the area.					
Dredging (including underwater blasting if necessary).	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	S	M	Minor	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers.	Minor	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No health and safety incidents / complaints. No Stop Work Orders issued.	Dredging contractor.
Construction of breakwaters.	Disruption of fishing including damage to fishing nets.	M	M	Moderate	Conduct a standalone Fisheries Impact Assessment (FIA) and develop a Fisheries Management Plan (FMP). Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding construction to be checked before commencing works to minimise risk of damaging fishing nets.	Minor	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No incidents / complaints.	Marine works contractor.
Construction of breakwaters	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	L	L	Major	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	Major	Monitoring carried out in line with the standalone Ecology Management Plan. To monitor that the standalone Ecology Management Plan has been carried out and implemented prior to construction.	Standalone Ecology Management Plan developed prior to construction. Standalone Ecology Management Plan implemented prior to construction and maintained throughout.	Mitigation measures and commitments are properly maintained and implemented.	Contractor / consultant.
Construction of breakwaters.	Noise, light and general disturbance from the marine works operations causing loss / disturbance of flora and fauna.	S	M	Minor	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Minor	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Monthly.	No light, noise or general disturbance complaints shall be received. Complaint responded to within 24 hours and complaint resolved. Noise levels are in accordance with the equipment specification.	Marine works contractor.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	The increased noise and vibration can have a negative impact upon both humans and fauna and can be both a nuisance and a health impact.	M	M	Moderate	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used. Low-noise equipment shall be used wherever possible.	Negligible	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Investigation of any noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Before construction works.	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles.	Contractors.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	N	M	Negligible	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Visual inspection for black smoke from exhausts.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Contractors.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon air quality from the generation of particulate matter during construction activities.	S	M	Minor	Minor impact - no mitigation measure proposed.	Minor	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Contractors.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation. This can be both construction wastewater, and domestic wastewater produced by the construction workers. Construction wastewater can contain sediment, cement, and other pollutants, while domestic	M	H	Major	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity.	Moderate	Physico-chemical and biological monitoring of the Keta Lagoon. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
	wastewater can have elevated BOD, COD, and can contain oils along with other pollutants.									
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	S	H	Moderate	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.	Moderate	Physico-chemical and biological monitoring of nearby waterbodies. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction and installation of utility facilities especially water and electricity services.	Potential temporary impact to the provision of utility services to PACs (i.e., power outages, damage to the power network / equipment).	S	M	Minor	Development of a dedicated substation for the port to prevent an overload on the community. The substation capacity should factor in all industries that would be cited in the port. ECG to be kept informed of progress and if a power outage is to be caused by the construction activities they would need at least 72 hours' notice.	Minor	The number of power outages caused by the port development will be monitored.	Continually throughout the construction period.	No unplanned power outages caused by the port development.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction / upgrade of port access roads.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	N	M	Negligible	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Visual inspection for black smoke from exhausts.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Contractors.
Construction / upgrade of port access roads.	Negative impact upon air quality from the generation of particulate matter during construction activities.	S	M	Minor	Minor impact - no mitigation measure proposed.	Minor	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Contractors.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
CONSTRUCTION										
Construction / upgrade of port access roads.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	S	M	Minor	Management of aqueous discharges and waste.	Minor	Physico-chemical and biological monitoring of the Keta Lagoon. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction of rail systems.	The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.	L	L	Major	Standalone environmental and social assessments would be required for the construction of a rail system to link with Ghana's railway network. Appropriate mitigation measures would be identified through these assessment processes.	Major	None proposed - to be developed as part of standalone environmental and social assessments.	N/a	N/a	Ghana Railway Development Authority (GRDA).
Construction of sea lock to the Keta Lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) along with the ecology that may be protected, rare, endangered and / or provides important ecocystem services. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.), the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services that the Keta Lagoon provides.	L	H	Major	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	Moderate	Physico-chemical and biological monitoring of the Keta Lagoon.	Monthly monitoring throughout the construction period.	No deteoriation in water quality in nearby waterbodies.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction of sea lock to the Keta Lagoon.	When the sea lock is constructed, it is planned to close the existing floodgate on the causeway as the sea lock will be designed to allow water to be released from the Keta Lagoon to the port basin. As the two locations are different, the sea lock may not provide the same flood protection as the floodgates.	M	M	Moderate	Detailed study on the impact upon flood control functionality to be undertaken as part of the design of the sea lock to the Keta Lagoon. If found to be necessary to achieve the same level of flood protection the existing flood gates could be left operational.	Negligible	None proposed.	N/a	N/a	Contractor / Sea Lock Design Consultant.

Table 1-3 - Operations Phase Potential Impacts Identified and Evaluated, Mitigation Measures Proposed, and Preliminary Environmental Management and Monitoring Plan

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
Port operations impact upon the shoreline, and ongoing impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	L	L	Major	Ongoing implementation of the standalone Ecology Management Plan which will need to be developed prior to construction.	Major	Monitoring carried out in line with the standalone Ecology Management Plan.	Standalone Ecology Management Plan implemented and maintained throughout.	Mitigation measures and commitments are properly maintained and implemented.	Port operator.
Population Influx, acculturation and loss of cultural identity and language of the local amenities.	The influx of migrant workers and populations seeking opportunities in the project area communities may come with attendant consequences of changing lifestyles, dilution of local culture practices, traditions, norms, value systems and language. Changing economic opportunities and livelihoods may affect locals who do not have the skills to integrate into the new economy. This may be attended with high standards / high cost of living, pushing local populations and the vulnerable further into poverty. Pressure on public infrastructure, social amenities, housing, among others	M	M	Moderate	Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding population influx Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions. Utilities such as water, electricity, waste management, public parks, etc. that may come with the port city should be equally extended to the project communities. Livelihood opportunities, including facilitation of skills training for local youth should be prioritized.	Negligible	Develop and implement a comprehensive population influx plan over a period of 10 years during the operational phase of the port with periodic annual reporing.	According to the population influx plan.	Provision of social infrastructures and amenities, social and cultural awareness programs and mass media education / sensitization.	GPHA, KeMA, Traditional Authorities.
OHS concerns and labour issues	Workers exposed to risks such as fire, hazards from operation of equipment, haulage, accidents from falling objects, forklift accidents, collisions, etc. Unhygienic working conditions, discriminatory practices, forced labour, and engagement of child labour by third party service providers may trigger labour rights concerns. Poor waste management significantly affecting safety and health in the workplace. Excessive speed incidents, accidents and road traffic situations. Workplace conflicts, labour agitations and unrests. Forced and child labour, SEA, discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses - theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc.	M	M	Moderate	Maintain high standards of OHS and environmental protection at the port to comply with relevant national and international laws and regulations on OHS. Maintain safe and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. Appropriate speed limits should be instituted, observed and enforced. Safe exit points, fire extinguishers and sprinklers should be placed at vantage points. Security at the port must be maintained to ensure only authorized persons are allowed into the construction area. Develop an OHS Plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on health and safety policy. Train selected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged.	Minor	Periodic reporting on compliance with OHS safeguard measures, incident reporting. Periodic port supervisions by regulatory institutions.	Periodic reporting.	Designated assembly points, periodic emergency preparedness trainings / drills for users of facilities. Develop and implement a Human Resource Policy and Plan that adheres to the requirements of IFC PS2, ILO Conventions on Labour and Human Rights including requirements for workers to have contracts, Workers Grievance Mechanism and develop retrenchment plans if there is a requirement for collective dismissals and all in compliance with the Ghanaian Labour Act.	GPHA / PoK operators.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
	Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.				Operate the harbour in compliance with environmental, social, health and safety laws, regulations and policies.					
Public health & safety issues - workers and communities	Population influx during the beginning of the operation period may result to increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs. The impact may be permanent or irreversible in nature. Open defecation is rampant at the beaches across all communities. Dumping of solid waste along the lagoon coast is also commonplace. Poor sanitation conditions may further pollute the environment and communities. Potential for traffic incidents / accidents on the public / community roads may be increased. Sewerage and wastewater from the port facilities and an ever-increasing population, posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	M	M	Moderate	Collaborate with the Keta Municipal Assembly (KeMA) / GHS for awareness for all workers and the general public on the behavioural changes required to prevent the spread of HIV / AIDS and other STDs. Provide adequate public toilet facilities and solid waste management systems for host communities. Provide security installations such as the police service in the project communities to help manage traffic congestion when the need arises. Build mini sewerage treatment plants for liquid waste treatment and disposal, as well as solid waste management systems and landfill sites.	Minor	Develop and implement a comprehensive population influx plan as well as public health awareness programs for a period of 10 years during the operational phase of the port with periodic annual reporing.	According to the population influx plan.	Social and sanitation infrastructure, and set public health milestones	GPHA / KeMA.
Community safety and general disturbance of PACs.	Accidental events such as boats colliding and capsizing on the sea and lagoon, drownings due to the depth of the dredged lagoon and impact on nearby properties and ecology. Increased flooding of project communities due to population pressure and changing landscape and land use. Restricted access to security zone installations, affecting livelihood activities such as salt mining, fishing, eco-tourism, etc.	M	M	Moderate	Build integrated drainage systems for communities in the catchment areas of the port to help mitigate any flooding situations. Structural plans being developed under an SDF (Spatial Development Framework) for Ketu South, Anloga and Keta in should be adopted and integrated into port development. Rescue equipment and support should be provided as part of port operation activities. Provide training to local fishermen on how to undertake rescue activities on the sea / lagoon. Engage community liaison officers to ensure all port operation activities are in sync with project communities – with clearer awareness of security zones, safety zones etc.	Minor	Develop and implement a comprehensive population influx plan over a period of 10 years during the operational phase of the port with periodic annual reporing.	According to the population influx plan.	According to the population influx plan.	GPHA / KeMA
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment	S	M	Minor	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to specify procedures to facilitate tracking of loads, and protocols for the	Negligible	Records of the quantities of wastes generated, recycled and disposed. Periodic reporting on compliance by dedicated safeguards team.	Monthly.	National laws, regualtions and policies on the environment and public health, complemented by other international performance standards, conventions and practices.	Contractor / consultant.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
	or removal for disposal via local sewage network or septic tanks.)				maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.					
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	M	H	Major	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Major	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.
Maintenance dredging of the port basin and access channel.	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	S	M	Minor	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers. Navigational charts updated.	Minor	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No health and safety incidents / complaints. No Stop Work Orders issued.	Dredging contractor.
Maintenance dredging of the port basin and access channel.	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	L	L	Moderate	Only Hydraulic Dredgers (CSD, or TSHD) will be used for vertical transport of dredged material. When using a TSHD the application of water jets will be delayed until the Drag Head is in contact with the seabed and the suction pump is running. The water jets will also be switched off before the dredge pump is disengaged and the draghead lifted off the seabed. When using a CSD the speed (revolution and swing) of the cutter and ladder will be carefully controlled in order to minimise the spillage	Minor	Regular inspections of vessels to be used for dredging works. Turbidity levels shall be monitored against background concentrations. Monitor and keep records of water quality characteristics and check compliance with regulatory limits.	Monthly reporting.	Vessel, plant and equipment log books are maintained and available for viewing. Turbidity levels against background concentrations. No water quality related complaints. No visual reduction in water quality. No indication of direct impacts on flora as a result of the dredging works.	Dredging contractor.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					(material that is cut but not sucked up by the suction pipe) by maintaining a balance between cutter speed and pump capacity. The cutter head / drag head selected will be suitable for the material likely to be encountered. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available. CSD / TSHD will be equipped with on-board systems for determining solids / water ratio or density of dredged material; and electronic positioning and depth control system for defining the location and depth of dredging. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Any TSHD that is used will have well maintained hopper seals / doors.		The number of complaints / incidents shall be monitored. Visual inspection.			
Maintenance dredging of the port basin and access channel.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	M	M	Moderate	All crew on dredgers / support vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels.	Minor	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Dredging contractor.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.					
Maintenance dredging of the port basin and access channel.	Disruption of fishing including damage to fishing nets.	M	M	Moderate	Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding dredger to be checked before commencing works to minimise risk of damaging fishing nets.	Minor	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No incidents / complaints.	Dredging contractor.
Maintenance dredging of the port basin and access channel.	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	S	M	Minor	All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Minor	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Daily during dredging operations.	No light, noise or general disturbance complaints shall be received. Complaint responded to within 24 hours and complaint resolved. Noise levels are in accordance with the equipment specification.	Dredging contractor.
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	M	M	Moderate	Dredged material will be tested and discharged accordingly. Suitable dredged material disposal site to be identified.	Minor	Use of tracers to investigate the fate of dredged material.	Following construction.	No evidence that disposed dredged material is re-entering the channel or harbour basin.	Port operators.
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	S	H	Major	No mitigation measure proposed.	Major	Monitoring of benthic infauna, zooplankton, phytoplankton, and chlorophyll a. Monitoring of fish catch assessments.	Prior to, during, and following maintenance dredging operations.	No negative impact upon commnuities of benthic infauna, plankton, or chlorophyll a. No negative impact identified in montoring of fish catch assessments.	Dredging contractors. Port operators.
Physical presence of the breakwaters.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. Constructing the main breakwater is expected to prevent littoral material movement along the coast. In the long term this may cause erosion on the downdrift side (Denu, Blekusu, onwards to Aflao) but lead to sediment accretion on the upstream side for sediment transport (i.e., areas on the coast to the south-southwest) and helping with land reclamation.	M	H	Major	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment. *(WRC, Hydrological Services Authority and Ministry of Environment, Science and Technology, are currently in discussion to identify a suitable location to pilot a Sand Motor / Building with Nature project).*	Major	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.
Physical presence of the breakwaters.	Potential negative impact on coastal flooding events.	N	H	Minor	No mitigation measure proposed - it is believed that constructing the Port of Keta will not influence coastal flooding events.	Minor	None proposed.	None.	No increase in the frequency or magnitude of coastal flooding events	None.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
General port operations.	Conflict between merchant and fishing vessels; and between industrial and artisanal fishing vessels.	M	H	Major	Sensitisation for coexistence. Spatial arrangements to contain each group of vessels.	Moderate	Numbers of conflicts occurring and numbers resolved	Weekly and throughout first year of operation	Numbers of conflicts effectively prevented and resolved	Client / Leadership of fishers.
Movement of vessels.	Movement of vessels and the disturbance of fishing and consequent risk of collision.				All crew on vessels will be appropriately trained and certified. All navigational / communication equipment in good working order. Emergency procedures are in place / carried out in case of incident. Vessel Traffic System (VTS) implemented to communicate information (such as MetOcean conditions) to vessels. Navigation Simulation Study (NSS) conducted to allow pilots to practice ship handling procedures to help ensure the safety of navigation. Navigational charts updated.	Minor				
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Movement of vessels and the use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	L	M	Major	Development of an Oil Spill Contingency Plan (OSC). All crew on construction vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately.	Moderate	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Port operators.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.					
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Noise, light and general disturbance from the movement of vessels and the use of equipment causing loss / disturbance of flora and fauna.	M	M	Moderate	Develop and implement and standalone Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Moderate	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Monthly.	No light, noise or general disturbance complaints shall be received. Noise levels are in accordance with the equipment specification.	Port operators.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon climate change and air quality from gaseous emissions from vessels, vehicles, machinery, and equipment operation.	S	L	Negligible	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Visual inspection for black smoke from exhausts.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Port operators.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon air quality from the generation of particulate matter from exhausts of vessels, vehicles, machinery, and equipment.	S	M	Minor	Minor impact - no mitigation measure proposed.	Minor	Monitoring of particulate matter in accordance with regulatory requirements.	Monthly monitoring. Constant visual inspection.	No deterioration in ambient air quality monitoring results.	Port operators.
Wastewater and sewage treatment and disposal.	Wastewater generated could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	M	H	Major	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity. Port reception facility provided.	Moderate	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent producedin line with EPA requirements. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	S	H	Moderate	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed.	Moderate	Physico-chemical and biological monitoring of nearby waterbodies in line with EPA requirements. Regular site inspections to ensure that mitigation measures and	Monthly monitoring throughout the construction period. Site inspections completed daily	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.		commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	throughout the construction period. Weekly reports.		construction supervision.
Operation of sea lock to the lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) along with the ecology. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.) due to the easy flow of water between the sea and the Keta Lagoon contributing positively to fishing livelihoods, the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services.	L	H	Major	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	Moderate	Physico-chemical and biological monitoring of the Keta Lagoon.	Monthly monitoring throughout the construction period.	No deteoriation in water quality in nearby waterbodies.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment.	Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column and sediments (harbour basin and Keta Lagoon).	L	M	Major	Development of an Oil Spill Contingency Plan (OSC). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g.	Moderate	The number of incidents / will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Port operators.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.					
Trucks and other vehicles visiting the port.	The port will significantly increase traffic volumes in the project communities and surrounding road network. This can cause congestion which may bring delays, can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.	L	H	Major	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Major	Visual observations of congestion levels. The number of incidents / accidents in the PACs will be monitored. The number of complaints will be monitored.	Continually	Zero traffic related accidents / incidents / complaints in the PACs.	Port operators.
Trucks and other vehicles visiting the port.	Increased traffic volumes will cause a quicker deterioration of the road surface, which can further impact congestion and incidents / accidents on the roads.	L	M	Major	Provision of a mandatory weighbridge to ensure that overweight vehicles do not leave the port. Access roads improved.	Moderate	Visual observations of the road surface in the main access roads. Number of overweight vehicles not permitted to leave the port.	Continually	No overweight vehicles are permitted to leave the port.	Port operators.
Trucks and other vehicles visiting the port.	The increased movement of trucks and other vehicles will result in increased noise and vibration and contribute to a reduction in air quality in the project communities and communities along the surrounding road network, this can have a negative impact on people in these areas. This can be both a nuisance (affecting peaceful resting and relaxation of people) and can have a health impact (stress, hearing challenges, etc.).	M	M	Moderate	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Moderate	Periodic sound level monitoring in the PACs and along the main access routes.	Quarterly	Sound levels are within the limits set by GSA.	Port operators.
Trucks and other vehicles visiting the port.	Trucks parking overnight / for extended periods in an informal manner (i.e., along the roadside) with drivers sleeping in their trucks can have a negative impact upon PACs through improper disposal of sanitary waste / increased open defecation at the beaches, improper disposal of solid / liquid waste (litter), increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs.	M	M	Moderate	Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks. Effective scheduling system for truck port entry.	Minor	Visual inspections of trucks parking overnight in an informal manner with drivers sleeping in their trucks.	Continually	No reports of drivers sleeping in their trucks in PACs or alongside port access roads.	Port operators.
Provision of security in and around the port.	Local and national safety & security concerns (crime, terrorists, piracy, stowaways).	M	H	Major	Robust Security Plan developed including ensuring security at anchorage. Proper ongoing engagement with the communities. Proper spatial planning (ecotourism, ecoparks, etc.). Port Facility Security Assessment to identify vulnerabilities, develop a Port Facility Security Plan.	Moderate	Monitoring safety and security incidents.	Continually	No increase in the number of safety and security incidents related to port operations in Ghana.	Marine police. Ghana navy. Port operators.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
					MOC to be developed, in addition to an Incident Management Centre. CSR activities undertaken to ensure communities feel a positive impact. Restricted access to security zone and compliance with ISPS.					
Ship waste handling	Sewerage and wastewater (including hazardous) from the port facilities (and an ever-increasing population), posing risks to the environment potentially leading to suspension of toxic, harmful substances in the water column with a consequent impact on aquatic life / water ecology and the local population if not treated properly prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	L	M	Major	Port reception facility provided.	Moderate	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.
Stormwater management activities	There is potential for stormwater collected from the port and surrounding environment to contain pollutants (as a result of the storage of cargo and containers, stockpiling of bulk (solid and liquid) materials, and the maintenance of equipment / machinery / general port facilities, and the handling of hazardous waste and materials including waste oil) which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	M	H	Major	Treatment of stormwater prior to release to the environment. A Spill Prevention and Response Plan shall be developed (including an OSCP). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. Secondary containment systems will be constructed with materials appropriate for the materials being contained and adequate to prevent loss to the environment (e.g. bunding). Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times. Establish and maintain a controlled fuelling, maintenance, and servicing protocol to minimize leaks and spills. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum and have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	Major	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. The outflow from any drainage grooves and settlement ponds will be regularly inspected.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.

Activity / Issue	Impact	M	S	Impact	Mitigation Measures	Residual	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
OPERATIONS										
Stockpiling of bulk materials.	There is potential for stormwater collected from the port and surrounding environment to contain pollutants as a result of the stockpiling of bulk materials which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	M	H	Major	Treatment of stormwater prior to release to the environment (including from iron ore stockpiles).	Major	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. The outflow from any drainage grooves and settlement ponds will be regularly inspected.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.
Stockpiling of bulk materials.	Negative impact upon air quality (particulate matter) from wind distributing stockpiled bulk materials to the surrounding environment causing an impact to water quality, having a nuisance effect, and an impact upon human health.	M	M	Moderate	Appropriate stockpile suppression methods to be implemented dependent upon the stockpiled material. Stockpiled materials to be covered during periods of high winds.	Moderate	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Port operators.

2. Introduction

2.1. Background

GPHA wish to develop the Port of Keta, in a small community called Kedzi, located north of Keta in the Volta Region of Ghana (see Figure 2-1). It is understood that the proposed development is being motivated by a combination of factors including the National Development Agenda, international market demands, global and regional trends, and Ghana's ongoing industrial and socio-economic development.

To support this intention a Feasibility Study and Master Planning Report was commissioned by GPHA and completed by Sellhorn Ingenieurgesellschaft mbH and Inveni Portum Solutions GmbH (SIIPS) in 2021.

The Port of Keta is expected to consist of main and secondary breakwaters; dredging the harbour basins', navigational channel and berths / reclamation to develop land banks; quay walls / piers with berthing furniture; multipurpose cargo storage areas / terminal; maintenance and repair workshops; administration building; navy dock and buildings; access roads / highways and other port infrastructure; public utility services systems - water, electricity, telecommunications, etc.; fishing harbour; shipyard and repair facility; liquid petroleum bulk terminals, tank farms etc.; iron ore terminal and other potential dry bulk handling facilities; marinas (marine side and lagoon side); ferry / cruise passenger terminals; and, port and public transportation facilities.

In accordance with Ghana's Environmental Assessment Regulations, 1999, Legislative Instrument (LI) 1652 (enacted under the provisions of the Environmental Protection Agency Act, 1994 (Act 490)) the proposed project falls under the undertakings for which an EIA study is mandatory. Consequently, CARES Ghana have been commissioned by GPHA to provide EIA Consulting Services.

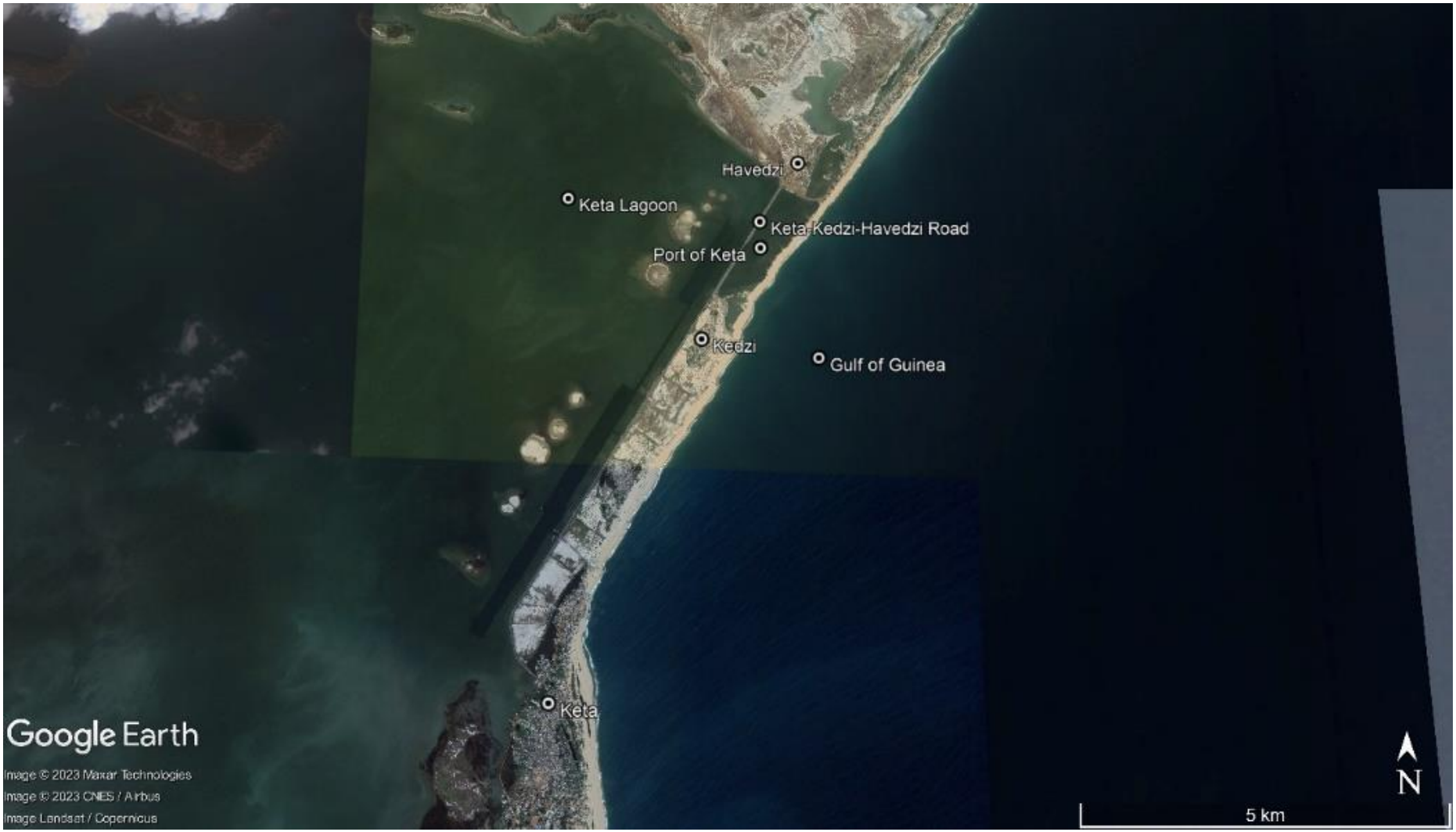

Figure 2-1 - Site Location Plan
(Source: Google Earth)

2.2. Project Justification

Compared with the existing maritime port system in Ghana, the Port of Keta project has different characteristics, in that it is a real greenfield project. The nearer and wider catchment area of the port has a specific socio-economic environment dominated by rural sites that are poorly integrated into the urban centres of the country and even less with Ghana's international trade. The region shows a low level of industrialisation, with life centred on the ecological environment with some fishery and relatively low harvest agriculture production. In addition to that, the connection to the hinterland transport shows some serious weaknesses. Therefore, from a local perspective, the port is seen as a trigger to stimulate economic development in the catchment area and to overcome some of these weaknesses (SIIPS, 2021).

Additionally, some other potential benefits may include:

- Providing physical protection from erosion to the coastline.
- Providing additional capacity to correspond with the anticipated increase in import and export volumes based on anticipated volumes of seaborne trade. This is expected due to Ghana's socio-economic development as well as population growth.
- Reducing the distance travelled by road for goods imported / exported from the Eastern Corridor (e.g., salt / salt products, clinker, fertilisers).
- Providing stimulus for potential industries located close to the port (This could support developing clusters, including a fishery cluster, agriculture cluster, shipyard / vessel recycling cluster, and energy cluster).
- Improving shipping efficiency for shippers (SIIPS, 2021).

According to the EIA Terms of Reference provided by GPHA, the potential positive opportunities from the proposed Port of Keta development may include:

- Increased revenue, opportunity for the economy and general local and government services through export and import activities and other port businesses and clustering activities.
- Direct and indirect employment generation and opportunities.
- Create an avenue for increased production and export of existing products in the area such as salt, fish, tomatoes, etc., thus creating increased business opportunities for the locals and investors / entrepreneurs.
- Revive and promote tourism in the area.
- Facilitate and improvement of infrastructure in the project area as electricity, water, sewage, road, rail, etc., will be improved or constructed as part of the port development.
- Improvement in local and national economies and opening the eastern section of the country for more development and business opportunities and will lead to improvement in the socioeconomic life of the people.
- Create opportunities for hinterland or landlocked countries such as Burkina Faso, Niger and Mali to use the Port of Keta instead of Tema Port due to the reduction in transportation cost of goods using the Eastern Corridor.
- Accretion at the western edge of the breakwater leading to useful reclamation of lands.

2.3. Purpose of the Environmental Impact Assessment (EIA)

The purpose of the EIA is to address possible direct and indirect significant environmental, social, health and safety impacts of the project during construction as well as operation of the project. The EIA also seeks to satisfy the legal and institutional framework specified under the EPA Act, 1994 (Act 490) and the Environmental Assessment Regulations, 1999 (LI 1652).

2.4. Objectives of the EIA

The primary objective of the EIA is to identify key adverse physical, biological, and social issues that can affect project viability and sustainability. The outcome of the EIA is also to assist GPHA to consider the consequences of a range of actions early in the planning process, to choose the most appropriate action on environmental / social grounds.

The specific objectives of the EIA are to:

- Define the boundaries for the EIA study in time, space, and subject matter.
- Collect baseline data and other relevant information.
- Incorporate stakeholder concerns and suggestions.
- Address the potential biophysical, socio-economic, and cultural environmental impacts and risks associated with the Port of Keta Project.
- Identify reasonable and practical alternatives to address environmental and social concerns of the project, where necessary.

2.5. Methodology and Approach

The methodology and approach for the EIA study includes:

- **Reconnaissance Visit** - Reconnaissance Visit / Project Site Inspections.
- **Desk Study and Literature Review** - Collection and review of available documentation relevant to the project including project related documents, and documents / reports on the existing environmental (biophysical, socio-economic, and cultural) conditions as well as relevant policies, laws and regulations. Literature review for theoretical support and direction.
- **Stakeholder Consultations** - Consultation and engagement with stakeholders including relevant government institutions / regulatory agencies, traditional authorities / local communities, Non-Governmental Organisations (NGOs), and Project Affected Persons (PAPs), as well as other Interested and Affected Parties (I&Aps).
- **Fieldwork / Baseline Data Gathering** - Field investigations have been carried out to determine baseline information on the physical environment, land environment, ambient air and noise, socioeconomic and sociocultural, and hazard vulnerability.
- **Data Analysis and Report Preparations** - Analysis of data collected and preparation of the EIA report.

2.6. Report Structure

The data obtained from the site reconnaissance visits, desk study and literature review, stakeholder consultations, and fieldwork / baseline data gathering have been analysed and are presented in this EIA. The format of the EIS is in line with the Ghana Environmental Assessment Regulations LI 1652 of 1999.

Consequently, the remaining chapters of the EIS are as follows:

1. Introduction.
2. Policy, Legal, and Regulatory Framework.
3. Description of Proposed Project.
4. Alternative Considerations.
5. Environmental Baseline Conditions.
6. Stakeholder / Public Consultations, and Participation.
7. Potential Impact Identification and Assessment.
8. Impact Mitigation and Management Measures.
9. Provisional Environmental Management and Monitoring Plan.
10. Conclusions.
11. References.
12. Appendices.

3. Policy, Legal, Regulatory, and Institutional Framework

CARES Group has identified and reviewed relevant national policies, legal, and institutional frameworks that will be required to guide the Port of Keta Project to ensure sustainable development and compliance with national and international regulations. These are briefly described in the following sections below.

3.1. National and Sector Policies and Plans

The relevant national and sector policies and plans identified include the following (see Table 3-1 for details):

- National Land Policy, 1999
- National Environmental Policy (NEP), 2012
- National Climate Change Policy, 2013
- National Water Policy (NWP), 2007
- National Energy Policy, 2013
- Medium Term National Development Policy Framework (Ghana Shared Growth and Development Agenda - GSGDA), 2014 to 2017
- Ghana Trade Policy, 2014
- Ghana Wildlife and Forest Policy, 2012
- Riparian Buffer Zone Policy, 2013
- National Gender Policy, 2015
- Occupational Safety and Health Policy for Ghana (Draft 2004)
- Agenda for Jobs: Creating Prosperity and Equal Opportunity for All (First Step) (2018-2021)
- National Buffer Zone Policy, 2014
- Ghana Wetlands Conservation Strategy and Action Plan, 2007
- National Biodiversity Strategy and Action Plan, 2016
- National Transport Policy, 2008
- National Environmental Sanitation Policy, 2010
- National Health Policy, 2007
- National Employment Policy, 2012
- National Tourism Development Plan, 2013-2027
- Ghana National Population Policy, 1994
- National Fisheries and Aquaculture Policy, 2022
- Co-Management Policy for the Fisheries Sector, 2020
- Fisheries Management Plan of Ghana. A National Policy for the Management of the Marine Fisheries Sector, 2022 - 2026
- Agenda for Jobs II: Creating Prosperity and Equal Opportunity for All, 2021-2025.

3.2. National Legal Framework

The relevant national framework to guide the project includes the following (with review provided in

):

- Constitution of the Republic of Ghana, 1992
- Environmental Protection Agency Act, 1994 (Act 490)
- Environmental Assessment Regulations, 1999 (LI 1652)
- Fees and Charges (Miscellaneous Provisions) Act, 2022 (Act 1080)
- Standards Authority Act, 1973 (NRDC 173)
- Land Use and Spatial Planning Authority Act, 2016 (Act 925)
- The Lands Act, 2020 (Act 1036)
- Local Governance Act, 2016 (Act 936)
- The Fire Precaution (Premises) Regulations, 2003 (LI 1724)
- Public Health Act, 2012 (Act 851)
- Ghana Standards Authority Act, 1973 (NRCD 175)
- Labour Act, 2003 (Act 651)
- Persons with Disability Act, 2006 (Act 715)
- Workmen's Compensation Act, 1987 (PNDCL 187)
- Wildlife Conservation Regulation, 1971 (LI 685)
- Factories, Offices and Shops Act, 1970 (Act 328)
- Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)
- Hazardous, Electronic and Other Wastes (Classification) Control and Management Regulations, 2016 (LI 2250)

- Ghana Ports and Harbours Authority Law, 1986 (PNDC Law 160)
- Ports Regulations, 1964 (LI 352)
- Ghana Maritime Authority Act, 2002 (Act 630)
- Ghana Maritime Authority (Amendment) Act, 2011 (Act 825)
- Ghana Maritime Authority (Maritime Safety Fees and Charges) Regulations, 2012 (LI 2009)
- Ghana Shipping Act, 2002 (Act 645)
- Ghana Shipping (Amendment) Act, 2011 (Act 826)
- Maritime Zones (Delimitation) Law, 1986 (PNDC Law 159)
- Beaches Obstructions Ordinance of 1897, Cap. 240
- Ghana Investment Promotion Centre Act, 1994 (Act 478)
- Ghana Meteorological Agency Act, 2004 (Act 687)
- Fisheries Act, 2002 (Act 625)
- Water Resources Commission Act, 1996 (Act 522)
- Water Use Regulation (WUR), 2001 (LI 1692)
- Oil in Navigable Waters Act, 1964 (Act 235)
- Marine Pollution Act, 2016 (Act 932)
- Forestry Commission Act, 1999 (Act 571)
- Wetland Management (RAMSAR Sites) Regulations, 1999
- Wild Animals Preservation Act, 1961 (Act 43)
- Wildlife Conservation Regulations, 1971 (LI 685)
- National Museum Act, 1969 (Act 387) and Executive Instrument (EI) 42
- Abandoned Property (Disposal) Act, 1974.
- The Children's Act, 1998 (Act 560)
- Ghana National Fire Service Act, 1997
- Road Traffic Act, 2004 (Act 683)
- National Building Regulations, 1996 (LI 1630)
- Ghana AIDS Commission Act, 2002 (Act 613)
- Public Holidays Act, 2001 (Act 601)
- Hunan Trafficking Act, 2005 (Act 694)
- Coastal Development Authority Act, 2017 (Act 961)

Table 3-1 - Summary of Applicable National and Sector Policies

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Land Policy, 1999	Provides framework and direction for dealing with issues of land ownership, security of tenure, land use and development, and sustainable environmental conservation. Ensures the payment, within reasonable time, of fair and adequate compensation for land acquired by government. Unless approved by the appropriate public authority, no land use change of any kind will be countenanced. All land and water resources development activities must conform with Ghana's environmental laws and where an EIA report is required, this must be provided. The Polluter Pays Principle applies, and all efforts should be made to prevent as much as possible the destruction of the environment and where this is not possible then the agency or organisation causing the pollution should ameliorate same. Provides for the protection of waterbodies and the environment in the long-term national interest under any form of land usage. Key aspects of Section 4.4 (Ensuring Sustainable Land Use) of the policy relevant to the Proposed Project are: The use of any land in Ghana for sustainable development, the protection of water bodies and the environment and any other socioeconomic activity will be determined through national land use planning guidelines based on sustainable principles in the long-term national interest. Inland and coastal wetlands are environmental conservation areas and there are uses that are considered incompatible with their ecosystem maintenance and natural productivity. This includes, human settlements and their related infrastructure development, and the disposal of solid waste and effluents. Under certain circumstances, and in consultation with custodians, shrines, sacred groves and other uses of land derived by customary practice will be treated as having protected status after their boundaries have been demarcated.	GPHA has acquired land for the proposed Port of Keta by EI 245 signed by the President of Ghana. Processes are currently underway to acquire additional land for the Port of Keta. GPHA must ensure fair and adequate compensation is paid within a reasonable time for the acquired land (from stool, traditional council, clan, family or individuals). The development of the Port of Keta and Port City will result in a change of land use which must be approved by the appropriate public authority. GPHA must put all efforts into preventing (as much as possible) destruction of the environment that may be caused by the Port of Keta. The ESIA process for the Port of Keta is a key tool to help minimise the destruction of the environment. GPHA and other stakeholders must ensure that the Port of Keta development activities conform with Ghana's environmental laws (see). EPA have indicated that an EIA is required for the Port of Keta development, which will culminate in the production of an EIA Report. GPHA have commenced this process with CARES Group acting as the consultant. Additional developments that will occur within the Port of Keta must also conform with Ghana's environmental laws and where an EIA report is required, this must be provided by the project proponents. The Port of Keta and Port City is being developed in close proximity to the Keta Lagoon - a coastal wetland. Under the policy, human settlement (and related infrastructure) and the disposal of solid waste and effluents is incompatible with the Keta Lagoon coastal wetland. Shrines, sacred groves, and other uses of land derived by customary practice potentially affected by the Port of Keta Project shall be identified and demarcated through the EIA process.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Environmental Policy (NEP), 2012	Aims to improve the surroundings, living conditions and the quality of life for all citizens, both present and future. Seeks to promote sustainable development through ensuring a balance between economic development and resource conservation. Identifies that a high-quality environment is a key element to support economic and social development. The policy notes that proper management of resources requires efforts to be redirected into more environmentally sustainable programmes and practices that protect and preserve resources for present and future generations; and that assessing potential environmental impacts of projects and advanced planning to mitigate / eliminate impacts will decrease environmental costs to the economy and promote cost-effective use of the countries resources. Sector-specific policies include: (a) Marine and Coastal Zone Management; (b) Water Resources; (c) Sustainable Agriculture; (d) Genetic, Species, and Ecosystem Biodiversity Conservation; (e) Forest and Wildlife Resources; (f) Energy Resources; (g) Mineral Resources; (h) Petroleum Exploration; (i) Urban Development; (j) Waste Management; and (k) Pollution Prevention and Control. Ghana's obligations under international environmental conventions must be respected and nurtured.	Various environmental and social assessments including an EIA will be carried out for the Port of Keta project. The current EIA process is being undertaken at an early stage and will assess potential environmental and social impacts and shall identify mitigation measures prior to project construction. The EIA report will include EMPs and contingency plans in case of accident. The Port of Keta decision-making process must take into consideration the interests, needs and values of all interested and affected parties, and should cover all forms of knowledge (including traditional systems). Those responsible for any environmental damage must be held liable for the repair. They must also be held responsible for the costs of preventive measures to reduce or prevent further pollution and environmental damage. Waste management for the Port of Keta project, must minimize and avoid the creation of waste, with particular attention given to toxic and hazardous wastes. Recycling, segregation, and safe disposal of unavoidable waste must be practiced. The Keta Lagoon must be protected in line with the principles of the Ramsar Convention. The Port of Keta EIA must consider the potential risk of the introduction of exotic species into the Keta Lagoon and other freshwater systems.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Climate Change Policy, 2013	The National Climate Change Policy provides strategic direction and coordinates issues of climate change in Ghana. The three objectives of the Policy are (1) effective adaptation, (2) social development and (3) mitigation. To address the adaptation issues in Ghana, five thematic areas have been prioritised. These are (1) energy and infrastructure; (2) natural resources management; (3) agriculture and food security; (4) disaster preparedness and response; and (5) equitable social development. These thematic areas have been subdivided into ten programme areas: a) develop climate-resilient agriculture and food security systems; b) build climate-resilient infrastructure; c) increase resilience of vulnerability communities to climate-related risks; d) increase carbon sinks; e) improve management and resilience of terrestrial, aquatic and marine ecosystems; f) address impacts of climate change on human health; g) minimise impacts of climate change on access to water and sanitation; h) address gender issues in climate change; i) address climate change and migration; j) minimise greenhouse gas emissions. Recognizes that the human impact of climate change falls, for the most part, on the poor, and – very often – on women and children, the aged, and the physically challenged.	A policy objective is to build climate-resilient infrastructure to protect inland and coastal communities, ecosystems, and services. The Port of Keta should be built in a climate resilient manner with particular attention paid to decrease vulnerability to sea-level rise. Climate change may increase coastal erosion and result in exposure to more turbulent waves, so this should be assessed. Climate change may change the frequency in which it is necessary for controlled spillage from Akosombo Dam. The Port of Keta should be developed to increase the resilience of the coastal communities which are vulnerable to the effects of climate change. The Port of Keta should minimise Greenhouse Gas emissions by considering measures for energy efficiency and cleaner energy technologies.
National Water Policy (NWP), 2007	Provides the framework for sustainable development and utilization of water resources, whereby the overall goal is to “achieve sustainable development, management, and use of Ghana’s water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations. This will be achieved by addressing relevant issues under water resources management, urban water supply and community water and sanitation”. Identifies that sustainable use of finite water resources is essential for socioeconomic development and eradicating poverty, and that available resources must be harnessed to meet growing basic needs of water supply and sanitation, contribute to food security, and hydropower. Identifies that groundwater use is faced with challenges and that rainwater harvesting offers great potential to increase water availability.	The project will require water from Ghana Water Company Limited (GWCL). The project is exploring the various option for water supply to the site. The policy looks at utilisation of water for both consumptive and non-consumptive use. Communities around the Keta Lagoon use the water resource for consumption, irrigation, and for livestock watering. The building of the port should incorporate mechanisms in which the water resource of the community for such purposes will not be affected and will remain safe for use. The Lagoon is used for inland fishing and water transportation. The Port of Keta should incorporate these in the design and development of the port.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
Medium Term National Development Policy Framework (Ghana Shared Growth and Development Agenda - GSGDA), 2014 to 2017	Provides policy objectives and strategies to guide the preparation and implementation of medium-term and annual development plans and budgets at sector and district levels as well as serving as a platform for donor coordination and economic transformation. There have been several policies and programmes to accelerate the growth of the economy and raise the living standards of Ghanaians in the past which have been pursued with varying degrees of success. In many respects, this medium-term development policy framework seeks to address the challenges and setbacks of the immediate past. It is also programmed to accelerate employment creation and income generation for poverty reduction and shared growth.	Ghana urgently requires an improvement in its infrastructure for the country to sufficiently fit into its middle-income status. The required investments are vast and requires the involvement of the private sector to share in some of the traditional responsibilities of the public sector. The Port of Keta Project aims to encourage private sector investment which will result in employment and income generation.
Ghana Trade Policy, 2014	Provides clear and transparent guidelines for the implementation of the GoG's domestic and international trade agenda. It is designed to ensure a consistent and stable policy environment within which the private sector and consumers can operate effectively and with certainty. The fundamental principle underlying the Trade Policy is that the private sector is the engine of growth, with Government providing a trade enabling environment to actively stimulate private sector initiatives.	The Port of Keta project will enhance both domestic and internal trade in the country.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
Ghana Wildlife and Forest Policy, 2012	Aims to achieve the conservation / sustainable development of forest and wildlife resources for environmental stability and to ensure the continual flow of socio-cultural, and economic goods and services from forests. Acknowledges the need to manage and enhance the ecological integrity of Ghana's ecosystems for the preservation of resources, conservation of biodiversity, and enhancing carbon stocks; the promotion of the rehabilitation and restoration of degraded landscapes through forestry. The Policy Objectives are as follows: (a) Managing and Enhancing the Ecological Integrity of Forest, Savannah, Wetlands, and Other Ecosystems; (b) Promoting the Rehabilitation and Restoration of Degraded Landscapes through Forest Plantation Development, Enrichment Planting, and Community Forestry; (c) Promoting the Development of Viable Forest and Wildlife Based Industries and Livelihoods, particularly in the Value-Added Processing of Forest and Wildlife Resources; (d) Promoting and Developing Mechanisms for Transparent Governance, Equity Sharing and Peoples Participation in Forest and Wildlife Management. (e) Promoting Training, Research and Technology Development that Supports Sustainable Forest Management (f) Supporting the Implementation of the Forest and Wildlife Policy Objectives and Programmes.	Policy seeks to promote the use of wetlands provided that the use also serves to conserve the ecosystem, biodiversity, and sustainable productivity of the wetland. Under Policy Objective 1 "Managing and Enhancing the Ecological Integrity of Forest, Savannah, Wetlands, and Other Ecosystems" the Strategic Direction for Wetlands Development highlights that a major obligation under the Ramsar Convention is the implementation of the principle of 'wise use' of the wetlands resources, where "wise use" is understood to mean: *"their sustained utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".* The policy states that wetlands management is unsustainable and will seek to promote the use of wetlands for farming, grazing, fishing, timber production and salt-winning provided that such uses also serve to conserve the ecosystem, biodiversity and sustainable productivity of the wetland.
Riparian Buffer Zone Policy, 2013	Provides comprehensive measures and actions that would guide the creation of vegetative buffers for the preservation and functioning of the nation's water bodies and vital ecosystems.	The establishment of buffer zones applies to lands adjacent to rivers, streams, lakes, and wetlands. The Port of Keta will be developed directly next to the Keta Lagoon.
National Gender Policy, 2015	Mainstreams gender, women's empowerment, and social protection concerns into national development processes for equitable livelihood for women and men, boys, and girls. Based on commitments in the Millennium Development Goals, Sustainable Development Goals, and Ghana's National Development Frameworks. The broad policy objectives include: (1) Women's Empowerment and Livelihood; (2) Women's Rights and Access to Justice; (3) Women Leadership and Accountable Governance; (4) Economic Opportunities for Women; and (5) Gender Role and Relations. The goal of the policy is to mainstream gender equality concerns into the national development process by improving the social, legal, civic, political, economic and socio-cultural conditions of women, girls, children, the vulnerable and people with special needs; persons with disability and the marginalized.	To ensure alignment with the National Gender Policy, as a project of national importance, the Port of Keta project should be developed in a manner to support women's empowerment and social protection, and equitable livelihoods for women and men, boys and girls. Women participation in various aspects of the Port of Keta project will be incorporated. This will include (but not be limited to) consultation during the EIA process with women and girls and vulnerable groups to ensure their socio-economic well-being are secured and their rights are protected.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
Occupational Safety and Health Policy for Ghana (Draft, 2004)	"To prevent accidents and injuries arising out of or linked with or occurring in the course of work, by minimizing, as far as reasonably practicable, the cause of the hazards in the working environment and, therefore, the risk to which employees and the public may be exposed". Derived from provisions of the International Labor Organization (ILO) Conventions 155 and 16.	The policy contains specific sections on objectives, scope, strategies, activities and promotion and awareness creation for occupational health and safety.
An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All (First Step) (2018-2021)	The Agenda for Jobs is the medium-term national development policy framework following the implementation of the previous Ghana Shared Growth and Development Agenda (GSGDA) II, 2014-2017. It is the operational framework of the President's Coordinated Programme of Economic and Social Development Policies (CPESDP), 2018-2021 – An Agenda for Jobs. It serves as the implementation framework to guide the overall economic and social development of the country. This vision is informed by the need for a strong economy that expands opportunities, inspires people to start businesses, stimulates expansion of existing businesses that ultimately leads to creation of jobs, increased economic growth and higher incomes. The vision also takes cognisance of Ghana's international commitments such as the African Union (AU) Agenda 2063 and the United Nations Sustainable Development Goals (SDGs). The overall development aspiration of the government therefore is to develop a Ghana beyond aid, which entails having efficient public services delivery system, modern economic and social infrastructure, expanded investments in strategic sectors of the economy to propel economic growth and development among others.	There are four main goals of the policy: a) Create opportunities for all Ghanaians; b) Safeguard the natural environment and ensure a resilient built environment; c) Maintain a stable, united, and safe society; and d) Build a prosperous society. Relevant key policy objectives include promoting international trade and investment and diversifying and expanding the tourism industry. Flagship initiatives include a paperless transaction processing system at all ports of entry and introduction of mandatory joint inspections at the ports. The Port of Keta is planned to be developed in a way to support existing businesses within its expected catchment area (e.g. salt production, tourism, agriculture, and commercial fishing). It is expected that this will support socio-economic growth. The overall goal of the government's economic development strategies, over the medium term, is to build a prosperous society. This entails optimising the key sources of economic growth; building a strong and resilient economy, capable of withstanding internal and external shocks; enhancing a competitive and enabling business environment; transforming agriculture and industry; and developing robust tourism and creative arts industries.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Biodiversity Strategy and Action Plan, 2016	The national biodiversity conservation vision is that: By 2030, effective systems would be in place to ensure that biodiversity in Ghana is valued, conserved, restored, and wisely used to maintain ecosystem services, and sustain life support services for a healthy planet while ensuring continuous and equitable sharing of the costs and benefits arising therefrom, to the well-being, prosperity, and security of all Ghanaians. The mission is to take effective and urgent actions to minimise the loss of biodiversity in order to ensure that by 2030 ecosystems in Ghana are resilient and continue to provide essential services, thereby securing the country's variety of life, and contribute to human wellbeing, and poverty eradication. The effective management of biodiversity to meet the national development objectives on biodiversity is guided by the four strategic objectives: • to address the underlying causes of biodiversity loss by mainstreaming biodiversity into all sectors of government and society programmes; • to improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity; • to enhance the benefits of biodiversity to all sectors of the economy; • to enhance implementation of national biodiversity action plan through participatory planning, knowledge management and capacity building.	In order to align with the policy framework, the Port of Keta Project should ensure that it improves the status of biodiversity by safeguarding ecosystems, species, and genetic diversity. It should ensure that the benefits of biodiversity in the form of ecosystem services are able to contribute to human wellbeing and poverty reduction.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Transport Policy, 2008	The Ministry of Transport has adopted a sector approach with the formulation of the National Transport Policy (NTP) as the guide to development and improvement of transportation in general. The vision of the transport sector, as stated in the NTP, is to provide an integrated, efficient, cost-effective, and sustainable transportation system. The NTP defined the following strategic goals for improving the performance of the sector as follows: • Establish Ghana as a Transportation Hub for the West African Sub-Region. • Create a sustainable, accessible, affordable, reliable, effective, efficient, safe, and secure transport system that meets user needs and is world classed. • Integrate land use, transport planning, development planning and service provision. • Create a vibrant investment and performance-based management environment that maximizes benefits for public and private sector investors. • Develop and implement a comprehensive and integrated Policy, Governance, and Institutional Framework. • Ensure Sustainable Development in the Transport sector; and • Develop adequate Human Resources and apply new Technology.	The project proponent is GPHA, which is under the Ministry of Transport, and has a key role to play in achieving a key strategic goal of the NTP, namely making Ghana as a gateway to the West African Sub-Region. The Port of Keta project can support this goal by providing an alternative route for the landlocked countries to the north. The Port of Keta development should be developed in line with the strategies of the policy. This includes exploring the feasibility of establishing other ports; encouraging open competition and port handling services; improving equipment and facilities in ports to reduce costs for users; making transport services through ports more competitive in the West African sub-region; and maximising access to international markets and transport networks.
National Environmental Sanitation Policy, 2010	The policy is aimed at developing and maintaining a clean, safe, and pleasant physical environment in all human settlements, to promote the social, economic, and physical well-being of all sections of the population. It comprises a number of complementary activities, including the construction and maintenance of sanitary infrastructure, the provision of services, public education, community and individual action, regulation, and legislation.	The implementation of the physical development aspect of the proposed project should take into consideration measures to ensure healthy sanitary practices at all construction and operational sites to protect and maintain a clean and safe environment. The project will require adherence to the policy be working with the appropriate authorities to ensure proper: waste management; waste treatment and disposal; liquid waste management; stormwater drainage; industrial waste management; vector and pest control; and food hygiene.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
National Health Policy, 2007	The core theme of the policy is *"Creating Wealth through Health"* and recognises that there are significant benefits that can be derived through greater investments and nutrition; and that a healthy lifestyle, a health-enhancing environment, a vibrant health industry and other sectors beyond health care services play in improving health and socioeconomic development. The policy aims at creating wealth through health and among other things places emphasis on improvements in personal hygiene, immunisation of mothers and children, the practice of safe sex and the prevention of injuries at work places. It further acknowledges that poverty is a major cause of under-nutrition and ill health and exacerbates the spread of disease and reduces productivity.	The policy includes emphasis on the need to prevent injuries at workplaces acknowledging that threats to OHS include a hazardous work environment, unsafe work practices, and inappropriate work design and tools. Consequently, the Port of Keta Project should be developed to ensure that OHS compliant measures are implemented in workplaces including safety awareness and HIV / AIDS prevention. The policy argues that a healthy population can only be achieved if there are improvements in environmental health and sanitation, proper housing and town planning, provision of safe water / food and nutrition, and encouragement of regular physical exercise. These should all be important considerations in the development of the Port of Keta Project. Furthermore, a potential benefit of the Port of Keta Project is contributing to poverty alleviation.
National Employment Policy, 2012	The National Employment Policy indicates that poverty is still high at about 28.5 percent and that there is a strong correlation between the employment situation and poverty. The policy states that the key source of demand for labour emanates from the productive sectors of the economy, namely, agriculture, industry, and service.	One of the key strategies of the employment policy is to promote employment through infrastructure development. The Port of Keta Project is well-aligned with this project with one of the potential benefits identified by GPHA to be direct and indirect employment generation and opportunities.
National Tourism Development Plan, 2013-2027	The 15-year National Tourism Development Plan (2013-2027) assesses how tourism can contribute to national and local economic development and enhance its role as a leading contributor for employment creation, revenue generation, environmental conservation and national cohesion and overall economic growth. The plan has therefore been prepared with the aim of positioning tourism within the national development agenda.	Potential positive impacts and opportunities from the Port of Keta project include reviving and promoting tourism within the area. Tourism is intended to be promoted through including a Ferry / Cruise Ship Area, and a Marina in the Public Area of the port during Phase Two, as well as the Sea Lock providing access to the lagoon. Additionally, within the lagoon tourism and leisure is intended to be promoted through developing a Lagoon Marina and Marina Club House; a Port City Recreational Park; and Hotel Island Developments. Promoting tourism will be aided by the unique natural environment, cultural resources, and important historical sites.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
Ghana National Population Policy (1994)	The policy includes the need to: integrate population issues into all aspects of the development planning process; educate the population about the causes, consequences and prevention of HIV / AIDS and other Sexually Transmitted Diseases (STDs); educate the population on the importance of environmental conservation, and the need to develop and enforce laws and regulations that protect the environment; develop programmes to reduce the suffering of rural and urban poor and other specially disadvantaged groups; to enhance integrated rural and urban development to improve living conditions (particularly in the rural areas), and to moderate and reorient migration, including the establishment of growth centres.	The Port of Keta Project will impact on the population dynamics of the project areas due to potential in-migration and labour influx. Additionally, the policy includes recognition that: (1) the youthful age structure means a high potential for rapid population growth and high dependency burden - this requires socioeconomic development and the need for job creation; (2) rapid population growth is negatively affecting the country and steps must be taken to protect land, forest resources, and other life supporting systems from population pressure; (3) increasing demand for sand, gravel, and stones for construction has led to extensive environmental degradation in areas where controls are lacking - with sand winning taking place along the coastline close to the project site; (4) concentration of population along the coastline is one of the major causes of the destruction of coastal resources - the Port of Keta will likely result in in-migration further contributing to this.
National Fisheries and Aquaculture Policy, 2022	The following national development priorities and general principles, inform and guide the policy: a) Poverty reduction; b) Decentralization; c) Divestiture of government function: involvement of government in activities that can be carried out by the private sector is avoided; d) Gender equity; e) Code of Conduct: Conduct for Responsible Fisheries, its supporting international fisheries instruments and related technical guidelines; f) Stakeholder participation; g) Sustainability; h) Precautionary principle; i) Conservation; j) Research; k) Education, Training and Public Awareness; l) Equity; m) Polluter pays principle; n) Transparency and accountability; o) Public Private Partnership (PPP).	Operational objectives of the policy include that the following are to be pursued: a) establish specific management and conservation measures based on regular assessments of the status of fish stocks and associated aquatic environment; b) To improve the effectiveness of stakeholder institutions and mechanisms for co-management; c) To ensure the sustainability of commercial fisheries through appropriate regulations and management measures; d) To protect and improve the aquatic environment, including biodiversity and habitats; e) To combat IUU fishing through appropriate regulations and effective monitoring, control and surveillance systems; f) to establish and/or strengthen and promote effective collaboration among key national and international actors; g) The restoration, protection and improvement of coastal lagoon ecosystems including biodiversity and habitats; h) to promote the sustainable use of lagoon resources through appropriate regulations and management measures.
Co-Management Policy for the Fisheries Sector, 2020	The policy seeks to address the following: a) low involvement of local communities in fisheries management planning and decision-making; b) open access to fisheries resources; c) Illegal, Unreported, and Unregulated (IUU) fishing; d) inadequate institutional capacity at the central level of management; e) low level of awareness and education on the implications of using unauthorized methods and unapproved gears in fishing; f) poor performance of existing central management.	Implementation of the policy is expected to enhance the participation of fisheries resource users in the decision-making processes for the sustainable management of the sector. The site for the Port of Keta is currently a landing site for fishermen and the project may impact upon the fisheries sector negatively and / or positively and the project should consider the policy.

Policy Framework	Summary of Core Requirements	Relationship to Proposed Project
Fisheries Management Plan of Ghana. A National Policy for the Management of the Marine Fisheries Sector, 2022 - 2026	Commitment to implementing a robust Fisheries Management Plan to ensure long term conservation of its fish stocks whilst at the same time contributing to improved food and nutritional safety at a national level. Guiding principles include a) Precautionary approach in management; b) Ecosystem approach; c) Co-Management; d) International Cooperation and Coordination; e) Participation, Public Accountability, and Transparency; f) Limitation of Adverse Environmental Impacts	The Port of Keta project has the potential to have adverse impacts upon fisheries. The policy includes the requirement to limit adverse environmental impacts to ensure the conservation and protection of fisheries resources and uphold and applying the polluter pays principle in protecting marine habitats.

Table 3-2 - Summary of the National Legal Framework

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
The Constitution of the Republic of Ghana, 1992	The constitution places an obligation on every citizen as a duty to protect and safeguard the environment for prosperity. Section 41(k) stipulates that 'It shall be the duty of every citizen to protect and safeguard the environment'.	There is potential for the Port of Keta Project to have positive and negative impacts upon the environment. Under the constitution it is every citizens responsibility to protect and safeguard the environment. The EIA will help identify the potential negative impacts and develop avoidance / mitigation measures to help protect and safeguard the environment.
Environmental Protection Agency Act, 1994 (Act 490)	Gives mandate to EPA to ensure compliance of all investments and undertakings with laid down Environmental Assessment (EA) procedures in the planning and execution of development projects, including compliance in respect of existing ones.	The EPA are the regulatory authority responsible for issuing Environmental Permits for the Port of Keta in accordance with the Environmental Assessment Regulations, 1999 (LI 1652). The first Environmental Permit is expected to be received from EPA after completion of the EIA. Subsequent permits will be provided after submission of EMPs. The first EMP should be submitted to EPA within 18 months of commencement of operations and thereafter every 3 years.
Environmental Assessment Regulations, 1999 (LI 1652)	Legislative Instrument (LI) 1652 provide details of the regulations for undertakings requiring registration and issue of an environmental permit. The regulations indicate that a project shall not be implemented for a project that requires an EIS under the regulations unless an EIA has been concluded in accordance with the regulations and the EPA has issued a permit. Schedule 5 classifies areas considered as Environmentally Sensitive Areas.	The EPA are the regulatory authority responsible for issuing Environmental Permits for the Port of Keta in accordance with the Environmental Assessment Regulations, 1999 (LI 1652). The first Environmental Permit is expected to be received from EPA after completion of the EIA. Subsequent permits will be provided after submission of EMPs. The first EMP should be submitted to EPA within 18 months of commencement of operations and thereafter every 3 years.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Fees and Charges (Miscellaneous Provisions) Act, 2022 (Act 1080)	Details the rates, fees, and charges collectable by Ministries, Departments, and Agencies (MDAs) for goods and services delivered to the public.	GPHA are an agency authorised to collect fees and charges under the First Schedule of Act 1080. The Act also details the fees and charges which GPHA must pay EPA in order to obtain Environmental Permits / Certificates.
Standards Authority Act, 1973 (NRDC 173)	Establishes the Standards Authority as the organisation responsible for establishing and promulgating standards with the object of ensuring high quality goods produced in Ghana; and, promoting standardisation in industry and commerce, industrial efficiency and development, and public and industrial welfare, health and safety.	The standards set by the Ghana Standards Authority will be adhered to during both the development and operation of the Proposed Project.
Land Use and Spatial Planning Authority Act, 2016 (Act 925)	Seeks to ensure the orderly and progressive development of land, town, and other areas for conserving and developing resources and to preserve and improve amenities thereof, and for related matters. Deals with spatial and land use planning at the national, regional, and district level and established the Land Use and Spatial Planning Authority (LUSPA), as well as the Land Use and Spatial Planning Development Fund.	LUSPA is a decentralised body at the MMDA level. Officials at the regional level guide physical planners at the MMDA level. From engagement, it is understood that physical planners of the Keta Municipal Assembly were involved in the designation and demarcation of the Port of Keta area. Therefore, any physical and settlement planning / land zoning by Keta Municipal Assembly and LUPSA takes cognizance of the lands designated for the Port of Keta.
The Land Act, 2020 (Act 1036)	Repeals the State Lands Act, 1962, and other laws and vests authority in the State to compulsorily acquire land for public purposes via an Executive Instrument (EI). Ensures the prompt payment of fair and adequate compensation. Declares that the Lands Commission shall act on behalf of the State during compulsory land acquisition.	The proposed site has been acquired by the state / GPHA and defined in the Executive Instrument establishing the Port of Keta. GPHA are in the process of applying for a new Executive Instrument to extend the port boundary to the southwest by an additional 68,320m^2 / 16.9 acres.
Local Governance Act, 2016 (Act 936)	Re-establishes and regulates the local government system and gives authority to the Regional Coordinating Council (RCC) and Metropolitan, Municipal, and District Assemblies (MMDAs) to exercise political and administrative power in the Regions and Districts to provide guidance, give direction to, and supervise all other administrative authorities in the regions and districts respectively.	The Port of Keta Project is situated within the jurisdiction of Keta Municipal Assembly. The Act mandates the Assembly to initiate programmes and collaborate with other state / private agencies for the development of basic infrastructure and provide municipal works and services as well as be responsible for the development, improvement, and management of human settlements and the environment in the district.
The Fire Precaution (Premises) Regulations 2003, (LI 1724)	The Fire Precaution (Premises) Regulations 2003 (LI 1724) requires all premises intended for use as workplaces to have Fire Certificates.	A Fire Certificate will need to be obtained prior to building any of the structures. Application will require submitting a site plan, block plan, and floor plan.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Public Health Act, 2012 (Act 851)	Empowers assemblies to prevent unhealthy activities and the control of drainage, latrines, and the disposal of sewerage and treatment systems. Provides for preventing of disease and pollution dangerous to health and to any water supply for domestic use. Establishes the Food and Drugs Authority to provide and enforce standards for the sale of food, herbal medicinal products, cosmetics, drugs, medical devices and household chemical substances. The provisions of the World Health Organisation, International Health Regulations specified in the Seventh Schedule shall apply in addition to the Regulations made under this Part in so far as a provision of the Seventh Schedule is not inconsistent with a provision of any of those Regulations.	The provisions of the World Health Organisation, International Health Regulations (2005) include the requirement that state parties shall send to WHO a list of ports authorized to offer: a) the issuance of Ship Sanitation Control Certificates; b) the issuance of Ship Sanitation Control Exemption Certificates; (c) extension of Ship Sanitation Control Exemption Certificates. Additionally, need to take all practicable measures consistent with the Regulations to monitor and control the discharge by ships of sewage, refuse, ballast water and other potentially disease-causing matter which might contaminate the waters of a port, rive, canal, strait, lake or other international waterway.
Ghana Standards Authority Act, 1973 (NRCD 175)	Ghana Standards Authority (GSA) formerly Ghana Standards Board (GSB) is given responsibility for the maintenance of acceptable standards for product and services and sound management practices in industries and public institutions in Ghana. GSA offers a wide variety of services and activities applicable for the Port of Keta project. GSA services and activities are categorized as follows: sale of standards (national and international); standards development and adoption; calibration, verification and inspection of weighing and measuring devices; inspection of products; product certification; system certification; and laboratory testing.	GSA has issued standards covering a wide variety of areas that may be applicable for the Port of Keta project depending on the nature of the organisations that will be situated in the port / port design. This includes (but is not limited to) the following categories: Services, Company Organization Management and Quality, Sociology, Administration, and Transport; Environment, Health Protection, Safety; Metrology and Measurement, Physical Phenomena; Testing; Mechanical Systems and Components for General Use; Electrical Engineering; Railway Engineering; Shipbuilding and Marine Structures; Materials Handling Equipment; Petroleum and Related Technologies; Construction Materials and Building; and Civil Engineering.
The Labour Act, 2003 (Act 651)	Consolidates existing laws relating to labour, employers, trade unions and industrial relations and provides for the rights and duties of employers and workers. Establishes the Labour Commission. Stipulates that it is the employer's duty to ensure that employees work under satisfactory, safe, and healthy conditions.	GPHA and other employers within the Port of Keta must ensure that provisions made under the Act are complied with. This includes protection of employment; conditions of employment; particular conditions about employment of persons with disability / women / young person's / temporary / casual; fair / unfair termination of employment; protection of remuneration; trade unions, employers, organisations and collective agreement; National Tripartite Committee; forced labour; OHSE; labour inspection; unfair labour practices; settlement of industrial disputes; and strikes etc.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Persons with Disability Act, 2006 (Act 715)	Provides rights of persons with disability, measures for promoting employment of persons with disability, measures to support the education of persons with disability, measures to facilitate the transportation needs of persons with disability,	Included within the rights of persons with disability is the requirement that the owner or occupier of a place to which the public has access shall provide appropriate facilities that make the place accessible to and available for use by a person with disability. This must be implemented for the public areas of the Port of Keta. Included within the measures to facilitate the transportation needs of persons with disability is that authorities responsible for the management of a port are required to provide facilities that will aid the movement of a person with disability at the port.
Workmen's Compensation Act, 1987 (PNDCL 187)	Provides for compensation payment for personal injuries caused by accidents arising out and in the course of their employment.	In the event that a member of the Port of Keta workforce sustains personal injury or death the provisions made under the Act will apply.
Wildlife Conservation Regulations, 1971 (LI 685)	Establishes provision for wildlife species that are wholly protected and restricted from hunting.	Provides a guide on wild animals of conservation concern in Ghana, that will need to be followed. The extent to which wholly protected, or partially protected species may be affected by the project will need to be assessed during the EIA process.
Factories, Offices and Shops Act, 1970 (Act 328)	Provides for the registration of factories, the health, welfare, and safety of persons employed in factories, offices, shops, dockworkers, building operations, and other places including engineering construction. The primary objective is to reduce the risk of injury and safeguard the health of all persons employed in premises covered by the Act.	The Port of Keta will need to ensure that the Act is followed to reduce the risk of injury and safeguard the health and welfare of all persons employed.
Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)	Restricts the import, export, transport, selling, purchasing, dealing and depositing of hazardous and electronic wastes. Provides for the management and disposal of hazardous waste, electrical and electronic waste and for related purposes. Details list of hazardous wastes and other wastes covered. Includes control and management of hazardous wastes and other wastes; control and management of polychlorinated biphenyls; electrical and electronic waste levy; electrical and electronic waste management fund; electrical and electronic waste recycling plant and other provisions.	The Port of Keta will be developed in accordance with this Act. This includes the need to ensure that the restrictions imposed upon the import and export of hazardous and electronic waste are followed during the port operations. Additionally, the Port of Keta shall ensure that the management of hazardous wastes is carried out in compliance with the Act. This includes taking the necessary steps to prevent pollution from hazardous wastes and other wastes arising from their management, and also minimising the consequences of pollution on human health and the environment. Additionally, ensuring any hazardous waste generated is not mixed with non-hazardous wastes or other wastes.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Hazardous, Electronic and Other Wastes (Classification) Control Regulations 2016 (LI 2250)	Regulates the classification, control, and management of waste; establishes a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Permit; prescribes requirements for the establishment of takeback systems; prescribes requirements and timeframes for the management of wastes listed in the First Schedule; prescribes general duties of waste generators, waste transporters and waste managers; and, prescribes requirements for the disposal of wastes.	The Port of Keta will generate waste during both construction and operation phases, and subject to sub regulation (2), the Regulations apply to a waste generator, waste transporter, and waste manager.
Ghana Ports and Harbours Authority Law, 1986 (PNDC Law 160)	Mandates GPHA to plan, build, develop, manage, maintain, operate, and control Ports in Ghana. The law enjoins GPHA (among other functions) to: provide facilities within ports as it appears necessary for the efficient and proper operation of the port; maintain the port facilities and extend and enlarge any such facilities as it shall deem fit; regulate the use of any port and of the port facilities; and maintain and deepen as necessary the approaches to, and the navigable waters within and outside the limits of any port, and also maintain lighthouses and beacons and other navigational services and aids to navigation (AtoN) as appear to it to be necessary. Allows for declaration of new ports and the varying and extending the boundaries of existing ports by Executive Instrument.	A key law for the development and operations of the Port of Keta including varying and extending the boundary of the port; the functions, staffing, and administration of GPHA; GPHA's Powers of Entry; regulation of ports and wharves; establishment and management of pilotage districts and boards; and details of dues and rates etc.
Ports Regulations, 1964 (LI 352)	It provides for the planning of port operations in Ghana. (Most of these provisions are now substituted by international conventions).	Provides for the planning of port operations in Ghana, of which the Port of Keta will need to adhere to.
Ghana Maritime Authority Act, 2002 (Act 630)	The Ghana Maritime Authority Act 2002, Act 630 has been enacted establishing the Ghana Maritime Authority which will advise Government on maritime matters and assist the Ministry of Transport (MOT) to formulate policies, monitor, regulate and coordinate activities and programmes of the various sub-sectors in the maritime industry.	GMA is to ensure the provision of safe, secure, and efficient shipping operations and protection of the marine environment from pollution from ships. GMA is therefore a key stakeholder for the Port of Keta.
Ghana Maritime Authority (Amendment) Act 2011 (Act 825)	The Act was mainly established to enable the Minister to enact regulations that impose specific levies, fees and charges to cover the administrative costs associated with the discharge of the functions and duties specified in the Ghana Maritime Authority Act, 2002.	GMA is to ensure the provision of safe, secure, and efficient shipping operations and protection of the marine environment from pollution from ships. Levies, fees and charges are likely to be applicable to cover the costs associated with the GMA.
Ghana Maritime Authority (Maritime Safety Fees and Charges) Regulations, 2012 (LI 2009)	The regulations provide information on maritime safety fees and charges on installations, ships, pipelines, cables, and other assets employed in the maritime domain.	Maritime safety fees and charges are likely to be applicable for the Port of Keta.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Ghana Shipping (Amendment) Act, 2011 (Act 826)	The main object of this amendment is to extend the definition of Ghanaian waters to include the 500-metre safety zone generated automatically under the United Nations Convention on the Law of the Sea (UNCLOS) around installations in the exclusive economic zone beyond the territorial sea. The Amendment extends the scope of local trade to include the trade from shore to any oil and gas installations that will be established beyond the 12 nautical miles territorial sea. It also grants permit to foreign vessels to trade in Ghanaian waters in instances where there are no Ghanaian vessels available or capable of providing those services so as not to create operational bottlenecks.	The Port of Keta will be within the territorial waters of Ghana.
Maritime Zones (Delimitation) Law 1986 (PNDC Law 159)	The Maritime Zones (Delimitation) Law, PNDC Law 159 of 1986 defines the extent of the territorial sea and Exclusive Economic Zone (EEZ) of Ghana. The territorial sea is defined as those waters within 12 nautical miles (approximately 24 km) of the low waterline of the sea. The law defines the EEZ as the area beyond and adjacent to the territorial sea less than 200 nautical miles (approximately 396 km) from the low waterline of the sea.	The Port of Keta will be within the territorial waters of Ghana.
Beaches Obstructions Ordinance of 1897, Cap. 240	The Beaches Obstruction Ordinance of 1897, Cap. 240 section 5 indicates that where a person without lawful excuse, causes, whether by an act or omission, an obstruction or impediment to the navigation of a port, river or lagoon, or to the lawful use of a pier, jetty, landing place, whether reserved or not under section 2, wharf, quay, dock, mooring, or any other work in the port, river, or lagoon the District Chief Executive may cause the obstruction or impediment to be removed. Additionally, a person who causes the obstruction or impediment commits an offence and is liable on conviction before a magistrate to a fine not exceeding twenty-five penalty units, and to pay the expenses of the removal. GPHA will screen all activities along the affected coastal area to ensure that these activities do not cause obstructions or impediments to the implementation of the proposed Port project activities.	Through the construction of the breakwaters and management / control of navigation in the area surrounding the port, the Port of Keta may potentially cause obstruction or impediment to navigation along the coast.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Ghana Investment Promotion Centre Act, 1994 (Act 478)	The Ghana Investment Promotion Centre Act 1994 (Act 478) requires that every investor wishing to invest in the country must in its appraisal of proposed investment projects or enterprises, "…have regard to any effect the enterprise is likely to have on the environment and measures proposed for the prevention and control of any harmful effects to the environment...".	GPHA is seeking investors in the Port of Keta (including measures to attract Climate finance).
Ghana Meteorological Agency Act, 2004 (Act 687)	This Act establishes the Ghana Meteorological Agency, which replaces the Meteorological Services Department. The Agency is to provide meteorological information, advice, and warnings for the benefit of agriculture, civil and military aviation among others to mitigate the effects of natural disasters such as floods, storms and droughts on socio-economic development and projects.	The Ghana Meteorological Agency can provide accurate data on climate which are relevant for the proposed port design and environmental assessment as well as port operations and implementation. The Agency can also provide climatic data for establishing climate change trends.
Fisheries Act, 2002 (Act 625)	The Act established the Fisheries Commission as a body to regulate and manage the utilization of the fishery resources of Ghana and coordinate the related policies. Section 93(1) of the Fisheries Act 2002, Act 625 states that any person or government department or other agency planning to conduct any activity other than fishing, which is likely to have a substantial impact on the fishery resources or other aquatic resources of Ghana, shall inform the Commission on the plans prior to the commencement of the planned activity with a view to the conservation and protection of the resources.	The proposed Port of Keta may have a potential substantial impact on the fishery resources or other aquatic resources of Ghana. Therefore, the Fisheries Commission is a key stakeholder, and the Fisheries Commission must be informed of plans prior to commencement of the planned activity with a view to the conservation and protection of the fishery resources.
Water Use Regulations, 2001 (LI 1692)	List such activities for which water use permit is required and this includes domestic, commercial, municipal, industrial water use among others. The Regulations also prescribe the raw water charges and processing fees to be paid by prospective water users with respect to the water use permits. The Water Use Regulations 2001 (LI 1692) prohibits the use of water resources without authority from the Water Resources Commission. The Act provides under section 16 for any person to apply to the Commission in writing for the grant of water right. The Commission is also mandated to request for evidence that an environmental impact assessment or an environmental management plan has been approved by the EPA before issuance of the Water Use Permit.	The Port of Keta will involve the use of water resources and therefore must comply with these regulations including obtaining authority from the Water Resources Commission.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Oil in Navigable Waters Act, 1964 (Act 235)	It was enacted in 1964 to give effect to the *International Convention for the Prevention of Pollution of the Sea by Oil* (1954) and also address oil pollution in inland waters. The Act makes the discharge of any oil or any mixture containing oil from any vessel or from land an offence. The owner or master of the ship, or occupier of the land or person in charge of the apparatus from where the oil was discharged, may be charged, and found guilty of the offense.	The Port of Keta will need to ensure that there is no discharge of any oil or any mixture containing oil from the port, or any vessels involved in the construction or operational phase of the project.
Maritime Pollution Act, 2016 (Act 932)	Before the Act the operative legislation was the Oil in Navigable Waters Act, 1964 (Act 235). The Maritime Pollution Act contains the following: • Part 1 - Application and Responsibilities of GMA regarding maritime pollution. • Part 2 - Interventions on the High Seas and Implements in Ghana the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1996 and its Protocol of 1973. • Part 3 - Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter at Sea and the London Protocol of 1996. The London Convention (1972) aims to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. • Part 4 - Prevention of Pollution from Ships (Eight Chapters and covers pollution by oil, noxious liquid substances in bulk, harmful packaged substances, sewage, garbage, air pollution, and oil pollution preparedness, response and cooperation) • Part 5 - Liability and Compensation for Pollution Damage	The Port of Keta will need to comply with the act during both the development and operational phases of the Port of Keta, noting that pollution from ships can be both accidental and operational pollution. Furthermore, ship-sourced pollution may damage fishing stocks and various forms of marine life and may affect tourist industries. Compliance with act will include (but not be limited to) provision of appropriate reception facilities, complying with dredged material disposal requirements, prohibiting the export of waste, and oil pollution preparedness / oil spill response.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Wetland Management (RAMSAR Sites) Regulations, 1999	Regulation 1 provides for the Establishment of Ramsar Sites. Regulation 5, subsection 6 states that no physical development shall be undertaken within a core area of a Ramsar Site. Regulation 6 provides for the proscribed activities in a Ramsar site and states that: No person shall within a Ramsar Site: Pollute any water; use poison, chemicals, explosives, or any prohibited method for fishing; use seine nets or other nets with mesh size below 25mm; fish during the closed season; do any other act that has or is likely to have an adverse effect on the environment. Regulation 7, subsection 3 states that *A person shall not undertake any activity that has or is likely to have an adverse effect on any animal or species or the environment in a Ramsar Site*. Regulation 8 provides for the various offences under this regulation.	Part of the proposed Port of Keta is within the Keta Lagoon Complex which is designated a Ramsar site under Section 1 of the Regulations. The Keta Lagoon Complex Ramsar Site covers all portions of South Tongu, Akatsi, Ketu, and Keta Districts enclosing a total area of 101,022.69 hectares. The following excerpts of the Regulations are applicable to the project: Section 4 (1) states that the Minister may, where necessary by publication in the Gazette or through the mass media approve the areas in the Ramsar Site where activities such as sand within quarrying or removal of soil may be carried out. Section 5 (2) states that The Executive Director (or his authorised representative) in consultation with the committee of a District Assembly responsible for the environment and natural resources referred to as the committee shall determine: • The type of wise use activities that are permitted in a core area of a Ramsar Site for its sustainable utilisation; and • The conditions that will sustain the use of the resources under which the permitted wise use activities in a Ramsar Site may be carried out. Section 5 (6) states that no physical development shall be undertaken within the core area of a Ramsar Site. Section 6 (2) states that no person shall within a Ramsar Site, pollute any water or do any other act that has or is likely to have an adverse effect on the environment. Section 7 (1) states that no person within a Ramsar Site shall win sand, carry out quarrying activities or remove any soil except from areas approved by the Minister in writing. Section 5 (2) states that no person within a Ramsar Site shall do any other act to disturb the ecosystem.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Wild Animals Preservation Act, 1961 (Act 43)	This is the principal Act relating to wild animals, birds and fish preservation and trade in Ghana. Lists the wild animals, birds, and fish that are completely protected (hunting, capturing or destroying is completely prohibited i.e., First Schedule), those that the young are specifically protected (i.e., Second Schedule), females accompanied by young are protected (i.e., Third Schedule), which only a limited number may be killed (i.e., Fourth Schedule), measures may be taken to reduce numbers (i.e., Fifth Schedule). Places restrictions on export and import of trophies	There is a potential risk that the proposed Port of Keta will affect the wild animals, birds and fish that are protected by the regulations. This could be during the preconstruction, construction or operation phases and could be directly or indirectly impacted by the project.
Wildlife Conservation Regulations, 1971 (LI 685)	The Wildlife Conservation Regulation, 1971 (LI 685) specifies the wildlife species that are completely protected from hunting, capturing and destruction of any form. The Regulation under Restriction on Hunting- Regulation 1 (Animals wholly protected), stipulates that, no person shall at any time hunt, capture or destroy any wild animal species whose protection, whether owing to their rarity or threatened extermination may be considered necessary. The Regulations amend sections of the Schedules to the Wild animals Preservation Act of 1961, Act 43.	There is a potential risk that the proposed Port of Keta will result in increased persons wishing to hunt, capture or destroy species that are protected under the regulations. This may be a result of the expected port city. The Port of Keta project shall ensure that no person shall hunt, capture or destroy wild animals in accordance with the regulations. Additionally, the Port of Keta should ensure that no regulated game and trophy are exported through the Port of Keta.
National Museum Act, 1969 (Act 387) and Executive Instrument (EI) 42 of 1972, and EI 29 of 1973	The National Museum Act 387 of 1969 governs the work of the Ghana Museums and Monument Board (GMMB). Section 9 (1) of the law, requires that no person shall remove any antiquity from its original site without the consent of the National Museum and Monuments Board. The law defines objects of archaeological interest as 'any fossil remains of man or of animals found in association with man or any ancient habitation, sacred place, erection, memorial, grave, shrine or excavation etc.	The Executive instrument (EI 42) of 1972 and the National Museums Regulation (EI 29) of 1973 provides for the management of any antiques and archaeological finds. This is the law governing the activities and operations of the Ghana Museums and Monuments Board (GMMB). Procedures to be followed on the discovery of any such artefacts are outlined in Act 387. Any archaeological finds during the construction activities shall be reported accordingly. In addition, during the operational phase customs officers at the Port of Keta shall not allow the export of antiquities until the export permit has been surrendered.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Abandoned Property (Disposal) Act, 1974 (NRCD 308)	Provides for the vesting of scrap metal, the manner in which scrap metal should be dealt with, and for related matters. The act applies to how scrap metal, timber, hoarding and signboards that are on public land, roads and or obstruct a road user may be removed by an authorised officer and disposed of. The Act provides the procedures by which such “abandoned property” could be disposed of by an authorized officer. The Act further indicates that, any authorised officer may if deem fit cause the immediate removal to the nearest safe place of any property to which this Decree applies, if such property is found in any place where it may constitute a danger or obstruction: Provided that when the property is so removed to a safe place, any notices required by this Decree shall be affixed to the property as if such property had not been removed.	In the event that abandoned property (such as scrap metal, tree, timber, log, signboards) is situated within the project area and needs to be removed, this law can be used to move the property.
Road Traffic Act, 2004 (Act 683)	The Act deals with restrictions on road use in the interest of road safety, registration and licensing of motor vehicles and trailers, licensing of drivers of motor vehicles, test of vehicles and issuance of road use certificates, and licensing of drivers of commercial vehicles. Under the Act, it is an offence for any drivers plying on the road to use a mobile phone, and drivers are required to carry on their vehicles all necessary accessories like fire extinguishers and genuine driving license. Again, no driver would be allowed to drive when he or she is improperly dressed. It is supported by the Road Traffic Offences Regulations, 1974 (LI 952), which was amended by the Road Traffic (Amendment) Regulations (1995), LI 1605, and the Road Traffic (Amendment) Act 2008 (Act 761) as well as the Road Traffic Regulations, 2012, LI 2180.	Vehicles and drivers involved in the implementation of the Port of Keta would comply with this Act.
National Building Regulations, 1996 (LI 1630)	The National Building Regulations, 1996 (LI 1630) provides guidance and standards to any person who intends to erect any building; or make any structural alteration to any building; or executes any works or installs any fittings in connection with any building. The law defines "building" as any structure or a part of a structure. It also includes drains, sewers, pipes, and everything regulated in the Regulations.	Many buildings will be constructed as part of the Port of Keta development and any building that is to be constructed including contractors’ work camp facilities will need to follow the Regulations.

Legal Framework	Summary of Core Requirements	Relationship to Proposed Project
Public Holidays Act, 2001 (Act 601)	The Act provides for public holidays as captured in the schedules to the Act or declared by the President of the Republic, and which should be observed as such. The Act also makes provisions for certain categories of workers or businesses that are exempted from observing such public holidays, and offences and penalties for contraventions of this law.	Workers under the Port of Keta project may be required to observe public holidays as agreed.
Human Trafficking Act, 2005 (Act 694).	This is an Act for the prevention, reduction, and punishment of human trafficking, for the rehabilitation and reintegration of trafficked persons and for related matters. The Act's definition of human trafficking includes the recruitment, transportation, transfer, harbouring, trading or receipt of persons within and across national borders by *(a) the* use of threats, force or other forms of coercion, abduction, fraud, deception, the abuse of power or exploitation of vulnerability, or *(b) giving* or receiving payments and benefits to achieve consent. Exploitation is defined by the Act to include at the minimum, induced prostitution, and other forms of sexual exploitation, forced labour or services, salary, or practices similar to slavery, servitude, or the removal of organs. A person who uses a trafficked person commits an offence and is liable on summary conviction to a term of imprisonment of not less than five years.	The Port of Keta project will need to take measures to ensure that: a) Trafficked persons are not used as labour for the project; b) Human trafficking does not take place through the port.
Coastal Development Authority Act, 2017 (Act 961)	An Act to establish the Coastal Development Authority (CDA) to provide a framework for the accelerated economic and social development of the Coastal Development Zone.	The Port of Keta project will support many of the objects of the CDA such as accelerating the economic and social development of the coastal zone, and private sector investments to reduce poverty.

3.3. National Institutional Framework for Implementing the Project

The Project Proponent for the Port of Keta is GPHA, which falls under the Ministry of Transport. The key agencies whose mandates will be triggered by the implementation of the proposed Project are summarised in Table 3-3 below.

Table 3-3 - National Institutional Framework

Institutional Framework	Key Objective and Relevance / Relationship to Proposed Project
Ministry of Transport	The Ministry of Transport is responsible for the formulation, coordination and monitoring of Transport infrastructure policies and programmes for both public and private sectors of Ghana. The Ministry has direct supervision over the Ghana Ports and Harbours Authority as well as other institutions as Ghana Maritime Authority, Ghana Shippers Authority, PSC Tema Shipyard, Regional Maritime University, Volta Lake Transport Company, etc.
The Ghana Ports and Harbours Authority (GPHA)	GPHA, acting on behalf of the Ministry of Transport, under the Government of Ghana (GoG), are the Project Proponent currently developing the Port of Keta.
Environmental Protection Agency (EPA)	Responsible for ensuring compliance with the laid down EIA procedures in the planning and execution of development projects, including compliance in respect of existing projects. The EPA is the regulator responsible for issuing of an Environmental Permit for the Proposed Project following approval of the EIA and will monitor to ensure compliance to the permit conditions and adherence to the Environmental Assessment Regulations, 1999.
Ghana Maritime Authority (GMA)	Regulatory body of Ghana's maritime industry established under the GMA Act (Act 630 of 2002), with responsibility for the monitoring, regulation, and coordination of all maritime activities of Ghana. The purpose of the GMA is to ensure the provision of safe, secure, and efficient shipping operations and protection of the marine environment from pollution from ships.
Ghana National Fire Service	National Institution responsible for the prevention and management of undesired fires. Responsible for providing the fire permit / certificate for the Proposed Project facilities during construction and operation.
Water Resources Commission	Responsible for regulating and managing Ghana's Water Resources, including the provision of Water Use Permits.
Ministry of Fisheries and Aquaculture Development / Fisheries Commission	Regulator for the fishery industry. Responsible for the regulation and management of the utilization of the fishery resources of Ghana.
Department of Factories Inspectorate	Responsible for the regulation of health and safety of workers and workplaces in general. To issue Facility / Project Registration Certificate or Approval and undertake monitoring of safety of workers at the project site.

Institutional Framework	Key Objective and Relevance / Relationship to Proposed Project
Ministry of Lands and Natural Resources	Mandated to ensure sustainable management and utilization of the nation's lands, forests, wildlife, and mineral resources for the flow of socio-economic growth and development. Ensures an enabling environment and adequate capacity and infrastructure are provided for both private entities and public agencies to perform at their best in the conservation and management of biodiversity. Plays a central role in the assessment and management of land-related social risks, hosting seven departments / agencies with roles in impact mitigation and management (Land Commission, Public and Vested Land Management Division, Land Registration Division, Survey and Mapping Division, Land Valuation Division, Office of the Administrator of Stool Lands).
Lands Commission	The Lands Commission is established by article 258 of the 1992 constitution and the Lands Commission Act, 767 in 2008. The Commission on behalf of the Government, manages public lands and other lands vested in the President by the Constitution or by any other law and any lands vested in the Commission, establishes, and maintain comprehensive land information. Hence, the Commission advises on the policy framework for the development of particular areas of the country to ensure land is coordinated with the relevant development plan for the area concerned; ensure that through sound, sustainable land use planning, socio-economic activities are consistent with long term national development goals; collaborates with other bodies to instil order and discipline in curbing land encroachment, unapproved development schemes, multiple or illegal land sales, minimize or eliminate protracted land boundary disputes, conflicts and litigations, promotes community participation and public awareness at all levels in sustainable land management and development practices to ensure the highest and best use of land.
Office of the Administrator of Stool Lands / Regional Office	The office was set up under Act 481, 1994. The administrator coordinates with lands commission and other relevant public agencies, traditional authorities and stools on matters relating to administration and development of stool lands and make available to them any relevant data / information. The Volta Regional Office of the OASL will be engaged regarding the proposed project and the EIA scoping activities. Insights on how stool lands in the region are administered will be sought and attestation / confirmation will be sought as to whether the proposed project lands are stool lands or private lands.
Land Use and Spatial Planning Authority (LUSPA)	The LUSPA is the regulator for land use and spatial planning. It is the body that confirms zoning status of areas earmarked for development and provides development approvals for physical development of land within an MMDA in the jurisdiction in which the land is situated. LUSPA is decentralized at the MMDA level, and the project is situated within the jurisdiction of Keta Municipal Assembly (KeMA). The Planning Officer at the KeMA will be consulted regarding performance of their role in this regard.
Ministry of Fisheries and Aquaculture Development	The Ministry is responsible for promotion of accelerated Fisheries Sector Development as a viable economic segment that will contribute to the overall development of Ghana in line with Medium to Long term National Development Policy Frameworks. Keta being a major fishing hub in Ghana may require some intervention and mitigation support from the Ministry in order for investment in fishing activities as part of project intervention.
Ministry of Trade and Industry (MoTI)	Lead policy advisor to the government on trade, industrial, and private sector development with responsibility for the formulation and implementation of policies for the promotion, growth, and development of domestic and international trade and industry.

Institutional Framework	Key Objective and Relevance / Relationship to Proposed Project
Hydrological Services Department of the Ministry of Works and Housing	The Ministry of Works and Housing (MWH) has the overall responsibility for the initiation, the formulation, implementation and coordination of policies and programmes for the systematic development of the country's infrastructure requirements in respect of Works, Housing and Flood Control Systems to ensure efficiency of the sector. Responsible for the programming and coordination of coastal protection works. Construction and maintenance of storm drains and the monitoring and evaluation of surface water bodies in respect of floods. Was involved with the Keta Sea Defence Project and may have site specific baseline information to share with the project.
Ghana Shippers Authority	To manage Ghana's commercial shipping effectively and efficiently, and to protect and promote the interests of shippers in relation to international trade and transport logistics. Mandated to ensure registration, building, importation and licensing of ships and proprietary interest in ships follow industry standards.
National Development Planning Commission (NDPC)	Advises the President (and Parliament on request) on development planning policy and strategy by providing a national development policy framework, preparing, and ensuring effective implementation of approved national development plans and to coordinate economic, and social activities countrywide in a manner that will ensure accelerated and sustainable development of the country to promote continuous improvement in living standards of all Ghanaians.
Forestry Commission - Wildlife Division	Develops and implements national policies, programs, and legislation to protect and conserve Ghana's wildlife. In charge or responsible for the Keta Lagoon Complex Ramsar site. The proposed port location is partly within the Ramsar site.
Fisheries Commission	Implementing agency of the Ministry of Fisheries and Aquaculture Development (MoFAD). Responsible for all monitoring, control, surveillance, evaluation, and compliance functions in all areas of fisheries development and management. As the regulator for the fishery industry has a major interest in the fishing activities in the project area, i.e., in the lagoon and offshore. To advise on mitigation measures or recommendations for project adverse impact on fishing activities in the affected areas.
Ghana Police Service	To be involved with the provision of security and maintenance of law and order in the project area during implementation.
Ghana Navy	Act as a law enforcement agency under the Ministry of Defence with authority to police Ghanaian waters and to ensure maritime security. To provide or may be required to provide offshore security for the port facility within Ghana waters.
Ghana Meteorological Agency (GMet)	Responsibilities include providing daily weather forecasts; collecting, processing, storing, and disseminating meteorological information; undertaking collaborative work with agricultural agencies and others on meteorological related matters and providing expert advice; providing expert advice on wetlands including birds' sanctuaries; and also providing meteorological information. Responsible for the provision of reliable climatic data for Ghana and can be contacted for climatic data for project design and implementation. Likely to provide regular weather information for project implementation especially during construction and operation.

Institutional Framework	Key Objective and Relevance / Relationship to Proposed Project
Minerals Commission	To confirm that quarries who will supply products for the proposed project have licenses and to provide permits for blasting of hard rock when the need arises during dredging or construction. To confirm large scale salt miners in the project area with licenses / concessions or in the process of acquiring concessions / licenses.
Energy Commission and it's Key Agencies (i.e., Ghana Grid Company Ltd. (GRIDCo), ECG)	Regulator of the energy sector in general. Responsible for issuing various permits / licences for projects within the energy sector. Interested in the power infrastructure aspect of the proposed project and supply of power to the proposed port facility. To confirm if any existing power lines or infrastructure may be impacted.
Ghana Tourism Authority (GTA)	The public entity (under the Ministry of Tourism) tasked with the promotion of tourism development activities in the country. Interested in the potential tourism aspect of the proposed project.
Ghana Water Company Limited (GWCL)	Provides potable water for public use. Interested in the potable water supply aspect of the project and to ensure that expected water demands of the facility are catered for. To confirm if any existing water supply pipelines will be impacted during the construction phase.
Geological Survey Authority	May be able to provide baseline information on the geotechnical / soil conditions, and the seismic hazards.
Ministry of Roads and Highways / Ghana Highway Authority	Responsible for the key access routes to the project site including the N1 and the Dabala-Keta-Denu Road. Interested in any activity under the project that will adversely impact or improve these access routes. To give approval for and advise on the crossing of any of these roads under its jurisdiction.
Ministry of Railways Development / Ghana Railway Development Authority	Responsible for railway development in Ghana Interested in the railway infrastructure aspect of the proposed project and any planned extension of railway facility to the port.
Ghana Museums and Monument Board (GMMB)	Regulator of cultural heritage (movable and immovable) in Ghana. Concerned about any chance finds of any relevant artefact (movable and immovable) during project implementation.
Labour Department	To enforce labour laws and regulations in Ghana and provide, for the benefit of workers and employers, employment-related services such as job-matching, job counselling and mediation; and to generate reliable labour market information for employment policy and national development planning.
Labour Commission	The Commission exists to develop and sustain a peaceful and harmonious industrial relations environment through the use of effective dispute resolution practices within the context of the law, promotion of cooperation among the labour market players and mutual respect for their rights and responsibilities.
Ghana Standards Authority (GSA)	Responsible for the management of the nation's quality infrastructure embracing the three (3) pillars of metrology, standardisation and conformity assessment (i.e., Testing, Inspection and certification). Responsible for Calibration, Verification and Inspection of weights, Measures and Weighing and Measuring Instruments Promoting Quality Management Systems in Ghana. Develops Environmental Standards for ambient air quality, noise control and effluent discharges, and makes available hardcopies of these Standards to the general public at a fee.

Institutional Framework	Key Objective and Relevance / Relationship to Proposed Project
Water Resources Commission (WRC)	Responsible for the regulation, management and utilisation of Ghana's water resources and the coordination of government policies in relation to them. Issues water rights to potential water users. WRC was established by an Act of Parliament (Act 522 of 1996) as the overall body responsible for water resources management in Ghana. The vision of the WRC is to achieve "sustainable water management by all for all. Its mission is 'to regulate and manage the sustainable utilization of water resources and to coordinate related policies by combining our core competencies and hard work through effective participation, monitoring and awareness creation for socio-economic development of Ghana'. The Commission was responsible for instituting the National Riparian Buffer Zone Policy and has since been responsible for its enforcement.
Ghana Chamber of Telecommunications / Telecommunication Companies (MTN, Vodafone, AirtelTigo, Glo, etc.)	Interested in the telecommunication infrastructure aspect of the proposed project. To confirm if any of their existing telecommunication infrastructure is within the proposed project area and are likely to be impacted.
Keta Municipal Assembly (KeMA)	Keta Municipal Authority is the planning authority charged with the overall development of the Keta Municipality, under which the Port of Keta development is located. Keta Municipal Assembly (KeMA) is responsible for the political administration and development of the project area and local communities within the municipality. KeMA to provide business registration / operating license for firms and companies working under the project within the municipality.
Nearby District Assemblies (Ketu South, Ketu North, Akatsi South, South Tongue, Anloga)	May have interest in the proposed port project due to proximity to their jurisdiction and as all these districts share in the Keta Lagoon Complex Ramsar Site. May be impacted by some subproject activities and may also be recipient of some project adverse impacts due to their proximity to Keta Municipality.
Anlo Traditional Council	Anlo Traditional Council has traditional / cultural oversight of local communities in the project area.
Keta, Kedzi, Havedzi (Blekusi, Horvi, etc.)	Nearby communities to the Proposed Project site. Likely or possible recipient of project adverse impacts.
Land Owners, Owners of Structures / Properties, Fishermen, Local Salt Producers, Mangrove Cutters, Local Sand Winners	Any person, organisation, or group who may be identified to be affected during project implementation.
Universities	May have useful baseline information, including on the Keta Lagoon Complex Ramsar Site.
Council for Scientific and Industrial Research (CSIR)	Pursues the implementation of government policies on scientific research and development. CSIR research programmes cover a wide range of activities in the following areas: Industry, Agriculture, Agro-processing, Fisheries, Forestry, Water Resources, Human Settlement Infrastructure, Environment, Health, Natural and Social Sciences.
Ghana Wildlife Society (GWS)	Non-governmental, non-political, and non-profit making conservation organisation, with a mission to conserve wildlife in all its forms to ensure a better environment and improved quality of life. A member of BirdLife International.
Mass Media, e.g., local FM stations at Keta and in Ghana as a whole.	Responsible for information dissemination, communication and education of the general public and local communities through electronic and print media.
Every Ghanaian	Public interest role.

3.4. Key Guidelines for Environmental Impact Assessment

In addition to the policies and legislations above, the Environmental Assessment Guidelines for Transport Sector (Aviation, Maritime, Rail and Road Sub-Sectors) (EPA, 2010) will be used to guide the EIA.

According to the guidelines, they have been prepared to ensure the sustainable development of the transport sector and contribute towards sound environmental management in the transport sector. The objective of the guidelines is to assist project authorities and consultants in the preparation of EIA of developments in any of the transport subsectors, to ensure systematic, consistent, and comprehensive coverage of environmental issues.

Chapter five of the guidelines are dedicated to the maritime, port, and harbour sub sectors. According to the guidelines, project alternatives should include conceptual alternatives, alternative designs and costs, and technology alternatives. Furthermore, conceptual alternatives should be evaluated at the macro-level and should involve comparing the potential environmental consequences of constructing port / harbour to enhance international trade and navigation.

The design alternatives involve assessing various options. This involves providing about two or three different designs and assessing their positive and negative impacts on the environment. Factors to be considered in arriving at the best conclusion are location / siting, and technology etc.

The guidelines indicate that the baseline environmental conditions should typically include details of ecological studies, land uses, natural resources, forest / vegetation, water resources, human resources, agricultural areas, industrial development, transportation facilities, communities, institutions (hospitals, schools, etc.), archaeological, cultural, and historic treasures, and other aspects of economic and human development.

Guidance on the impact evaluation and significance identifies those factors requiring special attention in preparing the EIS includes fish (finfish and shellfish) (riverine, estuarine, marine), coral reefs and associated sensitive marine ecology, mangrove swamps and other shoreline vegetation, and dedicated use areas (pearl oyster areas, shrimp farming areas, etc.).

The guidelines indicate that environmental monitoring should include noise, air quality, water quality, and biological and social environment.

3.5. Key National Environmental Quality Standards

GSA has issued standards for the environment and health protection with ambient air quality, motor vehicle emissions, ambient noise control, and effluent discharges as follows:

- GS 1212:2019 Environment Protection - Requirements for Effluent Discharge.
- GS 1219:2018 Environment and Health Protection - Requirements for Motor Vehicle Emissions.
- GS 1222:2018 Health Protection - Requirements for Ambient Noise Control.
- GS 1253:2018 Acoustics Guide for Measurement of Outdoor A-Weighted Sound Levels.
- GS 1236:2019 Environment and Health Protection - Requirements for Ambient Air Quality and Point Source / Stack Emissions.

Further details are provided in the following subsections.

3.5.1. Ambient Noise Level

Ghana Standard for Health Protection - Requirements for Ambient Noise Control (GS 1222:2018)

The Ghana Standard specifies the requirements for acceptable ambient noise levels within categorized locations. The ambient noise levels of the classified zones shall conform to the requirements given in Table 3-4 below.

According to the Standards, the test method should be in accordance with the relevant test methods given in GS 1253:2018 (Acoustics - Guide for the measurement of outdoor A-weighted sound levels).

Table 3-4 - Requirements for Ambient Noise Levels (GS 1222:2018)

Zone / Description of Area	Permissible Noise Level in dB (A)	
	Day 06.00 - 22.00	Night 22.00 - 06.00
A - Residential Areas	55	48
B - Educational (School) and Health (Hospital, Clinic) Facilities, Office, and Law Courts	55	50
C - Mixed Used (Residential Areas with some Commercial or Light Industrial Activities)	60	55
D - Areas with some Light Industry, Places of Entertainment or Public Assembly, and Places of Worship	65	60
E - Commercial Areas	75	65
F - Light Industrial Areas	70	60
G - Heavy Industrial Areas	70	70

(Source: GSA, 2018a)

Ghana Standard Acoustics – Guide for Measurement of Outdoor A-Weighted Sound Levels (GS 1253:2018)

The Ghana Standard (GS 1253:2018) specifies the methodology to be adopted for the measurement of outdoor A-weighted sound levels at specified locations or along particular site boundaries, using a general-purpose sound-level meter (GSA, 2018b). Additionally, in summary, the standard specifies that:

- The sound level meter to be used is calibrated and in good working condition.
- Measurements taken from a suitable location representative of the area. Factors such as proximity to noise sources, presence of reflective surfaces, and potential obstacles impacting sound propagation are considered.
- Equipment is set up according to the manufacturer's instructions and sound levels measured at each site within specified durations and intervals as stated in the standard.
- Information such as the measurement location, date, time, weather conditions, and any other factors that may influence the measurements, are recorded.
- The recorded sound level data is clearly labelled, organized and analysed using appropriate statistical methods. The results are validated to ensure accuracy and reliability.
- A report is generated that includes the methodology, results, and any relevant observations and/or recommendations.

3.5.2. Effluent Quality

Ghana Standard for Environmental Protection - Requirements for Effluent Discharge (GS 1212:2019)

EPA through GSA has issued formal standards on environment and health protection requirements. The requirements for effluent / wastewater discharges into Natural Water Bodies provide maximum permissible concentrations for water quality parameters for various sectors. Under the standard, the Proposed Project falls under the category of General Industry. The requirements for General Industry are provided in Table 3-5 below.

Table 3-5 - Requirements for Effluent / Wastewater Discharge for General Industry (GS 1212:2019)

Parameter	Unit	Maximum Permissible Level	Test Method	Container	Sample Size	Sample Type	Preservation	Maximum Storage	
								Recommended	Regulatory
Colour	TCU	200	ISO 7887	P, G, FP	≥500ml	g, c	Cool, ≤6ºC	48 hours	48 hours
Conductivity	µS/cm	1,500	ISO 7888	P, G	-	-	Refrigerate, analyse as soon as possible	-	-
pH	-	6 – 9	GS ISO 10523	P, G	≥50ml	g	Analyse immediately	0.25 hours	0.25 hours
Temperature	ºC	≤ 3 above ambient	-	P, G, FP	≥100ml	g	Analyse immediately	0.25 hours	0.25 hours
Turbidity	NTU	75	ISO 7027	P, G, FP	≥100ml	g, c	Analyse same day; store in dark; cool ≤6ºC	24 hours	48 hours
TDS	mg/l	1,000	ASTM D5907	P, G	-	-	Refrigerate, analyse as soon as possible	-	-
TSS	mg/l	50	ASTM D5907	P, G	-	-	Refrigerate, analyse as soon as possible	-	-
BOD_5	mg/l	50	APHA 5210 method B or D	P, G, FP	≥1000ml	g, c	Cool ≤6ºC	24 hours	48 days
COD	mg/l	250	ISO 6060 / ISO 15705	P, G, FP	≥100ml	g, c	Analyse as soon as possible, or add H_2SO_4 to pH < 2; cool ≤6ºC	7 days	28 days
Nitrate (as Total Nitrogen)	mg/l	50	GS ISO 10304-1	P, G, FP	≥100ml	g, c	Analyse as soon as possible; cool ≤6ºC	48 hours	48 hours (14 days for chlorinated samples)
Oil and Grease	mg/l	5	US EPA 1664	G, wide mouth calibrated	≥1000ml	g	Add HNO_3 or H_2SO_4 to Ph > 2; cool ≤6ºC	28 days	28 days
Alkalinity	mg/l	150	ISO 9963-1	P, G, FP	≥200ml	g	Cool, ≤6ºC	24 hours	14 days
Phosphorus Total	mg/l	2	APHA Method 4500-P	P, G, FP	≥100ml	g, c	Add H_2SO_4 to pH < 2 and cool ≤6ºC	28 days	28 days
Total Coliform	MPN / 100ml	400	GS ISO9308-2	P, G	-	-	Refrigerate, analyse as soon as possible	-	-
Key:									
P = Plastic (polyethylene or equivalent) | G = Glass | FP = Fluoropolymer (polytetrafluoroethylene (PTFE, Teflon) or another fluoropolymer) | g = Grab | c = Composite									

(Source: GSA, 2019a)

3.5.3. Ambient Air Quality

Ghana Standard for Environment and Health Protection – Requirements for Ambient Air Quality and Point Source / Stack Emissions (GS 1236:2019)

The Ghana Standard on Environment and Health Protection - Requirement for Ambient Air Quality and Point Source / Stack Emissions, specifies the requirements and methods of analysis for ambient air (see Table 3-6).

It also specifies the requirements and test methods for point source or stack emissions based on the sources of energy as shown in Table 3-7 below.

Table 3-6 - Requirements for Ambient Air Pollutants (GS 1236:2019)

Substance (µg/m^3)	Maximum Limits	Averaging Time	Test Method
Sulphur Dioxide (SO_2)	520 µg/m^3 50 µg/m^3	1-hour 24-hour	AS 358.4.10 Determination by Direct Reading Instrumental Method
Nitrogen Oxides (Measured as NO_2)	250 µg/m^3 150 µg/m^3	1-hour 24-hour	ISO 7996 Determination by Chemiluminescence Method
Total Suspended Particulate	150 µg/m^3 80 µg/m^3	24-hour 1-year	ASTM D4096-17 Determination by High Volume Sampler Method
PM_{10}	70 µg/m^3 70 µg/m^3	24-hour 1-year	ASTM D4096-17 Determination by High Volume Sampler Method
$PM_{2.5}$	35 µg/m^3	24-hour	ASTM D4096-17 Determination by High Volume Sampler Method
Black Carbon	25 µg/m^3 25 µg/m^3	24-hour 24 minutes	ASTM D6602-13 Standard Practice for Sampling
Benzene	5 µg/m^3	1-year	ASTM D5466-15 Determination by Canister Sampling Method
Lead	0.5 µg/m^3 1 µg/m^3	1-year 24-hour	ISO 9855 Determination by Atomic Absorption Method

(Source: GSA, 2019b)

Table 3-7 - Requirements for Point Source / Stack Emissions (GS 1236:2019)

No.	Pollutants	Maximum Limits	Test Method
1	**Solid Fuels**		
a.	Sulphur Dioxide (mg/Nm^3)	200	USEPA Method 6C
b.	Oxides of Nitrogen (mg/Nm^3)	200	ISO 10849
c.	Particulate Matter (mg/m^3)	50	ISO 9096
2	**Liquid Fuels**		
a.	Sulphur Dioxide (mg/Nm^3)	500	USEPA Method 6C
b.	Oxides of Nitrogen (mg/Nm^3)	400	ISO 10849
c.	Particulate Matter (mg/m^3)	50	ISO 9096
3	**Gaseous Fuels**		
a.	Sulphur Dioxide (mg/Nm^3)	100	USEPA Method 6C
b.	Oxides of Nitrogen (mg/Nm^3)	320	ISO 10849
c.	Particulate Matter (mg/m^3)	20	ISO 9096
4	**Electrical Energy**		

No.	Pollutants	Maximum Limits	Test Method
a.	Sulphur Dioxide (mg/Nm^3)	200	USEPA Method 6C
b.	Oxides of Nitrogen (mg/Nm^3)	200	ISO 10849
c.	Particulate Matter (mg/m^3)	50	ISO 9096
5	**Incinerators**		
a.	Sulphur Dioxide (mg/Nm^3)	200	USEPA Method 6C
b.	Oxides of Nitrogen (mg/Nm^3)	400	ISO 10849
c.	Particulate Matter (mg/m^3)	70	ISO 9096
6	**Other Parameters (that may apply)**		
a.	Carbon Monoxide (mg/Nm^3)	100	USEPA Method 10
b.	Hydrochloric Acid (HCl) (mg/Nm^3)	60	USEPA Method 0050
c.	Hydrogen Fluoride (mg/Nm^3)	4	ISO 15713
d.	Mercury and Mercury Compounds (mg/Nm^3)	0.03	USEPA Method 29
e.	Particulate Lead (mg/m^3) (expressed as lead)	0.50	USEPA Method 29
1) Electrical energy usage includes induction / electric arc furnaces, dryers, oven and kilns, alumina & iron smelting among others 2) 'N' represents Normal Atmospheric and Pressure			

(Source: GSA, 2019b)

Ghana Standard for Environment and Health Protection – Requirements for Motor Vehicle Emissions (GS 1219:2018)

Under the standard there are parameters evaluated for emissions of vehicles plying Ghana's roads, with the requirements based on the fuel type being used. Monitoring of emissions shall be every year for private motor vehicles or every six months for a commercial vehicle.

3.6. International Standards and Guidelines

3.6.1. Air Emission Levels and Ambient Air Quality

The Ambient Air Quality Guidelines recommended by the World Health Organization (WHO) are provided in Table 3-8 below (these are also recommended by the International Finance Corporation (IFC)).

Table 3-8 - WHO Ambient Air Quality Guidelines

Pollutant	Unit	Averaging Period	2005 Guideline Value (µg/m^3)	2021 Air Quality Guideline (AQG) Value
Particulate Matter (PM2.5)	µg/m^3	Annual	10	5
	µg/m^3	24-hour[a]	25	15
Particulate Matter (PM10)	µg/m^3	Annual	20	15
	µg/m^3	24-hour[a]	50	45
Ozone (O_3)	µg/m^3	Peak Season[b]	-	60
	µg/m^3	8-hour[a]	100	100
Nitrogen Dioxide (NO_2)	µg/m^3	Annual	40	10
	µg/m^3	24-hour[a]	-	25
Sulphur Dioxide (SO_2)	µg/m^3	24-hour[a]	20	40

Pollutant	Unit	Averaging Period	2005 Guideline Value (µg/m^3)	2021 Air Quality Guideline (AQG) Value
Carbon Monoxide (CO)	mg/m^3	24-hour[a]	-	4
[a] 99th percentile (i.e., 3-4 exceedance days per year). [b] Average of daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration.				

(Source: WHO, 2021)

3.6.2. World Bank Group Environmental, Health, and Safety Guidelines

The World Bank Group Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors, and for this project the relevant specific guideline is the WBG EHS Guidelines for Ports, Harbours, and Terminals.

The EHS Guidelines for Ports, Harbours, and Terminals are applicable to commercial ports, harbours, and terminals for cargo and passengers' transfer. Shipping (including repair and maintenance of ships), fuel terminals, or railways are addressed in separate industry sector EHS Guidelines, specifically the EHS Guidelines for Shipping, Crude Oil and Petroleum Product Storage, Railways, respectively.

According to the guidelines, sites for ports, harbours and terminals should be selected through a systematic, documented environmental assessment process that includes rigorous consideration of siting and alternatives, their direct and indirect environmental and social impacts, and consultation with affected communities. Appropriate site selection may avoid and / or minimize EHS and social impacts associated with ports, harbours, and terminals.

3.6.2.1. Environment

Environmental issues in port and terminal construction and operation for which the World Bank Group Guidelines focus on include the following:

- Terrestrial and aquatic habitat alteration and biodiversity.
- Coastal land erosion, sediment transport and deposition.
- Climate change resilience.
- Water quality.
- Dredge material management
- Dredge planning activities
- Dredge techniques
- Reuse and disposal of dredged materials
- Wastewater (port sewage, stormwater, ship wastewater)
- Air emissions
- Emissions from combustion sources
- Volatile Organic Compounds (VOCs), dust
- Waste management
- Ship wastes
- Hazardous materials and oil management
- Spill prevention
- Spill control planning
- Dangerous goods handling
- Noise and vibration (including underwater)
- Terrestrial noise
- Underwater noise and vibration.

3.6.2.2. Occupational Health and Safety

Occupational health and safety issues associated construction, operation and decommissioning of ports include, among others, exposure to dust and hazardous materials that may be present in construction materials and demolition waste (e.g., asbestos), hazardous materials in other building components (e.g., PCB and mercury in electrical equipment), and physical hazards associated with the use of heavy equipment, or the use of explosives.

Specific occupational health and safety issues relevant to port operations for which the guidelines primarily focus on include the following:

- Physical hazards.

- Chemical hazards.
- Confined spaces.
- Exposure to organic and inorganic dust.
- Exposure to noise.

The World Bank Group EHS Guidelines approach is for port operation activities to be conducted in accordance with applicable international regulations and standards to address occupational health and safety issues, and these include:

- International Labour Organization (ILO) Code of Practice for Safety and Health in Ports (2005).
- General Conference of the International ILO Convention concerning Occupational Safety and Health in Dock Work, C-152, (1979).
- General Conference of the ILO Recommendation concerning Occupational Safety and Health in Dock Work, R-160.
- IMO Code of Practice for Solid Bulk Cargo (BC Code).
- International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code).
- International Code for the Safe Carriage of Grain in Bulk (International Grain Code).
- Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code).
- International Maritime Dangerous Goods Code (IMDG Code).

3.6.2.3. Community Health and Safety

Community health and safety issues and impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labour. The following operational phase issues are specific to ports and discussed by the WBG EHS Guidelines include:

- Port marine safety.
- Port security.
- Visual impacts.

3.6.3. Grievance Mechanism

The establishment of a Grievance Mechanism is a requirement of EPA and EIA practices. A well-implemented Grievance Mechanism will help the project deal with specific concerns raised by all Project Affected Persons (PAPs) and or others in relation to compensation, resettlement, or livelihood restoration issues in an effective, transparent, and timely manner. This will provide aggrieved persons the voice and opportunity for redress, hence mitigating litigation, bad publicity, and delays in project execution. A Grievance Mechanism provides a formal and ongoing avenue for stakeholders to engage with project proponents and contractors, whilst the monitoring of grievance provides signals of any escalating conflicts or disputes. Protocols of the mechanism are equally useful for handling GBV, Sexual Harassment (SH), Sexual Exploitation and Abuse (SEA) cases and emphasize community representation in grievance redress committees within the various project affected communities.

3.7. The Equator Principles

The Equator Principles are guidelines adopted and applied voluntarily by Equator Principles Financial Institutions (EPFIs) for managing environmental and social issues in project finance lending 136 financial institutions in 38 countries are EPFIs (The Equator Principles Limited, 2024), covering the majority of international project finance debt within developed and emerging markets (ING, 2024). The guidelines are based on the environmental and social standards of the IFC (i.e., IFC Performance Standards). These principles are intended to serve as a common baseline and framework for the implementation of participating institutions, individual, internal environmental and social procedures, and standards for project financing activities across all industry sectors globally.

The Equator Principles aim is to ensure that prior to agreeing to provide financing:

- A project has been subject to an appropriate level of environmental and social assessment in accordance with the requirements of the IFC Performance Standards and World Bank Group EHS Guidelines,
- That the project will implement appropriate measures for the management of environmental, social and health issues during construction, operation, and decommissioning phases.

The Equator Principles are summarized in Table 3-9 below.

Table 3-9 - Summary of Equator Principles

Equator Principle	Summary Description
Principle 1: Review and Categorization	As part of the Equator Principles Financial Institutions (EPFI) internal environmental and social review and due diligence, projects will be categorized into (A-C) depending on the severity of impacts, with Project in Category A being ranked as high-risk projects and Category C being ranked as low risk projects.
Principle 2: Environmental and Social Assessment	Environmental and Social Impact Risk of proposed projects should be conducted. The ESIA should identify impacts and risk, and propose measures to minimise, mitigate and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed project. CO_2 emissions exceeding 100,000 tonnes, should require alternative analysis for less Green House Gases (GHG).
Principle 3: Applicable Environmental and Social Standards	ESIA process should in the first and foremost comply with relevant host country laws, regulations and permits with respect to environmental and social issues. IFC Performance Standards on Environmental and Social Sustainability and World Bank Environmental and Safety Guidelines should apply to projects in non-designated countries whilst host country laws, regulations and permits pertaining to environmental and social issues should apply to designated countries.
Principle 4: Environmental and Social Management System and Equator Principles Action Plan	Environmental and Social Management System (ESMS) should be developed and maintained by the client for Category A and B Projects. Secondly, an Environmental and Social Management Plan (ESMP) should be prepared by the client to address issues raised in the ESIA for the same Project Categories.
Principle 5: Consultations and Disclosure	The client should demonstrate effective Stakeholder Engagement with affected communities and other stakeholders in a structured and culturally acceptable manner. Risks and impacts of the project phase development, preference language of affected communities, decision-making processes, needs of disadvantaged and vulnerable groups, should form the core issues for discussions. The client will take account of, and document, the results of the Stakeholder Engagement process, including any actions agreed. Disclosure of environmental or social risks and adverse impacts should occur early, before construction commences, and on an ongoing basis.
Principle 6: Grievance Mechanism	The borrower will establish a grievance mechanism as part of the management system for all category A and some category B projects.
Principle 7: Independent Review	Environmental Assessment for project within Categories A and B, including EMP, ESMS and Evidence of Stakeholders Engagement shall be subjected to an independent review by a consultant not directly associated with the client as part of EPFI due diligence procedure to assess the Equator Principles compliance. Independent Review shall be mandatory on high-risk projects including the following: • Adverse impact on indigenous peoples, • Critical habitat impacts, • Significant cultural heritage impacts and • Large-scale resettlement.

Equator Principle	Summary Description
Principle 8: Covenants	The client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. In addition, for Category A and B Projects, the client will covenant the financial documentation: a. to comply with the ESMPs and Equator Principles Action Plan (where applicable) during the construction and operation of the Project in all material respects; b. to provide periodic reports in a format agreed with the EPFI at least annually. The report should be prepared by in-house staff or third-party experts. Such reports should comply with the ESMPs and Equator Principles Action Plan (where applicable), and it should provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; c. to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.
Principle 9: Independent Monitoring and Reporting	There shall be ongoing monitoring of projects after the financial close and over the lifespan of the project by an independent Environmental and Social Consultant or an experienced qualified external expert to ensure that the Project compliant with Equator Principles.
Principle 10: Reporting and Transparency (Client Reporting Requirements)	In addition to the disclosure requirements in Principle 5, the following client reporting requirements should be observed: For all Category A and, as appropriate, Category B Projects: • The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online. • The client will publicly report GHG emission levels during the operational phase for projects emitting over 100,000 tonnes of CO2 equivalent annually.

(Source: Equator Principles Limited, 2020)

3.8. International Treaties, Conventions, and Protocols

Ghana is signatory to several international and regional treaties, conventions, and protocols. Table 3-10 below presents relevant ones for the Proposed Project.

Table 3-10 - Relevant International Treaties, Conventions and Protocols

Treaty / Convention / Protocol	Objective	Relevance to the Project
Convention on Biological Diversity (1992)	Multilateral treaty promoting the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources.	The Port of Keta will be developed in a manner that uses biological diversity to the benefit of humans but in a way (and at a rate) that does not lead to the long-term decline of biodiversity i.e., the Port of Keta will adhere to this convention in term of conservation and sustainable use of biological diversity.
Vienna Convention for the Protection of the Ozone Layer	Protection of the Ozone Layer	Compliance with standards and protocols including ensuring that exports and imports of controlled substances do not occur through the Port of Keta
Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES") (1973)	Multilateral treaty that aims to ensure that international trade in wild animals and plants does not threaten their survival. Accords to varying degrees of protection more than 35,000 species of animals and plants.	Need to ensure that any habitat / species of importance to CITES are not imported or exported through the Port of Keta.
United Nations Framework Convention on Climate Change (UNFCCC) (1992)	The reduction of negative changes to the earth's climate, with focus on GHGs. Places focus on industrialised countries to reduce emissions. Developing countries like Ghana are currently exempt.	The Port of Keta should be developed in a manner to support adaptation to the effects of climate change (Ghana ratified the Paris Agreement in 2016, which requires adaptation to the effects of climate change). Additionally, the Port of Keta should be developed in a manner to reduce the GHG emissions associated with the project.
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise, and Vibration (ILO No. 148)	Encourages employers in consultation with their workers to understand project hazards related to air pollution, noise pollution, and vibrations.	Project occupational health and safety shall be ensured.
Bamako Convention on the Ban and Import to Africa and the Control of Transboundary Movement and Management of Hazardous Waste (1991)	Addressing the problem of hazardous wastes in Africa, bans the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa.	Measures should be put in place at the Port of Keta to ensure compliance with the convention including ensuring that hazardous waste is not imported.

Treaty / Convention / Protocol	Objective	Relevance to the Project
African Convention on the Conservation of Nature and Natural Resources	Enhancement of environmental protection; to foster the conservation and sustainable use of natural resources; and to harmonize and coordinate policies in these fields with a view to achieving ecologically rational, economically sound, and socially acceptable development policies and programmes.	The Port of Keta should aim to enhance environmental protection, foster conservation and sustainable use of natural resources and harmonize and coordinate policies in these fields. In addition, this is relevant for the conduct of the EIA-related biodiversity studies and design of biodiversity management measures
Universal Declaration on Human Rights	Promotion of respect for rights and freedoms and for progressive national and international measures to secure the effective recognition and observance among people of signatories themselves and among the territories under their jurisdiction.	Employment and labour issues and protection of worker welfare at the Port of Keta must be duly adhered to in compliance with these conventions, ILO Conventions, and the Ghanaian Labor Laws. Key provisions include: • Article 19: Everyone has the right to freedom of opinion and expression. • Article 20: (1) Everyone has the right to freedom of peaceful assembly and association. (2) No one may be compelled to belong to an association. • Article 24: Everyone has the right to rest and leisure, including reasonable limitation of working hours and holidays with pay.
Arhaus Convention on Public Access to Information and Participation in Decision Making and Access to Justice in Environmental Matters (1998)	Protection of the right of present and future generations to live in an environment adequate to their health and well-being. Each party would promote the rights of access to information, public participation in decision-making and access to justice in environmental matters in accordance with the provision of this Convention.	The Port of Keta project should enhance project information disclosure, public consultation, and stakeholder engagement throughout the project development
International Convention for the Prevention of Marine Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).	MARPOL is the main international treaty dealing with the prevention of pollution of the marine environment by ships from operational and accidental causes. The regulations covering the various sources of ship-generated pollution are contained in six technical annexes of the Convention.	Ghana has ratified I and II which deals with prevention of pollution by oil and the control of pollution by noxious liquid substances in bulk. Therefore, its provisions must be met in relation to preventing pollution by oil and noxious liquid substances in bulk when developing the Port of Keta.
UN Convention on the Law of the Sea (UNCLOS)	The Law of the Sea Convention defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.	Under this convention, Ghana claims rights within 12 nm of territorial water and a 200 nm Exclusive Economic Zone (EEZ).

Treaty / Convention / Protocol	Objective	Relevance to the Project
International Convention for the Safety of Life at Sea (SOLAS), 1974	The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment, and operation of ships, compatible with their safety.	Flag States are responsible for ensuring that ships under their flag comply with its requirements, and a number of certificates are prescribed in the Convention as proof that this has been complied with. Whilst Port State Control is the inspection of foreign ships in national ports such as the Port of Keta to verify that the condition of the ship and its equipment comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules. The current SOLAS Convention includes Articles setting out general obligations, amendment procedure among others.
International Code for the Security of Ships and Port Facilities (ISPS Code)	The International Code for the Security of Ships and Port Facilities (ISPS Code) is the brain child of the Maritime Safety Committee and Maritime Security Working Group under the auspices of the International Maritime Organization (IMO). It was adopted at the Conference of contracting Governments to the International Convention for the Safety of Life at Sea in 1974 and came into effect on the First of July 2004.	The Port of Keta will follow the ISPS Code. As a result, measures will need to be put in place to ensure the safety and security of ships and port facilities. This will need to include ensuring the detection of security threats and taking preventive measures to avoid security incidents.
RAMSAR Convention, 1971 (formally, the Convention on Wetlands of International Importance, especially as Waterfowl Habitat);	The Convention on Wetlands of International Importance as Waterfowl Habitats is also referred to as Ramsar Convention was adopted on 2nd February 1971 in the Iranian city of Ramsar and came into force in 1975. Its main objective is to promote conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world. The Convention defines wetlands as areas of marsh, fen, peatland, or water, whether natural or artificial, permanent, or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six metres. Member countries are to designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance, hereinafter referred to as "the List" which is maintained by the bureau established under Article 8. The boundaries of each wetland shall be precisely described and also delimited on a map, and they may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands, especially where these have importance as waterfowl habitat. The convention was signed by Ghana on March 1981 and ratified by Ghana in July 1989.	Currently, Ghana has legally designated the following wetlands as Ramsar Sites: Muni-Pomadze; Densu Delta; Sakumo; Songor; Keta Lagoon Complex and; and Owabi Wildlife Sanctuary. The proposed Port of Keta is situated within the Keta Lagoon Complex, and wetlands are among the world's most productive environments. A major obligation is the implementation of the principle of 'wise use' of the wetlands resources, where "wise use" is understood to mean "their sustained utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem.

Treaty / Convention / Protocol	Objective	Relevance to the Project
International Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (the Abidjan Convention; adopted 1981, entered into force 1984).	The Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention). The Action Plan and the Abidjan Convention were adopted by the Governments in 1981; the Convention entered into force in 1984. The Abidjan Convention covers the marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the West and Central African Region, from Mauritania to Namibia inclusive, which have become Contracting Parties to the Convention.	The Abidjan Convention is a comprehensive umbrella agreement for the protection and management of the marine and coastal areas. It lists the sources of pollution which require control: - pollution from ships, dumping, land-based sources, exploration and exploitation of the seabed, and pollution from or through the atmosphere. It also identifies environmental management issues from which co-operative efforts are to be made: Coastal erosion, specially protected areas, combating pollution in cases of emergency; and environmental impact assessment. These are all relevant for the Port of Keta project and management measures should be incorporated into the project.
Convention Concerning the Protection of the World Cultural and Natural Heritage	Parties recognise that the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage belongs to the state and that effective and active measures are taken for the protection, conservation and presentation of cultural heritage.	The Port of Keta project has the potential to positively and / or negatively impact cultural and natural heritage resources and these impacts will need to be assessed during the EIA.
Convention on Migratory Species (CMS) (or the Bonn Convention)	Acknowledges the importance of migratory species being conserved and of Range States agreeing to act to this end whenever possible and appropriate, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat. The Parties acknowledge the need to take action to avoid any migratory species becoming endangered. In particular, the Parties: a) should promote, co-operate in and support research relating to migratory species; shall endeavour to provide immediate protection for migratory species listed in Appendix I; and shall endeavour to conclude agreements covering the conservation and management of migratory species listed included in Appendix II.	The Keta Lagoon Complex Ramsar Site is an important habitat for migratory species that are protected under the CMS.
Convention on Road Traffic	Aims to facilitate international road traffic and increase road safety through the adoption of uniform traffic rules.	The Port of Keta is likely to attract international road traffic. Rules for roads developed should follow provisions made under the convention.
CMS / UNEP MOU on Conservation of West African Manatee and Small Cetaceans	Acknowledges the role of the CMS and the need to conserve the West African Manatee and small cetaceans.	The Port of Keta has the potential to impact species that may be protected by the MOU.

4. Description of the Proposed Project

4.1. Location of Proposed Project Site

4.1.1. Port Location and General Site Description

Ghana lies at the centre of the West African coast and shares borders with three French-speaking nations, namely Cote d'Ivoire to the west, Togo to the east, and Burkina Faso to the north. To the south are the Gulf of Guinea and the Atlantic Ocean. The country lies just above the equator and is on the Greenwich Meridian which passes through the Port of Tema, about 24km east of Accra, the capital.

The proposed Port of Keta is located in the Keta Municipality of the Volta Region of Ghana within a small community called Kedzi. Keta is located in the southeast coast of Ghana, approximately 137 km (i.e., shortest distance by air or birds fly) from the national capital Accra, and 30km from the border of Togo and its capital city Lomé. Keta is about 95 km southeast of Ho, the Volta Regional capital (SIIPS, 2021). Keta can be accessed by road using any of the following routes:

- National Highway, N1, and branching off at Sogakope, the capital of Central Tongue Municipality, on the Dabala - Angloga Highway
- N1 and via the Denu-Keta-Anloga Road
- N1 and branching off at Atsiteti via Anlo Afiadenyigba and Havedzi-Kedzi route.

The most prominent feature in the area is the Keta Lagoon Complex Ramsar Site, one of the largest lagoons in West Africa and the largest in Ghana. The lagoon is filled with brackish water and is surrounded by flood plains and mangrove swamps. It receives an inflow of both freshwater from rivers on the northern side as well as seawater during high tide from the Gulf of Guinea, which is separated only by a narrow sand strip from the lagoon. The proposed Port of Keta is located at this narrow sand strip at Kedzi, north of Keta town. The proposed Port of Keta location was selected because it is largely free of permanent settlements and is a strategic location for a port development. The site is characterised by a narrow beach strip of approximately 2km length and 100m width, connecting the towns of Keta and Kedzi. Parallel to the beach strip is a causeway doubling as a coastal defence wall with a two-lane road on the crest of the wall. The causeway features a flood gate in the centre with a total span of approximately 80m, and a width of 16m. The perimeter that is formed by the causeway / Keta-Kedzi-Havedzi Road, the beach strip, and the town road is the proposed location for the Port of Keta (see Figure 4-1 and Figure 4-3). The current land use at the proposed Port of Keta site includes artisanal / local fishing with landing sites, beach soccer, buildings / structures with some habited and some abandoned or uninhabited; portion of the Keta-Kedzi-Havedzi road with the flood control gates and low-tension electricity lines from Kedzi to Havedzi. Open defecation by some few individuals occurs at sections of the site beach. The fringes of the port boundaries are for residential / settlements; commercial activities occur especially at Havedzi such as shops / stores, taxi ranks; and burial grounds / cemeteries at Kedzi and Havedzi. The portion of the port area into the lagoon is also used for fishing and portions of the area are understood to be allocated to salt mining companies for salt production (SIIPS, 2021).

4.1.2. Port Boundary

The approximate location of the Port of Keta is defined in EI 251, signed on 01 October 2018 establishing the Port of Keta and in conformity with the provisions of the Ghana Ports and Harbours Authority Act, 1986 (P,N.D.C.L. 160) (Part One, Section 1). The boundaries for the proposed port development are largely defined by the edges of the surrounding settlements, the roads, and the causeway structure with the bridge. The Port of Keta boundary is provided in Figure 4-2, whilst an indication of the port development area is provided in Figure 4-3 below.

Figure 4-1 - Site Location Plan
(Source: Google Earth)

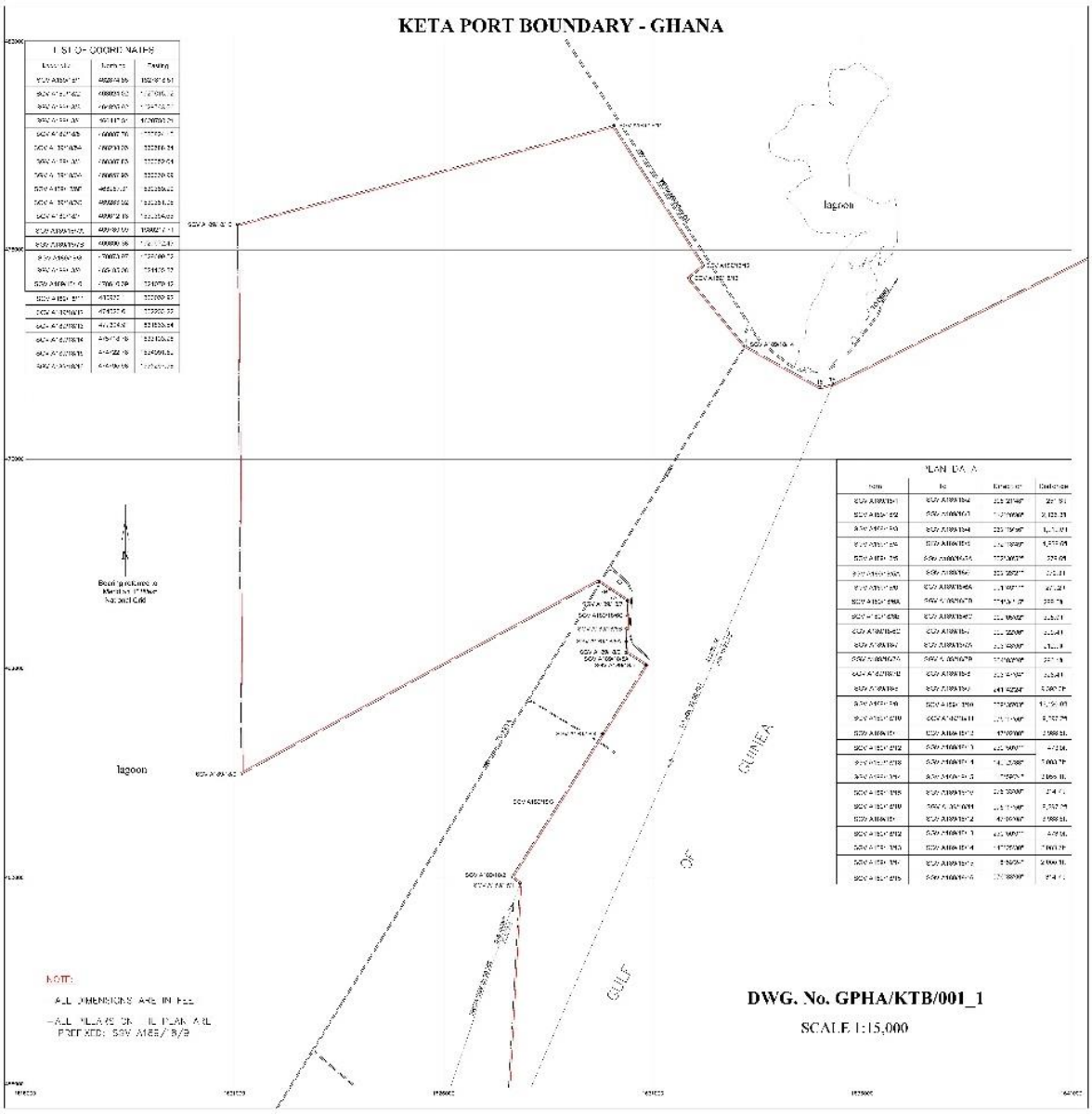

Figure 4-2 - Port of Keta Boundary
(Please note: Drawing also provided in Annex A)

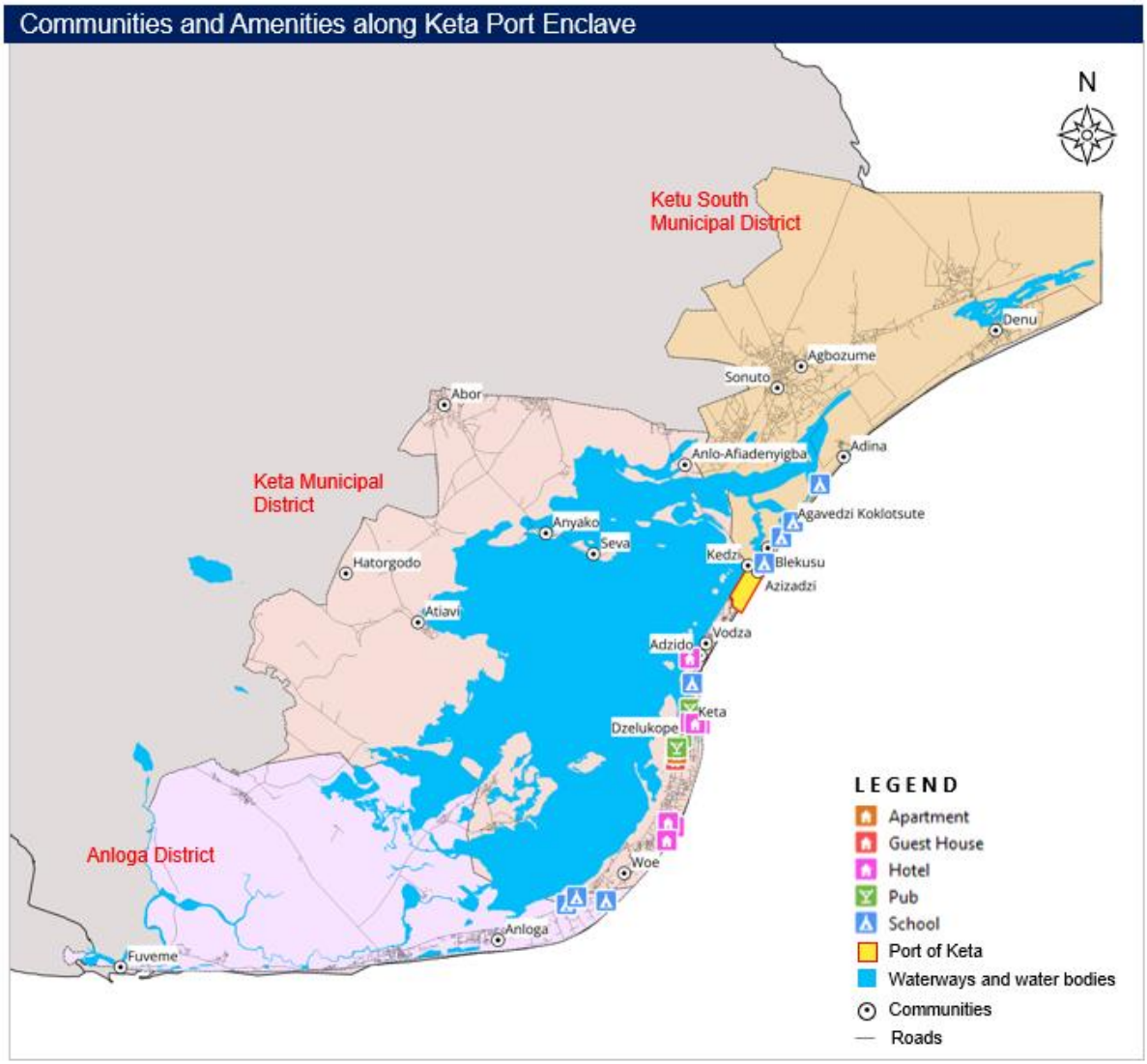

Figure 4-3 - Indication of Port Development Boundary and Communities in the Keta Port Enclave

GPHA are applying for a new Executive Instrument to extend the port boundary to the southwest by an additional 68,320m^2 / 16.9 acres. The proposed extension of the port boundary is provided in Figure 4-4.

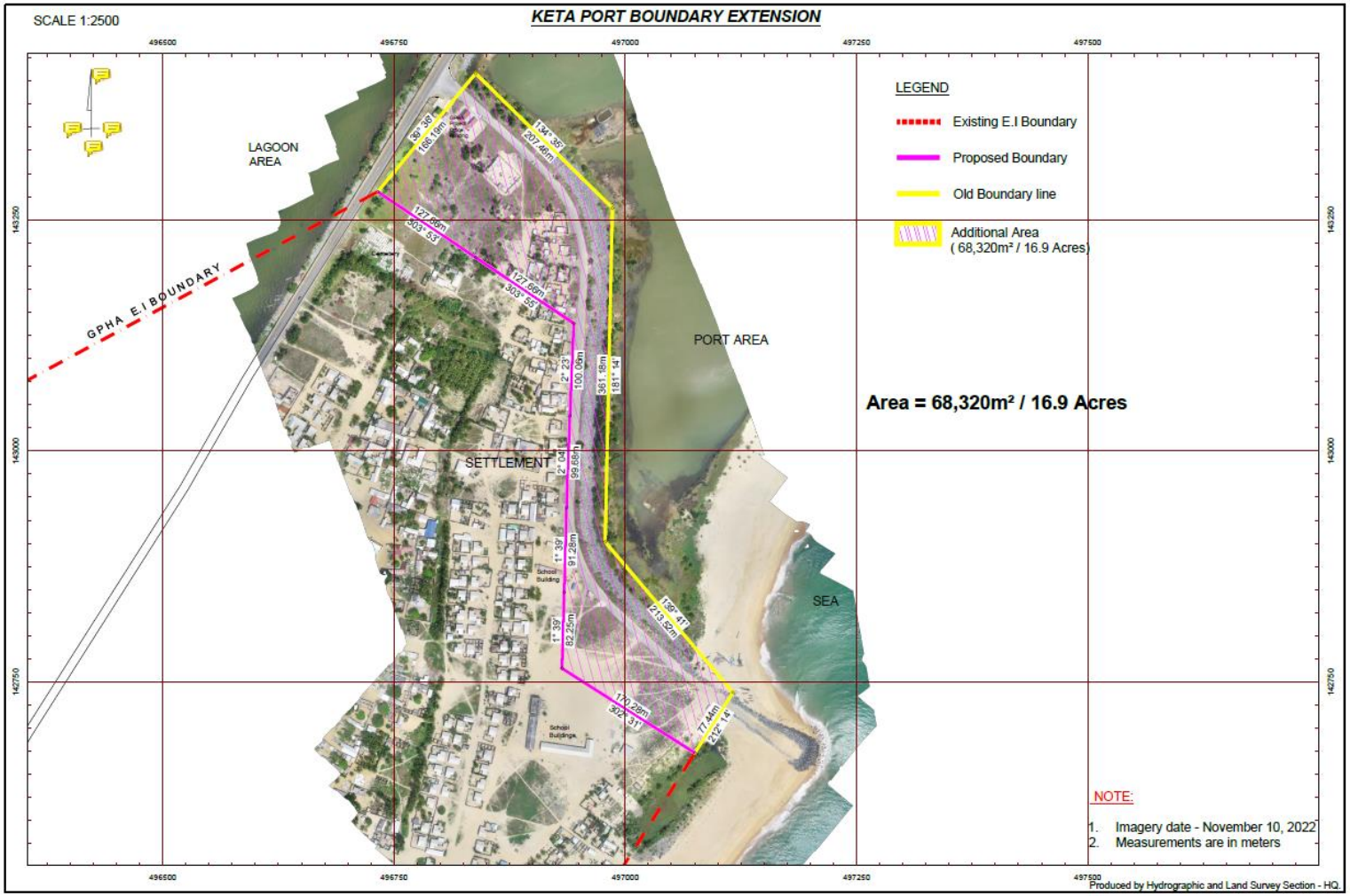

Figure 4-4 - Port Boundary Extension
(Source: GPHA, 2023 – Please note: Drawing also provided in Annex A)

4.2. Port Concept

According to the Final Master Plan and Feasibility Study (SIIPS, 2021) due to its geographical position in close proximity to the existing seaports at Tema and Lomé, as well as its characteristics as a real greenfield project without a well-developed hinterland and a highly developed, productive, and internationalised socio-economic catchment area, the main potentials of the port, at least until 2030-2033 is seen as complementary to the Port of Tema, and the Port of Lomé. Furthermore, the strategy for a feasible development of the Port of Keta before 2030 – 2033 should be based on the following pillars to exploit the identified cargo potentials:

- Development of the Port of Keta for the captive cargoes, namely for the export of salt / salt products, the import of clinker, the import of some fertilisers, and maybe import material required for the development of the onshore blocks in the Keta basin / export of crude oil coming from these activities.
- Developing the Port of Keta in a way that it can compete with Tema Port for some commodities, namely fertiliser and other commodities that are consumed or produced in the wider catchment area and even in some overlapping areas with Tema Port (to the west of the Volta River). This is with regard to the possibility of operating larger bulk / general cargo, etc. (former Panamax vessel type) and the efficient organisation of port operations and the administrative procedures – namely, custom clearance.
- Establish all elements of the development nucleus, especially the SEZ / free zone and the road hinterland connection to Keta-Adina-Denu for fostering the clustering of certain industries directly or close to the Keta location in order to create a kind of self-sustaining economic cargo flow inbound / outbound for the port. In this regard, the Feasibility Study viewed the fishery cluster, agriculture cluster, shipyard / vessel recycling cluster, and the energy cluster to have the highest chance to become a driving force for the Port of Keta and will be driven strongly by the existence of a well-developed seaport (see Figure 4-5).
- A highly flexible port development concept that allows relatively quick establishment of new services and business activities in and around the port without major reshaping of the port (making the port ready for immediately up scaling upon demand). E.g., providing areas that allow quick to establish RoRo / ferry-services, areas / mooring opportunities for establishing LNG bunkering, areas to quickly set-up a floating dock and related ancillary and areas for the loading of oil vessels / establish a tank farm. Once the development nucleus / basic elements of the port have been established, private sector demand and investments for the development of those activities will arise relatively quickly, even before 2030.

Potential Clusters for the Port of Keta			
Agriculture	Fishery & Agriculture	Fossil Fuels	Renewable Energy
Shipyard	Special Economic Zone (SEZ)		Naval Base

Figure 4-5 - Potential Clusters for the Port of Keta Development

The Feasibility Study also identified that, after 2030, large potentials for the upscaling / extending the port are expected, namely:

- A strong increasing demand for port handling capacity that cannot be satisfied neither by the existing capacity nor by the planned / newly stabled capacities (i.e., for the non-containerised cargo that is projected). For containerised cargo, it is expected that current capacity expansion can even satisfy the demand after 2040.
- The natural growth of the established clusters in the development nucleus will require additional port capacity areas for business / production activities in and around the special economic zone as well as additional areas for urban development.
- There are some reasonable opportunities for the upscaling of the Port of Keta after 2030, e.g., the start of the iron ore mining in Northern Ghana and using Keta as its port of loading destination. This, however, would require a direct rail hinterland connection, either directly from Tatale / Sanguli or via a connection to Tema / Accra. A rail connection to Tema / Accra would make Keta even more attractive and important for the port. The same argument applies to the oil / gas industry onshore and even offshore (if the port is already established sooner because it would be an important facilitator for these activities).

- The development nucleus and its anticipated growth is expected to make Keta attractive for additional tourism. The development nucleus shall be developed in a way that shows a high compatibility for any larger tourism investment projects (i.e., natural integration of a tourism element into the development nucleus and its possible upscaling).

4.3. Port of Keta Traffic Projection Brief

The Port of Keta traffic projection can be divided into short-term and medium-term projections (SIIPS, 2021):

In the short term:

- There are some reasonable potentials of captive cargoes for the Port of Keta, namely salt export (about 1 m tons/a) and clinker import (about 0.5 m tons/a).
- Some additional handling volumes for the Port of Keta are expected when setting up a physical, operative, and administrative framework that provides some competitive advantage compared to the Port of Tema operations, with large lots in less time and maybe with some better commercial conditions at least in a ramp up phase), especially related to fertiliser import (about 0.2 m tons/a).
- Additional self-sustaining cargo handling volumes as well as volumes for RoRo / passenger traffic are seen when creating the development nucleus, related to container import / export, import of fertiliser, and the import of general cargo / break bulk / project cargo.

In the medium term:

- A reasonable and continuous up scaling of the handling volumes described in the previous points is expected. Additionally, some large quantities of captive cargo are expected, namely the export of large quantities of iron ore / ferrous material and / or crude oil.

With regard to the projected business volume generated in the port and the related vessel forecast (see Table 3-1), there are some additional drivers, e.g., the set-up of a floating dock or the establishment of an LNG-bunkering facility.

Table 4-1 - Vessel Forecasts for the Port of Keta

Vessel Type	2024	2030	2035	2040	2045	2055
Small Vessels < 100 LOA	208	676	780	884	884	1,144
Handysize	10	117	163	163	163	163
Handymax	38	26	341	393	393	471
Panamax	46	383	626	678	678	756
Capesize	0	0	43	195	195	195
Total	**302**	**1,382**	**1,953**	**2,313**	**2,313**	**2,729**

(Source: SIIPS, 2021)

4.4. Main Features and Proposed Layout

4.4.1. Phased Development of the Port of Keta Layout

The preliminary layout for the Port of Keta was developed by SIIPS (2021), based on the cargoes, commodities, and development opportunities. The development is proposed to be undertaken in two phases:

- Phase 1: Includes elements identified for the Port Nucleus.
- Phase 2: Future development stage of the Port of Keta.

Figure 4-6 and Figure 4-7 show the Phase 1 and Phase 2 layouts respectively. The features included in each phase are provided in Section 4.4.1.1 (Phase One) and Section 4.4.1.1 (Phase Two) below.

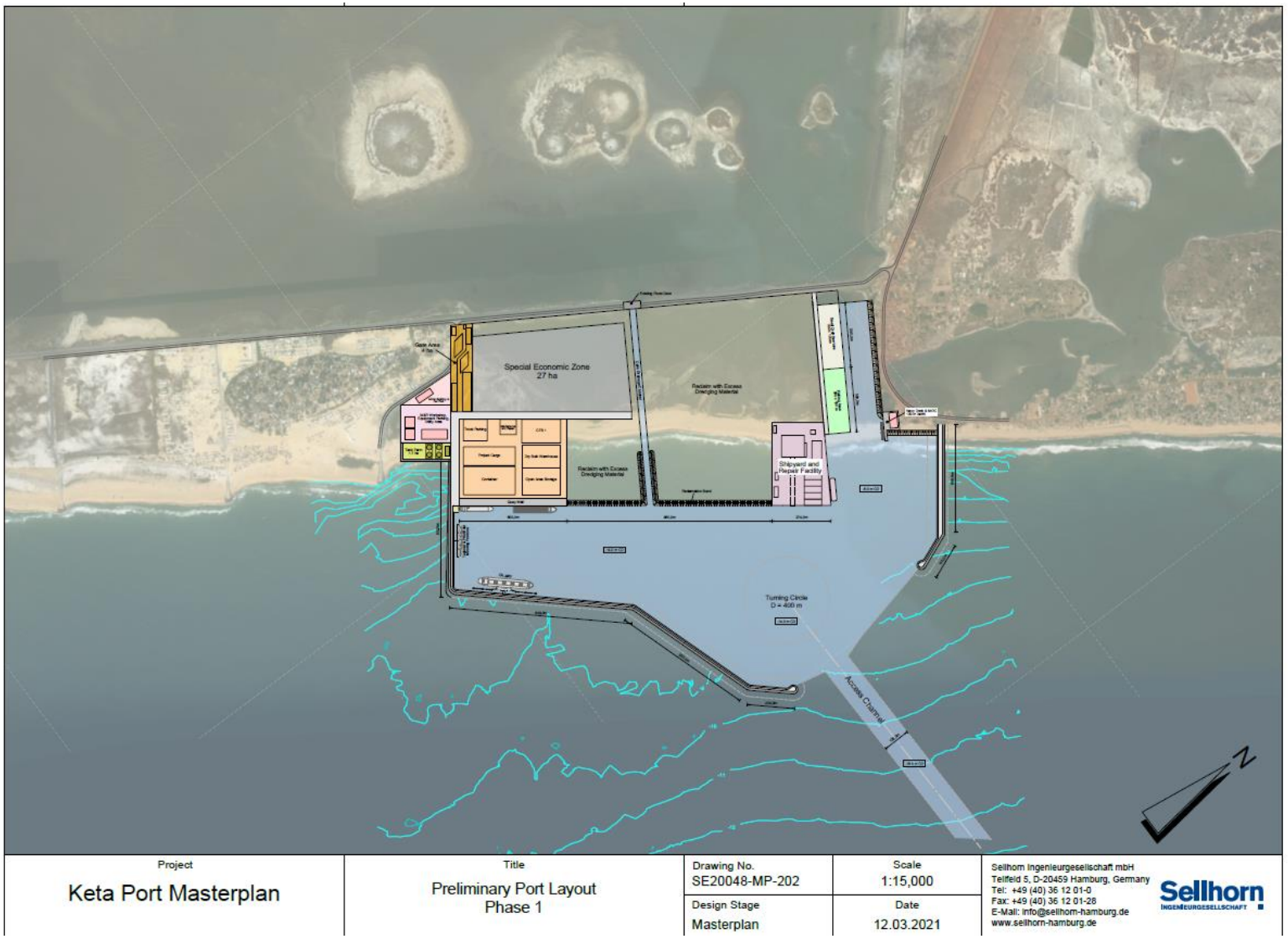

Figure 4-6 - Proposed Port of Keta Layout - Phase 1
(Source: SIIPS, 2021 - Please note: Drawing also provided in Annex A)

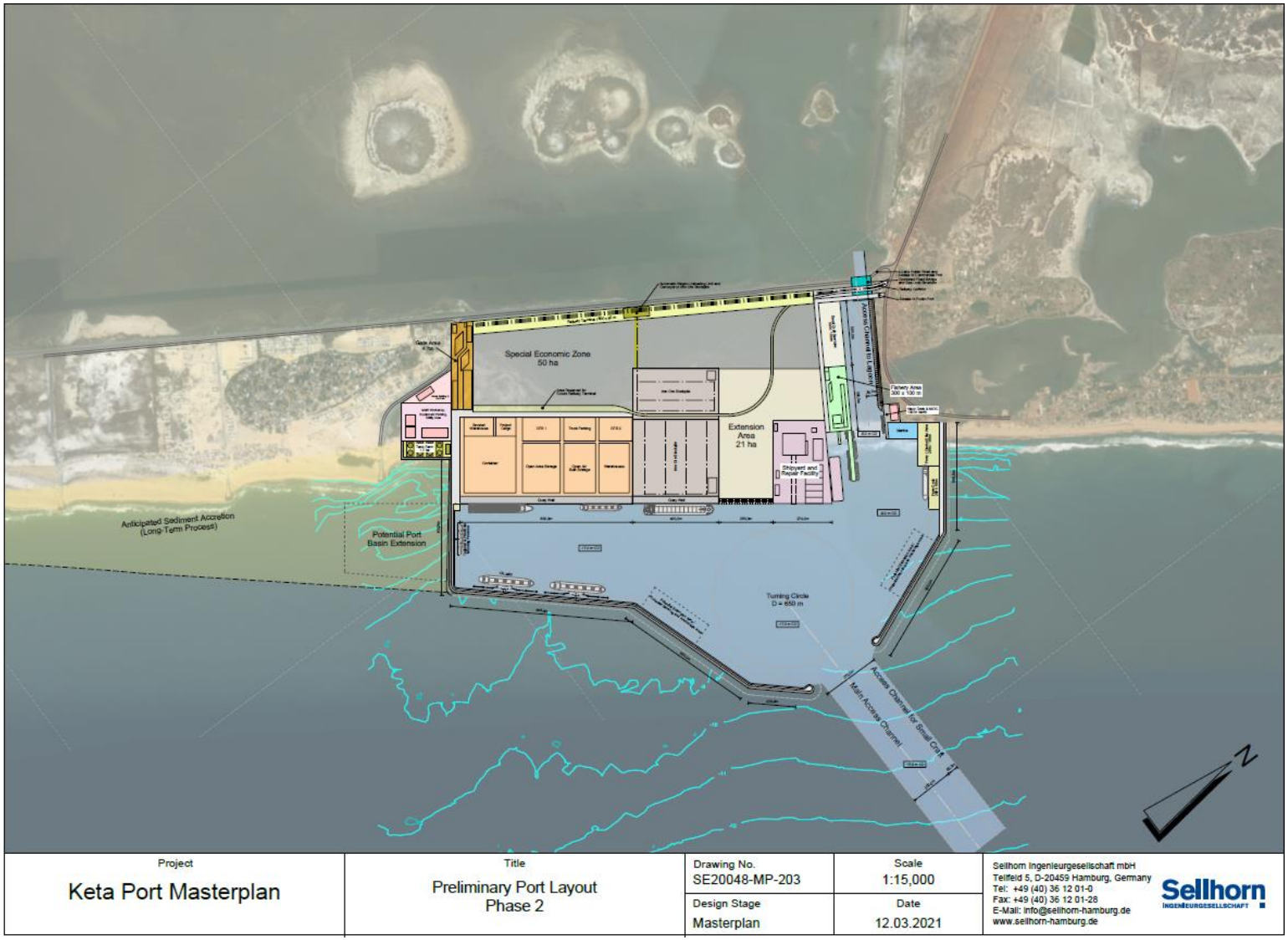

Figure 4-7 - Proposed Port of Keta Layout - Phase 2
(Source: SIIPS, 2021 - Please note: Drawing also provided in Annex A)

4.4.1.1. Phase One Features

The following features are proposed to be developed during Phase One:

- Main breakwater approx. 2.4 km, and secondary breakwater approx. 670 m.
- Dredging of access channel, turning circle (-15 m) and harbour basin (-14 m).
- Multipurpose berth 500 m.
- Multipurpose cargo storage areas: container, general cargo, dry bulk.
- Maintenance & repair workshop.
- Container freight station and empty container storage area.
- Administration building, port services pontoon.
- Navy dock and building.
- Access road, port and SEZ gate.
- Connection to public utility system / back-up power.
- Fishery jetty with 100 m length and fish processing area.
- Shipyard and repair facility 16 ha.
- Oil and hydrocarbon jetty and tank farm.
- Transportation hub.
- Addition of a jetty to the oil and hydrocarbon terminal.

4.4.1.2. Phase Two Features

The following features are proposed to be developed during Phase Two:

- Extension of the secondary breakwater by 500 m.
- Multipurpose berth extended by 300 m.
- Deepening of the access channel and turning circle (-18.5 m) and harbour basin (-17 m).
- Cargo storage areas: Container +1.5 ha, general cargo +6.5 ha, dry bulk +6.5 ha.
- Iron ore terminal: 400 m berth, 25 ha storage area.
- Railway connection.
- Lock gate for connection with the lagoon.
- Marina for leisure crafts.
- Ferry pier with a 200 m long quay, cruise centre and public.

4.4.2. General Port Layout

The port is described in its development configuration at the end of the planning horizon of the masterplan, referred to as “Phase 2”. In this final configuration, the port will feature two dedicated areas for commercial and public traffic. In addition, the Special Economic Zone (SEZ) will be developed in the port hinterland between the terminals and the causeway. A railway terminal is placed along the western edge of the port.

The commercial part of the port, containing the main cargo handling terminals and a shipyard, is contained in the larger part of the port placed parallel to the coastline. The public part of the port is located to the north at the edge of the commercial port towards the settlement of Kedzi and next to the proposed development area for the new city of Keta. It features separate landside and seaside accesses to avoid interference with commercial port operations. The main features of the commercial and public parts of the port are presented in Table 4-2.

Table 4-2 - Main Features of the Commercial and Public Parts of the Port

Commercial Area	Public Area
• Gate for Access Control	• Fishery Dock and Fish Processing Area
• Multipurpose Terminal	• Small Craft Service Area
• Iron Ore Terminal	• Ferry and Cruise Ship Dock
• Shipyard	• Marina
• Tank Farm and Oil Jetties	• Navy Dock with Marine Operations Centre (MOC)

Commercial Area	Public Area
• Auxiliary Facilities (Maintenance-Repair Workshop, Administration Building, Port Services Pontoon, Utility Infrastructure Buildings)	• Sea Lock providing Access to the Lagoon for Small Vessels

(Source: SIIPS, 2021)

The commercial and public port, along with their individual facilities and other areas of the port are described in detail in the following sections.

4.4.3. Breakwaters

The purpose of the breakwaters is to provide calm conditions inside the port in operating conditions. Consequently, the port will be protected by two breakwater structures:

- Main breakwater to the south and southeast.
- Secondary breakwater in the northeast

To maximise the efficient use of space, additional berths and operational areas are placed on the leeside of the breakwaters.

Constructing the main breakwater will also cause a hindrance to longshore sediment transport. Over the long term, this is anticipated to result in sediment accretion on the upstream side for sediment transport (as is apparent for the Port of Lomé further along the coast), helping curb erosion and with land reclamation for areas upstream of sediment transport (i.e., areas on the coast to the south-southwest). However, this will result in a reduction in sediment on the downstream side, which may result in increased erosion in areas on the coast to the north-northeast.

The breakwaters will be initially constructed to protect the southern and northern areas of the port, leaving the middle section more exposed. This choice was made to reduce investment costs for Phase 1, while the centre areas of the port are not utilized except for the shipyard. With growing activity and development of the port in these areas, the secondary breakwater will be extended by 500 m towards the sea, enhancing the protection in the mentioned section and thereby finalizing the breakwater structures. The remaining opening of the breakwaters, serving as access to the port basin, will feature a width of 270 m (SIIPS, 2021).

4.4.4. Waterside Areas and Seaside Access

The arrangement of the waterside areas and seaside access are described in this section (SIIPS, 2021).

Seaside access to the port will be established through a newly dredged access channel. The channel connects the open deepwater sea to the port basin, where it connects to the turning circle. The turning circle will be placed within the protected port basin to protect manoeuvring ships from wave action.

In Phase 2, the breakwater construction will be finalized, leaving an opening of 270 m to access the port basin.

Seaside traffic volumes are projected to increase from Phase 1 to Phase 2, whilst at the same time being concentrated into the smaller port basin access opening. To keep interference from small vessels such as fishing boats with commercial vessels to a minimum, traffic will be divided into two access lanes leading to the commercial and the public part of the port separately.

Mixing of small and large vessel traffic, which further creates operational and safety issues, is a common problem observed in other ports of the region and shall therefore be avoided by considering this issue in the design. The design includes the use of floating barriers which presents a cost-efficient but effective option for traffic separation.

The southern channel lane will be dredged and is to be used by large commercial cargo vessels, leading into the turning circle and commercial port. The northern lane will lead to the public port and will not be dredged as the natural water depth is sufficient for small and medium vessels. Ferries and cruise ships will need to use the larger southern channel due to their horizontal and vertical dimensions. For this reason, an opening will be created in the

floating barrier at the turning circle, which allows passing of these ships from the southern channel to the public port basin (SIIPS, 2021).

4.4.5. Extension Area

The development of the port is started on the updrift / southern side of the port with the commercial port gate and multipurpose terminal. Over time, the port will grow towards the north with the shipyard and the iron ore terminal (SIIPS, 2021).

The masterplan expects that over time, sediment will deposit and accrete on the seaward side of the perpendicular breakwater, creating a large beach area next to the port (SIIPS, 2021).

The placement of the commercial port on the updrift side therefore allows future expansions of the basin or other port facilities into this area. An extension area providing 500 m of quay wall on each basin side is currently reserved in the sediment accretion area, with the potential to allocate more room for the port development depending on its future growth. The remaining area is proposed to be allocated for residential or tourism development as part of the new City of Keta. As a second extension phase, the port could be developed towards the open sea with the reclamation of additional areas on the waterside of the planned breakwater structures (SIIPS, 2021).

4.4.6. Commercial Port

The commercial port comprises the larger areas of the port, stretching over almost the entire length of the existing causeway structure. In its final development, it will provide a continuous quay length of 1,500 m, with the possibility to further extend this by 500 m or more (SIIPS, 2021).

As indicated in Table 4-2, key features of the Commercial Port include:

- Gate Area
- Multipurpose Terminal
- Iron Ore Terminal
- Shipyard
- Tank Farm and Oil Jetties
- Auxiliary Facilities
  - Maintenance and Repair Workshop
  - Administration Building
  - Port Services Pontoon
  - Utility Infrastructure Buildings

Further details are provided in the following subsections:

4.4.6.1. Gate Area

The gate serves as access control to the commercial port and is therefore part of the security perimeter. It provides a pre-gate and main in / out gates for vehicular access. Vehicles can queue in the parking area while obtaining their documents from the nearby Port Access Control Building. The main in / out gates can be bypassed via a bypass lane. Additional facilities provided at the gate include a weighbridge and an x-ray scanner for trucks as well as a customs inspection and clearance area (SIIPS, 2021).

4.4.6.2. Multipurpose Terminal

The Multipurpose Terminal is placed right next to the gate, being the first cargo terminal of the development and the largest contributor to road traffic. The Multipurpose Terminal will be used to handle mainly containerized cargo with additional freight from project cargo and general cargo. For this purpose, dedicated storage areas for containers and general cargo will be provided. Empty containers are stored on the empty container yard on the terminal landside. Located within the multipurpose terminal is the Container Freight Stations (CFS) Warehouse 1 for consolidation and deconsolidation of containerized cargo. In Phase 2, the terminal is extended considerably by adding 300 m of quay wall and 12 ha of storage area. A second CFS warehouse along with a bonded warehouse for customs storage are also added. Additional storage warehouses are built for salt, fertilizer, and clinker, while

the existing storage areas for general and containerized cargo grow in size. Due to the variety of cargo being handled on the multipurpose terminal, different sets of equipment will operate on the quay. As an early estimate, three Ship-to-Shore (STS) cranes, two mobile harbour cranes, and two grab cranes with hoppers for dry bulk material handling will be required (SIIPS, 2021).

4.4.6.3. Iron Ore Terminal

The Iron Ore Terminal is placed next to the Multipurpose Terminal, providing a continuous quay line over the two and therefore allowing future repurposing of the terminal areas based on the operational requirements of the port. The Iron Ore Terminal will feature a quay length of 400 m with a storage area of 25 ha. At the current stage, it is foreseen for the terminal to provide not only cargo handling at berth, but also storage facilities in form of iron ore stockpiles with stacker-reclaimers and conveyor belts to transport the bulk material to the ship loaders. The material is transported to the stockpiles via another conveyor system connected to the Railway Terminal at the western edge of the port. Auxiliary facilities of the Iron Ore Terminal include:

- Water Treatment Plant for the drainage waters from the stockpiles.
- Building housing a workshop, offices, and social facilities.

An alternative layout is also considered, in which the iron ore stockpiles are relocated to a position further away from the port and the ore is transported to a jetty through a conveyor belt over a long distance. The main reasons for this would be to reduce disturbances to the residents of the nearby city caused by dust particles, and to reduce area consumption within the port area (SIIPS, 2021).

4.4.6.4. Shipyard

The shipyard will be located at the edge of the new terminal area, occupying an area of approximately 16 ha. The shipyard is intended to be a multimodal operation centre for the region, providing services for the existing fishery and other small ship fleet, including ship repair, class renewal and / or conversion, fabrication of small and medium-sized ships, and assembly and completion of delivered sets of ship construction. The shipyard will host (SIIPS, 2021):

- Shiplift
- Floating dock
- Outfitting pier and sheds
- Administration and storage buildings.

4.4.6.5. Tank Farm and Oil Jetties

The port includes facilities for handling and storage of hydrocarbon products. Fuel, oil, and other liquid bulk products can be stored on the tank farm, which is located nearby the gate. From there, pipelines run along the main breakwater towards two oil jetties located on the leeside of the breakwater. The location of the tank farm is chosen in a way to minimize the pipeline length and crossings with roads and other infrastructures. The jetties are located on the breakwater opposite to the commercial port terminals, as this presents an efficient use of the space available in the harbour basin. Additional jetties could be constructed in the future along the remaining breakwater length (SIIPS, 2021).

4.4.6.6. Auxiliary Facilities

The cargo terminals are complemented with auxiliary facilities required for the safe and efficient operation of the port. This includes:

- Maintenance and Repair Workshop - for the port's own cargo handling equipment and to perform repairs on the port infrastructure.
- Administration Building - housing the port authority's offices and amenity facilities for the port personnel. These buildings are located at a central location near the gate, where there are parking lots for port personnel vehicles and port equipment.
- Utility Infrastructure Buildings - such as the main substation and a Water Treatment Plant.

- Port Services Pontoon - The port will provide tug and pilotage services. The tug and pilot boats will be moored at a Port Services Pontoon located on the southern head side of the port basin. Given the small size of these boats, a pontoon is the better choice for mooring to allow movement with the tides (SIIPS, 2021).

4.4.7. Special Economic Zone (SEZ)

The area between the port terminals and the public road and causeway structure is reserved for the development of the Special Economic Zone (SEZ). The area will provide space for the establishment of businesses and industries closely associated with the port. Access control to the area will be provided by the port gate, with the option to build an additional SEZ gate if required. A second access point to the SEZ could be implemented by means of a secondary gate constructed at the interface between the SEZ and the public port. An internal road network will need to be designed for the area, which further connects to the port road. Utilities shall be provided from the port's supply. It is recommended to construct the road and utility network at an early stage and create plots of land with all infrastructures in place, which can then be offered to private businesses and industries (SIIPS, 2021).

4.4.8. Railway Terminal

As part of the development of the Iron Ore Terminal, it is planned to construct a Railway Terminal along the edge of the SEZ and the causeway. The terminal will feature four tracks and a length of 1,600 m, allowing for handling of 800m block trains. At the centre of the Railway Terminal, an Automatic Wagon Tippler Unloading Unit will be installed and connected to the Iron Ore Terminal via a conveyor belt system. The terminal is designed to handle 15 trains per day, carrying 2,000 tons of iron ore each. The Railway Terminal will need to be connected to Ghana's national railway grid through a branch line to Keta. In addition to the terminal located inside the port area, a Marshalling Yard for building and marshalling as well as servicing of rolling stock will need to be constructed at a suitable location in the port hinterland. The marshalling yard should be placed with some distance from the port and the city development due to the large area required for such a facility (SIIPS, 2021).

The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.

4.4.9. Public Port

The Public Port differs from the Commercial Port mainly in its access control and security features. The Commercial Port will have to be certified according to ISPS and will therefore need strict security control at its perimeter, which is not required nor reasonable to implement for areas subject to public traffic, such as the Ferry Terminal or Fishing Terminal. For this reason, the Public Port is separated from the Commercial Port. The Public Port is further divided into two areas (SIIPS, 2021):

- The southern one - providing area for industrial facilities such as the fishing dock and small craft services,
- The northern one - for public transportation services, leisure, and a small navy base.

The Public Port includes the following key features:

- Fishery area
- Small craft services
- Marina
- Ferry and cruise dock
- Navy dock.

Further details are provided the following subsections:

4.4.9.1. Fishery Area

The Fishery Area will provide facilities for the docking of fishing vessels, cargo handling, storage, processing and loading at a centralized location. It is expected that different sizes of vessels will berth and unload fish here, ranging from ocean trawlers over coastal fishing boats to small shore boats and canoes. Therefore, the docks provide different structures for mooring and unloading depending on the vessel size, including a quay wall and two floating jetties. Resupply, maintenance, and repair services for trawlers are provided directly at the terminal. Fish is initially received in a cold storage with an adjacent trading / auctioning hall. An additional cold storage allows short-term storage and loading into trucks for onward transport. For immediate processing into fish products, two processing facilities are located within the terminal. To the west of the terminal, a small gate, and an administration building provide access control and administrative services (SIIPS, 2021).

4.4.9.2. Small Craft Services

To the west of the fishery area, a dedicated area is reserved for the provision of repair and maintenance of small craft, mainly focused on local shore and coastal fishing boats. Pleasure craft from the marina could also be serviced here and undergo repair and maintenance. A fuel station for small vessels shall be part of this area too (SIIPS, 2021).

4.4.9.3. Marina

Next to the navy dock, a marina will be constructed to serve as a shelter for private pleasure craft. The area is closely associated and strategically located next to the new development of Keta city, allowing direct access for its residents. Additional leisure and tourism facilities could be built on this area, such as restaurants, beach clubs, hotels, etc. (SIIPS, 2021).

4.4.9.4. Ferry and Cruise Dock

In the future, it is planned to establish a ferry service to the Port of Keta. In addition, cruise ships could dock in Keta to visit the new city of Keta and other attractions of the region. A Ferry Dock will therefore be constructed within the Public Port.

It features a dedicated access to the public road, ensuring smooth flow of traffic and avoiding any interference and obstruction to the other operations of the port. The dock will be equipped to receive both vessels with a stern or bow loading ramp, as well as lateral ramps. A pre-storage area is part of the terminal, providing ample space as waiting area for vehicles. A Cruise Centre could be built next to the dock if regular visits of cruise vessels are projected. Next to the pre-storage area and the road, a public transportation hub for short- and long-distance buses could be established, further strengthening the transport link to and from Keta (SIIPS, 2021).

4.4.9.5. Navy Dock

On the northern side of the public harbour basin, opposite the fishery area and with direct access to the public road, a navy dock will be constructed, providing a quay length of 120m. The dock also contains the Marine Operations Centre (MOC), a building including the navy's operations centre, the officers' offices, accommodation, and amenities for 50 sailors, and an armoury. The chosen location of the navy dock allows establishment of a high-security perimeter and access control from the public road. It also provides a calm berth for the navy's boats, as these small fast ships are not built to withstand strong waves and therefore require a sheltered berthing location (SIIPS, 2021).

4.4.10. Waterside Access to Lagoon and Traffic Structures

The public port is initially developed with its basin along the edge of the commercial port and SEZ. Within Phase 2, it is planned to create an access channel from the public port to the lagoon navigable for small craft. Establishing this access will require the construction of a combined bridge and sea lock structure, with the roads and the railway line passing overhead the channel and sea lock. With the development of the railway terminal, the access road to the public port fishery area will have to be relocated from connecting to the causeway road to the northern main road over the newly constructed bridge. The existing flood gate and drainage channel will also be removed as the area will be cleared for the extension of the commercial port terminal. The sea lock shall therefore incorporate a spillway or gate to drain excess water from the lagoon.

Combining the sea lock and bridge into one traffic structure will save costs and reduce area consumption. The exact dimensions and clearance regarding vessel height and draft will need to be investigated in the future, as this depends on whether access should only be provided for small pleasure craft and fishing boats, or for mid-sized boats as well (SIIPS, 2021).

4.4.11. Port Buildings and Facilities

The Port of Keta requires a series of buildings and facilities to handle cargo, traffic flows, operational planning and administrative functions. These include:

- Administrative building.
- Workshop.
- Terminal gates.
- Other buildings and facilities such as:
  - Custom inspection gates
  - Customs buildings
  - Truck dispatch
  - Train yard
  - Employee car park
  - Amenity complex
  - Petrol station for public road traffic
  - Fire station
  - Security system and ISPS compliance
  - Fences.

4.5. Electricity Power Supply

According to GRIDCo, and the Energy Commission (EC) (SIIPS, 2021) a high voltage line with 161kV (part of the National Interconnected Transmission System (NITS), passes near the project area in the vicinity of the National Highway N1, further connecting to Togo. A substation is also located at the border town of Aflao, approximately 20km from the port site.

In addition, it is understood that as part of the national upgrading of powerlines, a new 230kV and eventually 330kV transmission line is planned in the region, passing north of the Keta Lagoon. General indication from the EC is that there should be enough capacity in the Volta Region to cover the project. The power source, whether the national grid or a ports' dedicated power production station, will be discussed in further stages of the project, based upon the port's own power demand. In any case, the port shall have a main substation, from where the terminals will be fed with an 11kV distribution network. All electrical power and communications shall be installed underground in a duct bank system (SIIPS, 2021).

4.6. Water Supply Infrastructure

The Keta area is part of the Ghana Water Company Limited (GWCL) Keta operational district. The Agordome-Sogakope Water Treatment Plant (WTP) serves Agordome, Sogakope, Anloga, Keta, and its environs with potable water. Installed capacity of the WTP is 7,200m^3/day and the production (approximately 4,000m3/day) and is understood to cover the demand of the Keta area. However, the capacity would not be sufficient to cover the planned Port of Keta Project (SIIPS, 2021).

GWCL is planning to expand its capacity in the area with the Keta Water Supply Rehabilitation and Expansion Project. At the time of reporting, the progress of the Keta Water Supply Rehabilitation and Expansion Project is not clear. However, the project is expected to include the following (SIIPS, 2021):

- Rehabilitation of the existing WTP to restore production to its installed capacity.
- Construction of a new 35,000m^3/day WTP near Ogapekolomo to improve water supply up to the year 2030.

- Pipeline improvement works.

4.7. Firefighting Water

The firefighting water is assumed to be supplied from the same source that has been proposed for the potable water system. The design capacity of the system should provide a supply of 192 m^3/h over two hours (in accordance with Guideline W405 for Firewater Demand of German Association of Gas and Water (DVWG). As an alternative, a separate system using seawater for firefighting could be used, having the benefit of unlimited supply from the sea, and therefore removing the need for a storage reservoir. However, seawater pumps and hydrants require a special coating to be resistant to corrosion (SIIPS, 2021).

4.8. Stormwater

A stormwater network of the terminal areas shall be designed for the proper drainage of the terminal surface. Rainwater from terminal traffic and storage areas will be directed on the surface to gullies and covered or open precast concrete channel drains, which will lead to manholes, where it will be discharged to the drainage pipe network. To achieve a proper discharge a cross gradient of a least 2% shall be applied and the drainage shall be large enough to ensure it cannot be blocked by sand build up (SIIPS, 2021).

In areas where fuels and light liquids are handled (e.g., tank farm, workshop) a coalescence separator with integrated mud separator and a subsequent control and sampling manhole shall be installed before being connected to the superior drainage system. The coalescence separator shall be connected to the sewage system. Before rainwater will be discharged to the sea, it will flow through a purification stage to deposit solid and liquid pollutants. Purification of rainwater shall be carried out in a combined rainwater clarifier and spill and overflow structure consisting of a dipping wall and a sedimentation basin located in the vicinity of the outlet structure (SIIPS, 2021).

4.9. Sewage

The new port will build its own sewage network. Sewage water from buildings will flow through free surface flow pipes to collecting manholes in front of those facilities. Submersible sewage pumps inside the collecting manholes will pump the sewage water into the sewage pressure lines, to the port's wastewater treatment plant. Treated water shall then be discharged directly to the sea. Another possible option would be to equip each building or facility with a septic tank to accumulate sewage water. The septic tanks are periodically emptied by trucks and sewage sent to designated public wastewater treatment plant or disposal sites (SIIPS, 2021).

4.10. Manpower and Labour Availability

Skilled labour for the operations of the proposed port project is available in Ghana, especially from the Tema and Sekondi-Takoradi areas in the Greater Accra and Western Regions of Ghana respectively, which have had port and harbour facilities in operation for many years.

It is believed that some port activities may have occurred in the Keta area in the 1950s before the commencement of the Port of Tema in the 1960s and therefore not a totally new development in the project area. However, it may be a new development for the active population (youth and middle age) and these local residents may generally lack the required skills and will require significant training. Similarly, Tema / Accra, Sekondi-Takoradi, and Lomé may have attracted professional staff who have migrated from the area to the operational ports there. However, unskilled labour will be readily available in the local communities (SIIPS, 2021).

Table 4-3 provides an estimate of staff requirements for the port nucleus (without the Iron Ore Terminal (IOT), fishery, shipyard, and liquid bulk terminal).

Table 4-3 - Staff Requirement for the Port Nucleus

	2024	2030	2035	2040	2045	2050	2053
Management / Administration / Others	**118**	**125**	**130**	**131**	**131**	**131**	**131**
Terminal Head Manager	1	1	1	1	1	1	1
Operational Manager	2	2	2	2	2	2	2
Commercial Manager	3	3	3	3	3	3	3
EDP Manager / Administration Manager	2	2	2	2	2	2	2
EDP Staff	11	11	11	11	11	11	11
Deputy Manager Operation	8	8	8	8	8	8	8
Workshop Manager	1	1	1	1	1	1	1
Administrative Staff Yard + Horizontal Transport	0	1	1	1	1	1	1
Administrative Part Workshop	1	1	1	1	1	1	1
Office Clerk	3	3	3	4	4	4	4
Security Force	27	27	42	42	42	42	42
Shuttlebus + Road Tanker + Small Forklift Driver	27	27	27	27	27	27	27
Car Driver	36	36	36	36	36	36	36
Cleaning Force	9	9	9	9	9	9	9
Operations	**154**	**490**	**833**	**1,288**	**1,288**	**1,288**	**1,288**
Ship Planner	1	1	2	2	2	2	2
Yard Planner	10	10	10	10	10	10	10
SSG / MNC-Driver	7	33	51	51	51	51	51
Ships Foreman (Crane Supervisor) + Head Clerk	6	9	12	12	12	12	12
Talley Clerk + Yard Worker	24	110	214	459	459	459	459
Supervisor	1	1	1	1	1	1	1
Lasher	18	88	176	386	386	386	386
TTU Driver	27	74	110	110	110	110	110
RTG-RS-Driver	9	21	36	36	36	36	36
Empty Handler Driver	4	11	15	15	15	15	15
Forklift Driver + Other	17	75	116	116	116	116	116
Reefer Worker	0	1	1	1	1	1	1
Gate Checker	29	55	87	87	87	87	87
Interchange Clerk	1	1	2	2	2	2	2
Technical Department	**72**	**76**	**76**	**83**	**83**	**83**	**83**
Head of SSG / MHC Workshop Section	2	2	2	2	2	2	2
Head of Yard / TTU Workshop Section	2	2	2	2	2	2	2
Hydraulic Mechanics	11	13	13	16	16	16	16
Electrical Mechanics	9	11	11	14	14	14	14
Workshops Clerks	40	40	40	40	40	40	40
Storekeeper	8	8	8	9	9	9	9
Administration	**74**	**74**	**74**	**74**	**74**	**74**	**74**
OMMP Local Manager	1	1	1	1	1	1	1
Deputies of Manager	1	1	1	1	1	1	1
Secretary	3	3	3	3	3	3	3
Head of Technical Departments	1	1	1	1	1	1	1
Head of Commercial Department	1	1	1	1	1	1	1
Head of HSE Department	1	1	1	1	1	1	1
Head of Security Department	1	1	1	1	1	1	1
Administrative Staff of Various Departments	25	25	25	25	25	25	25
Supporting Forces	40	40	40	40	40	40	40
Total	**418**	**765**	**1,113**	**1,576**	**1,576**	**1,576**	**1,576**

(Source: SIIPS, 2021)

Table 4-4 - Marine Service Manpower Requirements

	2024	2030	2035	2040	2045	2050	2053
Towage	**12**	**20**	**32**	**60**	**60**	**60**	**60**
Masters	3	5	8	15	15	15	15
Mates	3	5	8	15	15	15	15
Chief Engineers	3	5	8	15	15	15	15
Able-Bodied Seamen	3	5	8	15	15	15	15
Pilotage	**9**	**9**	**9**	**9**	**9**	**18**	**18**
Skipper / Master	3	3	3	3	3	6	6
Able-Bodied Seamen	3	3	3	3	3	6	6
Pilot	3	3	3	3	3	6	6
Mooring	**18**	**18**	**18**	**18**	**18**	**18**	**18**
Mooring Team	16	16	16	16	16	16	16
Skippers	1	1	1	1	1	1	1
Able-Bodied Seamen	1	1	1	1	1	1	1
Total	**39**	**47**	**59**	**87**	**87**	**96**	**96**

(Source: SIIPS, 2021)

4.11. Project Schedule and Management

4.11.1. Project Management

As set out in PNDC Law 160 of 1986 / GPHA Act, GPHA will play a predominant role in the development of the proposed Port of Keta. GPHA is the beneficiary of the proposed project, and currently has overall responsibility for the design, construction, and operation of the proposed port. However, the model for the Port of Keta is a Public Private Partnership (PPP), whereby GPHA will purely be a landlord with port operations conducted by third party private entities (this is in contrast to the hybrid systems adopted at Tema and Takoradi).

Figure 4-8 shows a macroscopic organisation chart of GPHA. Currently, there is a Director of Keta Port Project established at the GPHA Corporate Headquarters in Tema.

4.11.2. Implementation Schedule

The implementation of the proposed port is a gradual, ongoing process, dependent on a number of conditions which includes (but is not limited to):

- Provision of project finance.
- Decision to proceed to development from the Government of Ghana
- Progress of environmental and other statutory permitting and licensing requirements.

Based upon the above assumptions construction of Phase One was expected to take about three years.

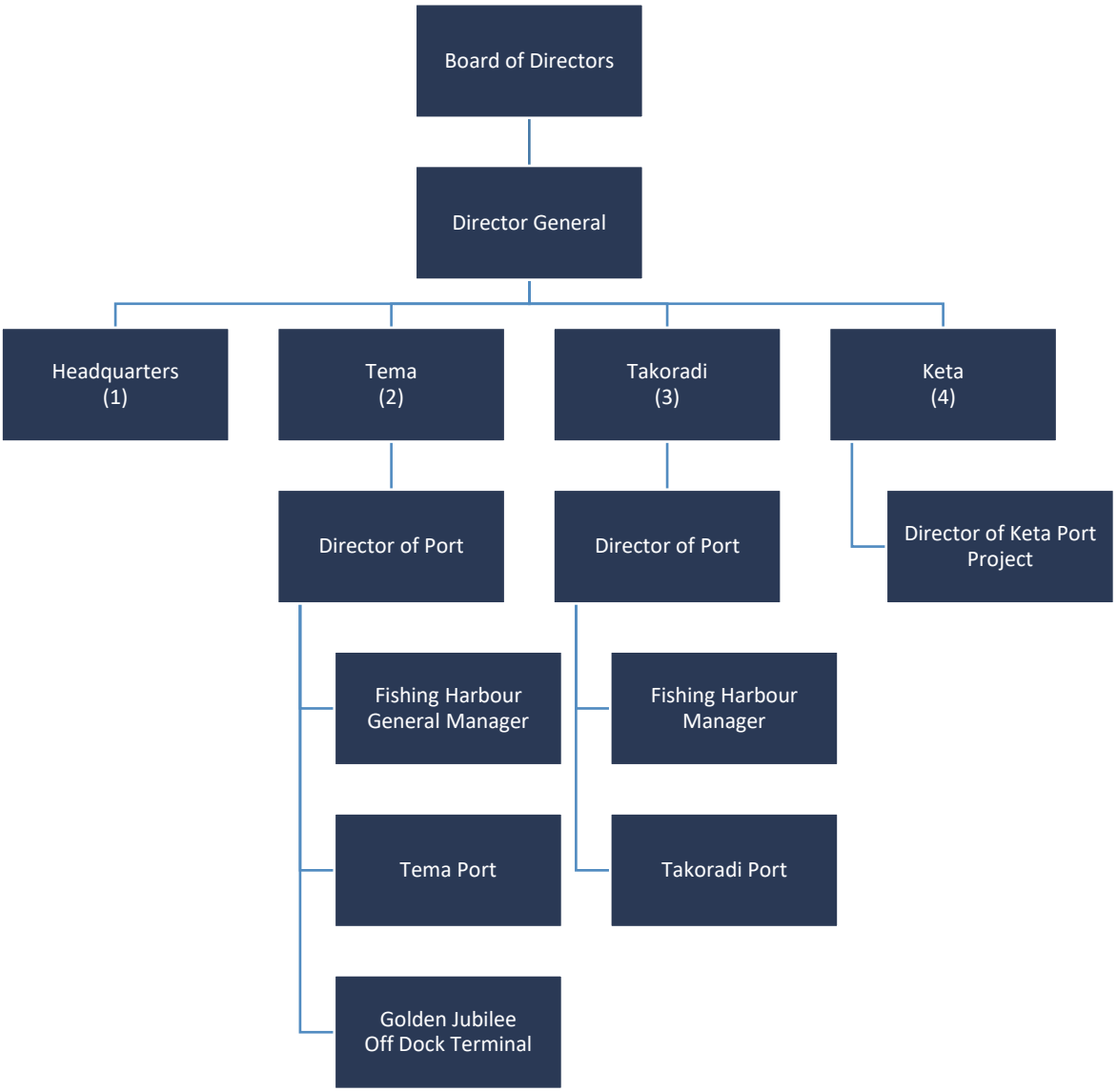

Figure 4-8 - GPHA's Organisational Chart

5. Alternative Considerations

5.1. The No Action Taken Alternative

The Proposed Project is motivated by a combination of factors: national development agenda, international market demands, global and regional trends and Ghana's quest for increased industrial and socio-economic development, development options for diversified cargo-specific port clusters, trade facilitation with long-term planning horizon, etc.

The Proposed Project intends to act as a driver for socio-economic development in the region and provide additional port capacity. If no action is taken i.e., the proposed Port of Keta is not developed, then any potential negative impacts related to developing the Port of Keta will not occur. Similarly, the intended benefits and any secondary benefits will not be achieved.

5.2. Site Selection Options

The Proposed Project site was carefully selected, being fixed at the semi-submerged area between Kedzi and Havedzi, along the existing causeway and the flood protection structure.

Whilst other areas along the coastline such as Keta, Dzelukope, (and Tegbi, Woe, and Anloga in Anloga District) are densely populated, the project site is largely free of permanent settlement (there are some structures in Kedzi Agorta), needs coastal protection (is semi-submerged) and is a strategic location for a port development. Consequently, the site has been declared as the site for the Port of Keta through GPHA Act 1986 (PNDC-L 160) and an Executive Instrument (EI) and no other sites are being considered. If the Port of Keta is not built at this site and consideration was given to another site, then the whole planning process would start again.

5.3. Project Phasing Options

As indicated in Chapter 4, the Port of Keta is planned to be developed using a phased approach. During Phase One the main facilities needed to drive the commercial port development will be developed, this includes the following:

- Commercial port gate with the access control and administration building.
- Multipurpose terminal with a berth length of 500m and the RoRo Dock.
- Oil terminal consisting of a tank farm and one oil jetty.
- Shipyard with dedicated basin for floating docks and vessel maintenance.
- Main and secondary breakwaters.
- Navigational channel.

Additionally, the public part will also be developed. During Phase One this will include developing:

- Fishing Area
- Small Craft Service Area
- Navy Dock and Marine Operation Centre (MOC).

During subsequent phases both the commercial and public parts of the port will be expanded. An alternative project phasing option would be to attempt to develop the port during a single phase; however, this is not feasible for the Port of Keta for a number of reasons. Firstly, port development is generally an ongoing process, that rarely stops. For example, the Port of Tema and the Port of Takoradi have been in operation for many years yet continue to develop to meet the requirements of port users and global trends. Secondly, the level of investment needed to develop the Port of Keta in a single phase would be much greater and unlikely to be obtained. As a result, the single-phase option has been discounted as it considered not feasible.

Whilst the Port of Keta is planned in two main phases (Phase 1 and Phase 2), a pre-development phase (Phase 0) with only a few core facilities could be implemented during the construction of Phase 1 of the port to allow an earlier start date of selected operations and facilities. For Phase 0, only a reduced section of the main breakwater of approximately 850m length would be required to create a port basin pocket at the location of the main multipurpose terminal. The area would comprise the multipurpose terminal with 500m berth length and one oil jetty. No facilities or structures of the public port or shipyard are to be developed at this stage. For maintenance and repair of ships, a floating dock could be moored at the multipurpose berth to serve as an early development of the future shipyard (SIIPS, 2021).

5.4. Site Configuration Options

As part of the feasibility studies, alternative layout considerations and analysis were carried out on the port configuration, port positioning and management options to inform the recommended / selected choice presented in Chapter 4. The alternative site layout analysis conducted by SIIPS (2021) considered likely implementation cost, as well as environmental issues, and three alternative general configurations were evaluated: I-Shaped, U-Shaped and L-Shaped Configuration

The advantages and disadvantages of these three configurations were determined according to the following criteria:

- Dredged volumes in the construction phase.
- Land reclamation volumes.
- Flexibility of operation in the terminal areas.
- Flexibility for further expansion.
- Hindrance to longshore sediment transport.
- Estimated construction costs of the breakwaters.

The degree of wave calmness inside the port was assumed to be the same for all three configurations, as the port entrance width and orientation towards the direction of main wave attack has been kept the same in all configurations. The optimized entrance geometry to ensure the port basin is adequately protected from wave agitation will need to be defined by a numerical wave agitation study at a later stage of the design process (SIIPS, 2021).

For each of the three configurations, the total length of quays and breakwaters is generally the same. Moreover, no differentiation between construction phases was included in the analysis.

5.4.1. I-Shaped Configuration

In the I-shaped configuration the port is orientated parallel to the coastline, where berths are located along a continuous quay to accommodate vessels of different sizes (see Figure 5-1). All wharfs and terminal areas are located directly on the side or the SEZ. The main breakwater runs parallel to the coastline and provides shelter for jetties and extra moorings. The secondary breakwater is perpendicular to the coastline and complimentary to the main breakwater for assuring wave tranquillity in the basin (SIIPS, 2021).

The advantages of the I-Shaped Configuration are the following:

- With the wharfs oriented along the coastline in the shallowest part of the basin, less land reclamation is required than with respect to the other configurations.
- The terminal continuity is assured by the continuous wharf, giving the highest operational flexibility. Berths are close to the SEZ, assuring a direct and quick transportation of goods.
- There is sufficient flexibility for future port expansion on both east and west sides of the port, without the need to introduce significant changes in the already existing configuration.
- The main breakwater is built at shallower depths in comparison with other solutions, implying a reduction of construction materials. As the breakwater construction represents the highest capital expenditure in a

greenfield port project, it is expected that this solution gives lower investment costs than other configurations with the same breakwater lengths.

- The longshore sediment transport is affected. However, as the main breakwater protrudes less seawards than in the other two configurations, the degree of hindrance will also be less than the other two configurations, or at least not worse (SIIPS, 2021).

In relation to the disadvantages, dredged volumes in the construction phases inside the basin are higher than in other solutions, as this configuration develops where the sea bottom is shallow, although this will also provide more dredged material for reclamation (SIIPS, 2021).

Figure 5-1 - I-Shaped Port Configuration
(Source: SIIPS, 2021)

5.4.2. U-Shaped Configuration

The U-shape Configuration presents a port orientation perpendicular to the coastline with two independent berths (see Figure 5-2). The breakwaters are oriented seawards and provide mooring to allocate jetties and future berth expansion.

The advantages of the U-Shaped Configuration are:

- Berths and terminals occupy the deepest part of the basin, reducing the dredging volumes for the construction of the wharfs and for the ports regular operational maintenance dredging.

The disadvantages are:

- Increased quantity of material required for earth filling with respect to the other two configurations.
- The distance between berths and the SEZ is higher than in the other alternatives, impacting the goods transportation time.
- The reduced area linking the wharfs and the SEZ may represent a bottleneck for port operations.
- Limited room for future expansion in the inner basin.
- Expansion on the sides of the port is possible only with the creation of separate basins and without a direct connection with the initial basin and berths.

- The presence of two breakwaters protruding into the sea at deeper waters increases the total construction costs.
- The presence of two breakwaters protruding into the sea in deeper waters will have a greater impact on littoral drift than in the other two alternatives (SIIPS, 2021).

Figure 5-2 - U-Shaped Port Configuration (Source: SIIPS, 2021)

5.4.3. L-Shaped Configuration

The L-Shaped Configuration represents a halfway solution between the I-shaped and the U-shaped configurations. The first quay lays parallel to the coastline, and the second quay perpendicular to it extending towards the deepest basin depths (see Figure 5-3).

The main breakwater has been designed with a first part perpendicular to the coast, on the backside of which a continuous wharf is located, and a second part running parallel to the coast, where jetties can be allocated. The secondary breakwater is perpendicular to the coastline and protects the basin from waves coming from the east.

The advantages and disadvantages of this solution are intermediate between the other two previously analysed configurations:

- The required dredging volumes for the construction phase are lower than the I-Shaped Configuration, but higher than in the U-Shaped Configuration.
- Land reclamation quantities are higher here than in the I-Shaped Configuration, but lower than in the U-Shaped Configuration.
- The degree of sediment transport hindrance is comparable with what would be expected for the I-Shaped Configuration and not worse than for the U-Shaped Configuration.

- Breakwater depths and related construction costs are higher than in the I-Shaped Configuration, and lower than in the U-Shaped Configuration.
- The orientation of the quay on the left and the sediment material accumulated on the updrift side of the main breakwater limit the expansion possibilities on this side of the port. A new basin and access channel should in this case be created. Future expansions are instead possible by taking advantage of the secondary breakwater for creating a further enclosed space on its back side, where erosion processes are expected to occur (SIIPS, 2021).

Figure 5-3 - L-Shaped Port Configuration
(Source: SIIPS, 2021)

5.4.4. Chosen Configuration

To compare the configurations described above, SIIPS (2021) used an evaluation matrix, where each configuration was evaluated according to the aforementioned criteria, with the scores being good (+), average (0), or poor (-). This is presented in Table 5-1.

Table 5-1 - Multi-Criteria Analysis of Alternative Considerations

Criteria	I-Shaped Configuration	U-Shaped Configuration	L-Shaped Configuration
Dredging Volumes	-	+	0
Land Reclamation Volumes	+	-	0
Operational Flexibility	+	-	0
Expansion Flexibility	+	-	0
Longshore Sediment Transport Hindrance	0	-	0
Breakwater Construction Costs	+	-	0
Total	+	-	0

(Source: SIIPS, 2021)

As the analysed criteria have the same weighting factor, the I-shaped configuration scored the highest in comparison with the other configurations and was therefore chosen for further development of the Port of Keta.

5.5. Site Layout Options

Alternative site layout options include an alternative location for iron ore stockpiles, and an alternative / complementary Oil and Hydrocarbon Terminal. These are discussed in Section 5.5.1 and Section 5.5.2 below.

5.5.1. Iron Ore Terminal Location

The iron ore terminal requires a large storage area for the stockpiles. This area is currently foreseen to be located directly at the iron ore berth within the port perimeter, thereby utilizing high-value land. In an alternative concept, the iron ore stockpiles could be placed with some distance to the port in a remote and currently vacant area. This would allow the high-value land within the port to be utilized for other purposes, such as additional area for the multipurpose terminal or economic developments as part of the SEZ. In this case, the iron ore berth could also be relocated to the opposite side of the basin, to be constructed as a jetty on the breakwater leeside, further minimizing the usage of space at the quay line (SIIPS, 2021).

Another positive effect of relocating the iron ore stockpiles is the reduction of potential disturbances to the residents of new Keta city by suspended ore dust particles. Despite the use of dust suppression systems, handling of iron ore inevitably creates iron ore dust. These fine particles travel with the wind and can become visible nuisances due to their red colour, as well as having adverse effects to health when under continuous exposure. It has to be noted that with the prevalent wind direction being south-southwest, it is not expected that the new city of Keta will be exposed to iron ore dust on a prolonged basis. In addition, given the distance of the terminal to the city of approximately 2 km, the impact of suspended dust to the city is assumed to be minimal (SIIPS, 2021).

The relocation of the stockpiles would require construction of a long conveyor belt system, connecting the storage area to the terminal. The conveyor belt should be closed to avoid spreading of dust particles along the route. Water and electricity lines will need to be installed along the conveyor to power the belt motors and operate dust suppression systems. The conveyor system should be built on the ground to reduce costs but needs to be elevated at intersections with roads and other traffic routes. The construction costs for such a system depends largely on its length, with the price per meter ranging from approximately US$ 2,000 to US$ 3,000. Operating and maintenance costs will be higher compared to the proposed railway given the increased energy consumption and high complexity of the system. The conveyor belt would need to be built on already populated land and would run either directly through, or in close proximity to, the new development of Keta City. In addition, the identified alternative stockpile locations are located within the current salt mining concession areas. Both constraints would need to be clarified and resolved if an alternative location is to be considered in the future (SIIPS, 2021).

5.5.2. Alternative Oil and Hydrocarbon Terminal Location

The area for the tank farm is currently foreseen to be located directly north from the gate area, within the boundaries of the port. The farm is connected to two jetties that are located on the lee side of breakwater opposite to the commercial port terminals. An alternate option could be to locate the hydrocarbon terminal on the northern side of the harbour, i.e., to position the oil jetty on the leeside second breakwater and to build the tank farm on a partly reclaimed area as shown in Figure 5-4 below (SIIPS, 2021).

Figure 5-4 - Potential Alternative Hydrocarbon Terminal Location (Source: SIIPS, 2021)

The advantage of this option is that it would free up the south-eastern part of the port basin and will not hinder any future extension of the basin (phase 3) which would, in the proposed configuration, require a rerouting of the pipelines. This option also provides more flexibility for the development of port terminals (multipurpose, iron ore) and the SEZ. The distance between the jetty and the terminal is relatively short and no roads have to be crossed, which are also advantages for the construction of pipelines. On the other hand, the tank farm would have to be located outside the boundaries allocated for the port development. The area would either have to be completely reclaimed from the sea, or it would require the relocation of some of the existing settlements. The dimensions of the second breakwater only allow the development of one major jetty as compared to the main breakwater which offers more potential for the development of up to 3 jetties. Last but not least, the clear separation between commercial and public port (as provided in the main solution) will no longer apply and the tank farm will be located in an area planned for the development of the future city of Keta and adjacent to the marina (SIIPS, 2021).

5.6. Port Position Options

5.6.1. Background and Methodology

With the port layout being defined in the previous section, the position of the port in relation to its distance from shore was also analysed by SIIPS (2021). The purpose of the analysis was to find the optimal position of the port with respect to the following factors:

- Balancing of dredging and reclamation volumes, while considering that reusability of dredge material varies based on soil composition and dredging methodology.

- Minimizing breakwater length and thereby construction costs.
- Providing a minimum area of 40 ha for the SEZ.

The analysis was carried out by SIIPS (2021) with the 3D earthworks modelling software Kubla Cubed. The available bathymetric and topographic information was imported into the software.

The current port layout was developed in the software by modelling the terminal areas and SEZ as raised platforms at the finished ground level ("fill"), and the port basin, turning circle, and access channel as depressions at their target dredged depths ("cut"). These cut and fill areas were then moved in 100 m intervals perpendicularly from the shoreline into the sea. The distance from shore was measured from the quay to the shoreline, with a starting "position zero" of the quay line being placed directly on the shoreline. The analysis was done without changes to the layout and port areas itself. The only changes are to the breakwater and embankment structures, which have to be extended with increasing distance from the shore. The breakwater itself was not modelled in the software, as no dredge material is used for its construction. With increasing distance of the port from the shore, the hinterland area between the port terminal areas and the railway terminal also increases. In the scenarios, the additionally available area was fully allocated to the SEZ. The use of this area for expansions of other facilities is also possible. The public section of the port, which includes the fishery facilities, marina, ferry, and cruise dock as well as the access channel to lagoon, was kept at its original proposed location throughout the different scenarios. Due to the shallow draft of the vessels operating in this basin and the limited area requirements for the public facilities, the share of earthworks volume accounts for only approximately 15% of the total volumes. In addition, given the public nature of this section of the port, the proximity to the coast with direct road access for each of the facilities was preferred, which could not be provided in further offshore positions. The analysis was carried out for the initial development stage, in which the port basin is dredged to -14 m and the access channel to -15 m depth. As the initial phase is the most cost-sensitive factor of the project, it is prudent to reduce costs as much as possible. The volumes accrued from deepening the basin and channel in the latter port development, or to allow access to deep-draft iron ore bulk carriers, were not accounted for in the initial phase. Instead, the additional dredge material from these anticipated works can be used for other purposes later on, such as beach nourishment on the port downdrift side, or to reclaim additional areas in the sea or lagoon (SIIPS, 2021).

5.6.2. Evaluation of Earthworks Volumes

Figure 5-5 through to Figure 5-10 (Source: SIIPS, 2021) show the different cut and fill areas with increasing distance from the shore.

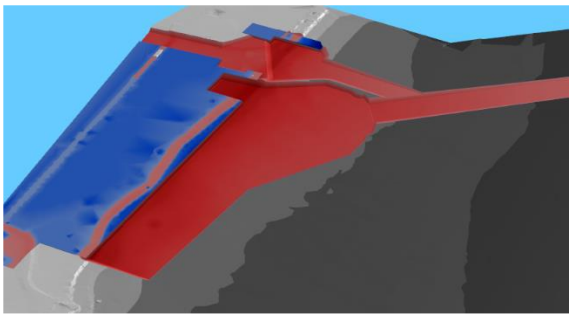

Figure 5-5 - Port Position +0m

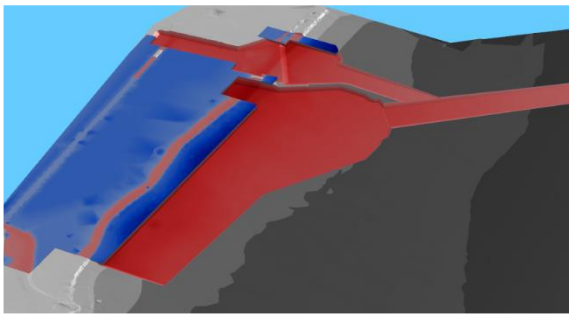

Figure 5-6 - Port Position +100m

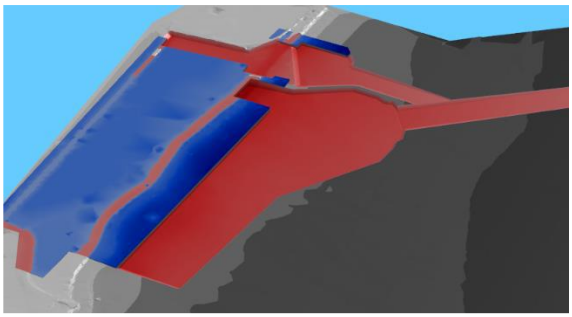

Figure 5-7 - Port Position +200m

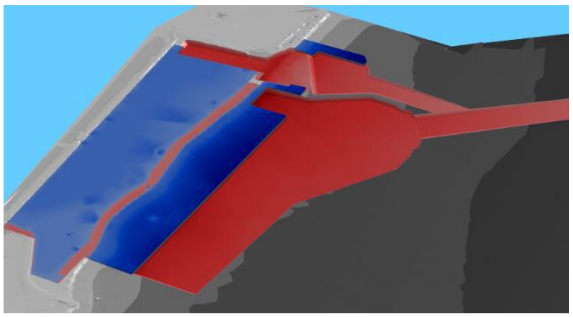

Figure 5-8 - Port Position +300m

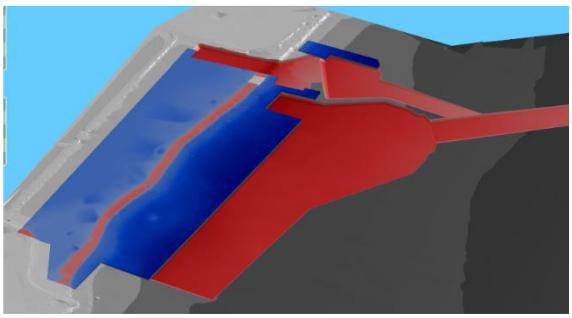

Figure 5-9 - Port Position +400m

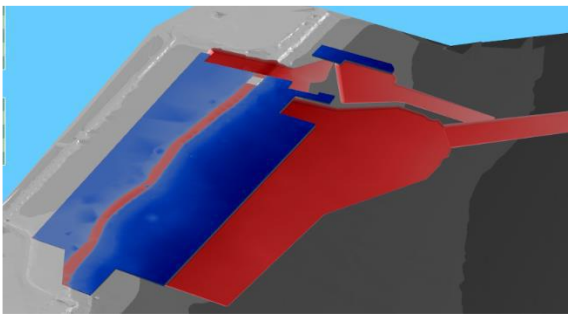

Figure 5-10 - Port Position +500m

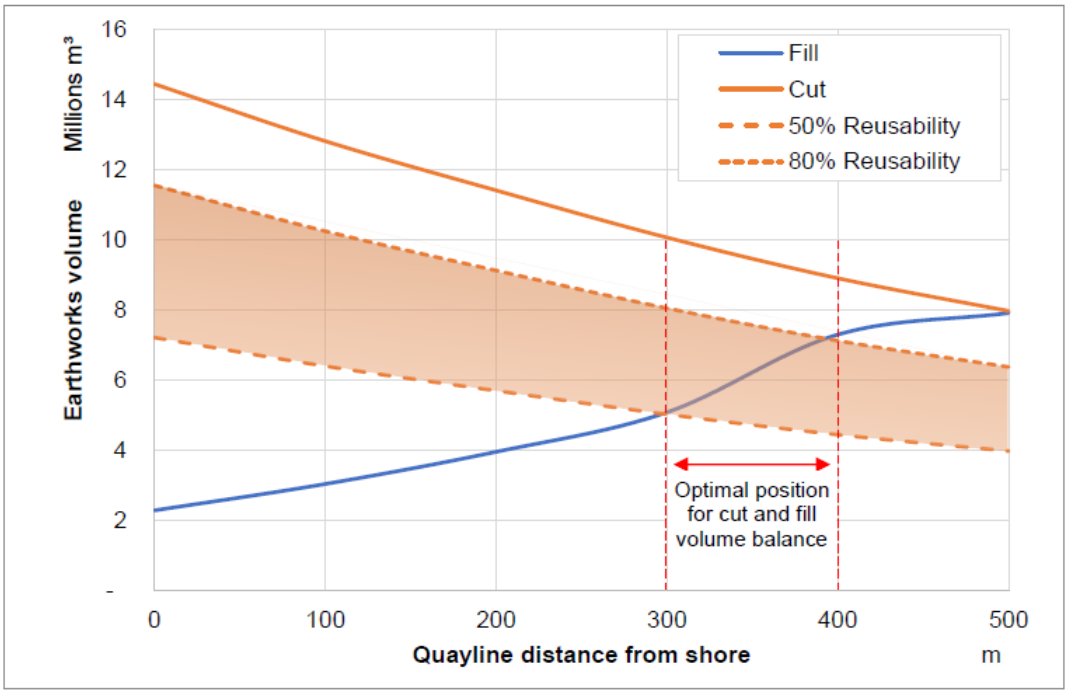

Figure 5-11 - Cut and Fill Volumes and Reusability as Function of Quay Line Distance from Shore (Source: SIIPS, 2021)

Figure 5-11 shows a comparison of the dredging and reclamation / cut and fill volumes over the port distance from shore. In addition, a band showing the availability of dredge material for reclamation based on its reusability has been plotted on the chart.

The reusability of dredging material depends on two main factors:

- Suitability of dredge material for reclamation: Soils with high fines contents are typically less suitable for reclamation due to their unfavourable settlement characteristics. Organic soils or mud are usually discarded completely.

- Operational circumstances: A certain percentage of material is always lost during the dredging process. This loss factor is dependent on the chosen dredging equipment, methodology of the works, MetOcean conditions during execution, etc. It typically varies from 10-30% (SIIPS, 2021).

Given the limited information available on soil conditions, the reusability of dredge material was estimated to be between 50-80% based on other projects in a comparable setting. Once additional information on the soil conditions are available, the reusability factor should be re-evaluated (SIIPS, 2021).

5.6.3. SIIPS Recommendation

Generally, it is beneficial for port construction projects to achieve a balance of earthworks volumes from dredging and reclamation, as this reduces both construction costs and time. It allows the contractor to minimize both the purchase and / or sourcing of additional material for reclamation, as well as the costs for disposal of excess dredging material, while also limiting the environmental impact of the works. As shown in Figure 5-11, the optimal distance from shore in which these volumes can be balanced ranges from 300 to 400 m, depending on the estimated percentage of dredge material reusability. Given the limited information currently available on soil conditions, SIIPS (2021) recommended to keep on the conservative side of estimations, i.e., 50% of dredge material reusability, with which the optimal port position was calculated to be 300 m offshore. In this case, one additional requirement is the provision of an area of minimum 40 ha in the port hinterland which is to be developed into the SEZ. A minimum distance of 300 m from shore is required to provide this area. A distance of 400 m would provide additional 16 ha, i.e., 66 ha in total. The cost of breakwater and embankment structures increases with distance from shore due to the higher water depths and additional required materials. When considering the breakwater costs, a port position as close to shore as possible is therefore preferred. With these considerations, it was proposed to construct the quay line of the port at 300 m offshore. This distance ensures the balance between dredging and reclamation volumes even at a conservative estimate for dredge material reusability of 50%. In addition, the proposed position provides exactly 40 ha of hinterland development area for the SEZ, while keeping breakwater costs at a minimum (SIIPS, 2021).

Once additional information on the soil conditions is available in the future, this analysis should be re-evaluated. Especially in case of a higher assessment of the dredge material reusability, a port position at approx. 400 m offshore could be advantageous in order to balance cut and fill volumes. This alternative position also provides an additional area of 16 ha for development at the expense of a longer and therefore more expensive breakwater (SIIPS, 2021).

6. Environmental Baseline Conditions

This chapter presents the environmental and social baseline information of the potentially affected environment in terms of the project location and adjoining land uses including biophysical, socioeconomic, and cultural. The environmental and social baseline information presented in this chapter has been obtained through a desk study / literature review, publicly available information, observations / investigations made during field work (primarily in February 2024) and consultations / engagements.

The chapter is subdivided into two major headings: biophysical environment (Section 6.1), and socio-economic, cultural and institutional (Section 6.2).

6.1. Biophysical Environment

6.1.1. Climatic / MetOcean Conditions

6.1.1.1. Rainfall and Temperatures

The Keta Municipality falls within the Dry Coastal Equatorial Climate with an annual average rainfall of less than 1,000mm. The municipality experiences a double maximum rainfall pattern. The major rainy season is between March and July while the minor one begins in September and ends in November. Average monthly rainfall in the major season can reach 133 mm in the peak month of June as shown in Figure 6-1. During the rainy seasons, the area is affected by the warm moist South Westerly Monsoon Winds (Tropical Maritime). The dry season generally occurs from December to March. During this period, the project area is usually affected by the dry dusty North East Trade Winds (Tropical Continental). The north east trade wind is locally referred as the Harmattan (SIIPS, 2021).

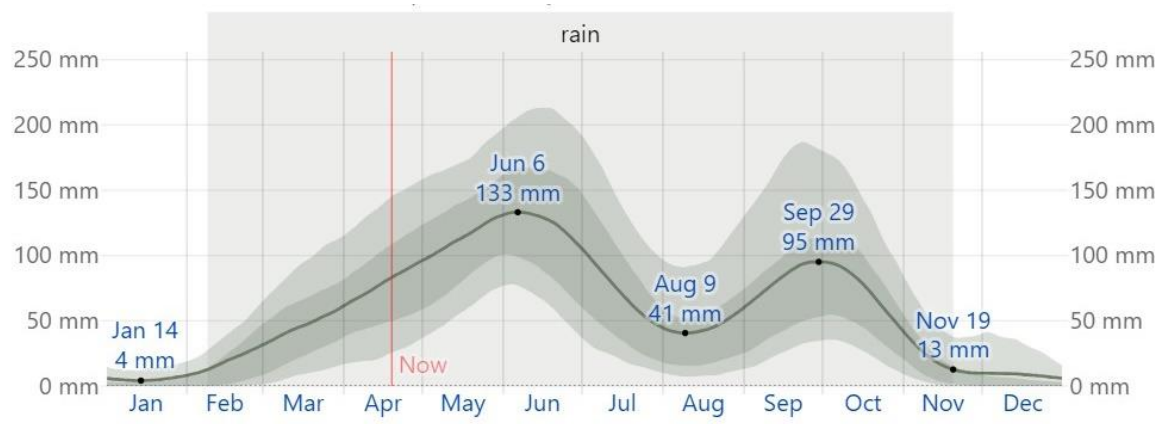

Figure 6-1 - Average Monthly Rainfall in Keta Accumulated Over a 31-Day Period from 2016 to 2024 (Source: Weatherspark.com)

Figure 6-2 shows the daily average high and low temperatures. Generally, the daily average temperatures in Keta range between 24.0°C and 32.0°C. Temperatures are appreciably high for most parts of the year with the highest during the main dry season (December - March) and are lowest during the months of July and August (SIIPS, 2021).

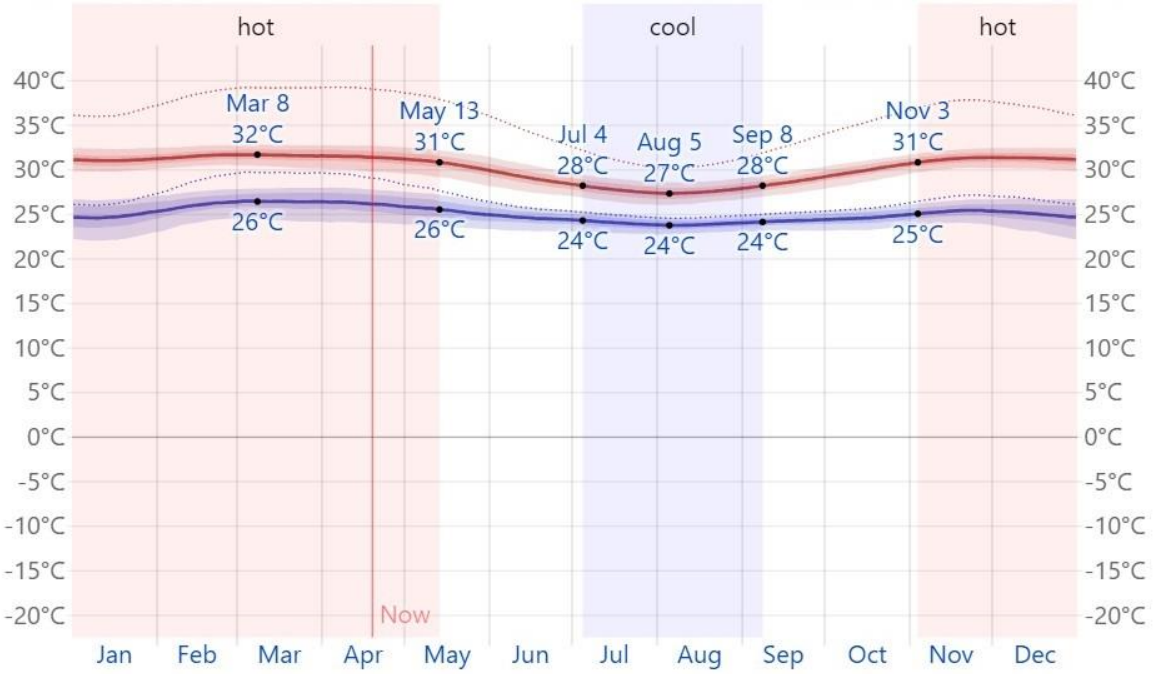

Figure 6-2 - Daily Average High (Red Band) and Low (Blue Band) Temperatures in Keta from 2016 to 2024 (Source: Weatherspark.com)

6.1.1.2. Wind

Wind data for the vicinity of Keta has been sourced from three sources namely; measured data from Lomé Airport, modelled data from the ECMWF ERA5 Reanalysis Model, and satellite scatterometer data from the ASCAT instrument. Each of these data sources has its strengths and weaknesses, and hence have been used in combination to give a complete as possible picture of wind conditions around the proposed Port of Keta. With no wind data available for the site itself, CARES Group have interpreted surrounding data from land-based stations, Numerical Weather Prediction Model Data and satellite data offshore. Further details are provided in Table 6-1 below.

Table 6-1 - Wind Data Sources Utilised

Wind Source / Figures	Comments
Measured Data from Lomé Airport (Figure 6-3 & Figure 6-4)	Weather parameters are measured at airports for aviation safety and coded into METAR reports. These reports for Lomé (OGIMET, 2023) have been decoded to extract wind speed and direction. Data is typically hourly, but with some missing periods. The period from 2017 to 2022 has been used, as earlier data appears to suffer some quality issues - that appear to be rectified after 2017.
Modelled Data from the ECMWF ERA5 Reanalysis Weather Model (Figure 6-5)	Weather forecast models have been developed over decades that utilise all available weather data and physical equations to build a picture of the weather situation. These models are also run for past decades to build a picture of past weather conditions - known as a reanalysis. The ECMWF ERA5 reanalysis (Hersbach *et al.,* 2023; Hersbach *et al.,* 2020) is one of the most renowned and respected reanalyses, and data for wind has been extracted for a location just offshore Keta.
Satellite Scatterometer Data from the ASCAT Instrument (Figure 6-6)	Scatterometers are active satellite remote sensing instruments for deriving wind direction and speed from the roughness of the sea. They are used by low Earth orbiting satellites and act like radars transmitting electromagnetic pulses and detecting the backscattered signals. 4 years of data has been retrieved from the ASCAT scatterometer (EUMETSAT, 2023a) flying on the Metop-A Satellite (EUMETSAT, 2023b) and summarised for the sea area off Keta.

Figure 6-3 shows wind roses constructed using the Lomé Airport wind data and show winds coming mostly from the sector between west and south - and with directions varying slightly with the time of year. Winds of Force 4 (moderate breeze) are quite frequent, but less frequent between October and January when winds are weaker.

Examining the time history of winds, it is clear there is a cycle over 24 hours of stronger winds in the afternoon compared to at night - a classic sea breeze situation. To illustrate this, the wind roses from the Lomé Airport data (Figure 6-3) have been recast using only night-time data (Midnight to 6 AM). These are presented in Figure 6-4 and indicate that nighttime winds are lighter overall, especially between October and June, and shift in direction towards the west.

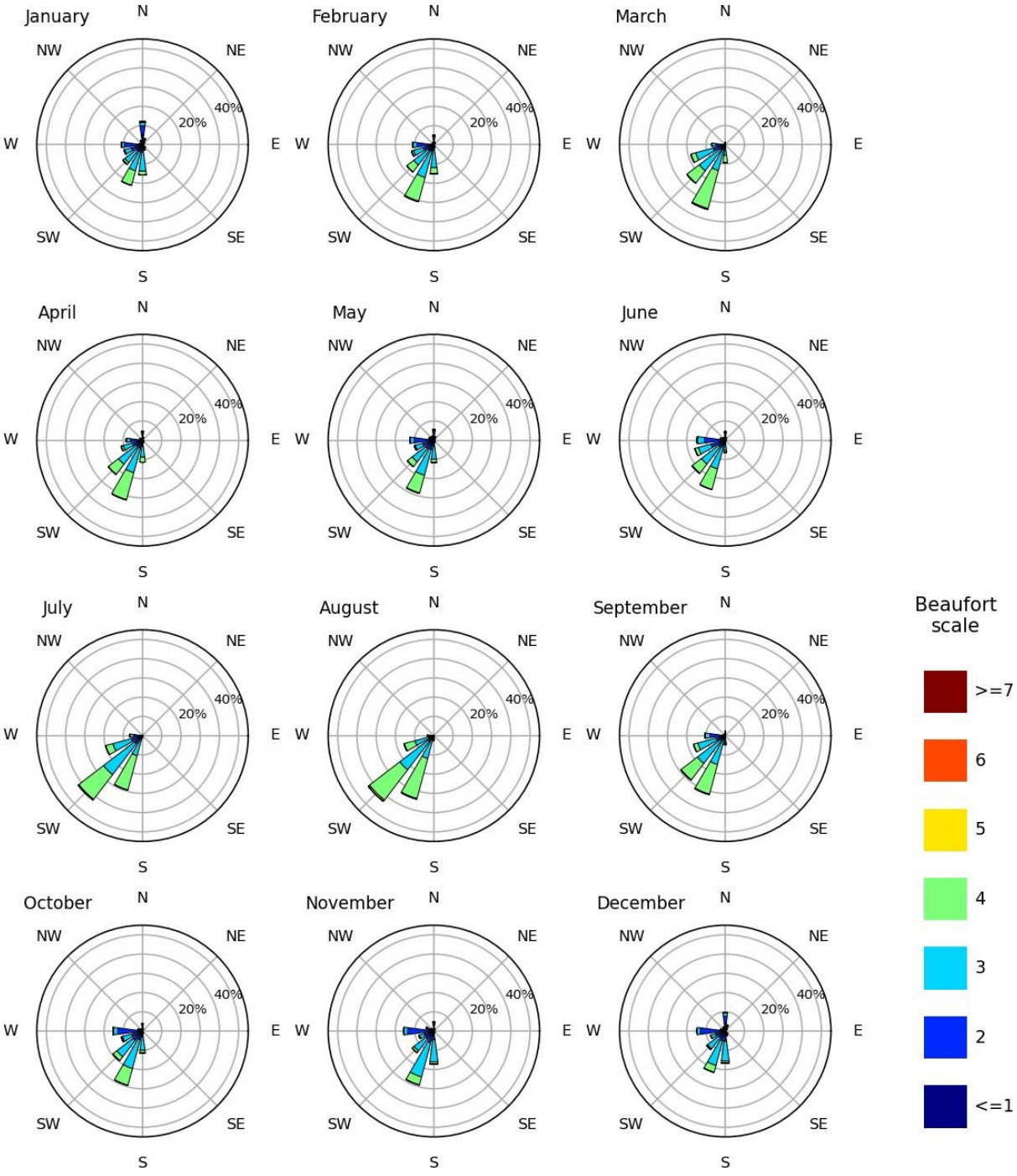

Figure 6-3 - Wind Roses Derived Using Wind Data from Lomé Airport (Directions Follow the Meteorological Convention of which Direction the Winds Come From (Source: CARES Group Graphic)

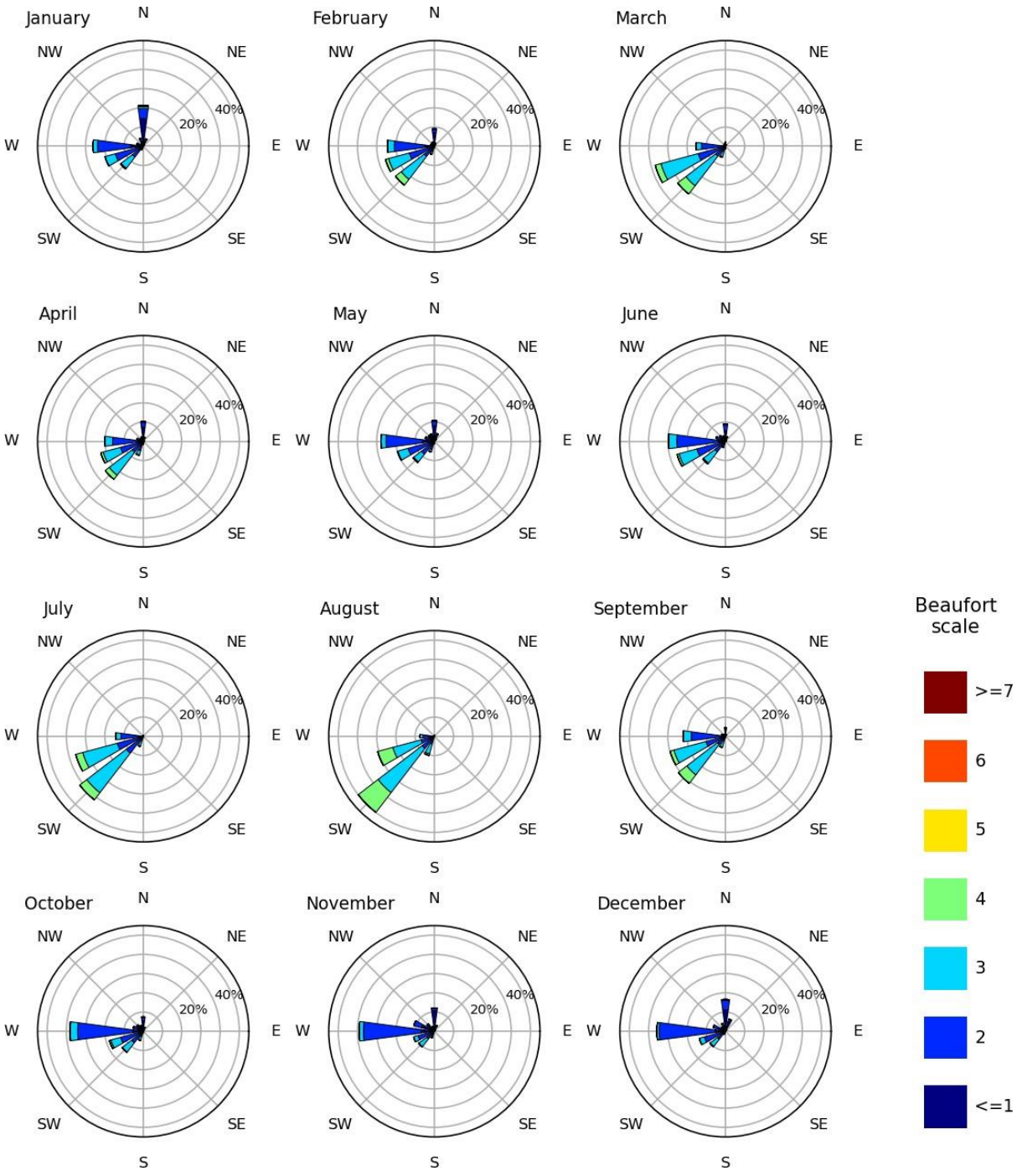

Figure 6-4 - Wind Roses Derived Using Only Night-Time Wind Data from Lomé Airport (Directions Follow the Meteorological Convention of which Direction the Winds Come From) (Source: CARES Group Graphic)

Figure 6-5 presents the wind roses for Keta from the ECMWF reanalysis. These show similar directions to the Lomé Airport data, with a slight increase in wind speeds. This increase may be due to the ECMWF winds being over the exposed sea, rather than a more sheltered urban area. Still winds are predominantly only Force 3 or 4 (gentle or moderate breeze). The ECMWF reanalysis does not show a sea breeze effect at Keta, which may be realistic as Lomé is at least partially an 'Urban Heat Island' and Keta Lagoon will reduce heating inland during the day. The ECMWF model will also not fully capture small-scale sea breeze effects.

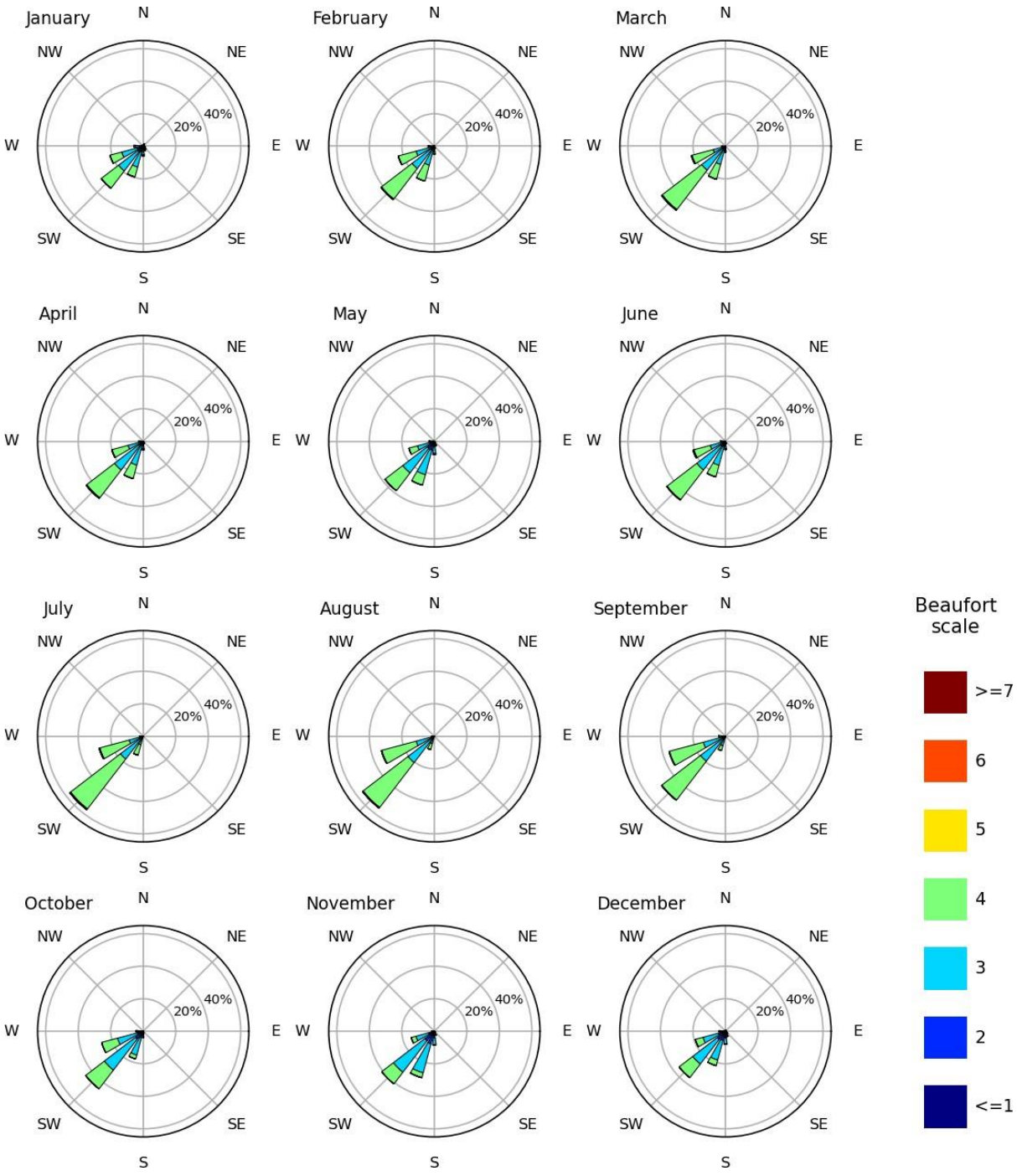

Figure 6-5 - Wind Roses Offshore Keta, Using Data from the ECMWF ERA5 Reanalysis Weather Model (Directions Follow the Meteorological Convention of which Direction the Winds Come From) (Source: CARES Group Graphic)

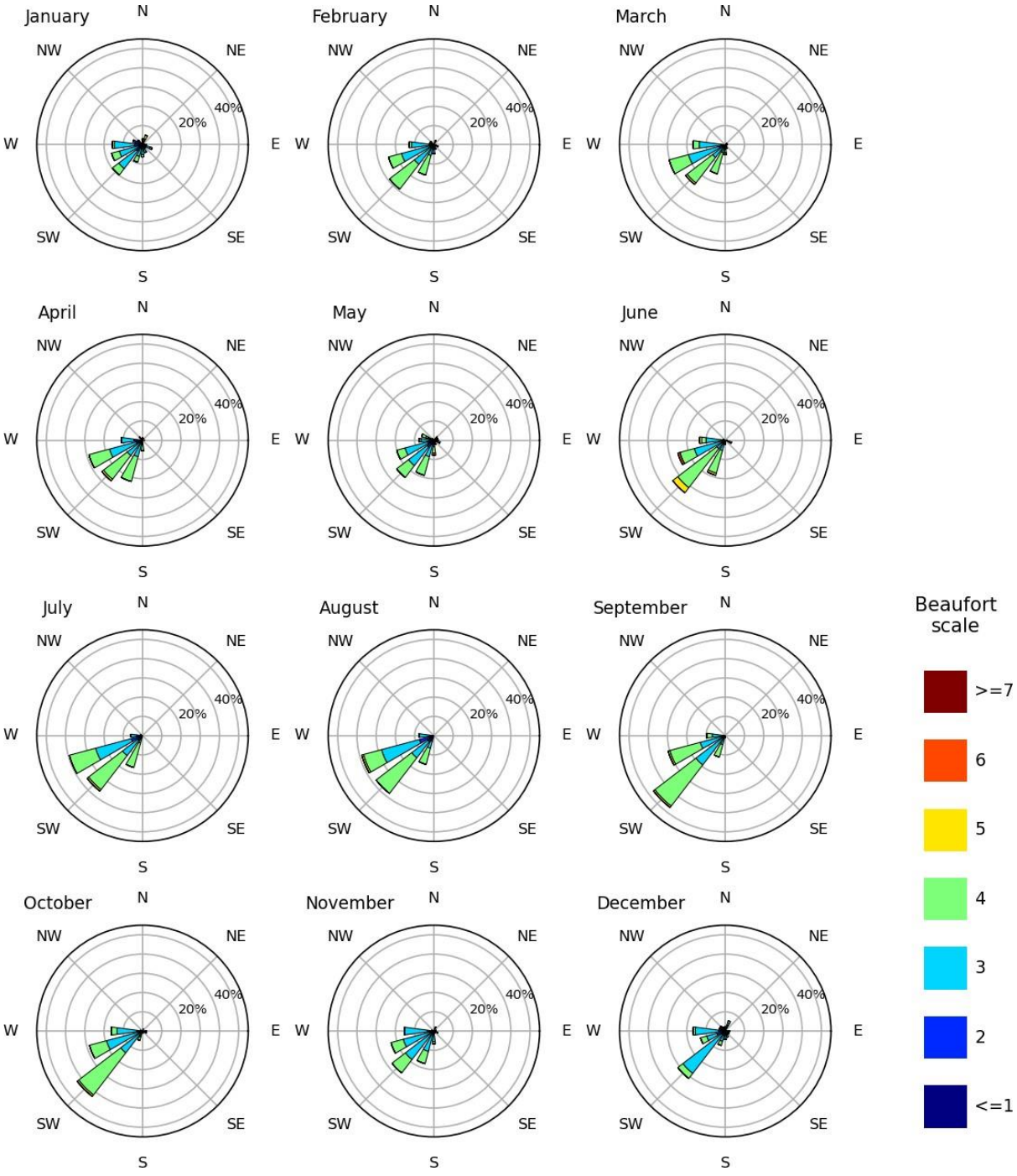

Figure 6-6 - Wind Roses Offshore from Keta, Using Data from the ASCAT Satellite Scatterometer (Directions Follow the Meteorological Convention of which Direction the Winds Come From) (Source: CARES Group Graphic)

Figure 6-6 presents wind roses from the ASCAT Satellite Scatterometer and the wind roses are quite similar to Lomé Airport and the ECMWF reanalysis. However, there is a noticeable occurrence of stronger winds of Force 5 'Fresh Breeze', especially in June from the southwest. To illustrate the time of year and the magnitude of these stronger wind events, they have been plotted in Figure 6-7. This plot shows the average wind for the satellite overpass (averaged over the mid 50% of data to remove outliers), but also the more extreme localised wind speeds (averaged over the greatest 25% of data from the overpass). Two events are detected in 4 years that could be classed as 'Near Gale', although the single satellite analysed may not have detected all such events. By viewing the satellite wind field (examples shown in Figure 6-8 and Figure 6-9), these events mostly appear to be associated with localised storms and these examples would not be modelled in the ECMWF reanalysis.

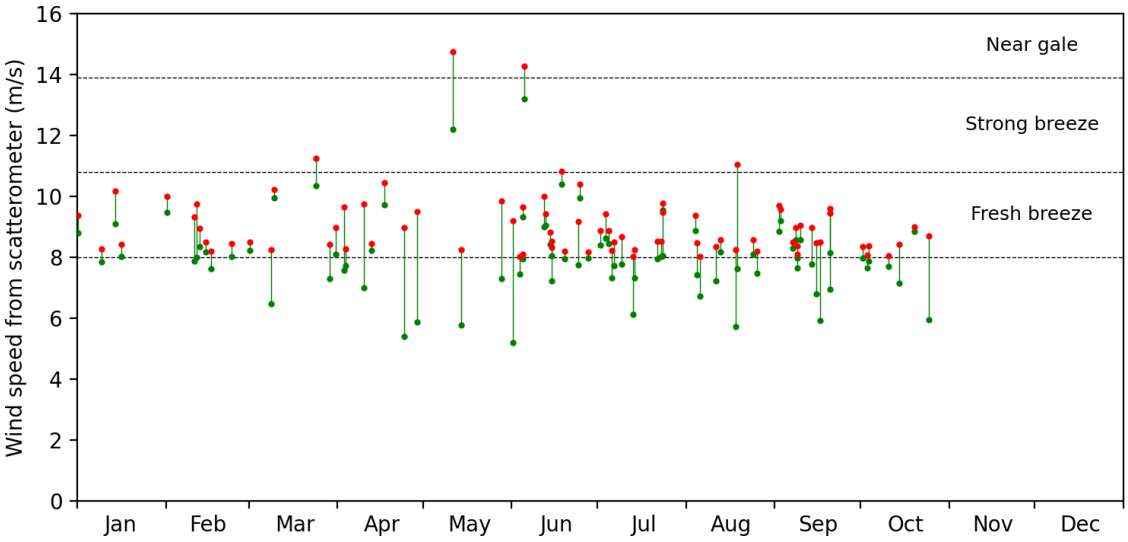

Figure 6-7 - Average (Green) Maximum (Red) Wind Speeds for the Most Extreme Wind Events Found in 4 Years of ASCAT Satellite Scatterometer Data, Plotted Against the Time of Year they Occur (Source: CARES Group Graphic)

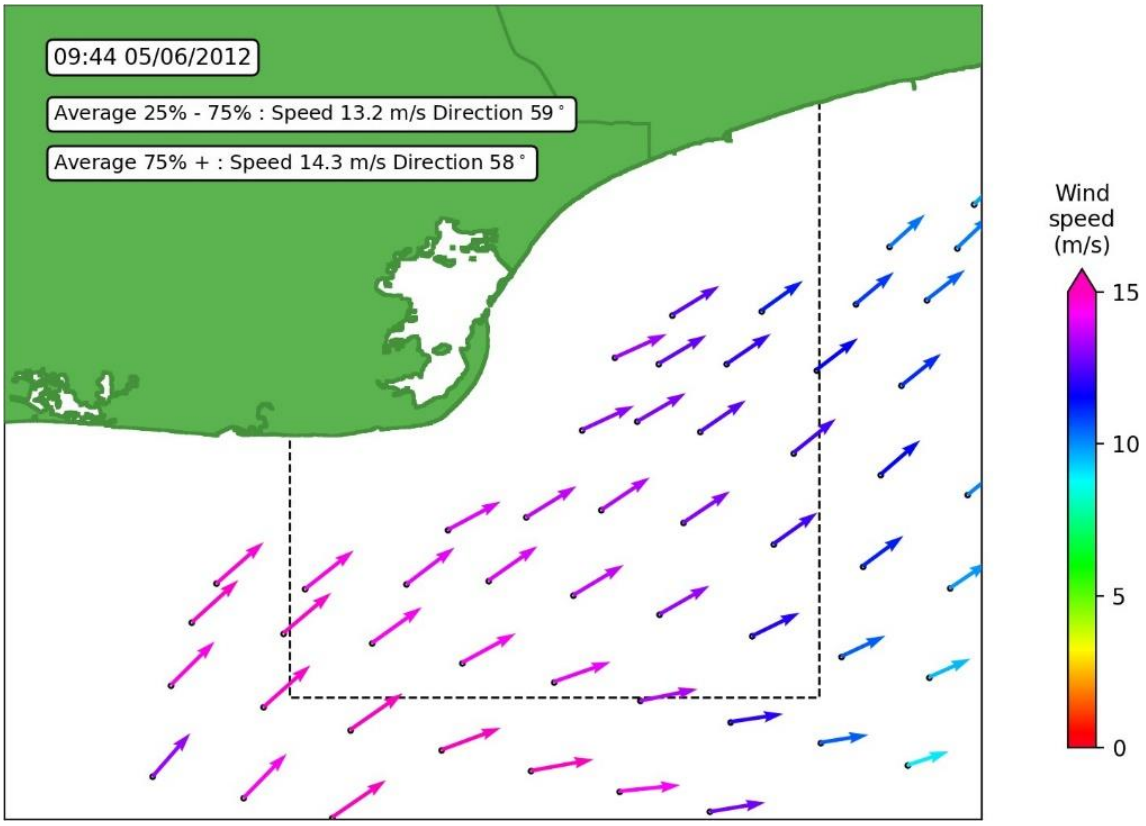

Figure 6-8 - Example Wind Field for One of the Most Extreme Wind Events Found in 4 Years of ASCAT Satellite Scatterometer Data (the dashed box shows the area used for averaging the wind data) (Source: CARES Group Graphic)

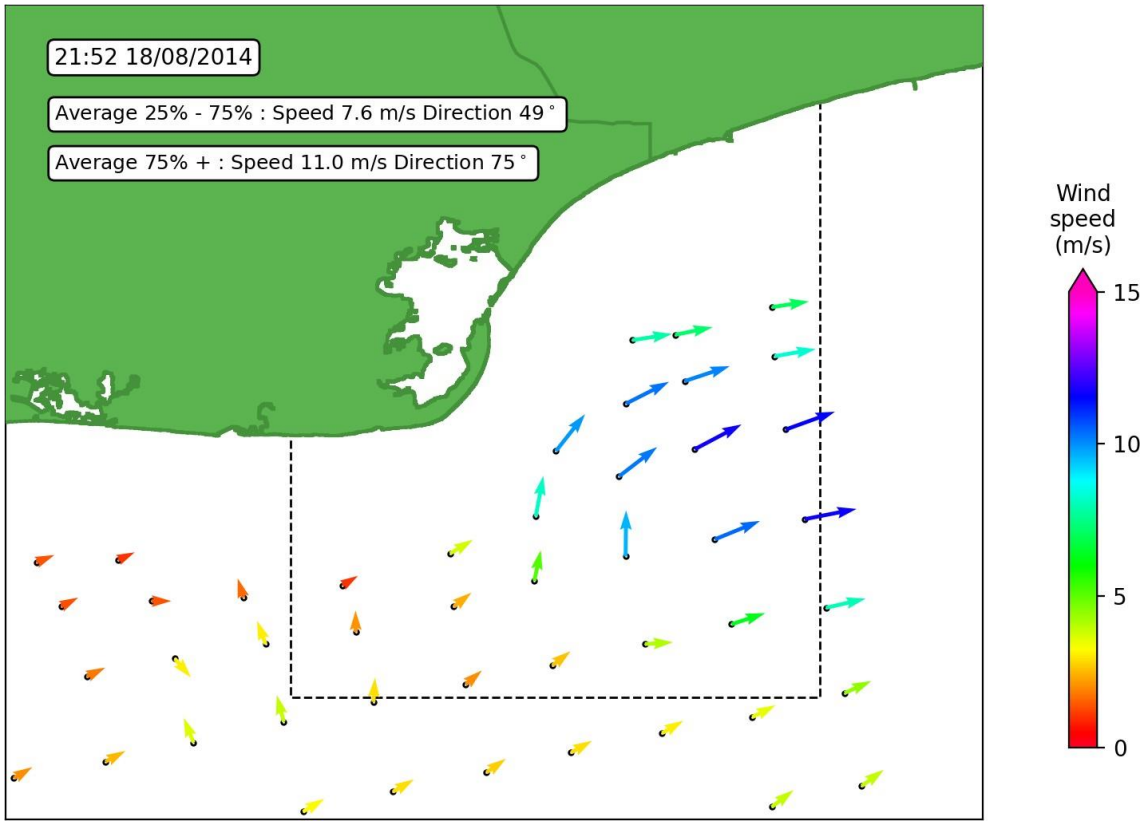

Figure 6-9 - Further Example of the Wind Field for One of the Most Extreme Wind Events found in 4 Years of ASCAT Satellite Scatterometer Data (The dashed box shows the area used for averaging the wind data) (Source: CARES Group Graphic)

Based on the above analysis, the baseline wind conditions can be summarised as follows:

- Winds predominantly come from the sector between west and south.
- Winds are predominantly Force 3 or 4 (gentle or moderate breeze).
- Stronger winds can occur sporadically, up to Force 7 (near gale).
- The strongest winds are associated with localised storms.
- The strongest winds occur around May / June.
- The sea breezes seen at Lomé may not be so dominant at Keta.

6.1.1.3. Currents

To assess the tidal currents around Keta, the OTPS tidal model has been used (Egbert and Erofeeva, 2002). The OTPS model utilises tidal level data to constrain global and local tidal models, and the Atlantic Ocean model has been used. For a location close to the coast off Keta, the tidal currents are found to never be greater than 1 cm/s and hence are negligible. This is expected, as the tidal currents in deep water are very small given the depth of the open ocean over which the tidal currents are distributed. The current required to deliver the rise and fall in the mass of water at the coast is small, as the distance it must travel is short from the deep ocean off Keta.

Therefore, at Keta, the dominant currents are expected to be associated with large scale ocean currents, i.e., the Guinea Current as marked on the Admiralty Chart. As no obvious source of offshore current data has been found for the vicinity of Keta, ocean models have been used. These models simulate the non-tidal ocean currents, by forcing a global (or more local) model with realistic weather to simulate how the key ocean parameters evolve over multiple years, at the surface and at depth horizons to the ocean bottom. They can also use satellite and in-situ data to constrain the simulation. Data from such models is freely available on the global scale, but none have been found on the more local scale for the West African coast.

To analyse the currents at Keta, the Global Ocean Physics Reanalysis run by Mercator Ocean International (Mercator, 2023) has been used. Daily currents have been extracted at multiple depth levels for the period 2000 to 2020 inclusive. Two examples from the model are shown in Figure 6-10 and Figure 6-11 below for near the surface and deeper beyond the shelf break. The two examples highlight how the shape of the coast around Keta is captured by the model. Figure 6-10 illustrates how currents vary significantly with time, even within the same month. The currents on 5th October appear like the expected Guinea Current flowing west to east at the surface, while it is reversed 20 days later. Flow speeds can reach over 0.5 m/s, which is as fast as tidal currents at other coastal locations worldwide.

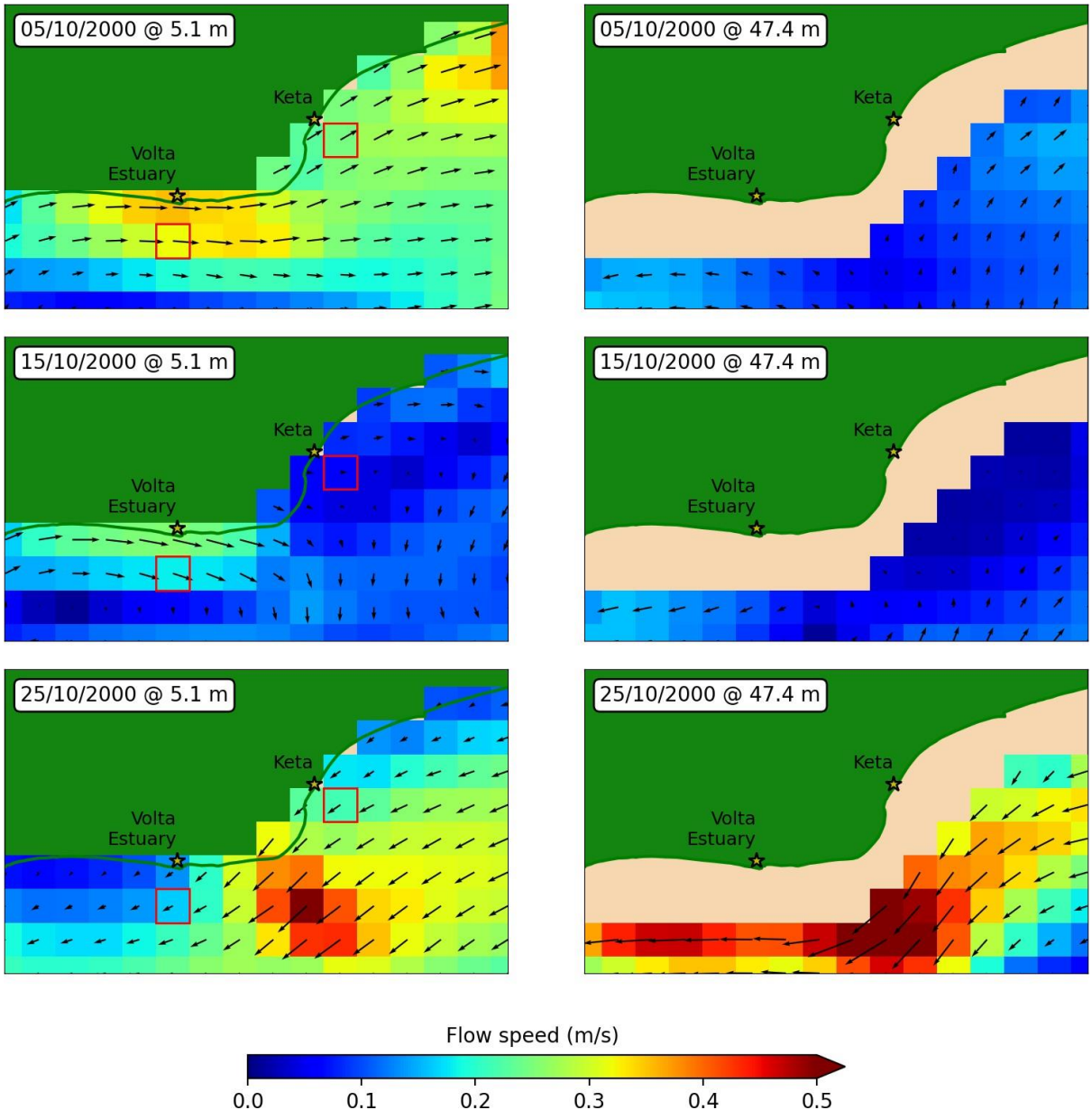

Figure 6-10 - An Example of Currents at Two Depths (Currents at Two Depths – 10 Days Apart from a Global Circulation Model. Two Locations are Marked with Red Boxes, that are used to Summarise Current Statistics) (Source: CARES Group Graphic)

To summarise the currents, the model currents near the surface have been extracted at two locations, one near Keta and the other near the Volta estuary. For these locations, current roses have been derived using the whole 20-year time history to derive the statistics. Whilst snapshots from October 2000 and October 2020 are provided in Figure 6-10 and Figure 6-11, the current roses provided in Figure 6-12 and Figure 6-13 show the frequency of

currents for the full range of magnitudes and directions, to show any systematic changes in currents during a typical year.

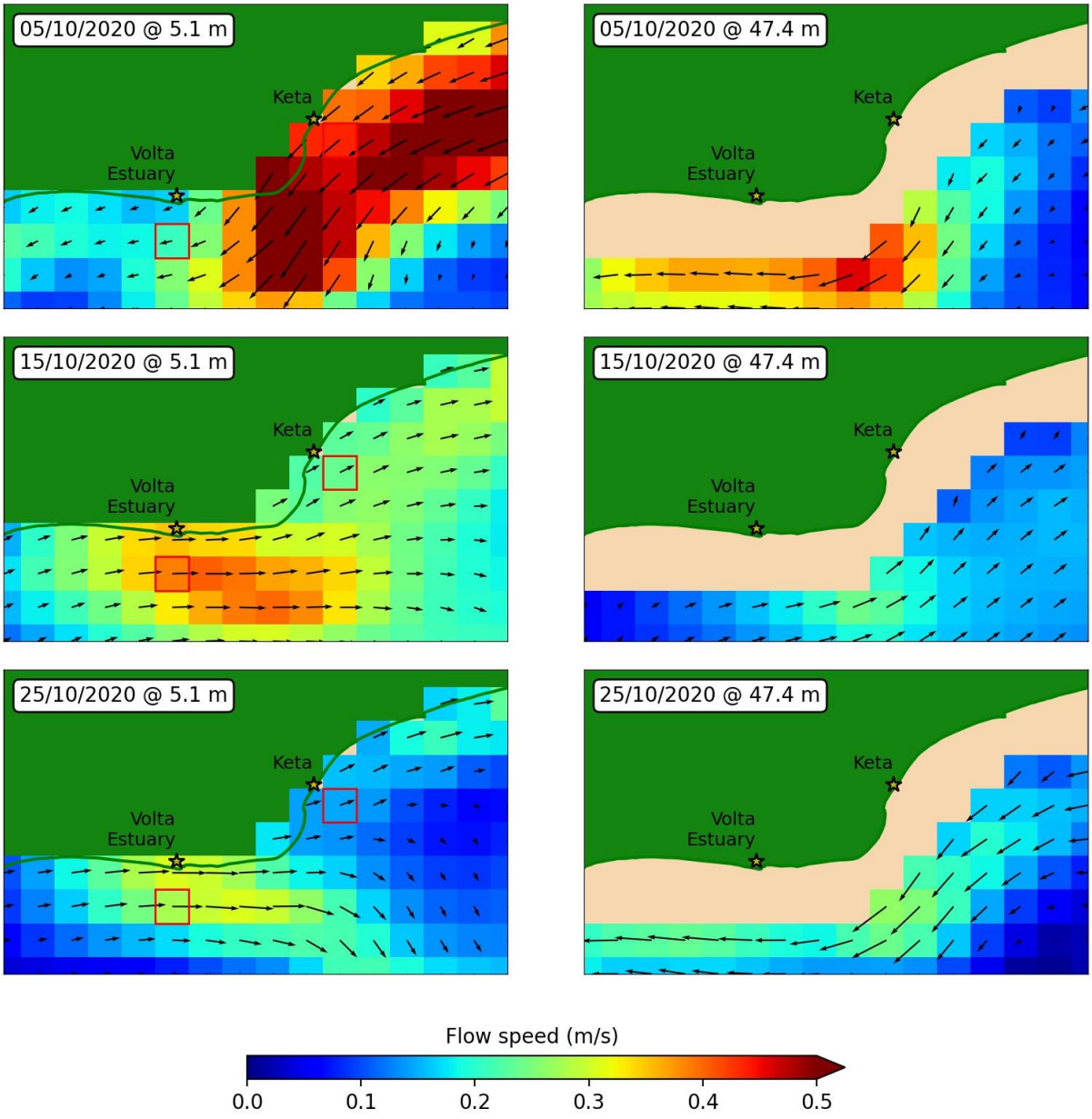

Figure 6-11 - An Example of Currents at Two Depths
(Currents at Two Depths – 10 Days Apart from a Global Circulation Model.
Two Locations are Marked with Red Boxes, that are used to Summarise Current Statistics)
(Source: CARES Group Graphic)

Figure 6-12 presents the current roses at Keta, where the current is predominantly flowing towards the northeast and east-northeast. Flows are typically below 0.3 m/s but can be stronger. There are also periods of flow reversal. Figure 6-13 presents the current roses at the Volta estuary and show that the current is stronger, regularly reaching over 0.5 m/s, flows eastward, and very seldom reverses direction.

The surface Guinea Current, as captured by the ocean model, spreads and becomes more variable as it reaches the vicinity of Keta Lagoon and does not entirely flow around the corner in the coastline. This may have implications for sediment supply to the Keta coastline hence around the proposed Port of Keta.

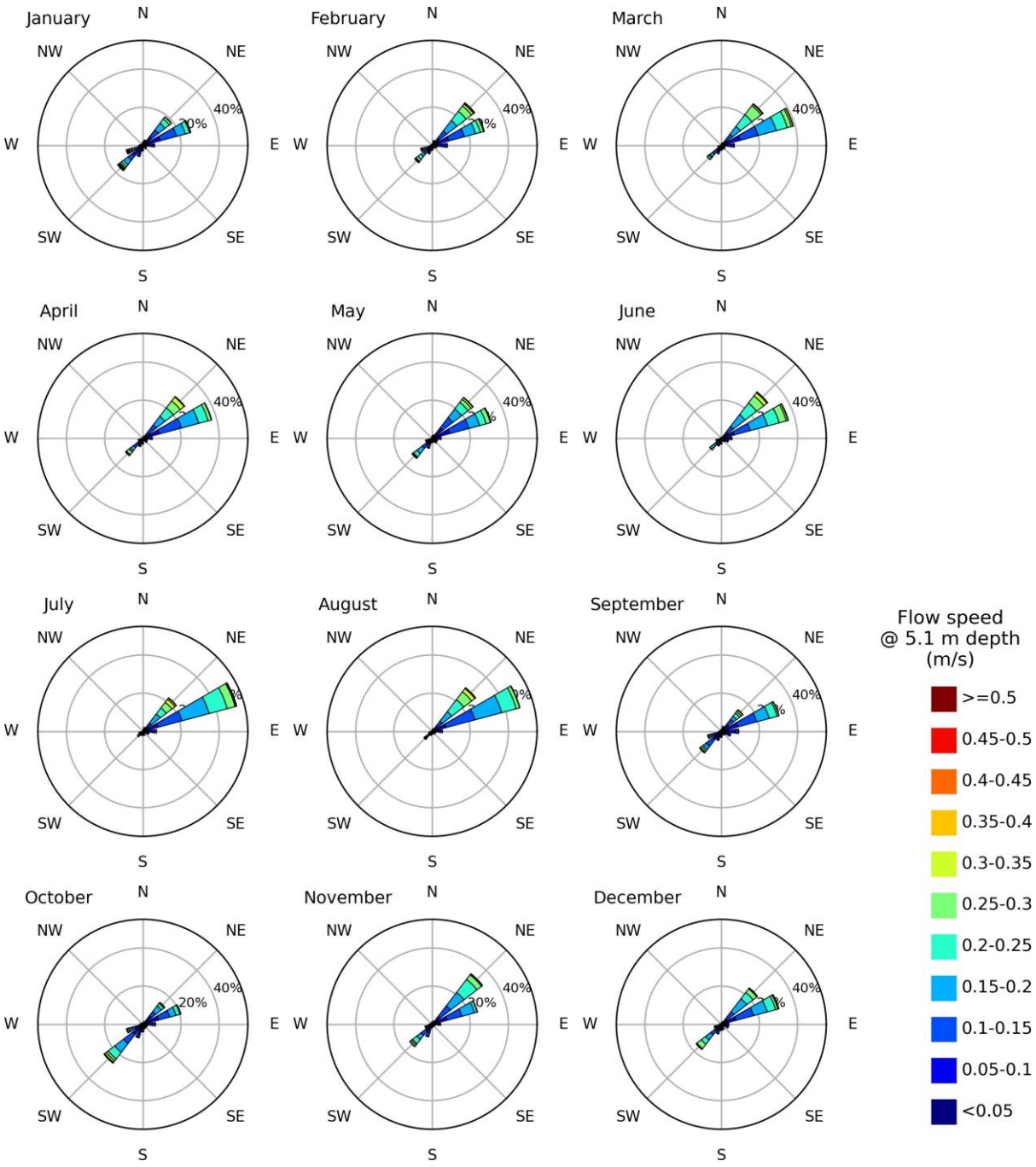

Figure 6-12 - Current Roses from Data Near Surface from A Global Circulation Model (Location Off Keta Indicated in Figure 6-10. Directions follow the Oceanographic Convention of Where Currents are Going to) (Source: CARES Group Graphic)

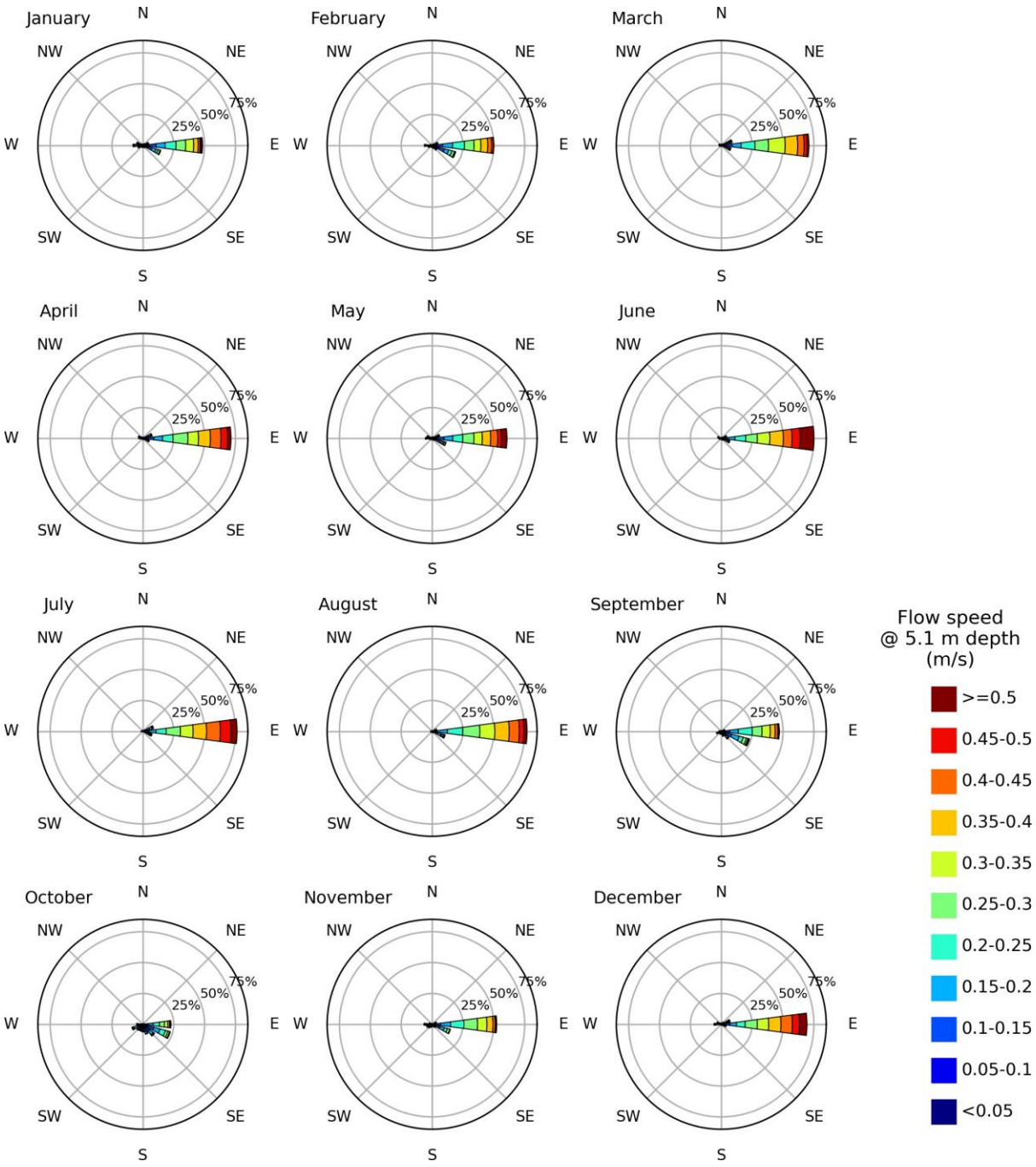

Figure 6-13 - Current Roses from Data Near Surface from A Global Circulation Model (Location Off Volta Indicated in Figure 6-10. Directions follow the Oceanographic Convention of Where Currents are Going to) (Source: CARES Group Graphic)

6.1.1.4. Offshore Waves

To understand the waves that arrive in the deeper water off the shelf at Keta, the wave model component of the ECMWF ERA5 Reanalysis has been used. In basic terms, the winds from the atmospheric model (as discussed in Section 6.1.1.2) drive a global wave model at a resolution of 0.5° latitude / longitude. The data from 5°30' N 1°0' E is used for the analysis here, which is in the deeper water beyond the shelf just south of Keta Lagoon. Various wave parameters and diagnostics are available from the ERA5 reanalysis, and a number of these have been used in this wave analysis.

Using significant wave height and wave direction, wave roses have been produced. These are presented in Figure 6-14 and indicate waves coming from the south-southwest and the south. This is because the waves are not locally

generated but are generated by storms in the southern part of the South Atlantic and propagate northwards. Figure 6-14 also shows that wave heights are lower between October and March, as this is the Southern Hemisphere summer and storms generating waves will be less frequent and less intense. During the Southern Hemisphere winter, wave heights can reach over 2 metres in the deep water off Keta.

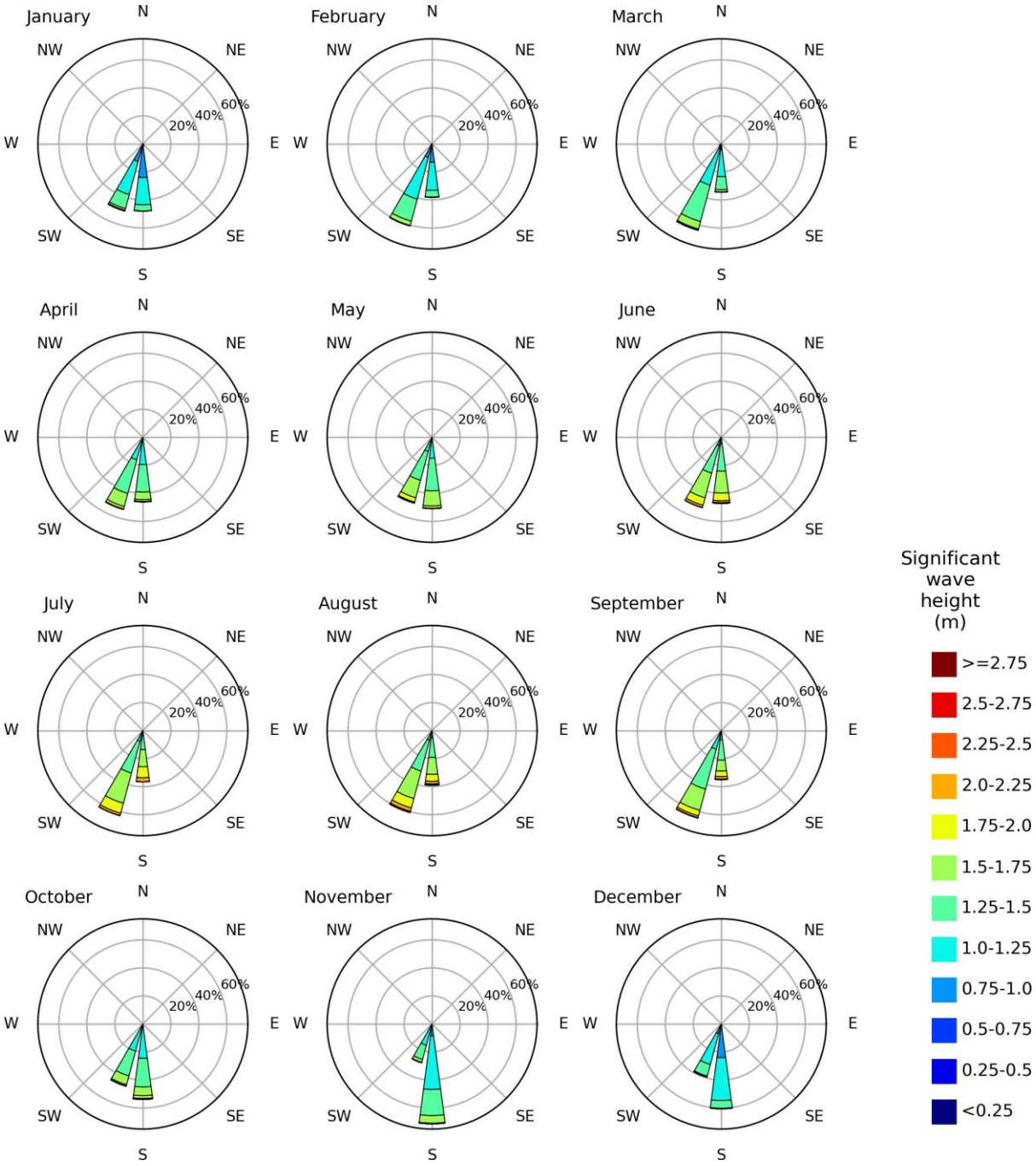

Figure 6-14 - Wave Roses for Deep Water Offshore Keta, Using Data from the ECMWF ERA5 Reanalysis Wave Model (Directions Follow the Meteorological Convention of Where Waves Come From) (Source: CARES Group Graphic)

To validate the accuracy of the ECMWF ERA5 reanalysis wave data (CLS France, 2023), Figure 6-15 shows satellite altimeter significant wave height measurements compared to the modelled wave heights. Many spikes in wave height (such as during March 2021) compare very well between model and satellite. However, some events are not well captured by the timing of the satellite overpasses, while others are underestimated by the model (for example in August 2021 and April 2022). There is also a bias where the model is overestimating the periods of

low wave heights from January to May. The comparison is also shown as a scatter diagram in Figure 6-16. The errors are generally less than 20 centimetres, but the biases mentioned produce some outliers beyond that.

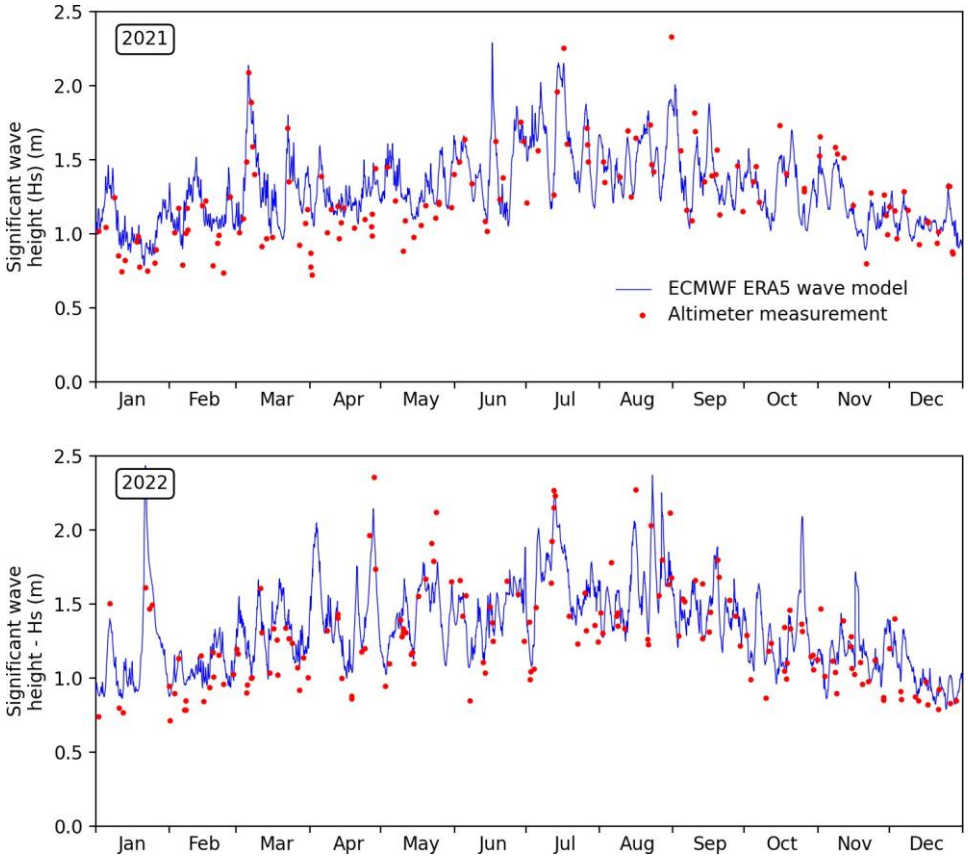

Figure 6-15 - Comparison of Significant Wave Height from ECMWF ERA5 Reanalysis Wave Model Against Satellite Altimeters Measurements
(Source: CARES Group Graphic)

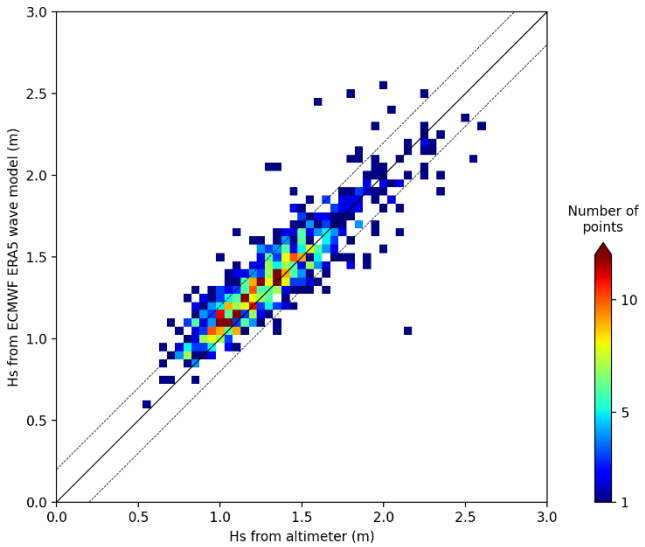

Figure 6-16 - Scatter Plot Comparing Significant Wave Height from ECMWF ERA5 Reanalysis Wave Model Against Satellite Altimeter Measurements
(The dashed lines show an error of 20 centimetres each side of the solid 1-1 line)
(Source: CARES Group Graphic)

To better resolve the occurrence of wave heights through the year, Figure 6-17 shows histograms of the significant wave height for each month of the year. The increase in wave heights during Southern Hemisphere winter (e.g.,

June to September) is clear, with 2 metre waves occurring more than 6% of the time in August. The wave periods indicate long period waves (from distant sources) predominate.

The ECMWF ERA5 model also provides diagnostics for distinct swell energy arriving at the analysis location. The long period swell (taken as longer than 10 second period) has been plotted as a histogram in Figure 6-18. From April to October / November, there is significant swell arriving of greater than 1.5 metres - however it is mostly less than a 12 second period. High swell height and longer period swell may be implicated in coastal flooding events, and there is evidence in Figure 6-18 that such conditions do occur (but rarely).

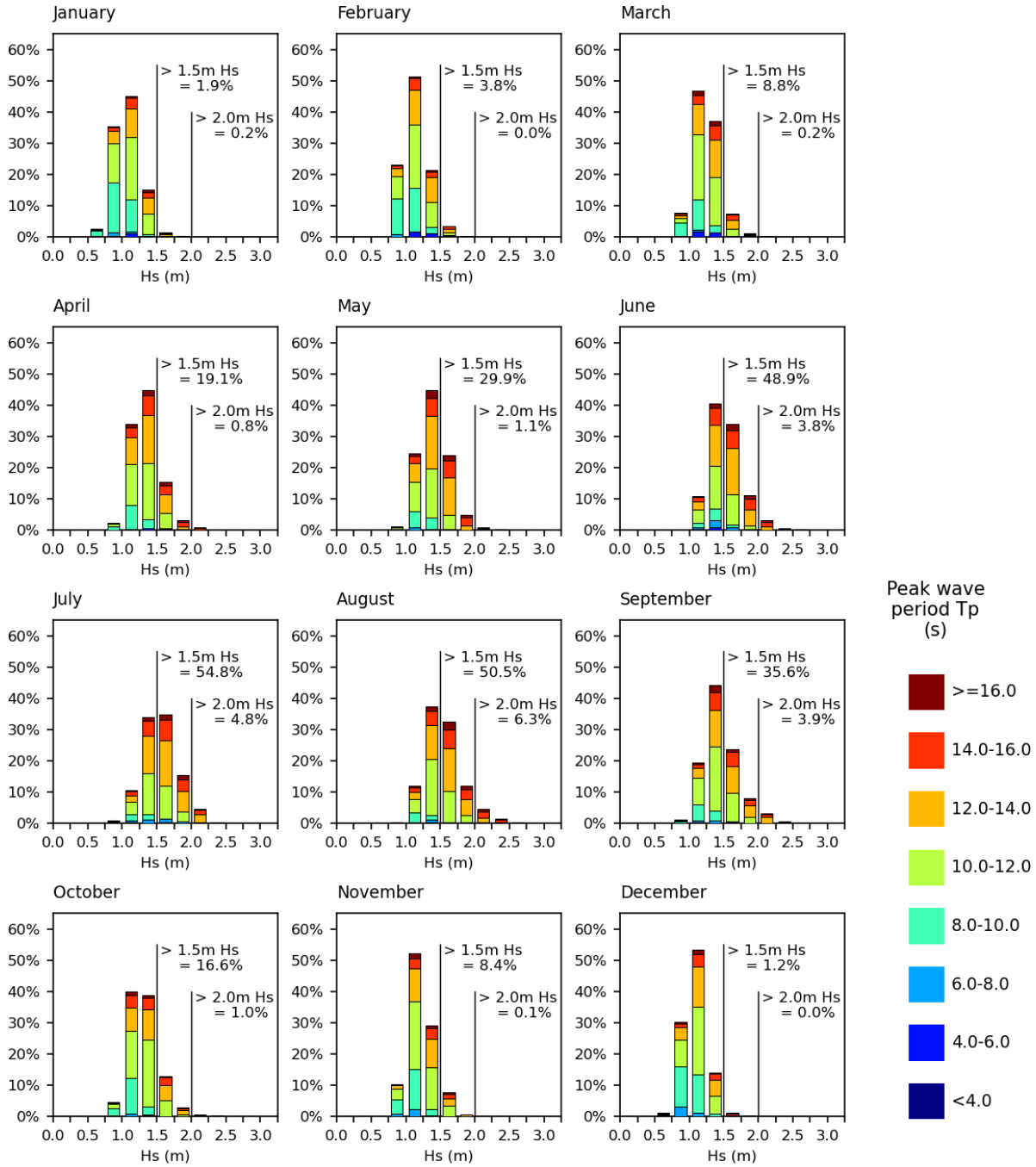

Figure 6-17 - Histograms of the Occurrence of Significant Wave Height and Peak Wave Period for Deep Water Offshore from Keta, Using Data from the ECMWF ERA5 Reanalysis Wave Model. (Source: CARES Group Graphic)

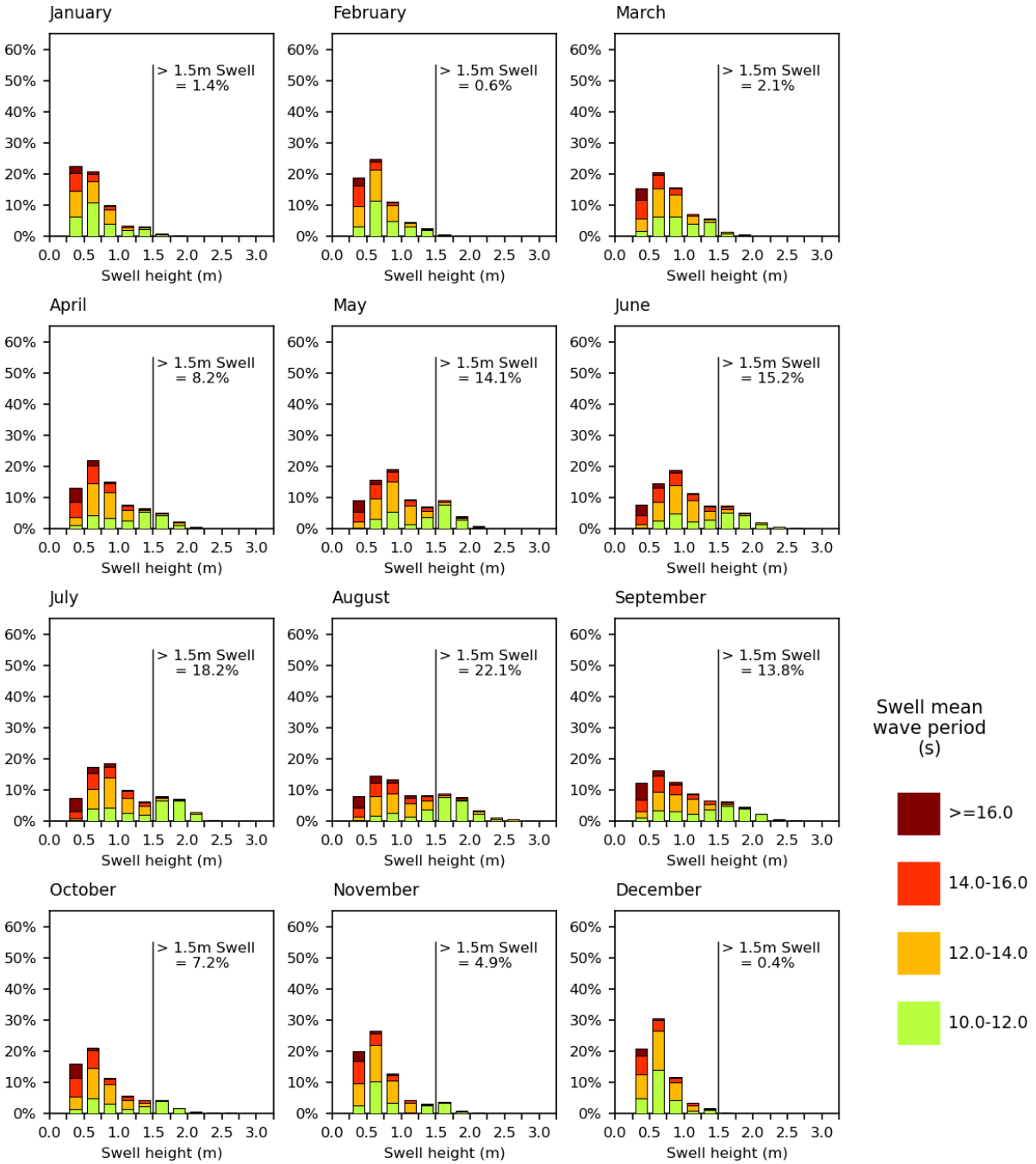

Figure 6-18 - Histograms of the Occurrence of Swell Wave Height and Period for Deep Water Offshore from Keta, Using Data from the ECMWF ERA5 Reanalysis Wave Model. (Source: CARES Group Graphic)

6.1.1.5. Water Level

To estimate the tidal level parameters for Keta, the OTPS tidal model has been used. 20 years (a tidal epoch) of data has been extracted and all the high waters and low waters identified. From this, parameters such as Mean High-Water Springs can be calculated. These parameters are compared to those from the Admiralty Chart in Table 6-2 and as there is a close comparison gives confidence that the OTPS model is capturing the tidal water level to a good level of accuracy.

Table 6-2 - Tidal Statistics from the Admiralty Chart and the OTPS Model

	Admiralty Chart (m)	OTPS Tidal Model (m)
HAT (Highest Astronomical Tide)		1.78
MHWS (Mean High Water Springs)	1.5	1.57
MHWN (Mean High Water Neaps)	1.2	1.22
MLWN (Mean Low Water Neaps)	0.6	0.60
MLWS (Mean Low Water Springs)	0.2	0.23
LAT (Lowest Astronomical Tide)	Approx. 0m	0.00

Additionally, tide gauge data from Tema has been sourced. The data covers from mid-2019 to present at hourly intervals, with a few missing data gaps. The OTPS model suggests that the Tema gauge will also represent Keta, as there is only a 1% difference in water level and a 4-minute shift in phase (tide arrival time).

Figure 6-19 presents the residual water depth from the Tema gauge after the removal of tidal levels from OTPS. As the gauge data shows residual levels which are close to satellite altimeter measurements this suggests that the non-tidal residual is a reality. Additionally, the residual water level varies fairly consistently with time of year and is also captured by the global current model - and is hence likely related to large scale ocean circulation.

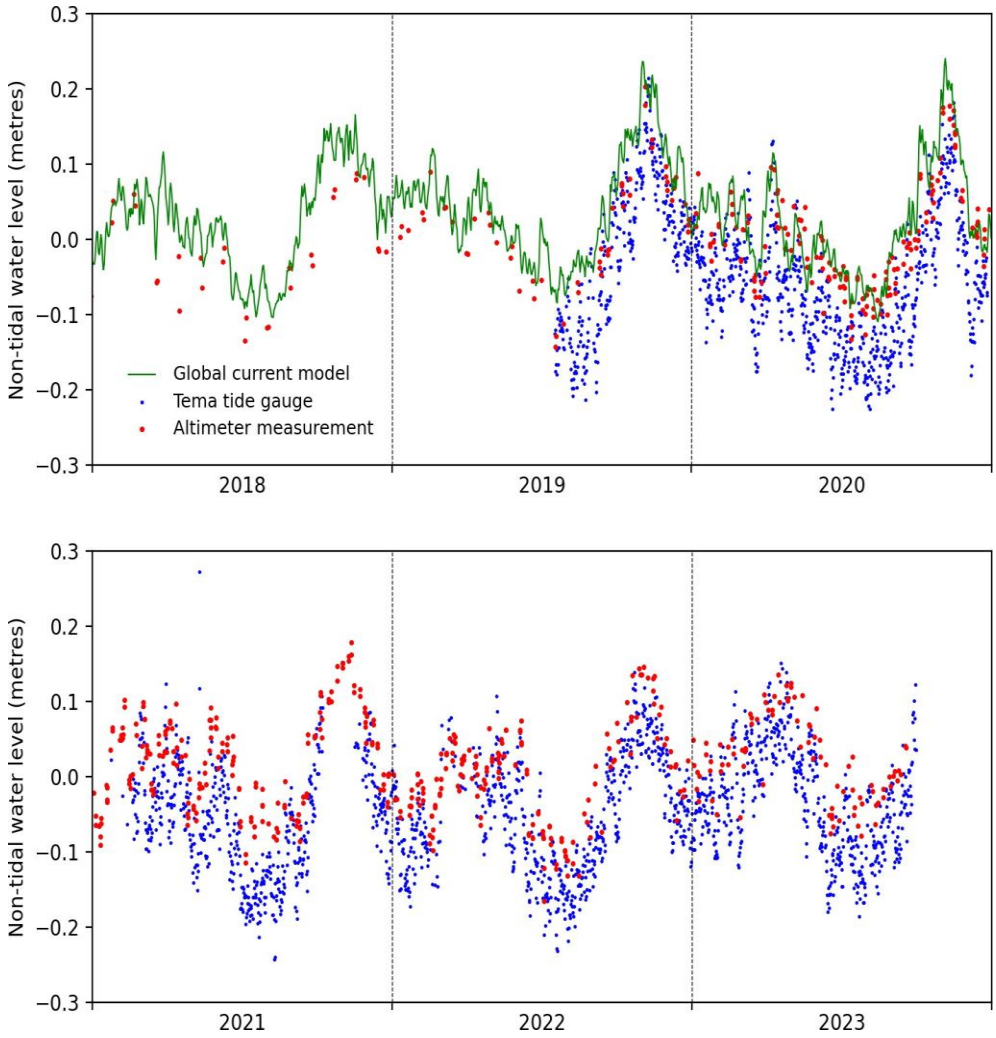

Figure 6-19 - Time Histories for 6 Years of Residual Non-Tidal Water level at Tema (And Nominally Keta - Data is from the Tema Tide Gauge, a Global Circulation Model and Satellite Altimeters) (Source: CARES Group Graphic)

Therefore, in terms of understanding the water level at Keta, the drivers are:

- The mean water level above datum (approx. 90 centimetres)
- The ebb / flood tidal cycle (approx. ±50 centimetres)
- The spring / neap tidal cycle (approx. ±18 centimetres)
- How typical the spring / neap cycle is (approx. ±20 centimetres)
- The seasonal non-tidal residual - possibly from large scale ocean circulation (approx. ±15 centimetres)
- Short term fluctuations in the non-tidal residual - and other small errors (5 to 10 centimetres).

In terms of understanding the occurrence of high-water levels (excluding wave action), for example as a contributor to coastal flooding, the above factors can (at times) work in concert in a mostly predictable way.

6.1.1.6. Sediment Concentrations

The construction of the Akosombo Dam (1965) and the operation of the hydropower facilities at Akosombo and Kpong (constructed 1982) drastically changed the flow regime of the Lower Volta River. Flow peaks downstream of the two facilities have been greatly reduced whilst low flows have increased. Thus, the natural seasonal high and low flows of the river have been replaced by an almost constant flow throughout the year (Logah *et al*., 2017). This effectively eliminates the dynamic interactions between the river and its floodplains, wetlands, deltas, estuaries, mangrove and beach environments, which are the great engines of riverine and marine biodiversity and the environmental services that they provide.

By eliminating the annual floods in the Lower Volta River floodplain and estuary, the Akosombo and Kpong dams have drastically reduced sediment flushing which once fostered the formation of a permanent sandbar at the estuary. As sediments accumulate in the channel (and are trapped in the lake behind the dam) this has significantly reduced the sediment load in the Lower Volta River and discharge to the sea, and so sediments are no longer replenishing the beaches in Ghana, Togo, and Benin, resulting in massive beach erosion, loss of mangrove habitats, and reductions in the productivity of the Guinea Current (WRC, 2014).

To understand the siltation and erosion of the beaches in the Keta area, waves and currents are important but so also is the source of sedimentary material to the coastal zone. In the area of interest east of the Volta estuary, the source is expected to be the Volta River. No obvious data on coastal sediment has yet been found, hence satellite imagery has been utilised. The MODIS instrument measures in 36 spectral bands (NASA, 2023), of which the blue-green visible light can be used to estimate the diffuse attenuation coefficient for downwelling irradiance - which is in turn a proxy for sediment load in the surface water.

Figure 6-20 presents large scale maps for Ghana and show a plume of sediment from the Volta River, especially in August 2022. As the satellite imagery uses the visible spectrum, it is obscured by cloud. When using monthly composite data, there are still months without data due to cloud.

By collating MODIS data from 2003 onwards, for points around Keta and the Volta estuary (see Figure 6-21), some understanding of the seasonal sediment load can be gained. Directly east of the Volta estuary, sediment loads are relatively high (attenuation greater than 0.1 m^{-1}) and highest in July and August. The sediment load at Keta is significantly lower, and similar to in the extension to the Guinea Current offshore (see location 2 in Figure 6-21).

The satellite data suggests that the sediment coming from the Volta River varies significantly between years, and the amount reaching the Keta coast is greatly reduced by the 'fanning out' of the Guinea Current as it reaches the northward turn in the coastline at Keta Lagoon. This may help partly contribute to the starving of sediment along the Keta coast and coastal erosion and suggest the erosion and siltation regime is different at Keta compared to closer to the Volta estuary.

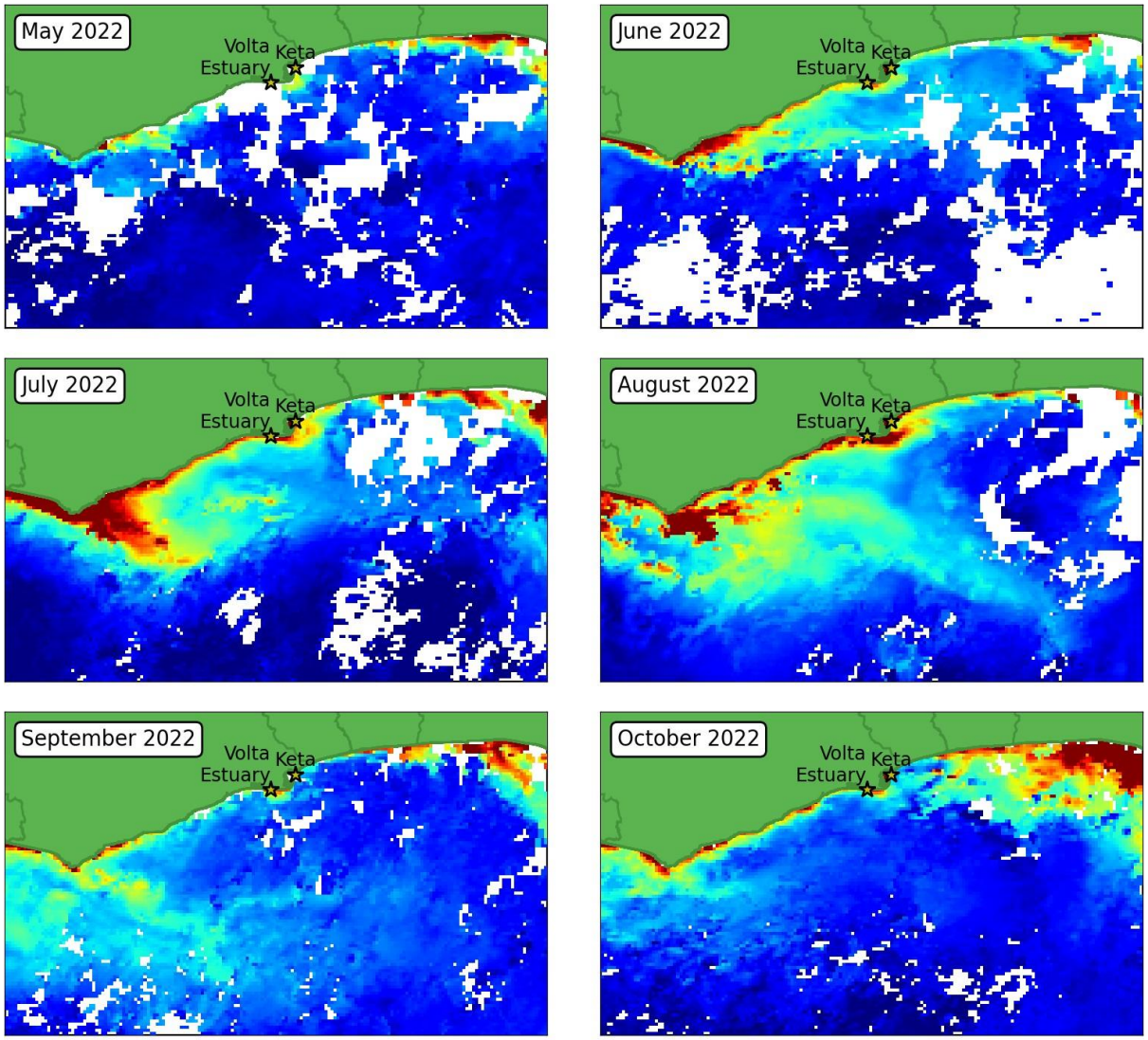

Figure 6-20 - Example monthly composite maps of light attenuation for 2022. (Note the logarithmic colour scale) (Source: CARES Group Graphic)

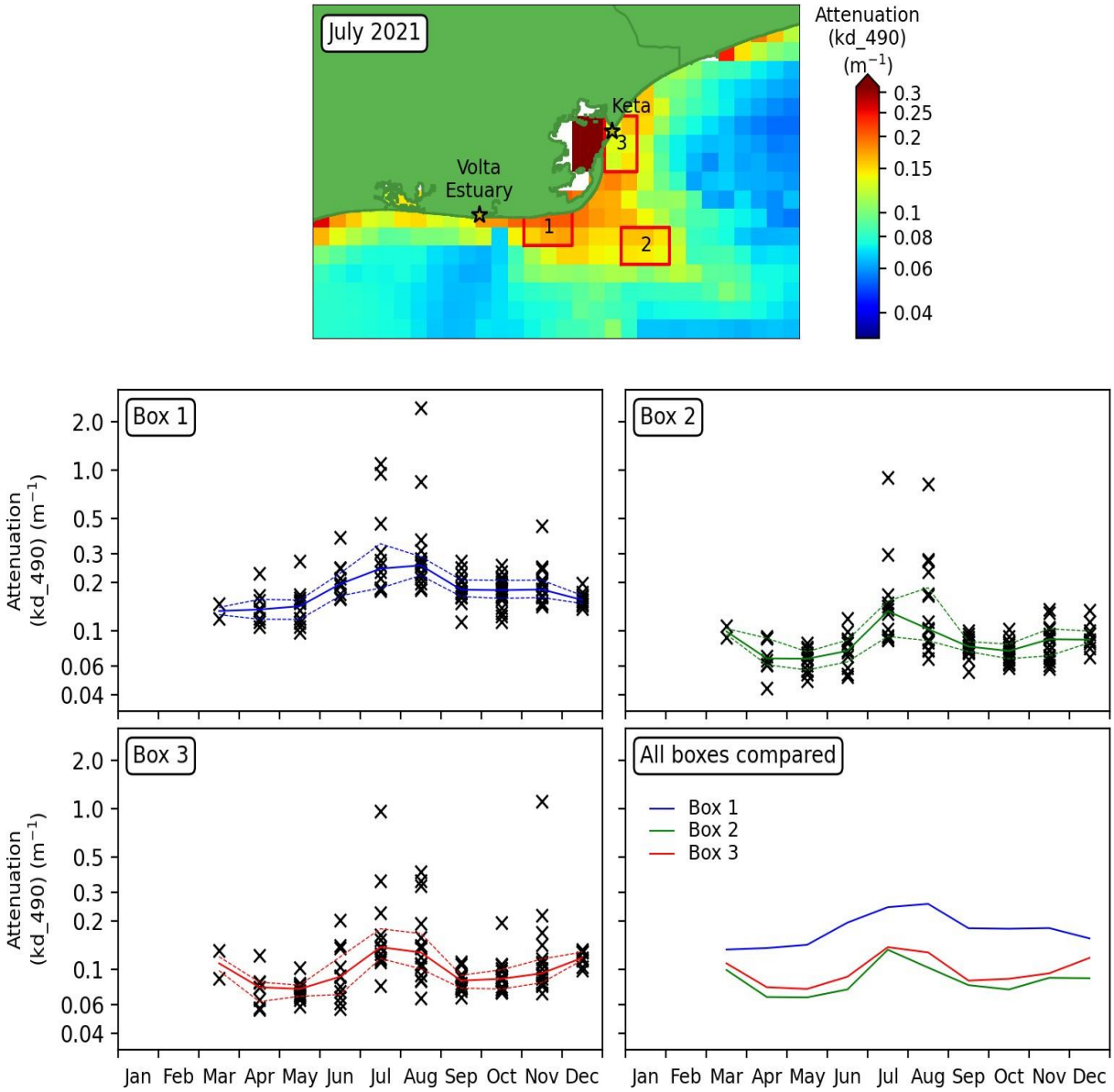

Figure 6-21 - Multi-year Data for Light Attenuation from 3 Areas of Interest in the Vicinity of Keta (Note the Logarithmic Scale - Areas of Interest Shown in the Top Map) (Source: CARES Group Graphic)

6.1.2. Bathymetry

Knowing the bathymetry of the waters off Keta is vital in understanding the physical processes, and in modelling the processes - such as modelling wave propagation from deep waters into the coast. GPHA does not have dedicated bathymetry measurement available for the Port of Keta project. Furthermore, CARES have investigated other potential sources of bathymetric data in the vicinity of Keta and have not received confirmation of any existing data (includes investigation with specific individuals that reportedly may have data). For this reason, waters depths have been digitised from the local Admiralty Chart (UK Hydrographic Office, 2017). The digitised point data is shown in the top map of Figure 6-22, which represents all the point data from the chart, with the addition of some points digitised from charted depth contours to help fill data gaps.

While the top map of Figure 6-22 gives an impression of the bathymetry and its features, it is preferable visually to have a continuous spatial representation of the bathymetry – which can also be used to construct gridded bathymetry for modelling. To achieve this, a natural neighbour algorithm is used, which uses a Voronoi tessellation to define the area of influence of each data point, and then the interpolation points are added individually to the

Voronoi diagram to find a weighted average of surrounding data points. The result is a spatially smooth bathymetry field that preserves the chart data at their actual locations (see the bottom map of Figure 6-22).

The bathymetry shows a coastal shelf of approximately 20 to 25 kilometres width, which east of Keta and west of the Volta estuary shallows from 100 metres depth in towards the coast. East of the Volta estuary, the shelf area is shallower - thought to result from an accumulation of sediment from the Volta River. There is an extensive area of less than 20 metre water depth stretching almost to the shelf edge. The orientation of the shelf edge changes from being oriented east/west to the west of Keta Lagoon, to southwest / northeast offshore from Keta Lagoon, and then west- southwest to east-northeast east of Keta Lagoon. These bathymetry features will all impact the propagation of swell waves coming from the deep water to the south, for example shifting the direction of propagation as the long period waves feel the ocean bottom and refract.

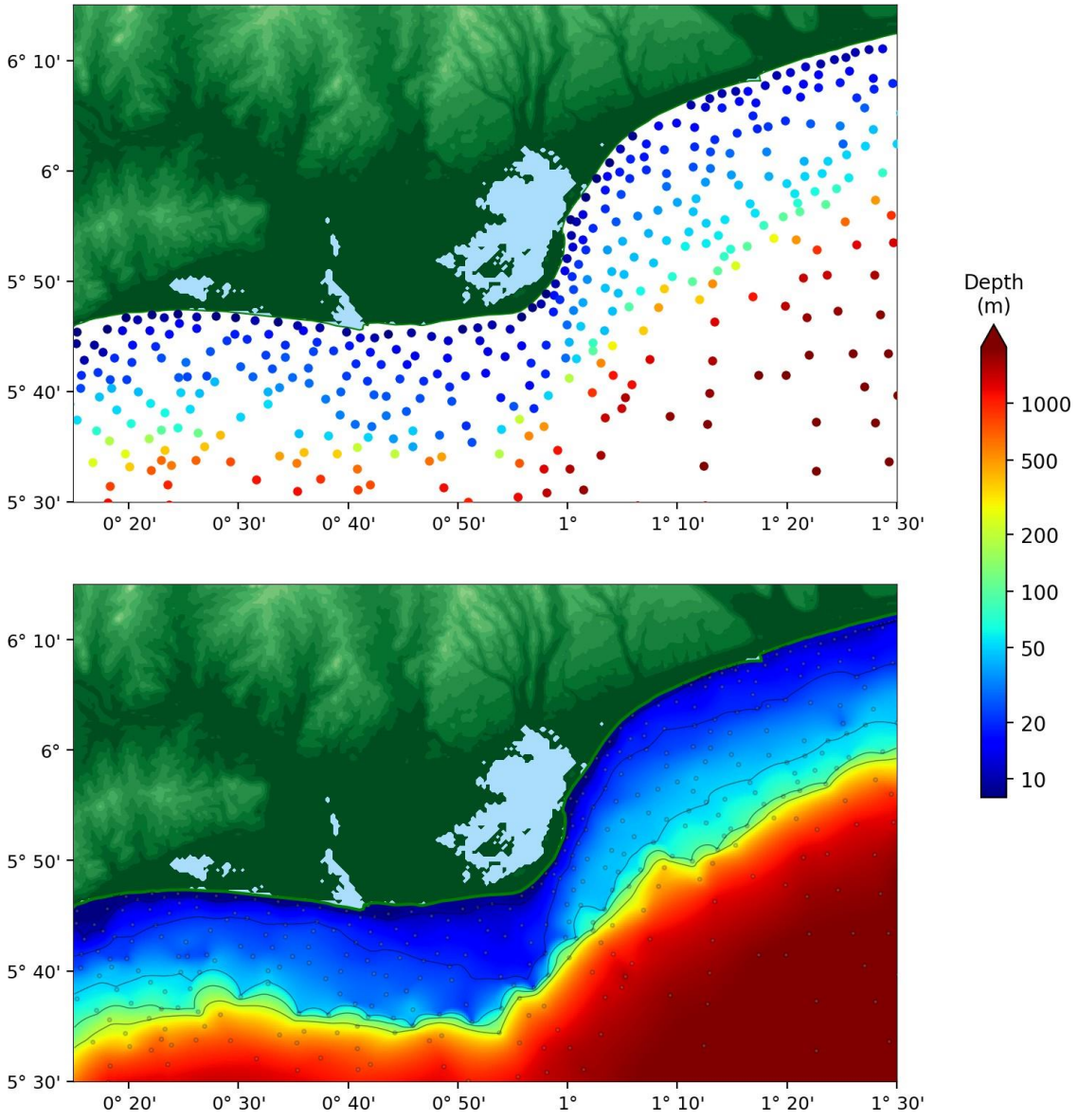

Figure 6-22 - Digitised Water Depths from the Admiralty Chart (Top) Interpolated to Give Full Coverage of the Area of Interest (Bottom)
(The Vertical Datum is Lowest Astronomical Tide)
(Source: CARES Group Graphic)

The bathymetry within the project area is relatively uniform and shallow, showing a generally smooth sloping of the ground into the sea. The upper beach profile in the swash zone has a slope of approximately 1:3, while the lower beach of 1:10 to 1:15. The presence of moderate winds and the coarse sediments determines the absence of dunes, and the upper beach barrier is mainly shaped by wave run-up.

Depths of -5 m are seen within approximately 200 – 300 m from the shoreline, with depths increasing to -10 m and beyond after approximately 1.5 km.

Topography over the general project area is relatively flat, with maximum ground levels of around +4 m in places along the shore. Slopes in the lagoon are generally flat and ground levels within the small lagoon delimited by the sand ridge and the causeway road range from approximately 0 m to 1 m below sea level.

6.1.3. Geology and Soil

Keta is located in the Accra-Keta Sedimentary Basin which is a Cretaceous wrench modified pull-apart basin structurally bounded by Chain Fracture Zone in East and Romanche Fracture Zone in the West. It covers an area of approximately 33,900 km², of which 1,900 km² is onshore. This basin is the western extension of the Dahomeyan embayment that stretches east covering Togo, Benin and Western Nigeria and ending just before the Niger Delta in Nigeria. The basin's formation history has been divided into:

- Pre- Rift Stage comprising Precambrian to Late Jurassic rocks
- Syn-Rift Stage comprising Lower Cretaceous rocks and,
- Post Rift Stage represented by Upper Cretaceous to Tertiary sequences

According to the Petroleum Commission (c2024), studies by Abu et al. (2010) suggest the presence of a working Cretaceous Petroleum System, with at least two key mature source rocks: Early Cretaceous lacustrine shales with Types II and III kerogen and Turonian-Coniacian organic rich shales. Numerous Syn-rift Albian, Late Cretaceous and Tertiary reservoirs exit. Both stratigraphic and structural trapping mechanisms are present, with the former predominating. Several horizons mapped and interpreted on seismic sections as Cretaceous-Tertiary shales could provide sealing. Potential petroleum exploration opportunities exist (for example, basin floor fans and ponded turbidites exist in the Upper Cretaceous and Tertiary) (Petroleum Commission, c2024), with some opportunities previously explored.

The British Geological Survey (BGS) geological map provided in Figure 6-23 shows that the superficial geology of the Port of Keta site consists of tidal flat deposits and salt pans.

6.1.3.1. Soil Associations in the Keta Area

Most of the soils found in the Keta Basin are recent and have been developed over coastal and lagoon deposits. The main soil associations in the Keta Municipality according to the 2018-2021 MTDP for the KeMA include the following:

- **Oyibi-Muni Association** - Along the coastal strip are the Oyibi-Muni and Keta Associations characterized by sandy soils often without any top layer of humus. Naturally, it supports coconut cultivation. When manured, it supports shallot, okro, pepper and other vegetables. In fact, this strip is the leading shallot producing area in Ghana though it covers only about 11 percent of the Municipality (excluding lagoons).
- **Ada-Oyibi Association** - The soil in the lagoon basin (Ada-Oyibi Association) is very shallow, overlying a hard and compact clay formation. The soil is generally alkaline and supports mangrove vegetation, sugar- cane, and grass for pasture. Due to the underlying clay, this area is liable to flood and not suitable for arable farming though it covers over 75 percent of the total dry land of the Municipality.
- **Toje-Alajo Association** - The Toje-Alajo Association covers the Northern plain around Abor and constitutes about 14 percent of the Municipality (lagoon excluded). It is relatively deep and supports crops like cassava, maize and legumes (SIIPS, 2021).

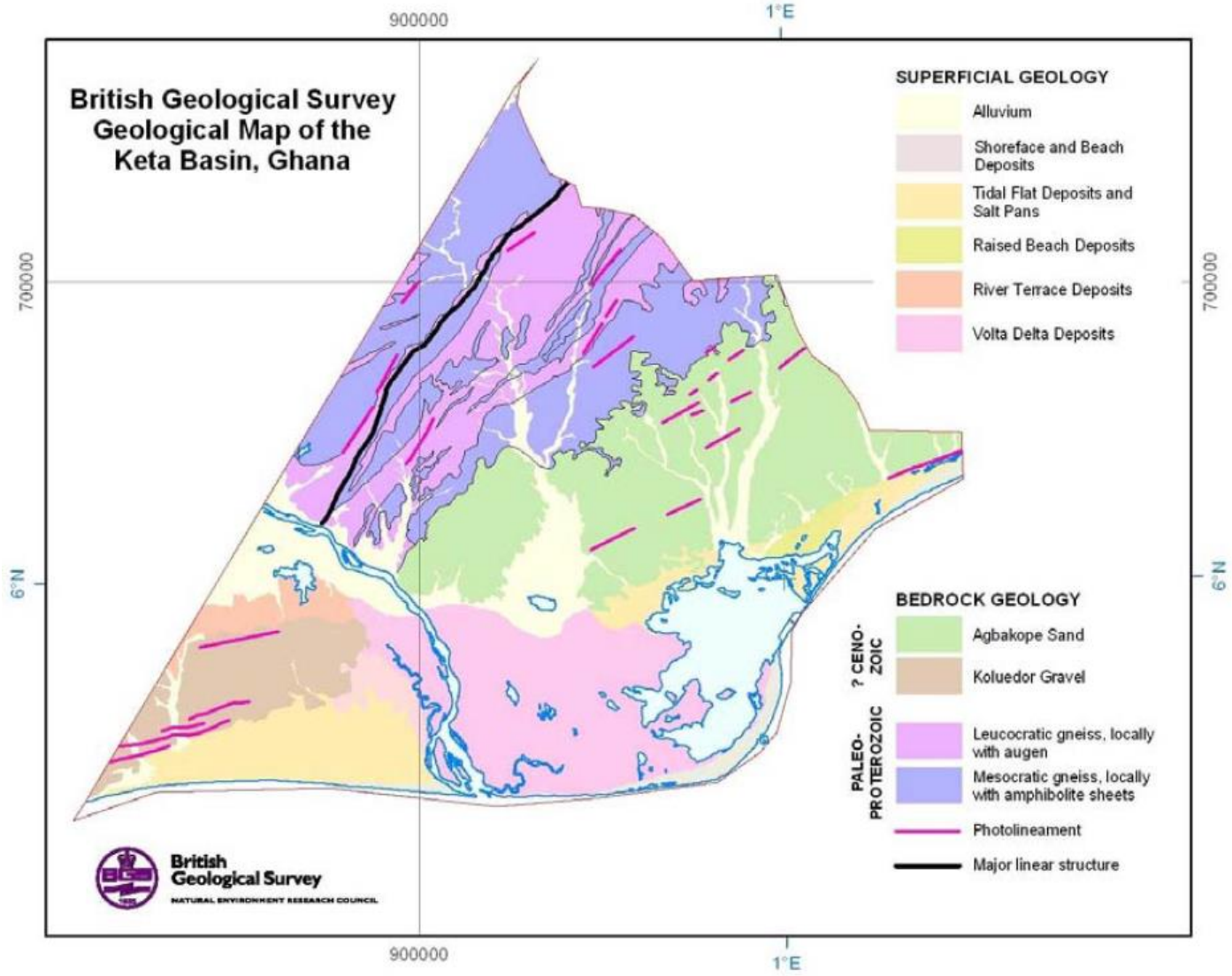

Figure 6-23 - Geological Map from the Keta Basin, Onshore Part (Source: BGS, 2009)

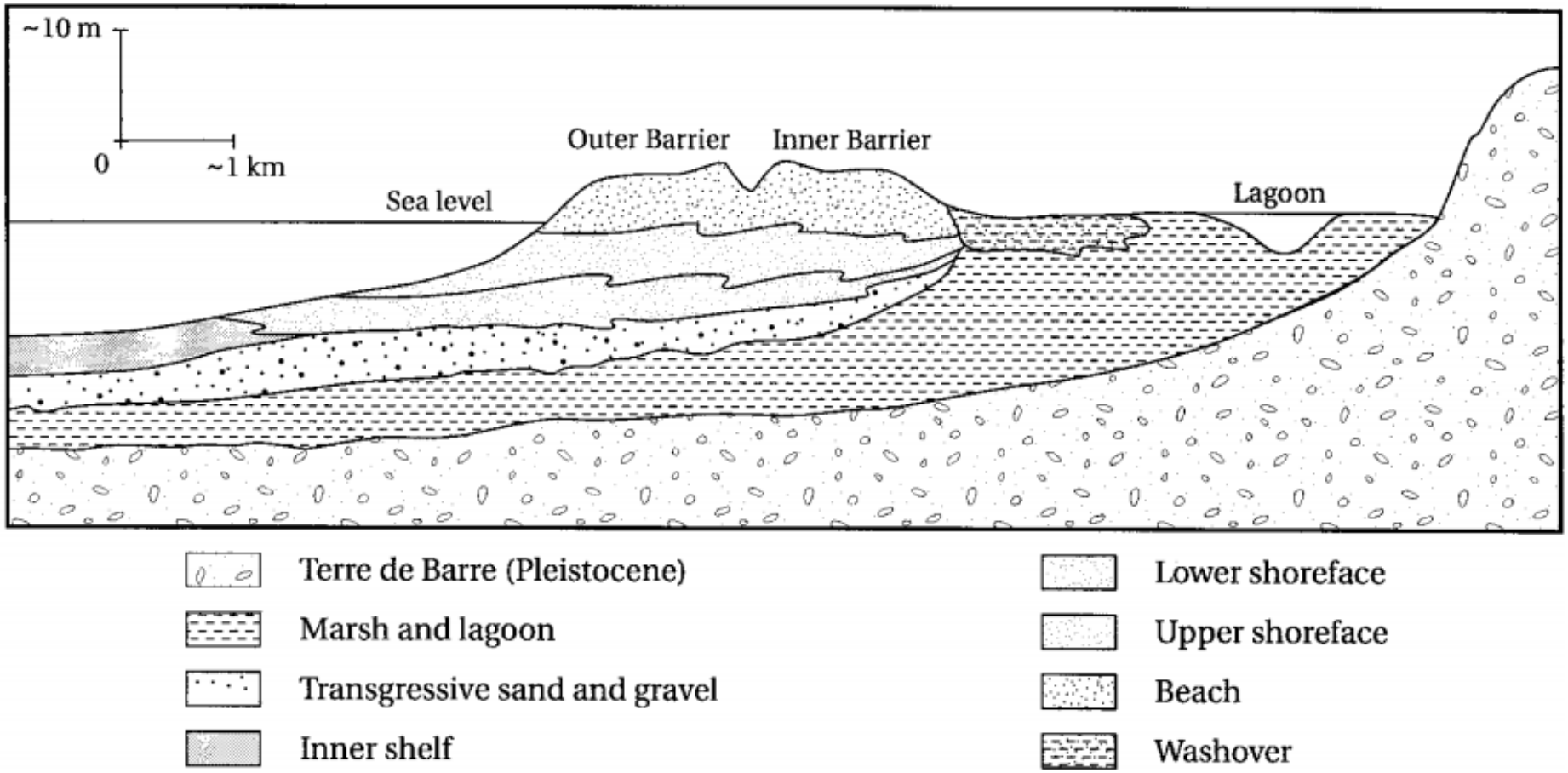

Figure 6-24 - Schematic Representation of the Barrier and Lagoon Subsoil (Source: Anthony and Blivi, 1999)

6.1.4. Seismic Setting

Ghana is not located close to any of the world's well-known seismic zones. However, several major and minor earthquakes have struck the country in the past, with some occurring recently in some areas of southern Ghana, with earth tremors of magnitude ranging from 1.0 to 4.8 on the Richter scale recorded in recent times (Cornille *et al.,* 2021). According to the seismicity map of southern Ghana (see Figure 6-25), Keta lies in Zone 2 of the seismic risk assessment, resembling medium risk (Kutu, 2013). This factor has to be considered in the structural design. For design works, seismic impact is normally determined by the Peak Ground Acceleration (PGA). A common source for PGA values is the Global Seismic Hazard Map (GSHAP) (see Figure 6-26). This shows that the project is located in the green coloured area, featuring a PGA between 0.6 m/s² and 0.8 m/s².

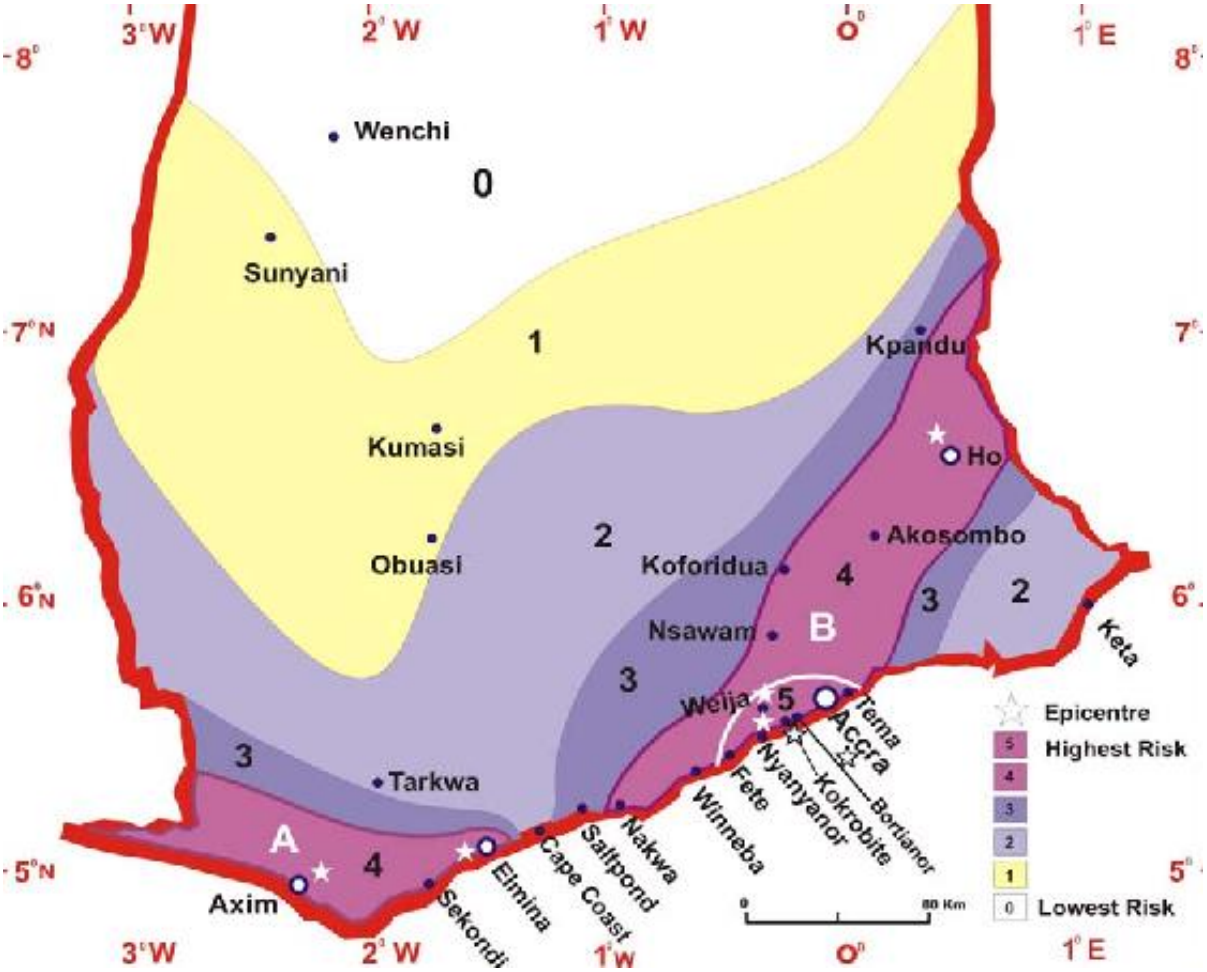

Figure 6-25 - Seismic Risk Map of Southern Ghana (Source: Kutu, 2013)

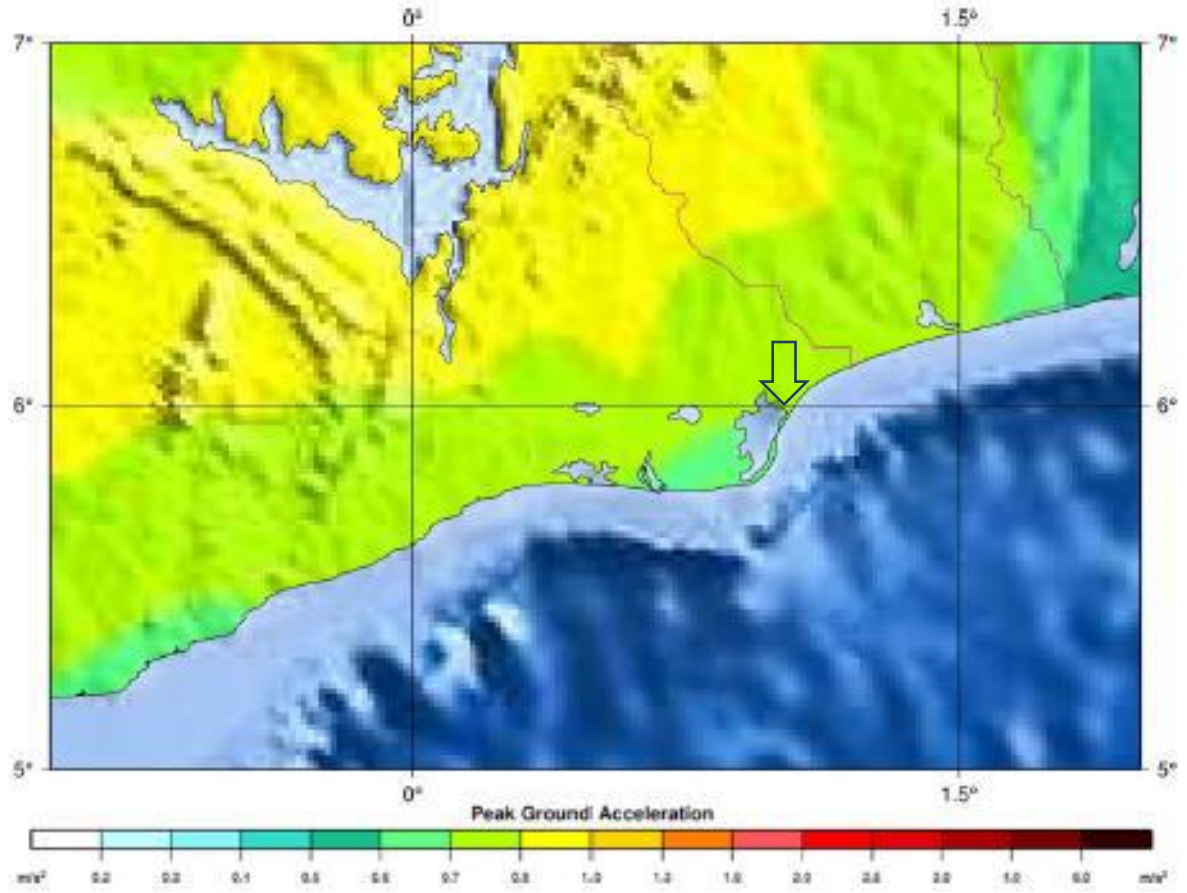

Figure 6-26 - GSHAP Map of Keta Basin and Surrounding Regions (Source: GSHAP, 2020)

6.1.5. Drainage and Geographic Belts

The main drainage basins are the lagoons, which together constitutes about 362km^2. The major lagoons include Keta, Angaw Agbatsivi, Logui, Nuyi and Klomi. Into this basin, drain some streams and distributaries of the Volta River. These include such streams as Angor, Avida, (near Hatorgodo), Awafla (near Awaflakpota), Nukpehui (in the north-western part of the Municipality), Tordzie and Kplikpa. Many of the creeks are dwindling in size due to low rainfall, excessive evaporation and siltation. As a result, the volume of water in the lagoon has drastically declined and tends to fluctuate seasonally, leading to the emergence of several islands in the Keta, Angor and Agbatsivi lagoons. The biggest among the Islands are Seva and Dudu, which are partially inhabited (KeMA, c2024)). An outlier to this was the exceptional events of October 2023 related to VRA's controlled spillage from the Akosombo and Kpong Dams which temporarily drastically increased the volume in the lagoon and resulted in widespread flooding. Due to this, the flood gates on the causeway and dredging the sand bar at the Port of Keta site were temporarily opened to allow floodwaters to escape.

Keta Municipality is a low-lying coastal plain with the highest point of only 53 metres above sea level around Abor in the north of the Municipality. The lowest point is approximately between 1 to 3.5 metres below sea level along the coast around Vodza, Kedzi and Keta townships. Three main geographic belts may be identified, namely the Narrow Coastal Strip, the Lagoon Basin of the middle belt and the Plains of the North. Further details are provided below:

- **The Coastal Strip** - the generally low-lying nature has exposed particularly the eastern parts of the coastal strip to intense sea erosion and occasional flooding. Notwithstanding, a great irrigation potential exists. The Coastal Strip is marked by sand bars with a few sea cliffs bordering the coast. This belt is affected by severe sea erosion, with attempts made to save these by the Keta Sea Defence Project, with the previously worst hit areas include Keta, Kedzikope, Vodza, Kedzi, Horvi and Srogboe-Dzita.

- **The Lagoon Basin** - The general elevation of the lagoon basin is also below sea level. It is made up of lagoons and islands such as Atiavi, Alakple, Seva, Anyako and Dudu. The basin is generally marshy due to the underlying sandy-clay geological formation.
- **The Northern Plains** - generally gently undulating with a relatively higher elevation of about 53 metres above sea level (KeMA, c2024).

6.1.6. Keta Lagoon Hydrography

Freshwater inflow into the lagoon comes from three main sources: the rivers Tordzie, Aka and Belikpa. The contribution of the Volta River has decreased substantially after the constructions of the Akosombo and of the Kpong dams along its course (SIIPS, 2021).

Freshwater flows have a seasonal pattern, corresponding to the seasonal variations in rainfall. The Tordzie River has a mean annual flow variable between 2.5 m^3/s and 18.5 m^3/s. The 100-year flood is estimated to be about 140m^3/s. As a result of the annual flow variability Tordzie River could significantly contribute to flooding in the Keta Lagoon. The rivers Aka and Belikpa also drain into Keta lagoon and normally dry out between December and April. There are no historic records of flows on these rivers, however, considering the rainfall data distribution and using the Tordzie catchment runoff coefficients, during the rainy season the Aka flow is estimated to be equal to 5.8 m^3/s and the Belikpa flow equal to 3.8 m^3/s (SIIPS, 2021).

The Volta River is the largest drainage system in the country with a total drainage area 379,000 km^2. Since the construction of the dam the river has had a mean annual flow of 1,100 m^3/s downstream of the Akosombo and of the Kpong dams. The regulated flow of the river prevents its floodwaters from entering the lagoon (SIIPS, 2021), although in exceptional circumstances this can occur, when the dam operators are required to spill flood flows to ensure dam safety; this is fortunately a rare occurrence but last occurred in October 2023 causing widespread flooding.

6.1.7. Climate Change in Ghana

Information from the National Climate Change Adaptation Strategy indicates that historical data for Ghana from the year 1961 to 2000 clearly shows a progressive rise in temperature and decrease in mean annual rainfall in all the six agro-ecological zones in the country. Climate change is manifested in Ghana through:

- Rising temperatures.
- Declining rainfall totals and increased variability.
- Rising sea levels.
- High incidence of weather extremes and disasters (SIIPS, 2021).

The average annual temperature has increased 1°C in the last 30 years. Based on this data, the Minia *et al*. (2004), estimate that temperature will continue to rise, while rainfall is also predicted to decrease in all the ecological zones. Even though model prediction may not provide actual climate at the projected dates, from historical analyses rainfall in the West African sub-region is associated with high variability which climate change would only amplify. From historical records, temperatures have also risen and are likely to continue in the future. In all agro-ecological zones average annual temperatures are estimated to increase between 0.8°C and 5.4°C for the years 2020 and 2080 respectively. Within the same period average annual rainfall total is estimated to decline by between 1.1%, and 20.5% (SIIPS, 2021).

Available data shows a sea-level rise of 2.1 mm per year over the last 30 years, with projections of 16.5 cm and 34.5 cm by 2050 and 2080 respectively. Scientists predict a 1 m rise in sea-level globally by 2100. The east coast of Ghana is and will be the most affected (SIIPS, 2021).

6.1.8. Flooding and Effect of Sea Level Rise in the Keta Region

The coastal region of Keta is exposed to the risk of both terrestrial and coastal flooding (see Figure 6-27) due to its low-lying topography and extremely mild gradients, to the reduction of sediment supply from the Volta delta causing severe erosion, and to the potential impacts of the sea level rise (SIIPS, 2021).

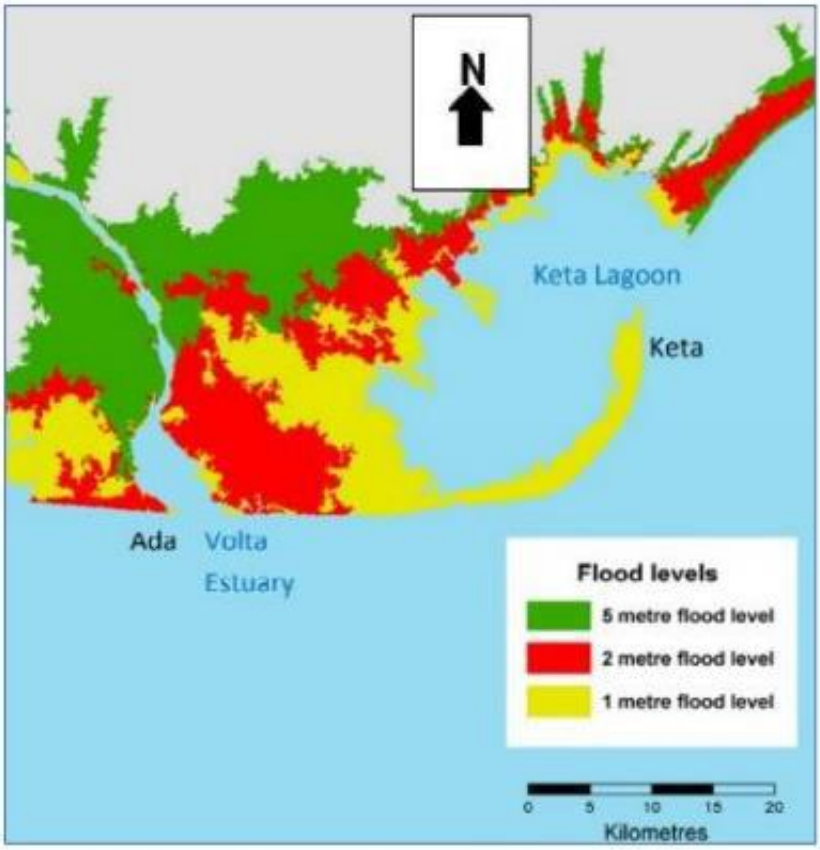

Figure 6-27 - Potentially Inundated Areas of the Volta Delta and Keta Lagoon (Source: Boateng, 2009 / SIIPS, 2021)

Notwithstanding these infrequent flood inflows to the lagoon from the Volta River, there is a net flow of seawater into the lagoon as a result of the tidal effects, especially along the narrow sand bar along the coast. This is particularly evident when the sand bar gets locally breached by the wave action. Flooding from the seaside occurs in the form of an overwash process during storm events from the Gulf of Guinea. With terrestrial flooding from the Volta River occurring infrequently compared to the tidal and storm impacts, the effect of sea level rise and other impacts of climate change are a concern as it increases the frequency of inundation, and the shoreline retreats due to erosion (SIIPS, 2021). It should also be noted that the flood gates on the causeway at the site of the Port of Keta were opened, following high water levels in the lagoon and flooding caused by controlled spillage at Akosombo and Kpong Dams (October 2023), and a temporary channel was dredged in the sand bar to facilitate the release of water to the sea.

Another effect of sea level rise is the acceleration of the shoreline retreat. On average, sea level has risen by about 5.3 cm over the last 21 years along the Ghanaian coast and has increased the mean annual coastal erosion rate to about 2 m/year (Evadzi *et al*., 2017).

Existing flood control structures date back to the Keta Sea Defence Project, where an 8.3 km long road / causeway between Keta and Horvi has been constructed, where an outlet sluice discharges excess water from the lagoon into the sea (SIIPS, 2021).

6.1.9. Biological Environment

A standalone report on the biological environment is provided in Annex B. A summary of this report along with other relevant information is provided in the following subsections.

6.1.9.1. Keta Lagoon Complex Ramsar Site

The site is an ecologically sensitive location, due to its proximity to the nationally important Keta Lagoon Complex Ramsar site and the Volta River Estuary.

The Keta Lagoon Complex Ramsar Site is the largest lagoon in Ghana and consists of a large area of open brackish water, floodplain and marshland. The Site falls within the coastal savannah ecological zone of Ghana and its boundaries follow a catchment boundary and the Volta River to the west, which borders another Ramsar Site, the Songor Ramsar Site (no. 566) and Biosphere Reserve. Keta Lagoon is dominated by scrubland and extensive mangrove forest and is home to several species of rodents, Nile monitor lizards, African royal pythons, species of sea turtles, manatees, and invertebrates such as crabs and molluscs. It is the most important coastal wetland for birds in Ghana and supports over 72 species of resident and migratory birds with an estimated population of over 100,000 individuals. The site supports the livelihoods of hundreds of thousands of people, some of whom extensively use mangrove firewood to smoke fish for sale. It is threatened by sea erosion and pollution as well as excessive mangrove wood harvesting (Ramsar Sites Information Service, 2024).

The Keta Lagoon Complex is the largest lagoon in Ghana and has rich floral and faunal biodiversity including mammals such as manatees and sea turtles.

Five out of the seven species of sea turtles in the world utilize Ghana's coastal areas for foraging and migration. These are the Leatherback, Green Turtle, Olive Ridley, Hawksbill, and Loggerhead. Of the five species, three species (Leatherback, Green and Olive Ridley) deposit their eggs in appreciable numbers on the sandy beaches of Ghana (Agyekumhene *et al*., 2021; Agyekumhene, 2009; Amiteye, 2002) with the Olive Ridley being the most abundant. All five species are threatened and need to be protected with one turtle capable of laying approximately 100 eggs which can take three months to hatch (GWS, 2024).

Marine turtles are known to deposit their eggs in nests on the sandy beaches of the coastline of the Keta area between Anloga and Dzita (especially around Dakordzi and Akplorwotorkor).

Three of the five protected species are often recorded in the project area - the Oliver Ridley, Green and Leatherback Turtles. The Hawksbill is occasionally encountered in the project area, whilst the Loggerhead Turtle is not thought to be encountered in the project area (GWS, 2024). The Olive Ridley and the Leatherback are the two most common species accounting for the majority of the nests deposited in the project with the Olive Ridley accounting for the majority of nests deposited (Ghana Turtle Conservation Project, field data).

Figure 6-28 - Oliver Ridley Turtle Nesting in Volta Region in October 2023 (Photo Credit: Andrews Agyekumhene)

Figure 6-29 - Leatherback Turtle Nesting in Volta Region in October 2023 (Photo Credit: Andrews Agyekumhene)

The different species of sea turtles nest at different periods in Ghana. The Leatherbacks nest primarily between November and February (Agyekumhene *et al*., 2021; Agyekumhene, 2009; Amiteye, 2002) with some early nesting occurring in October and March respectively (Agyekumhene, 2009). The Olive Ridley nests year-round with peak nesting occurring in November-December. While earlier records for Green Turtle nesting were reported in June to August, recent data from the project area suggest the nesting to occur primarily between November and December (Ghana Turtle Conservation Project, unpublished).

6.1.9.2. Field Data Collection Approach

The biological baseline study involved both desk and field assessments to collate existing information in the literature, both grey and published. All relevant and available literature was consulted as part of the desktop study to help provide background environmental information as well as inform the analysis of the findings of the study. Fieldwork to capture the post-Akosombo dam water spillage biological baseline was conducted from Saturday 10 February 2024 to Friday 16 February 2024, while the pre-Akosombo dam water spillage baseline was benchmarked from desk study for periods before 2023. Sampling sites were selected based on their oceanographic and limnological effects on the project; details are presented in Table 6-3, with their locations presented in Figure 6-30.

Table 6-3 - Georeferenced Study Locations

ID	Site Name	Description	Latitude	Longitude
RTU	River Tordzi Upper	Lagoon Keta receives its water from the primary river source. This place lies beside the Sogakope-Aflao route to the north.	05 58' 42.7"	001 01' 06.6"
RTM	River Tordzi Mid	The Keta lagoon receives its water from the main river source. This place is situated on the Sogakope-Aflao highway's southern side.	06 05' 24.1"	000 44' 49.3"
RTB	River Tordzi Bottom	The main river source that feeds into the Keta lagoon close to its confluence. This location is found in the Atiavi township	05 56' 34.1”	000 51' 12.8"
KLC1	Keta Lagoon Complex 1	This location lies on the eastern side of the lagoon, close to a landing site at Havedzi Kedzi.	05 58' 42.8"	001 01' 06.8"
KLC2	Keta Lagoon Complex 2	This location lies midway through the lagoon, close to the bridge where the spillway of the lagoon is constructed.	05 58' 09.7"	001 00' 49.6"
KLC3	Keta Lagoon Complex 3	This location lies on the western side of the lagoon, close to the settlements in Keta township	05 58' 38.5"	001 01' 16.8"
HK	Havedzi Kedzi	This location lies on the eastern side of the main port basin at Havedzi Kedzi, close to its township.	06 19' 23.8"	002 31' 06.7"
HKM	Havedzi Kedzi Mid	This location lies in the middle of the main port basin, close to the bridge where the spillway from the lagoon is constructed.	05 58' 09.7"	001 00' 51.8"
HKS	Havedzi Kedzi Sea	The location lies at the seaside on the eastern end of the main port basin in the Havedzi Kedzi township.	05 58' 24.8"	001 01' 28.5"
AD	Adina Sea	The location lies on the eastern side of the proposed Keta port project, about 10 kilometres from the sea.	06 02' 38.9"	001 04' 44.7"
KAL	Kedzi Agorta Lagoon	This location lies on the western side of the main port basin, close to the Kedzi Agota township.	05 57' 43.3"	001 00' 38.1"
KLE	Keta Lagoon East	The main river source that feeds into the Keta lagoon is close to its confluence. This location is found in the Atiavi township	05 58' 32.6"	001 01' 23.4"
AKS	Agorta Kedzi Sea	The location lies on the seaside at the western end of the main port basin at the Kedzi Agota township beach.	05 57' 44.2"	001 00' 54.8"
DS	Denu Sea	This location lies further east of the proposed Keta Port project, about 25 kilometres away at the seaside.	06 5' 30.42"	001 9' 10.01"

ID	Site Name	Description	Latitude	Longitude
ACU	Anyanui Creek Upper	The location lies on the eastern side of the mouth of the Volta River estuary, and it is suited to the upper portion of the fresh water. The bank of the creek is surrounded by mangrove swamps and is located on the western side of the proposed project.	05 46' 50.84"	000 42' 10.49"
ACM	Anyanui Creek Mid	The location is found on the western side of the proposed Keta Port project and lies in between the upper and lower portions of the creek.	05 46' 45.34"	000 42' 39.59"
ACL	Anyanui Estuary Lower Creek	Here the river meets the sea. The location is on the western side of the proposed port project	05 46' 34.62"	000 41' 55.54"

After a quick physical appraisal of the project sites, a targeted sampling approach was developed considering ease of access (which is important for any follow-up monitoring plan), known 'hotspots' from literature (where previous studies have been conducted / previous events and effects documented) and ensuring ecological representativeness within the proposed Port of Keta project area (to include the Volta Estuary, selected rivers / streams, lagoon and marine ecosystems). At each section, a Geographic Positioning System (GPS) (Hand-held Gamin GPS receiver) location were recorded (see Table 6-4). Two replicate samples were taken at each sample location. Human activities around the sampling sites were noted; these included artisanal fishing, improper disposal of solid wastes near the Keta Lagoon and mangrove deforestation at Anyanui catchment area, among others. Photographs showing selected sites were taken.

Focus Group Discussions were conducted based on a semi structured format that allows the researcher to explore and to probe further during discussions with respondents.

Field observation, sampling, enumeration and data collection including fish catch and effort assessment, and experimental fishing and interviews of residents were carried out. In-situ measurements of water quality characteristics at each site were evaluated using a multi-water quality meter (Horiba 50-U series). Parameters included:

- Water Temperature.
- Dissolved Oxygen (DO).
- Electrical Conductivity (EC).
- Total Dissolved Solids (TDS).
- Salinity.
- Ph.
- Turbidity.

Additionally, water, fauna and flora samples were collected from the sites for further analysis.

Generally, the sample locations were divided into three main parts:

- Brackish Ecosystem (BE).
- Freshwater Ecosystem (FE).
- Marine Ecosystem (ME).

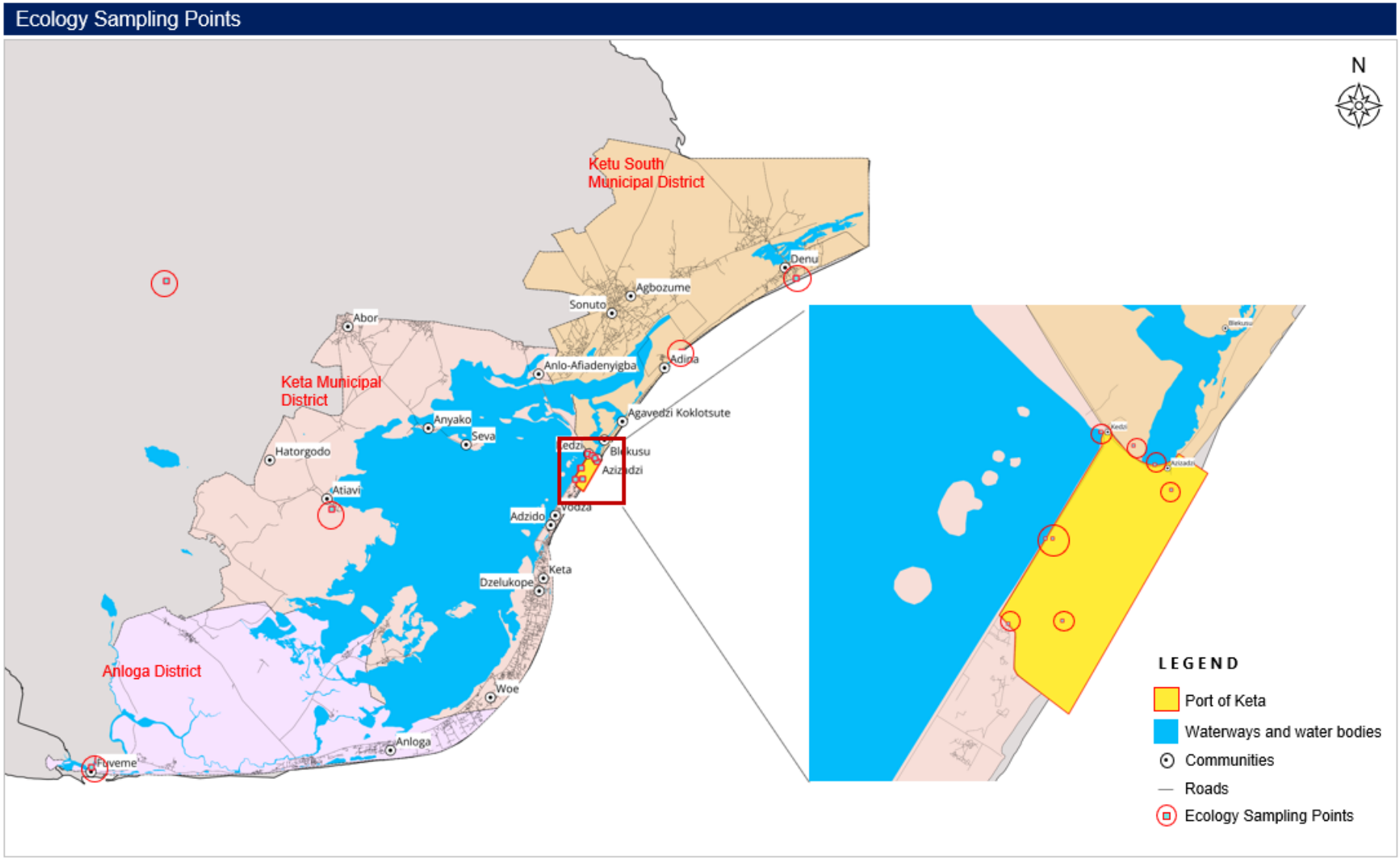

Figure 6-30 - Map Showing Study Locations

Table 6-4 - Photographs of Sampling Activities February 2024

Ecosystem	Description	Photo
Marine Ecosystem (ME)	Collecting Benthic Macro-Invertebrate Samples from a Marine Site	
Marine Ecosystem (ME)	Collecting Plankton (Zooplankton and Phytoplankton) from a Marine Site	
Marine Ecosystem (ME)	Collecting Sediment Core Samples from a Marine Site	

Ecosystem	Description	Photo
Benthic Ecosystem (BE)	Collecting Water, Sediment, and Benthic Samples at Keta Lagoon.	
Benthic Ecosystem (BE)	Pen-Fishing at Keta Lagoon.	
Benthic Ecosystem (BE)	Piled Harvested Mangrove Plants Ready for Market at Anyanui.	
Freshwater Ecosystem (FE)	Fishermen were using the Freshwater Site as a Landing Place. It was Inundated with Various Emerging and Submerged Aquatic Plants.	

Ecosystem	Description	Photo
Freshwater Ecosystem (FE)	The Freshwater Site is Overgrown with Riparian Vegetation. The Water was Apparently Turbid.	
-	Community Engagement within the Project Catchment Area to Explain and Solicit their Views on the Project Impact, among Others.	
-	Community Engagement with Fishermen.	

6.1.9.2.1. Water Quality In-Situ Measurement

All measurements taken in both sampling regimes followed established standard methods. Temperature, Dissolved Oxygen (DO), Electrical Conductivity (EC), Total Dissolved Solids (TDS), and pH were measured in-situ using potable water quality meters. Temperature, EC, TDS, and pH were measured using a HORIBA Multimeter (Model U-50 series). Physical water quality parameters were recorded directly at the sampling sites in two replicates. Water samples from each site were collected and stored in 500-ml polyethylene bottles. Turbidity, Total Suspended Solids (TSS), nitrate-nitrogen, orthophosphate, sulphate, and silicate were measured in the laboratory in accordance with standard procedures (American Public Health Association (APHA) *et al.*, 1995).

6.1.9.2.2. Flora and Fauna Survey

To help assess the overall biological integrity of the aquatic ecosystem of freshwater in the project area, a quantitative approach was adopted for all data collection. Aquatic fauna was sampled, identified, and abundance

estimated as per standard methods at all stations. Replicate samples and records were taken of all groups of fauna. All species were identified using standard identification guides supported by the experience of experts.

Other relevant observations were noted, and results were analysed to help with the prediction and mitigation of significant impacts.

For plants, phytoplankton, aquatic macrophytes, including flora, and overhanging flowering plants were assessed. The fauna groups assessed were zooplankton, macro-invertebrate, fish, and birds. Some fishermen were hired to carry out experimental fishing at the sampling locations, and all catch were examined.

Three replicates of macro invertebrate samples were collected at each sampling point. At stations with sufficient fringe vegetation, sweep net samples were taken with 10 sweeps of the net (mesh size of 200 µm and diameter of 19.5 cm). Where there was no fringe vegetation, benthic samples were taken using a 4 cm PVC Pipe Corer. The contents of the core were then washed and emptied into 250 ml containers and stained with 10 % formalin / Rose Bengal mix. Using a sweep net, macrophyte associated insects were caught, identified, and their abundance determined. All samples were later examined under light microscope in the laboratory.

To estimate the zooplankton and phytoplankton community, a standard plankton net (mesh size 100 µm) was towed on the surface of the lake using an outboard engine for 10 minutes at each site. Materials collected by the net were washed into sample bottles and fixed with 10% formalin for further analysis in the laboratory.

The zooplankton were enumerated using a 10.1 ml counting chamber filled with the concentrated plankton sample and examined under a compound microscope (APHA, 1998). The identification was done using the descriptive keys of Han (1978), Prescott (1982), Kadiri (1993) and Kemdirim (2001).

Experimental fishing was done at HK (lagoon) while residents were interviewed about the fish biodiversity and fisheries of the area. A cast net (thrown diameter 5 m; mesh size 20 mm) was used which made 30 throws within 60 minutes. On the field, the total catch for each fishing attempt was recorded and subsequently totally enumerated for its composition and sizes (total length in cm and weight in g). Using the catch and the effort, the Catch Per Unit Effort (CPUE) / catch rate was calculated. Back in the laboratory, the corresponding wet weight (W) for each Total Length (TL) of the individual fishes recorded was measured using a top loading electronic scale and a fish measuring board respectively for confirmation purposes only. Fish species were taxonomically identified using Dankwa *et al*., (1999). Representative residents found in the area were interviewed using a picture freshwater fish identification guide (Holden and Reed, 1972), to provide information on dynamics of fish biodiversity and exploitation.

The observational method was adopted for both pre-water spillage and post-water spillage data collection. It focused on individual birds or small groups for a specified period, and the names of the birds were recorded with experience.

Samples of water, fish, crustaceans, and other fauna and floral groups such as plankton and macro-invertebrates were collected and sent to the laboratory for further identification, enumeration and further analysis. In addition, water quality analyses were carried out, which included phosphates, nitrates, and silicates.

Figure 6-31 - Macro-Invertebrate Sampling

Figure 6-32 - Macro-Invertebrate Sampling

Figure 6-33 - Sampling in the Keta Lagoon

Figure 6-34 - Sampling within the Port Footprint

Figure 6-35 – Sampling within the River Tordzi

Figure 6-36 - Beach Sampling

Figure 6-37 - Fedler Crabs

Figure 6-38 - Blue Swimming Crabs

Figure 6-39 - Black Chin Tilapia / Blue Swimming Crab

Figure 6-40 - Crab Traps

Figure 6-41 - Fish Catch Observed

Figure 6-42 - Catches Observed

Figure 6-43 - Catches Observed

Figure 6-44 - Catches Observed

Table 6-5 - Physical, Nutrient and Other Chemical Test Results – Post-Akosombo Dam Water Spillage (Source: CARES Group Fieldwork 10 to 16 February 2024)

Site Code	Location	Temp (℃)	DO (mg/l)	pH	Turbidity (NTU)	EC (µS/cm)	TDS (mg/l)	Salinity (PSU)	Silicate (mg/l)	Phosphate (mg/l)	Nitrate (mg/l)
RTU	River Tordzi Upper	30.3	7.23	7.69	43.15	594.5	381	0.3	17.25	0.06	1.50
RTM	River Tordzi Mid	30.2	6.83	7.37	56.8	281	185	0.1	19.65	0.06	1.40
RTB	River Tordzi Bottom	30.3	5.83	8.29	30.4	1,205	789	0.6	9.80	0.04	1.15
KLC 1	Keta Lagoon Complex 1	33.9	7.22	7.55	43.3	596	186	13.7	2.50	0.02	0.85
KLC 2	Keta Lagoon Complex 2	32.2	6.58	7.47	18.65	23,050	14,600	13.8	7.75	0.815	5.65
KLC 3	Keta Lagoon Complex 3	33.2	6.86	7.91	23.6	22,700	14,100	13.6	3.60	0.13	1.15
HK	Havedzi Kedzi	30.6	6.28	6.27	34.5	46,600	28,300	30.1	3.30	0.02	1.10
HKM	Havedzi Kedzi Mid	31.7	6.89	7.65	21.7	39,100	23,900	25	5.60	0.02	1.15
HKS	Havedzi Kedzi Sea	31.2	6.84	7.13	27.45	46,600	33,500	34.4	2.65	0.03	1.30
AD	Adina Sea	29.1	6.59	7.29	17.85	46,700	31,100	34.4	1.45	0.02	1.00
KA	Kedzi Agota	30.6	7.81	7.65	20.8	47,200	28,800	29.2	6.95	0.04	1.00
KLE	Keta Lagoon East	31.9	6.67	7.40	35.75	52,200	34,400	34.4	13.40	0.03	1.30
AKS	Agota Kedzi Sea	32.5	7.52	7.83	28.1	47,800	28,700	29.1	1.40	0.04	1.40
DS	Denu Sea	30.2	8.80	7.77	26.2	45,450	28,400	34.5	1.50	0.20	1.15
ACU	Anyanui Creek Upper	33.5	7.85	7.50	16.2	454	315	0.3	7.35	0.07	2.30
ACM	Anyanui Creek Mid	34.2	7.69	7.57	24.35	12,300	8,700	8.8	4.30	0.03	1.80
ACL	Anyanui Creek Lower	30.6	7.34	7.80	30.35	32,600	20,100	24.4	2.30	0.03	0.90
WHO Limit		-	-	6.5-8.5	5	300-700	1,000	-	5-25	<0.3	10
NBL		-	7	7	5	700	1,000	-	-	<0.3	0.25

Table 6-6 - Physical Parameters – Pre Akosombo-Dam Water Spillage
(Source: Keta Water Project & Coastal Wetlands Management Project Reports (2022 & 2021)

Site Code	Location	Temp (℃)	DO (mg/l)	pH	Turbidity (NTU)	EC (µS/cm)	TDS (mg/l)	Salinity (ppt)	Silicate	Phosphate (PO4)	Nitrate (NO3-N)
S1	Freshwater Sites	29.4	3.43	7.31	1.49	70	46	0	4.22	0.04	0.45
S2	Lower Volta (Agordome)	29.4	3.57	7.21	1.49	69	45	0	5.21	0.04	0.66
S3		29.4	5.21	7.22	0.71	70	46	0	3.12	0.05	0.82
S4		29.4	5.49	7.35	0.71	70	46	0	2.01	0.06	0.86
ACU	Anyanui Creek Upstream	29.8	4.52	7.8	7.34	13,530	7,564	5.2	3.11	0.12	1.34
ACL	Anyanui Creek Downstream	30.1	4.77	7.7	11.2	29,760	16,250	9.6	3.18	0.14	2.85
KLC	Keta Lagoon Complex	30.2	4.82	7.6	20.2	26,402	14,250	8.8	7.12	0.34	1.92
KLE	Keta Lagoon East	30.6	5.11	7.9	24.8	48,560	25,120	23.6	14.20	0.32	1.26
AD	Adina Sea	31.4	5.12	8.1	10.2	45,450	23,629	32.8	1.20	0.05	0.44
WHO Limit*		-	-	6.5-8.5	5	700	1,000	1,000	-	<0.3	10
NBL*		22-29	7	7	5	50-300	-	-	-	-	-

WHO – World Health Organisation, 1996

NBL – Natural Background Level

* Source: Lester and Birkett, 1999; Akpabli and Drah, 2001.

6.1.9.3. Water Quality Results

Table 6-5 presents the values of physico-chemical parameters of all the water samples in the study area compared with Natural Background Level (NBL) and World Health Organization (WHO) Standards.

The surface water temperatures were normal at all sampling stations for the pre-spillage regime. However, for post-spillage, there was a marked difference compared with the natural background level of 22–29 °C for tropical surface waters. The relatively high temperature recorded for post-spillage is most likely due to the recent high temperatures recorded across the country.

The pH of the water for both regimes were stable and fell well within the WHO permissible level of 6.5 - 8.5 and NBL of 7. According to the EPA (2002), the safe range of pH should be between 5.0 and 9.0 for freshwater aquatic life, between 6.0 and 9.0 for domestic use, and between 6.5 and 9.0 for fisheries and aquaculture.

The level of turbidity for the post- spillage were very high compared to pre-spillage. EC and TDS for the freshwater were within the WHO acceptable limits for both pre-spillage and post-spillage. Relatively high EC was recorded for both brackish waters and marine waters, which is typical of coastal waters. The concentrations of DO were good for aquatic life, with the amount of DO in any given water body a good indicator of water quality as the right amount of DO is essential for the survival of aquatic life. The average DO that was recorded for both regimes were within acceptable limits. The concentration of nutrients (nitrate & phosphate) are indicators of water pollution. However, the nutrient concentrations were below the WHO limit.

The Keta Lagoon and its catchment areas are characterised by intensive agriculture with the subsequent use of agro-chemicals and organic manure. Transport of nutrients from run-offs and through soil infiltration to the lagoonal and coastal waters increase the risk of eutrophication, thereby potentially reducing the water quality of the lagoon and the freshwater aquifers (SIIPS, 2021).

It should be noted that the Post-Akosombo Spillage data gathering was undertaken 10 to 16 February 2024, which was relatively soon after the exceptional events associated with the controlled spillage at the Akosombo and Kpong Dams (which took place September and October 2023). Therefore, a monitoring programme may be needed in order to clearly define the baseline conditions.

6.1.9.4. Sediment Profile

Sediments have a significant impact on the ecological functioning of aquatic ecosystems. They serve as a food source for filter-feeding invertebrates (Schipper *et al*., 2008; Jiang *et al*., 2013) and as spawning grounds for various organisms (Prato *et al*., 2011). Nevertheless, a substantial influx of sediments can lead to ecological issues, including the suffocation of benthic eggs and larvae, decreased availability of light, and the discharge of related contaminants into the water column (Green and Coco, 2014). The sediment input into coastal harbours is influenced by natural causes such as tides and waves (Leys and Mulligan, 2011), the discharge of sediment from rivers (Akrasi, 2011), and human activities such as sand extraction (Kusimi and Dika, 2012).

As shown in Table 6-7 below, the sediment composition consists primarily of sand. When extracted from their natural habitats, both coarse and fine sediment can serve as effective measures to prevent sea erosion and sustain beaches.

Table 6-7 - Sediment Particle Size
(Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site Code	Location	Distribution %			Description
		Sand	Silt	Clay	
RTU	River Tordzi Upper	90	8	2	Moderately Well-Sorted Coarse Sand
RTM	River Tordzi Mid	88	10	2	Well-Sorted Coarse Sand
RTB	River Tordzi Bottom	84	13	3	Bimodal, Well-Sorted Coarse Sand
KLC 1	Keta Lagoon Complex 1	80	15	5	Bimodal, Moderately Sorted Coarse Sand
KLC 2	Keta Lagoon Complex 2	82	15	3	Moderately Well Sorted Coarse Sand

Site Code	Location	Distribution %			Description
		Sand	Silt	Clay	
KLC 3	Keta Lagoon Complex 3	81	14	5	Moderately Well Sorted Coarse Sand
HK	Havedzi Kedzi	74	18	8	Moderately Sorted Medium Sand
HKM	Havedzi Kedzi Mid	72	18	10	Moderately Sorted Medium Sand
HKS	Havedzi Kedzi Sea	74	18	8	Moderately Sorted Coarse Sand
AD	Adina Sea	88	6	6	Coarse Sand, Poorly Sorted
KA	Kedzi Agota	76	15	9	Moderately Sorted Medium Sand
KLE	Keta Lagoon East	70	22	8	Moderately Sorted Very Fine Sand
AKS	Agota Kedzi Sea	85	10	5	Coarse Sand, Moderately Sorted
DS	Denu Sea	80	10	10	Coarse Sand, Moderately Sorted
ACU	Anyanui Creek Upper	73	18	9	Moderately Sorted Very Fine Sand
ACM	Anyanui Creek Mid	70	22	8	Moderately Sorted Very Fine Sand
ACL	Anyanui Creek Lower	81	15	4	Well-Sorted, Coarse Sand

Table 6-8 below shows the level of heavy metals recorded in the sediments. The heavy metals concentrations in all the sediments evaluated were below the revised Australian and New Zealand Guidelines for Fresh and Marine Water Quality released in 2000 (Australian and New Zealand Environment and Conservation Council (ANZECC) / Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000).

Table 6-8 - Results of Selected Heavy Metals in Sediments
(Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site Code	Location	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Cr (mg/kg)	Cd (mg/kg)
RTU	River Tordzi Upper	0.23	<0.001	<0.0001	<0.0001	0.002
RTM	River Tordzi Mid	1.04	<0.001	<0.0001	<0.0001	0.001
RTB	River Tordzi Bottom	1.22	<0.001	<0.0001	<0.0001	0.002
KLC 1	Keta Lagoon Complex 1	0.88	0.003	<0.0001	<0.0001	0.024
KLC 2	Keta Lagoon Complex 2	0.64	0.041	<0.0001	<0.0001	0.032
KLC 3	Keta Lagoon Complex 3	0.44	0.044	<0.0001	<0.0001	0.012
HK	Havedzi Kedzi	<0.01	<0.001	<0.0001	<0.0001	0.001
HKM	Havedzi Kedzi Mid	<0.01	<0.001	<0.0001	<0.0001	0.001
HKS	Havedzi Kedzi Sea	<0.01	<0.001	<0.0001	<0.0001	0.001
AD	Adina Sea	<0.01	0.011	<0.0001	<0.0001	0.003
KA	Kedzi Agota	0.22	0.081	<0.0001	<0.0001	0.023
KLE	Keta Lagoon East	0.21	<0.001	<0.0001	<0.0001	0.001
AKS	Agota Kedzi Sea	<0.01	<0.001	<0.0001	<0.0001	0.081
DS	Denu Sea	<0.01	0.003	<0.0001	<0.0001	0.001
ACU	Anyanui Creek Upper	0.19	0.121	<0.0001	<0.0001	0.015
ACM	Anyanui Creek Mid	0.16	0.033	<0.0001	<0.0001	0.014
ACL	Anyanui Creek Lower	0.18	0.032	<0.0001	<0.0001	0.012
ANZECC / ARMCANZ, 2000		**65**	**50**	**0.15**	**-**	**1.5**

6.1.9.5. Aquatic Macrophytes

Diversity of Aquatic Macrophytes encountered in the field (Post Akosombo Dam Water Spillage) is presented in Table 6-9.

Table 6-9 - Plants / Trees Identified at the Sampling Locations (Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site Code	Location	Description of Aquatic plants at Sample Location
RTU	River Tordzi Upper	Dominant reed noted around this area is the (*Typha domingensis*) and a few neem trees (*Azadirachta indica*) around the area.
RTM	River Tordzi Mid	Dominant reed around this area is the (*Typha domingesis*), a few neem trees (*Azadirachta indica*) around the area, and farmland on the side.
RTB	River Tordzi Bottom	A variety of aquatic plants, including forbs (*Sessuvium portulalcastrum*), grasses (*Pasplaum v*aginatum, *Sporobolus virginicus*), sedges (*Cyperus articulatus*), and reeds (*Typha domingesis*), are thriving in this region.
KLC 1	Keta Lagoon Complex 1	Succulent forbs (*Sessuvium portulalcastrum*), herbaceous bushes (*Ipomoea pescaprae*) and white mangroves (*Avicenia germinans*) with an average height of 5 metres and girth of 6 cm were observed along the beach.
KLC 2	Keta Lagoon Complex 2	The inlet pathway of the bridge is surrounded by perennial vegetation (*Ipomoea pescaprae*) and succulent forbs (*Sessuvium p*ortulalcastrum).
KLC 3	Keta Lagoon Complex 3	The coastal region is primarily inhabited by succulent forbs (*Sessuvium portulalcastrum*) and perennial vegetation (*Ipomoea pescaprae*), which are dominant grass species.
HK	Havedzi Kedzi	The dominant vegetation along the littoral of this region consists of succulent forbs (*Sessuvium portulalcastrum*) and herbaceous shrub (*Ipomoea pescaprae*).
HKS	Havedzi Kedzi Sea	Coconut (*Cocos nucifera*): about 120 trees planted along 200 m transect on the beach; succulent forb (*Sessuvium portulalcastrum*); and herbaceous shrubs (*Ipomoea pescaprae*) covering about 200 square metres.
AD	Adina Sea	Coconut (*Cocos nucifera*): about 1000 trees planted along a 1 km stretch of beach
KLE	Keta Lagoon East	A limited quantity of punctia spp., grass (Typha domingesis), and white mangrove (*Avicenia germinans*) are present.
AKS	Agota Kedzi Sea	Coconut (*Cocos nucifera*): about 100 found on the sandy beach; a few patches of succulent forb (*Sessuvium portulalcastrum*) and herbaceous shrub (*Ipomoea pescaprae*) covering a few square metres
DS	Denu Sea	Coconut (*Cocos nucifera*): about 800 trees planted along a 1 km stretch of beach
ACU	Anyanui Creek Upper	There are large numbers of white mangroves (*Avicenia germinans*) on both sides of the creek, with an average height of 7 metres from the ground and a girth of 7 cm.
ACM	Anyanui Creek Mid	There are large numbers of white mangroves (*Avicenia* germinans) on both sides of the creek, with an average height of 7 metres from the ground and a girth of 7 cm.

Site Code	Location	Description of Aquatic plants at Sample Location
ACL	Anyanui Creek Lower	There are large numbers of white mangroves (*Avicenia germinans*) on both sides of the creek, with an average height of 7 metres from the ground and a girth of 7 cm.

A total of thirteen species of aquatic macrophytes were identified during the survey in the freshwater and brackish water ecosystem areas. This is presented in Table 6-10. The dominant plant being the invasive aquatic plant *Eichhornia crassipes* and *Typha domingensis.*

Table 6-10 - Inventory of Aquatic Plants at Project Site (Pre Akosombo Dam Water Spillage)

S/No	Species	Family	Growth Form
1	*Ceretophyllum demersum*	Ceratophyllaceae	Submerged
2	*Eichhornia crassipes*	Pontederiaceae	Emergent
3	*Ipomoea asarifolia*	Convolvulacea	Emergent
4	*Neptunia oleracea*	Fabaceae	Emergent
5	*Polygonum lanigarum*	Polygonaceae	Emergent
6	*Polygonum senegalense*	Polygonaceae	Emergent
7	*Pistia stratiotes*	Araceae	Free-Floating
8	*Salvinia nymphellula*	Salviniaceae	Free-Floating
9	*Typha domingensis*	Typhaceae	Emergent
10	*Utricularia inflexa*	Lentibularitaceae	Submerged
11	*Vossia cuspidata*	Poaceae	Emergent
12	*Vallisneria spirallis*	Hydrocharitaceae	Emergent
13	*Avecinnia africana*	Avicenniaceae	

It was further observed that the submerged vegetation *Ceretophyllum demersum* has formed extensive beds in the shallow areas of about 1- 2 m depth. *Vallisneria spirallis* was also observed as forming a thick green carpet on the substratum.

Figure 6-45 through to Figure 6-64 presents flora identified during the fieldwork at the various sampling locations.

Figure 6-45 - Flora at Anyanui Creek Upper (ACU)

Figure 6-46 - Flora at Lagoon Complex 3 (KCL3)

Figure 6-47 - Flora at Keta Lagoon East (KLE)

Figure 6-48 - Flora at Keta Lagoon Complex 1 (KCL1)

Figure 6-49 - Flora at Kedzi Agorta Lagoon (KAL)

Figure 6-50 - Flora at Keta Lagoon Complex 2 (KLC2)

Figure 6-51 - Flora at Keta Lagoon Complex 2 (KCL2)

Figure 6-52 - Flora at Kedzi Agorta Lagoon (KAL)

Figure 6-53 - Flora at River Tordzi Bottom (RTB)

Figure 6-54 – Flora at River Tordzi Bottom (RTB)

Figure 6-55 - Flora at Keta Lagoon Complex

Figure 6-56 - Flora at Keta Lagoon Complex

Figure 6-57 - Flora at the Beach

Figure 6-58 - Flora at the Beach

Figure 6-59 - Flora at River Tordzi Mid (RTM)

Figure 6-60 - Flora at River Tordzi Mid (RTM)

Figure 6-61 - Flora at River Tordzi Mid (RTM)

Figure 6-62 - Flora at River Tordzi Mid (RTM)

Figure 6-63 - Flora at River Tordzi Bottom (RTB)

Figure 6-64 - Flora at River Tordzi Bottom (RTB)

6.1.9.6. Macro-Invertebrate Community

In a lotic environment, aquatic insects are an important element in the ecological dynamics, playing an important role in the cycle of material and in trophic transfer (Maneechan *et al*., 2015). Generally, the macro invertebrate diversity at the locations were similar, and does not show any marked variations in terms of abundance (Table 6-11). By composition, the aquatic insects for pre-spillage were dominated by Diptera (Oligochaetes) and Ephemeroptera.

A total number of 12 taxa was identified and a total of 263 individual macroinvertebrates were counted. Most Mayflies (Ephemeroptera) are sensitive to pollution. Therefore, the relatively high abundance of empheroptera at the sites is an indication of good water quality. However, different communities of macroinvertebrates were observed for the post-water spillage, which are predominantly chironomids, oligochaetes, and gastropods (Table 6-11). This is an indication of low to medium pollution of the water.

Table 6-11 - Occurrence, Abundance and Distribution of Macroinvertebrates (Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site	Taxa	Count
Upstream	Oligochaeta spp.	24
	Hemiptera	4
	Dytiscidae	5
	Ephemeroptera	19
	Odonata nymph	3
	Shrimp (Mysida)	4
	Tricorythidae	3
	Hemiptera	5
	Juvenile fish	3
	Total Number of Specimen	**67**
	Total Number of Taxa	**9**
Midstream (intake point)	Oligocheata	50
	Hydropsychidae	9
	Dytiscidae	9
	Ephemeroptera	9
	Prawns (Mysida)	17
	Gerridae	1
	Hydropsychidae	3
	Total Number of Specimen	**98**
	Total Number of Taxa	**7**
Downstream	Oligochaeta spp	24
	Gerridae	13
	Baetidae	12
	Ephemeroptera	33
	Crab	1
	Shrimp (Mysida)	15
	Total Number of Specimen	**98**
	Total Number of Taxa	**6**

The abundance and distribution of the main macro-invertebrates species post spillage are presented in Table 6-12. In the Keta Lagoon, the most commonly encountered species was the oligochaetes followed by polychaetes.

Table 6-12 - Occurrence, Abundance and Distribution of Macroinvertebrates at Sample Sites (Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site Code	Location	Taxa	Count	% Occurrence
RTU	River Torgi Upper	Naticidae	1	0.5
		Oligochaeta	4	
		Eulimidae	1	
		Donacidae	1	
		Total Taxa	**7**	
RTM	River Torgi Mid	Pleuroceridae (Goniobasis)	2	0.6
		Chironomidae	4	
		Oligochaeta	2	
		Total Taxa	**8**	
RTB	River Torgi Bottom	Copepoda	40	6.3
		Cladocera	14	
		Hydracarnia	4	
		Baetidae	11	
		Belostomidae	14	
		Total Taxa	**83**	
KLC 1	Keta Lagoon Complex 1	Tellinidae	3	19.3
		Donacidae	79	
		Oligochaeta	105	
		Polychaeta	59	
		Columbellidae	2	
		Total Taxa	**255**	
KLC 2	Keta Lagoon Complex 2	Oligochaeta	42	8.9
		Polychaeta	60	
		Donacidae	15	
		Total Taxa	**117**	
KLC 3	Keta Lagoon Complex 3	Donacidae	16	8.8
		Oligochaeta	49	
		Polychaeta	51	
		Total Taxa	**116**	
HK	Havedzi Kedzi	Donacidae	42	7.6
		Potamididae	4	
		Turritellidae	6	
		Oligochaeta	28	
		Polychaeta	20	
		Total Taxa	**100**	
HKM	Havedzi Kedzi Sea	Potamididae	2	10.5
		Turritellidae	8	
		Donacidae	51	
		Polychaeta	38	
		Oligochaeta	39	
		Gammaridae	1	
		Total Taxa	**139**	
HKS	Havedzi Kedzi Sea	Donacidae	60	12.6
		Potamididae	6	
		Turritellidae	9	
		Oligochaeta	50	
		Polychaeta	40	
		Hirudinea	1	
		Total Taxa	**166**	
AD	Adina Sea	nil		

Site Code	Location	Taxa	Count	% Occurrence
KA	Kedzi Agota	Polychaeta	23	3.9
		Oligochaeta	11	
		Donacidae	17	
		Potamididae	1	
		Total Taxa	**52**	
KLE	Keta Lagoon East	Donacidae	66	15.6
		Oligochaeta	52	
		Polychaeta	88	
		Total Taxa	**206**	
AKS	Agota Kedzi Sea	nil		
DS	Denu Sea	nil		
ACU	Anyanui Creek Upper	Gerridae	12	3.4
		Baetidae	7	
		Ephemeroptera	23	
		Crab	3	
		Total Taxa	**45**	
ACM	Anyanui Creek Mid	Shrimp (Mysida)	4	0.8
		Oligochaeta spp	2	
		Coleoptera	4	
		Total Taxa	**10**	
ACL	Anyanui Creek Lower	Aquatic earthworm	3	1.2
		Oligochaeta spp	6	
		Giant water bugs	5	
		Non-biting midges	2	
		Total Taxa	**16**	
Total Number of Specimen for all Locations			**1,320**	**100**

6.1.9.7. Zooplankton Community

The composition of zooplankton species was comparable at most of the sites; therefore, the introduction of invasive species into the area by seawater from one environment to another will not have a significant ecological impact on the port or the environment. The results are presented in Table 6-13 below.

Table 6-13 - Zooplankton Taxa Abundance and Distribution (Post Akosombo Dam Spillage 10 to 16 February 2024)

Site Code	Taxa	Count
RTU	Bacillariophyta	4
	Euglenophyta	2
	Cyanophyta	12
	Chlorophyta	12
RTM	Bacillariophyta	3
	Euglenophyta	2
	Cyanophyta	10
	Chlorophyta	15
RTB	Bacillariophyta	4
	Euglenophyta	2
	Cyanophyta	12
	Chlorophyta	17
KLC 1	Bacillariophyta	20
	Dinophyta	7
	Cyanophyta	2
	Chlorophyta	1

Site Code	Taxa	Count
HKS	Bacillariophyta	19
	Dinophyta	10
	Cyanophyta	2
	Chlorophyta	1
AD	Bacillariophyta	20
	Dinophyta	9
	Cyanophyta	2
	Chlorophyta	1
KA	Bacillariophyta	22
	Dinophyta	8
	Cyanophyta	1
	Chlorophyta	1
AS	Bacillariophyta	19
	Dinophyta	10
	Cyanophyta	2
	Chlorophyta	1

Site Code	Taxa	Count
KLC 2	Bacillariophyta	16
	Dinophyta	11
	Cyanophyta	2
	Chlorophyta	1
KLC 3	Bacillariophyta	20
	Dinophyta	7
	Cyanophyta	2
	Chlorophyta	1
HK	Bacillariophyta	19
	Dinophyta	8
	Cyanophyta	2
	Chlorophyta	1
HKM	Bacillariophyta	19
	Dinophyta	9
	Cyanophyta	2
	Chlorophyta	1

Site Code	Taxa	Count
DS	Bacillariophyta	19
	Dinophyta	9
	Cyanophyta	2
	Chlorophyta	1
ACU	Bacillariophyta	19
	Dinophyta	8
	Cyanophyta	2
	Chlorophyta	1
ACM	Bacillariophyta	20
	Dinophyta	8
	Cyanophyta	2
	Chlorophyta	1
ACL	Bacillariophyta	17
	Dinophyta	11
	Cyanophyta	2
	Chlorophyta	1

6.1.9.8. Phytoplankton Abundance

The post-dam spillage revealed dominance of only five taxa of phytoplankton, namely *Bacillariophyta, Euglenophyta, Chlorophyta, Chlorophyta and Dinophyta.* Bacillariophyta was the dominant species. Details of taxa abundance is shown in Table 6-14.

Table 6-14 - Phytoplankton Abundance
(Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Code	Phytoplankton Diversity	Count
RTU	Bacillariophyta	4
	Euglenophyta	2
	Cyanophyta	12
	Chlorophyta	12
RTM	Bacillariophyta	3
	Euglenophyta	2
	Chlorophyta	10
	Chlorophyta	15
RTB	Bacillariophyta	4
	Euglenophyta	2
	Chlorophyta	12
	Chlorophyta	17
KLC1	Bacillariophyta	20
	Dinophyta	9
	Chlorophyta	2
	Chlorophyta	1
KLC2	Bacillariophyta	20
	Dinophyta	7
	Chlorophyta	2
	Chlorophyta	1
KLC3	Bacillariophyta	20
	Dinophyta	78
	Chlorophyta	2
	Chlorophyta	1

Code	Phytoplankton Diversity	Count
AD	Bacillariophyta	20
	Dinophyta	9
	Chlorophyta	2
	Chlorophyta	1
KA	Bacillariophyta	22
	Dinophyta	8
	Chlorophyta	1
	Chlorophyta	1
KLE	Bacillariophyta	18
	Dinophyta	9
	Chlorophyta	2
	Chlorophyta	1
AS	Bacillariophyta	19
	Dinophyta	10
	Chlorophyta	2
	Chlorophyta	1
DS	Bacillariophyta	19
	Dinophyta	8
	Chlorophyta	9
	Chlorophyta	1
ACU	Bacillariophyta	19
	Dinophyta	8
	Chlorophyta	2
	Chlorophyta	1

Code	Phytoplankton Diversity	Count
HK	Bacillariophyta	19
	Dinophyta	10
	Chlorophyta	2
	Chlorophyta	1
HKM	Bacillariophyta	19
	Dinophyta	9
	Chlorophyta	2
	Chlorophyta	1
HKS	Bacillariophyta	19
	Dinophyta	10
	Chlorophyta	2
	Chlorophyta	1

Code	Phytoplankton Diversity	Count
ACM	Bacillariophyta	20
	Dinophyta	8
	Chlorophyta	2
	Chlorophyta	1
ACL	Bacillariophyta	17
	Dinophyta	11
	Chlorophyta	2
	Chlorophyta	1

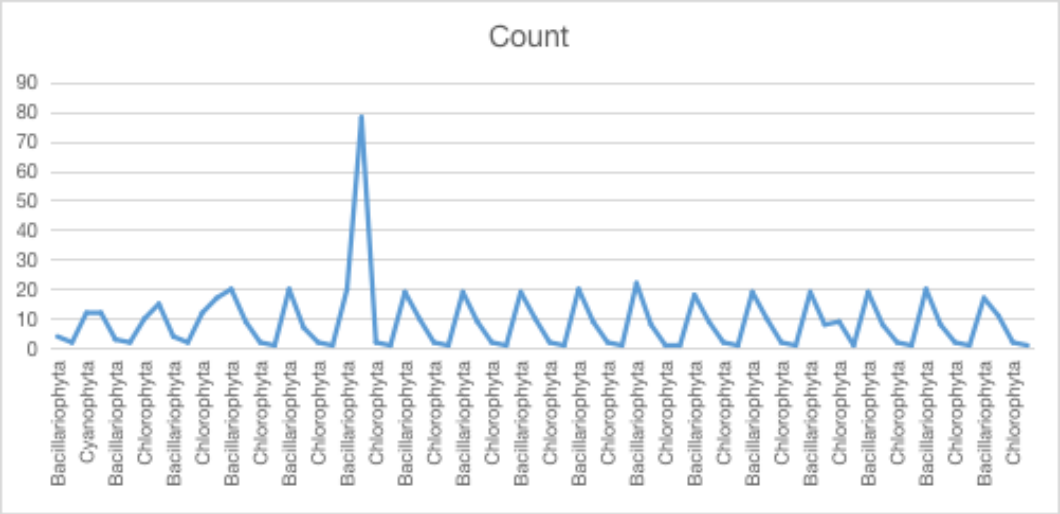

Figure 6-65 - Phytoplankton Abundance Across the Sample Locations (Source: CARES Group Fieldwork 10 to 16 February 2024)

6.1.9.9. Birds

The Keta Lagoon Complex Ramsar Site is ecologically important for the large numbers of waterbirds it supports. It accounts for over 59% of the bird populations that frequent the wetlands in Ghana - especially, coastal wetlands. It has a very high diversity of bird species (about 80% of all listed wetland bird species in Ghana).

The Keta Lagoon Complex Ramsar Site supports over 72 waterbird species with an estimated total population of well over 100,000 (Ramsar Sites Information Service, c2024) including globally significant numbers of 21 species. The site is particularly important for waders, supporting almost one third of the estimated East Atlantic Flyway population of *Tringa erythropus*. Other species which occur in large numbers at the site include *Calidris ferruginea*, *C. minuta, Himantopus himantopus.* The site is also known to have recorded the largest concentrations of ducks mainly White-faced tree duck *(Dondrocygna viduata)* as species for the local inhabitants. There are several heron and egret species as well. The highest population of Roseate tern *(Sterna dougalli)* the rare bird which was the genesis of the erstwhile Save the Sea shore Birds Project (SSBP) was recorded at Keta, (Ntiamoa-Baidu and Gordon, 1991). The most important parts of the lagoon for waterbirds are the Fiahor, Woe, Tegbi, Adina and Afiadenyigba sections (Tufour *et al.,* 1999*)*.

Birds encountered during post water spillage sampling locations were identified and documented using binoculars and expert knowledge. A total of 46 species of birds were counted (Table 6-15). No waterbird was seen at RTU, RTM, ACU, ACM and ACL sampling sites. Available data collected during pre-water spillage revealed a total of 39 species of birds, including waders such as heron, kingfisher and egrets. terns, and others.

Table 6-15 - Birds Identified
(Post Akosombo Dam Water Spillage. Source: CARES Group Fieldwork 10 to 16 February 2024)

Site	Waterbirds	Species
RTB	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
KLC 1	Curlew sandpiper	*Calidris ferruginea*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Little stint	*Calidris minute*
	Black-winged stilt	*Himantopus himantopus*
KLC 2	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Little stint	*Calidris minute*
	Black-winged stilt	*Himantopus himantopus*
KLC 3	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Black-winged stilt	*Himantopus himantopus*
HK	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Black-winged stilt	*Himantopus himantopus*
HKM	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Black-winged stilt	*Himantopus himantopus*
HKS	Terns	*Sterna sp*
	Egret	*Ardea alba*
AD	Terns	*Sterna sp*
	Egret	*Ardea alba*
KA	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Black-winged stilt	*Himantopus*
KLE	Curlew sandpiper	*Calidris ferruginea*
	Ringed plover	*Charadrius hiaticula*
	Greenshank	*Tringa nebularia*
	Spotted redshank	*Tringa erythropus*
	Black-winged stilt	*Himantopus*
AKS	Terns	*Sterna sp*
	Egret	*Ardea alba*
DS	Terns	*Sterna sp*
	Egret	*Ardea alba*

6.1.9.10. Fishery Resources

Comprehensive data on both pre-water spillage and post-water spillage on catch, value and effort of sampled canoes is reported as shown in Appendix A of the Baseline Ecology Report (provided in Annex B). The dominant

fishing gears used in the marine waters are beach seine, purse seine, and drift gill net, in preferential order. In the brackish water and freshwater areas traps and cast net fishing dominate.

The main difference between pre spill and post spillage is the shift to dominance of crustaceans (shrimps and crabs) in the brackish water catch. Post spillage fishers have caught and continue to catch large numbers of the blue swimming crab, *Callinectes amnicola* and *Callinectes pallidus*. Fishers have responded to the shift in species by designing new fishing traps and nets to catch these shrimps and crabs. Photographs are provided in Figure 6-37 through to Figure 6-44.

The dedicated interviews of fishers on the potential impact of the port construction and operation on their livelihoods is presented in Appendix B of the Baseline Ecology Report (provided in Annex B). Residents are generally in support of the project and in in expectation of immediate implementation.

6.1.9.11. Macro-Invertebrate

The macro-invertebrates of most commercial importance include the blue-legged lagoon crab *(Callinectes ammcola), Peneus notialis, Penaeus kerathurus* and *Parapenaeus atlanlica* all of which are found in the main lagoon waters. The land crab *Cardiosoma armcitum* are dominant on the flood plains while *Tympanotonus fuscalus* are common within the mangrove roots and on the mud flats (Tufour *et al.,* 1999*)*.

6.1.9.12. Mammals and Reptiles

The wetland is also a home to several species of common rodents: Common mouse *(Mus musciilus),* Common rat *(Rattus rattus),* Nile rat *(Mastomys)* and Giant rat *(Cricetomys gambianus).* Commercially important reptile inhabitants include Nile monitor *(Veranus nilolicus),* Graceful *chemeleon (Chemaeleo gracilis),* African python *(Python setae),* Royal python *(Python regius),* Puff adder *(Bitis arietans),* Green turtle *(Chelonia mydas),* marine turtles and manatees (Ameyaw-Akumfi *et. al.* 1998) (Tufour *et al.,* 1999*)*.

6.1.10. Air Quality and Noise Nuisance

A standalone report on the baseline air and noise environment is provided in Annex C. A summary of this report along with other relevant information is provided in the following subsections.

The proposed port location and its environs are devoid of major industrial or construction activities. The major and common human activities undertaken at the project site towards the sea is fishing, beach soccer, and leisure, and towards the lagoon is fishing. Movement of vehicles occurs intermittently on the paved access roads to the project site. Windblown dust from the sandy beach was also observed during the field visits. Air pollution and noise nuisance is not a major issue at the project site. However, the Keta town could experience occasional elevated noise due to commercial activities, vehicular movements and human activities.

The ambient air quality and noise level characteristics at seven selected sites within the proposed Port of Keta Project AoI were assessed on 11 March 2024 and 12 March 2024, which is within the dry season of the country. The location of the seven sites are presented in Figure 6-66, whilst the results are presented in Table 6-16, Table 6-18, and Table 6-19.

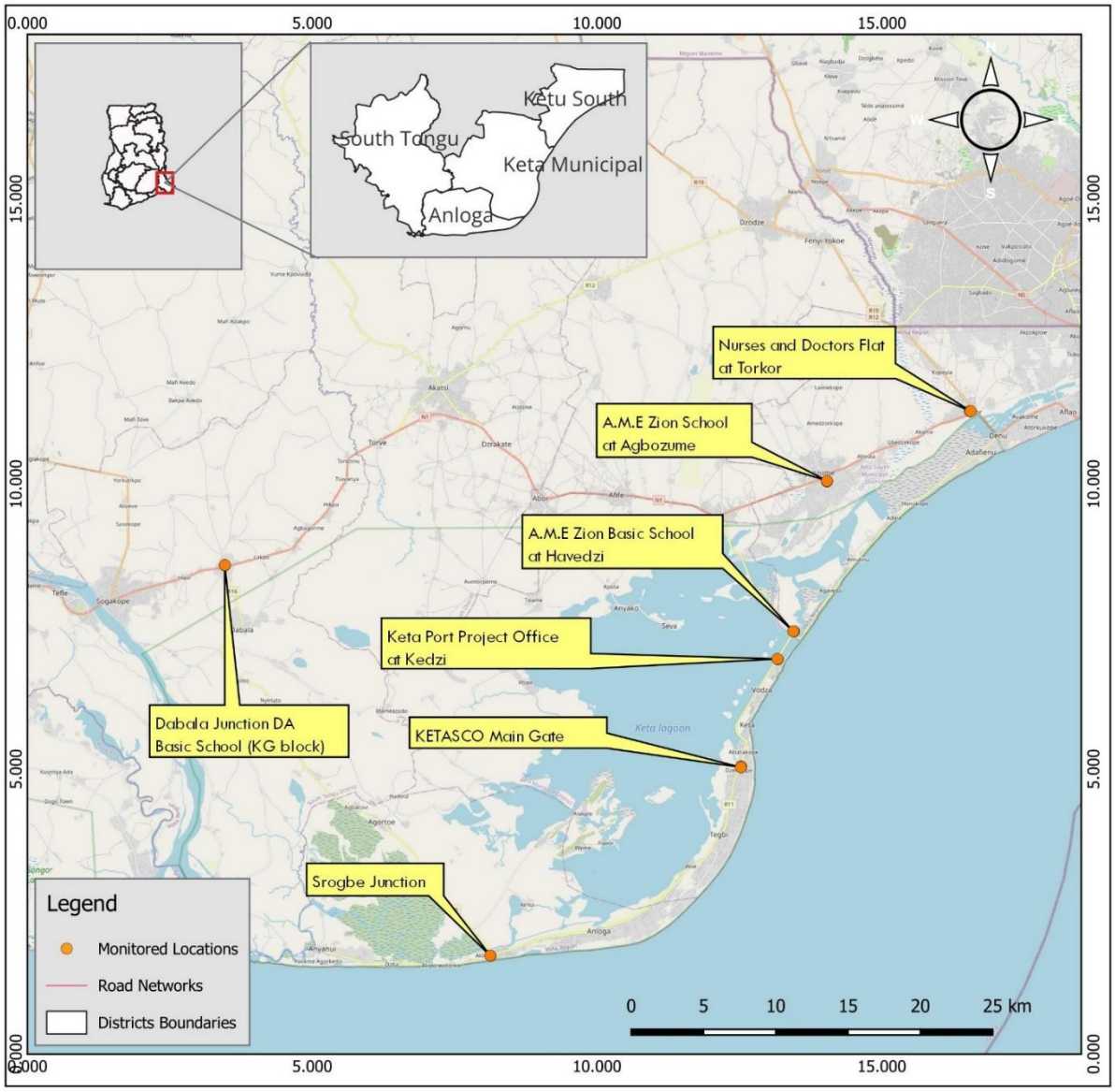

Figure 6-66 - Ambient Air Quality and Noise Monitoring Locations

6.1.10.1. Particulate Matter and Noxious Gases

Table 6-16 presents the results for ambient air quality, as sampled on the 11 March 2024 and 12 March 2024. The following conclusions can be made with regards to particulate matter and noxious gases:

- The concentrations of dust (Total Suspended Particulate (TSP), PM_{10} and $PM_{2.5}$) were below the Ghana Standard (GS) values of 150µg/m^3 for TSP, 70µg/m^3 for PM_{10} and 35µg/m^3 for $PM_{2.5}$ at Dabala Junction DA Basic School (KG block), Nurses and Doctors Flat at Torkor and AME Zion Basic School at Havedzi.
- TSP recorded concentrations ranging from 72.4µg/m^3 at AME Zion Basic School at Havedzi to 396.4µg/m^3 at the KETASCO Main Gate compared with the GS value of 150.0µg/m^3 for a 24-hour averaging time.
- PM_{10} recorded concentrations ranging from 53.4µg/m^3 at AME Zion Basic School at Havedzi to 134.9µg/m^3 at the KETASCO Main Gate compared with the GS value of 70.0µg/m^3 for a 24-hour averaging time.
- $PM_{2.5}$ recorded concentrations ranging from 15.6µg/m^3 at AME Zion Basic School at Havedzi to 36.9µg/m^3 at the AME Zion School at Agbozume compared with the GS value of 35.0µg/m^3 for a 24-hour averaging time.
- SO_2 recorded concentrations was 0.000mg/m^3 at all the monitoring locations except at AME Zion Basic School at Havedzi which recorded a value of 8.333µg/m^3, Srogbe Junction which recorded a value of 0.018µg/m^3 and

at KETASCO Main Gate which recorded a value 0.006µg/m³ compared with the GS value of 50.0µg/m³ for a 24-hour averaging time and they were all below the GS value.

- NO_2 recorded concentrations ranging from 0.000µg/m³ at Nurses and Doctors Flat at Torkor to 8.689µg/m³ at the AME Zion School at Agbozume compared with the GS value of 150.0µg/m³ for a 24-hour averaging time and they were all below the GS value.
- CO concentration was 0.00mg/m³ at all the monitoring locations compared with the GS value of 30.0mg/m³ for a 1-hour averaging time and they were all below the GS value.

Table 6-16 - Results for Ambient Air Quality (Sampled 11th and 12th March, 2024)

No.	Sampling Site	TSP / (µgm^{-3})	PM_{10} / (µgm^{-3})	$PM_{2.5}$ / (µgm^{-3})	NO_2 / (µgm^{-3})	SO_2 / (µgm^{-3})	CO / (mgm^{-3})
1	Dabala Junction DA Basic School (KG block)	72.9	54.2	18.3	6.048	0.000	0.000
2	AME Zion School at Agbozume	250.4	126.8	36.9	8.689	0.000	0.000
3	Nurses and Doctors Flat at Torkor	82.9	54.3	24.4	0.000	0.000	0.000
4	AME Zion Basic School at Havedzi	72.4	53.4	15.6	0.001	8.333	0.000
5	KETASCO Main Gate	396.4	134.9	22.6	0.001	0.006	0.000
6	Srogbe Junction	194.8	107.5	18.8	8.010	0.018	0.000
7	Keta Port Project Office at Kedzi	93.4	72.1	23.4	3.167	0.000	0.000
GS 1236:2019 - Ambient Air Pollutants		150.0*	70.0*	35.0*	150.0*	50.0*	10.0**
* 24 hours averaging time **8-hour averaging time							

6.1.10.2. Noise Levels

Table 6-18 presents results for daytime noise levels sampled on 11 March 2024 and 12 March 2024, whilst Table 6-19 presents nighttime noise levels sampled on 11 March 2024 and 12 March 2024. The following conclusions can be reached with regards to the noise levels:

- Generally, the equivalent noise levels were all below the GS value of 60dB(A) and 55dB(A) for Mixed Use areas for daytime and night-time respectively except at the Dabala Junction DA Basic School (KG block), KETASCO main gate and Srogbe junction which recorded values of 61.4dB(A), 66.7dB(A), 65.5dB(A) respectively during the daytime and at AME Zion Basic School at Havedzi and KETASCO main gate with both recording a value of 58.0dB(A) during the night-time.
- The equivalent noise levels for the daytime ranged from 52.6dB(A) at Keta Port Project Office at Kedzi to 66.7dB(A) at the KETASCO main gate and that for the night-time ranged from 39.3dB(A) at Nurses and Doctors Flat at Torkor to 58.0dB(A) at AME Zion Basic School at Havedzi and KETASCO main gate.
- The least noise level recorded for the daytime was at the Keta Port Project Office at Kedzi with a value of 34.1dB(A) and that for the night-time was at Nurses and Doctors Flat at Torkor with a value of 27.9dB(A) while the highest for the daytime was 87.9dB(A) at the KETASCO Main Gate and that of the night-time was 77.3dB(A) at the KETASCO Main Gate and could be attributed to noise emanating from vehicles / motorbikes that ply the main road.

Table 6-17 - Legend for Table 6-18 and Table 6-19

Legend:	
L_{EQ}	Equivalent Sound Level representing the average integrated sound level accumulated during the sampling period.
L_{MAX}	Maximum Sound Level obtained during the sampling period

Legend:	
L_{MIN}	Minimum Sound Level obtained during the sampling period
L_{10}	Nuisance noise level during the sampling period
L_{50}	Average noise level recorded during the sampling period
L_{90}	Background noise level recorded during the sampling period

(Source: GSA, 2018a)

Table 6-18 - Results for Daytime Noise Levels
(Source: CARES Group Fieldwork 11th and 12th March 2024 - Measurements done in line with GS 1253:2018)

No.	Sampling Site	Noise Level / dB(A)					
		L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
1	Dabala Junction DA Basic School (KG block)	61.4	79.4	43.8	67.3	64.3	54.8
2	AME Zion School at Agbozume	58.9	80.1	44.6	61.6	53.8	48.0
3	Nurses and Doctors Flat at Torkor	55.8	81.8	36.1	55.2	44.4	39.9
4	AME Zion Basic School at Havedzi	56.5	77.6	40.2	58.9	49.4	43.6
5	KETASCO Main Gate	66.7	87.9	49.2	68.8	61.1	53.8
6	Srogbe Junction	65.5	80.7	47.4	69.1	60.0	53.2
7	Keta Port Project Office at Kedzi	52.6	85.9	34.1	52.4	44.1	39.1
GS 1222:2018 (Mixed Use)		60.0	-	-	-	-	-

Table 6-19 - Results for Nighttime Noise Levels
(Source: CARES Group Fieldwork 11th and 12th March, 2024 - Measurements done in line with GS 1253:2018)

No.	Sampling Site	Noise Level / dB(A)					
		L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
1	Dabala Junction DA Basic School (KG block)	44.2	63.3	33.3	45.2	38.2	34.7
2	AME Zion School at Agbozume	52.8	74.8	34.1	52.9	38.7	34.1
3	Nurses and Doctors Flat at Torkor	39.3	56.3	27.9	42.1	30.9	29.2
4	AME Zion Basic School at Havedzi	58.0	70.1	35.4	62.1	50.4	38.2
5	KETASCO Main Gate	58.0	77.3	37.3	61.4	48.4	41.9
6	Srogbe Junction	49.5	65.9	39.5	52.1	45.2	41.0
7	Keta Port Project Office at Kedzi	46.1	59.6	37.3	48.7	42.1	39.6
GS 1222:2018 (Mixed Use)		55.0	-	-	-	-	-

6.1.11. Environmental Challenges in the Coastal Communities

From the 2018- 2021 MTDP of Keta Municipal, the following are some major environmental challenges facing the municipality:

- Mangrove harvesting and degradation.
- Flooding and coastal erosion especially at Srogboe-Dzita-Anyanui stretch of the coastline.
- Soil infertility (salinity).
- Pollution from heat and smoke exposure during fish processing.
- Ocean acidification (carbon dioxide concentration in the atmosphere) Sand mining on the beaches (see Figure 6-81).
- Indiscriminate domestic liquid and solid waste disposal.

- Water pollution due to seepage of agro-chemicals, household and human waste into underground water sources.

6.2. Socio-Economic, Cultural and Institutional

A standalone report on the baseline socio-economic environment is provided in Annex D, whilst a standalone report on the baseline archaeology and cultural heritage is provided in Annex E. A summary of these reports along with other relevant information is provided in the following subsections.

6.2.1. Location and Size of Keta Municipality

The project site is located within the Keta Municipality in the Volta Region of Ghana (see Figure 6-67).

The Municipality lies within Longitudes 0.30E and 1.05W and Latitudes 5.45N and 6.005S. It is located east of the Volta estuary, about 160km to the east of Accra, off the Accra-Aflao main road. It shares common borders with Akatsi South District to the north, Ketu North and Ketu South Districts to the east, South Tongu District to the west and the Gulf of Guinea to the south. Out of the total surface area of 1,086km^2, approximately 362km^2 (about 30 percent) is covered by water bodies. The largest of these is Keta Lagoon, which is about 12 km at its widest section and 32km long.

6.2.2. Local Governance Structure of Keta Municipal Assembly (KeMA)

The Keta Municipal Assembly is the highest administrative and political authority in the District. The legislative and deliberative organ of the Assembly is made up of 32 elected Assembly Members including 1 Municipal Chief Executive (MCE) and a Member of Parliament. The 32 Assembly Members are made up 29 males and 3 females. There are also 10 government appointees which comprises of 8 males and 2 females.

The Members of Parliament and the MCE are non-voting members of the General Assembly. Keta hosts the Keta Constituency. There are 7 Zonal Councils and 22 electoral areas. The Presiding Member is the leader of the General Assembly.

An Executive Committee, chaired by the MCE performs the executive and administrative functions of the Assembly. The executive, however, excludes the Presiding Member (PM) of the Assembly and operates through the following mandated Sub-committees:

- Development Planning.
- Justice and Security.
- Works.
- Finance and Administration
- Social Service.

These sub-committees are responsible for deliberation on specific issues and submitting recommendations to the Executive Committee for onward submission to the General Assembly for ratification.

The Municipal Coordinating Director (MCD) heads the Directorate, and it is established to provide secretariat and advisory services to the Executive Committee (KeMA, c2024a).

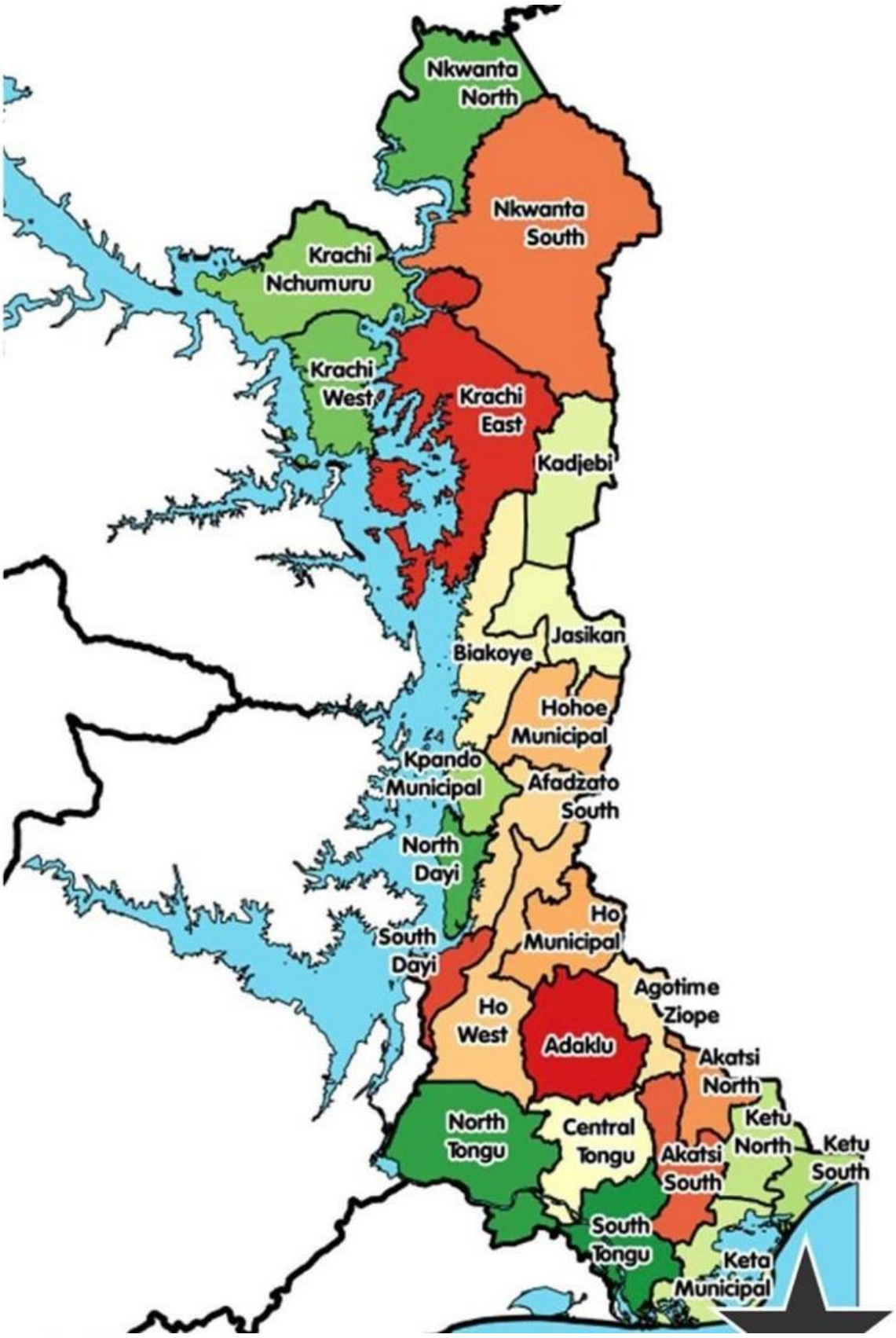

Figure 6-67 - Districts of Volta and Oti Regions
(Source: Wikipedia, 2012)

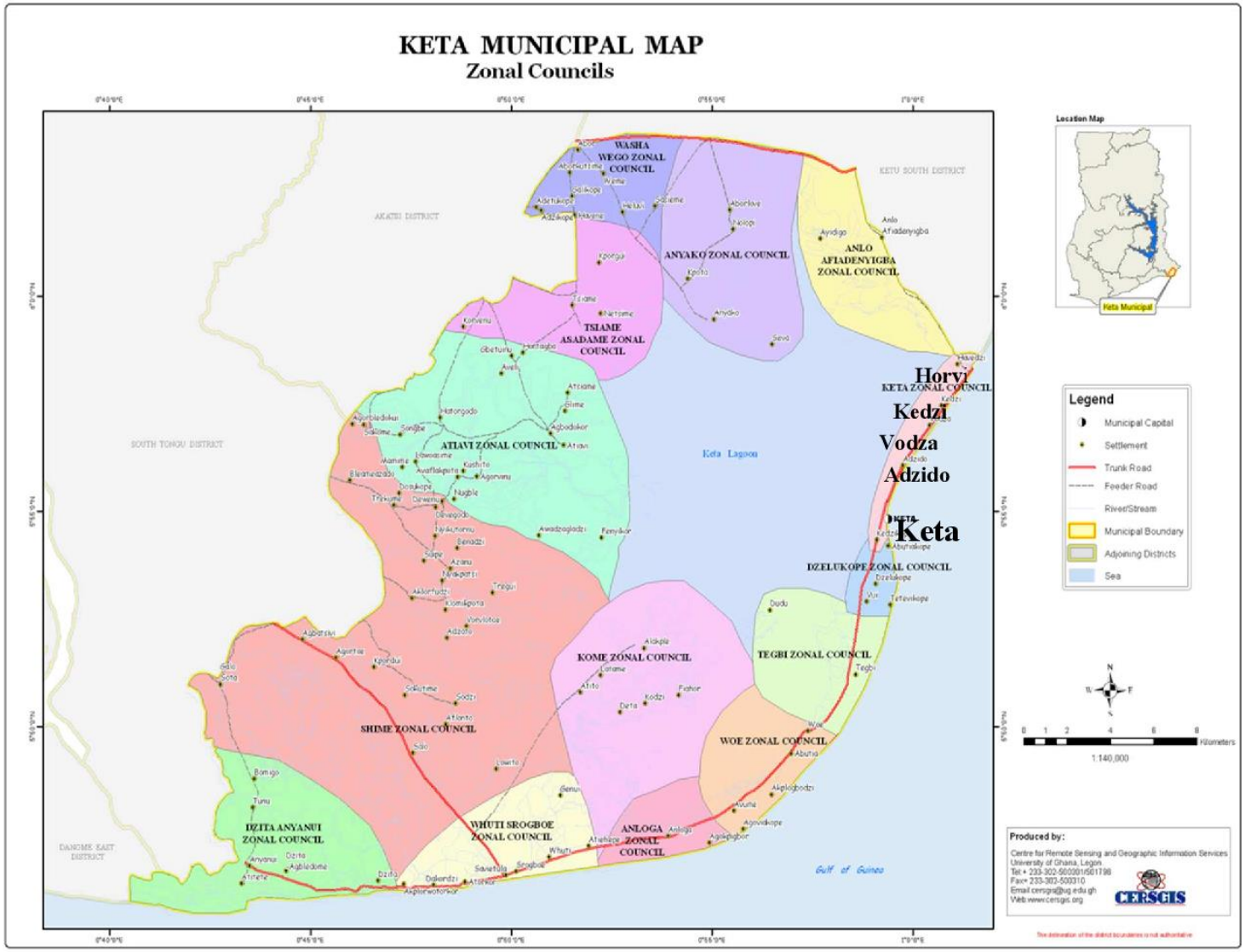

Figure 6-68 - Keta Municipal Map Showing Zonal Councils
(Source: Keta Municipal Assembly)

6.2.2.1. Decentralised Departments

Section 78 of the Local Governance Act, Act 936, spelt out the following decentralized departments that are supposed to exist: Central Administration; Finance; Education, Youth and Sports; Health; Agriculture; Physical Planning; Social Welfare and Community Development; Works, Disaster Prevention Department, Natural resources, Game and Wild Life Department, Feeder Roads and Urban Roads.

6.2.2.2. Sub-District Structures

The Municipal Assembly has fourteen (14) Zonal Councils namely Anloga, Keta, Dzelukope, Tegbi, Woe, Whuti-Srogboe, Dzita-Anyanui, Kome, Shime, Anyako, Tsiame-Asadame, Atiavi, Washa-Wego and Anlo-Afiadenyigba. These are presented in Figure 6-68.

6.2.3. Location of Project and Project Communities

The location of the proposed port specifically shares boundaries with communities of Kedzi, Havedzi. And Vodza, all within the KeMA. The project site is about 7.1km from the Keta, the Municipal capital of KeMA.

KeMA established by Legislative Instrument (LI) 2371 of 2018 has Anloga District carved out of Keta. The Municipality lies within Longitudes 0.30E and 1.05W and Latitudes 5.45N and 6.005S. It is located east of the Volta estuary, about 160km to the east of Accra, off the Accra-Aflao main road. It shares common borders with Akatsi South District to the north, Ketu North and Ketu South Districts to the east, South Tongu and Anloga Districts to the west and the Gulf of Guinea to the south. Out of the total surface area of 446km^2, approximately 132km^2 (about 29.6 per cent) is covered by water bodies. The largest of these is Keta Lagoon, which is about 12km at its widest section and 32km long (KeMA, 2021).

Anecdotal information received from the tour guide of Fort Prinzenstein, who doubles as Assembly Member of Keta Central and a local historian**,** Keta has a history of a natural port in the colonial days, with a major southern sector market widely patronized in the 1800s to the early 1960s, with many companies and warehouses such as the Swanzea, GB Olivant, Batholomew, United Africa Company, etc. established in the area. However, major sea erosion destroyed coconut plantations and larger parts of the township, colonial buildings, warehouses, offices, administrative buildings, workers quarters, etc. In 1960 sea defences were constructed, but these did not stand the test of time. Between 1999 and 2003 the government of Ghana built an extensive sea defence project, with lands reclaimed from the lagoon and many households relocated to new homes built around Kedzi, Adzido and Vodza.

Agbotadua Kumassah, during the introductory meeting with the Dufia of Kedzi noted that the construction of the Tema port in 1962 led to waves of sea erosion hitting the Keta Township, and a rapid decline in business activities in the Keta Township. In 1970, the main road through the township was washed away, leading to the final abandonment of Keta township as a commercial / business enclave. These events led many to blame the Tema Harbour development as the final cause of the demise of Keta township through the worsening barrage of sea waves and erosion. A folk song dating back to the 1960s implicate the Tema harbour as such. The lyrics of the song read: “Harbor, ey, Tema Harbour ey, Harbour ya wo doa, tside Keta ey” (To with “Harbour ey, Tema harbour ey, Harbour that was built, water has displaced Keta ey”).

6.2.4. Socio-Cultural Structure

According to the Ghana Statistical Services (GSS) 2021 census the Keta Municipality has a homogenous population of ethnic Ewes constituting 95.8 percent while other ethnic groups constitute the remaining 4.1 percent. The municipality is part of Anlo Traditional Area made up of 36 states and headed by Torgbi Sri III, the Awoamefia of Anlo who serves as a symbol of Authority among all people in the Municipality. There are other chiefs with their own AoI who assist the Awoamefia in the promotion of peace and stability in the municipality. For example, the project specific site at Kedzi-Havedzi has a paramount chief designated as Dufia of Kedzi, Torgbi Joachim Acolatse V.

Similar to other African ethnic groups, the Anlo's have a bottom-up hierarchical social organization and chieftaincy system starting with the family unit. The same system is relied upon for grievance redress within the family, community and the Anlo state.

As summarised in Figure 6-69, the structure starts with 1) nuclear family with the man / father as the head; then to 2), the extended family where there is a known and designated clan head; then to 3) a community with no chieftaincy seat / title where the Hanua is the head; then to 4) the towns where there are Fiawo (multiple chiefs). Above the Fiawo is the Dufia (Chief of the Town) and above the Dufia is Paramount Chiefs as can be found in Aflao, Weta, etc. Then after the 4th layer with its sub-structures are the Awalorgowo (Wing Commanders – right, middle, left). Above the Awalorgowo is the Awadada (War Lord). Finally, above all these is the Awomefia (the Ultimate Ruler) of Anlo. All conflict cases go through the ladder and are often terminated before reaching far up the ladder.

Anlos Bottom-Up Hierarchical Social Organization and Cheiftancy System
1) Nuclear Family - with the man / father as the head. 2) Extended Family - with a known and designated clan head. 3) Community - with no chieftaincy seat / title where the Hanua is the head. 4) Towns - where there are Fiawo (Multiple Chiefs), and the Dufia (Chief of the Town). 5) Paramount Chiefs - found in Aflao, Weta etc. 6) Awalorgowo (Wing Commanders - Right, Middle, Left). 7) Awadada (War Lord). 8) Awomefia (Ultimate Ruler of Anlo).

Figure 6-69 - Summary of Anlo Bottom-Up Hierarchical Social Organization and Chieftaincy System

Cases related to intra community land disputes; river channels / pond disputes are brought directly to the court of the Awomefia. Paternity disputes are sent directly to the Awadada whilst other cases of alleged theft and other accusation cases can be settled through trial-by-ordeal (an African trial practice where incantations are made to an oracle where the guilty party is found by a spiritual means). Criminal cases are not dealt with at the courts of chiefs but by the police.

6.2.5. Festivals and Taboos

Every year in the first week of November, the people of Anlo gather at Anloga to celebrate Hogbetsotso Festival. The festival symbolizes the great exodus of Ewes from their ancestral home, Notsie, to their present abode around the 15th Century. The Hogbetsotso Festival, which is celebrated at Anloga, the traditional home of the Anlo's, attains a grand final with a durbar of Chiefs and people amidst pomp and pageantry on the first Saturday of every November.

Kedzi, Havedzi, and Horvi communities celebrate Norvikporgbeza every Easter to mobilize their communities towards peaceful coexistence, reconciliations, welfare, family reunions and development. During these festivals 'tsahloe' rites which entail purification of the land by collecting unwanted objects and dumping them at designated points outskirt of the communities are performed. The festivals are climaxed with rituals performed using cows, ram, fowls, and drinks to the gods. During these rituals, noise making, whistling, and roasting of dry corn are not allowed. Other general community taboos include; no fishing on Sundays, women not allowed to swim in the sea, washing of dirty and blackened pots in the sea is not allowed, no sweeping in the night (it brings bad spirits to the household), no sex in the bush / on bare floors / at the beaches, and insults are not allowed towards elders, chiefs, fetish priests and priestesses.

6.2.6. Religion

Practitioners of the traditional Anlo belief system have a strong spiritual attachment to the lagoon. It is believed that the lagoon has gods which must be worshiped if the people wish to get an abundant catch. One of the gods is called 'Gbele' where the people of Anlo Afiadenyigba once every year perform some rituals for the lagoon. Many

other taboos including women not being allowed to swim in the sea are observed. According to the 2021 Population and Housing Census, the most predominant religion in the municipality is Christianity (Catholic, Protestant, Pentecostal and Other Christian faiths), which constitutes about 69.5% of the population followed by traditional religion 18.1%; Islam constitutes 1.5% and other religions is 0.1%.

Per the results of CARES Group's baseline data collected from 328 respondents in 16 communities in Ketu South, Ketu North and Keta Municipality in February 2024 however, 76% of all respondents were Christians whilst 24% of them were Traditional African Religious believers. There are numerous shrines in the municipality. The significant ones are Yewe, Afa, Hogbato Nyigbla, Korku, Atigare, Blekete and Fofui. Most of these shrines came with the people from Notsie. Each of these cults has moral values which are of great significance to the followers. During the performance of Yeve rituals for example, all participants and observers must be naked from their torsos, be barefooted, wear no capes and permissions sought before pictures are taken and videos recorded.

6.2.7. Population / Demography

The 2021 population and housing census has the population of Keta Municipality to be 78,862 consisting of 36,986 (46.9%) males and 41,876 (53.1) females. This represents 4.8% of the total population of Volta Region, and 0.26% of Ghana. Out of this total, 47,968 (60.8%) are considered urban dwellers whiles 30,894 (39.2%) are considered rural dwellers. The Keta Municipal has a population density of about 177 persons per square kilometre and the population growth rate of the municipality is 2.5%. The number of households was 20,320 and the average households size was 1.2. The age-dependency ratio is 80 people in the dependent age groups for every 100 persons in the working ages, whereas for females there were 75 persons in the dependent age group for every 100 persons in the working ages.

6.2.8. Tourism

The Keta Municipality offers great potential for tourism development, which the Port of Keta aims to promote, with attractions including nesting of sea turtles (see Figure 6-70), quiet and sandy beaches (see Figure 6-71), the Keta Lagoon Complex Ramsar Site (with its creeks, mangrove forests, and lagoons), Fort Prinzenstein – a World Heritage Site, Atorkor Slave Market (see Figure 6-72), Anlo Military Headquarters, Cape St. Paul Lighthouse (see Figure 6-73), and lots of hotels and guesthouses.

Figure 6-70 - Sea Turtle Nesting on Coast

Figure 6-71 - Sandy Beach at Project Site

6.2.8.1. Keta Lagoon Complex Ramsar Site

The Keta Lagoon Complex Ramsar Site is the largest lagoon in Ghana and consists of a large area of open brackish water, floodplain and marshland. The site falls within the coastal savannah ecological zone of Ghana and its boundaries follow a catchment boundary and the Volta River to the west, which borders another Ramsar Site, the Songor Ramsar Site (no. 566) and Biosphere Reserve. Keta Lagoon is dominated by scrubland and extensive mangrove forest and is home to several species of rodents, Nile monitor lizards, African royal pythons, species of sea turtles, manatees, and invertebrates such as crabs and molluscs. It is the most important coastal wetland for birds in Ghana and supports over 72 species of resident and migratory birds with an estimated population of over 100,000 individuals. The site supports the livelihoods of hundreds of thousands of people, some of whom

extensively use mangrove firewood to smoke fish for sale. It is threatened by sea erosion and pollution as well as excessive mangrove wood harvesting (Ramsar Sites Information Service, 2024).

6.2.8.2. Fort Prinzenstein

Fort Prinzenstein is located at Keta. The fort is the easternmost group of forts along the Atlantic coast of Ghana that has been designated as a World Heritage Site. Fort Prinzenstein first started as a Danish post in 1714. The fort has been actively involved in trade including slaves, gold and ivory in exchange for muskets, brandy, iron rods, textiles, cowries shells etc. The slaves were transported over the Atlantic Ocean and most of them were sold in the Danish-Norwegian Islands in the Caribbean, St. Croix, St. Thomas and St. John (ICOMOS, c2003).

The fort stands between the seas and a huge lagoon on a reef of soft rock, joined northward by a sand bar and the sea has gradually devoured the seaward section of Fort Prinzenstein. There are also reports of digging for mercury under the basement of the fort, which has contributed to weakening its structure. Irrespectively of the fact that a portion of the historic fort has been eaten away by the sea, a number of visitors from Ghana and abroad visit the fort (ICOMOS, c2003).

6.2.8.3. Atorkor Slave Market

Atorkor is located in Anlo District, some 28 kms to the east of Keta. The Atorkor Slave Market is one of the ancient slave markets in the Volta Region. The Anloga District Assembly intends to re-reengineer the existing slavery monument, to upgrade and transform the place into an international UNESCO accredited slavery centre (Anloga District Assembly, 2020). Figure 6-72 shows the monument constructed at the slave market which includes a sculpture of a slave dealer giving orders to slaves with a whip.

6.2.8.4. Anlo Military Headquarters, Tsiame

This is yet another important tourist spot where the Anlo's during their historical wars gathered to plan war strategies against their enemies. It is located at Tsiame, north of Keta and at that very spot today, stands a grove, which tourists can visit (Ghana Districts, 2017).

6.2.8.5. Cape St. Paul Lighthouse, Woe

Cape St Paul Lighthouse is an ancient lighthouse (built in 1901, see Figure 6-73) is located at Woe near Keta. This lighthouse is still functioning, and it directs ships at night away from what is believed to be a big, submerged mountain just off the coast of Woe (Ghana Districts, 2017).

Figure 6-72 - Monument at Atorkor Slave Market (Source: Atorkor Development Foundation, c2024)

Figure 6-73 - Cape St. Paul Lighthouse (Source: Sbonsu! c2024)

6.2.8.6. Hotels / Guesthouses Facilities

There are a lot of Hotels and Guesthouses in the Municipality which includes: Meet Me There at Dzita, Aborigines at Dzelukope, Sitsofe Guesthouse at Abor, Harmony Hotel at Anyako, Abutia Guest House, Keta Beach Hotel, Ocean View Hotel, Agblor Lodge, Loreta Guest House, Happy Corner Restaurant, Hotel de White House at Anloga, Twins Lodge Hotel at Tegbi, Larota Guest House at Tegbi, Pin Drop Hotel at Anloga, Dzigbordi Lodge at Anloga and etc.

6.2.9. Socioeconomic Baseline Conditions

This section provides the baseline conditions of the Project Communities and Keta Municipality.

Under this section, mixed data from the 2021 population census results of the GSS, data from the Health Directorate and Ghana Education Service of Keta Municipal Assembly, and socio-economic baseline survey data collected from a questionnaire (see Annex D) administered to 328 respondents across 16 randomly surveyed communities in February 2024 within the project specific area and adjoining communities (as detailed in Table 6-20 below) have been analysed as part of the full EIA preparation.

This analysis was completed to present key baseline conditions of the project communities prior to the project intervention.

Four criteria were adopted for the prior selection of communities for the baseline data collection:

Communities directly within the project designated area were automatically considered for baseline data collection (Kedzi, Havedzi, Vodza).

- Some communities in close proximity and adjoining the project area along the sea, or between the sea and the lagoon randomly sampled (Horvi, Adzido, Adina Keta, Blekusu, Weta, Amutsinu, Agavedzi, etc.).
- Some communities along the lagoon only (Sonuto, Dogbekope, Awalavi, etc.).
- Communities West (Keta, Adzido) and East (Abeliakope, Adina, etc.) of the proposed area.

Table 6-20 - Communities Surveyed

Communities Surveyed		
1) Kedzi	7) Amutsinu	12) Dogbekope-Agbozume
2) Vodza	8) Adina	13) Awalavi
3) Havedzi	9) Blekusu	14) Weta
4) Horvi	10) Sonuto-Tackscorner-Agbozume	15) Abeliakope-Aflao/Denu
5) Adzido	11) Kpedzakope-Agbozume	16) Keta
6) Agavedzi		

Through this cross-cutting approach, an appreciation of the awareness of the locals about the proposed Port of Keta Project, their attitudes, reception and perception of the project was established across all the communities engaged and surveyed.

The proposed project was very well accepted, with all communities very anxious about when its implementation will commence. The general knowledge of how the Lomé Port has helped generate jobs and trade in the area, as well as its associated fishing harbours are seen as likely to be replicated when the project comes to realization. Many have however raised concern that sea-defence to protect communities along the sea must be a major priority as part of project implementation.

6.2.9.1. Perception and Knowledge About Port of Keta Project

Figure 6-74 presents survey respondents awareness about project, reception, and attitude towards the project.

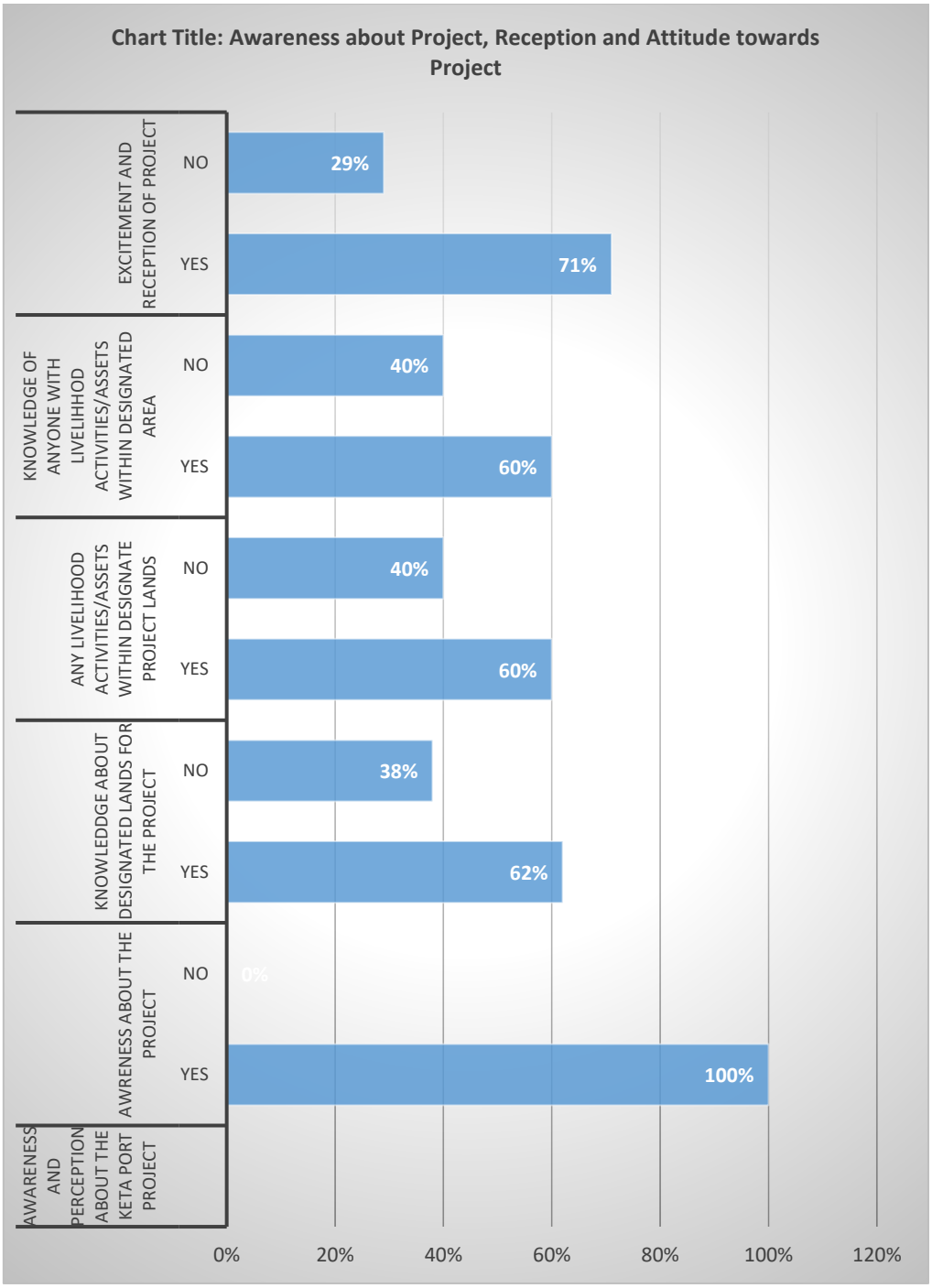

Figure 6-74 - Awareness about Project, Reception and Attitude Towards the Project (Source: CARES Group Field Baseline Data, Feb-2024)

Generally, all baseline respondents were aware of the Port of Keta Project, with great impatience and anticipation for the realization of the project. The project has taken on a political dimension, with the main complaint of all respondents and persons engaged being that the timelines initially given by project officials for the commencement of the building of the project has long elapsed. Many therefore believe that the project as touted is to politically deceive the locals - especially since the studies and its related engagement activities are happening in an election year. These doubts many said has led to reduction in the excitement around the project, with 29% of all respondents responding to having no excitement towards the project any longer. Nonetheless, 62% of all the respondents indicated their knowledge about the designated area for the project, 60% responding to having knowledge of the livelihood activities in the designated project area (mainly being a landing beach, etc.), and 60% of respondents responding to knowing someone with livelihood activities and physical asses within the project

designated area. Many indicated their desire for the project, with the expectation it will revive the economic fortunes of the area, lead to the establishment of warehouses and factories in adjoining communities, lead to employment creation, and development of public infrastructures and social services.

6.2.10. Population / Demography of Keta Municipality

The population and housing Census conducted in 2021 has the population of Keta Municipality to be 78,862 consisting of 36,986 (46.9%) males, and 41,876 (53.1%) females. This represents 4.8% and 0.26% of the total population of the Volta Region and national respectively. Out of this total, 47,968 (60.8%) are urban dwellers, while 30,894 (39.2%) are rural dwellers. Keta Municipal has a population density of about 177 persons per square kilometre, and a population growth rate of 2.5%. The number of households was 20,320 and the average households size was 3.8. The age-dependency ratio is 80 people in the dependent age groups for every 100 persons in the working ages whereas for females, there were 75 persons in the dependent age group for every 100 persons in the working ages (GSS, 2021). The profile of respondents to CARES socioeconomic baseline data gathering is provided in Figure 6-76 below).

6.2.11. Background / Profile of Baseline Survey Respondents

As shown in Figure 6-76, 30% of the survey respondents are in the 31-40 years age group, 21% are in the 19-30 years age group, 18% in the 41-50 years age group, 14% in the 51-60 years age group, 11% in the 61-70 years age group, and 6% are above 71 years old. 59% of the respondents were female; whilst 68% of household heads were males. 52% of respondents are of nuclear family with children, 43% of extended family households, and 5% nuclear family with no children. Also, as shown in Figure 6-76, 70% of respondents are married, 15% single, 7% widowed, and 8% divorced / separated. 43% of the survey participants have attained basic education up to Junior High School (JHS) level, 39% attained secondary education and 9% attained tertiary education. The remaining 9% had no formal education.

In the case of religious beliefs, 76% of all respondents were Christians whilst 24% of them were Traditional African Religious faith. In terms of positions / roles of respondents in their respective households as shown in Figure 6-75 below, 34% of the respondents were wives of household heads, 28% as breadwinners of household but not household heads, 20% as household heads, and 18% as relatives of households. In respect of the types of household dwellings inhabited, 34% of respondents lived in family compound houses, followed by 32% in self-compound self-contain houses, 28% in family houses that are not compound in nature and 6% lived in rented rooms in compound houses.

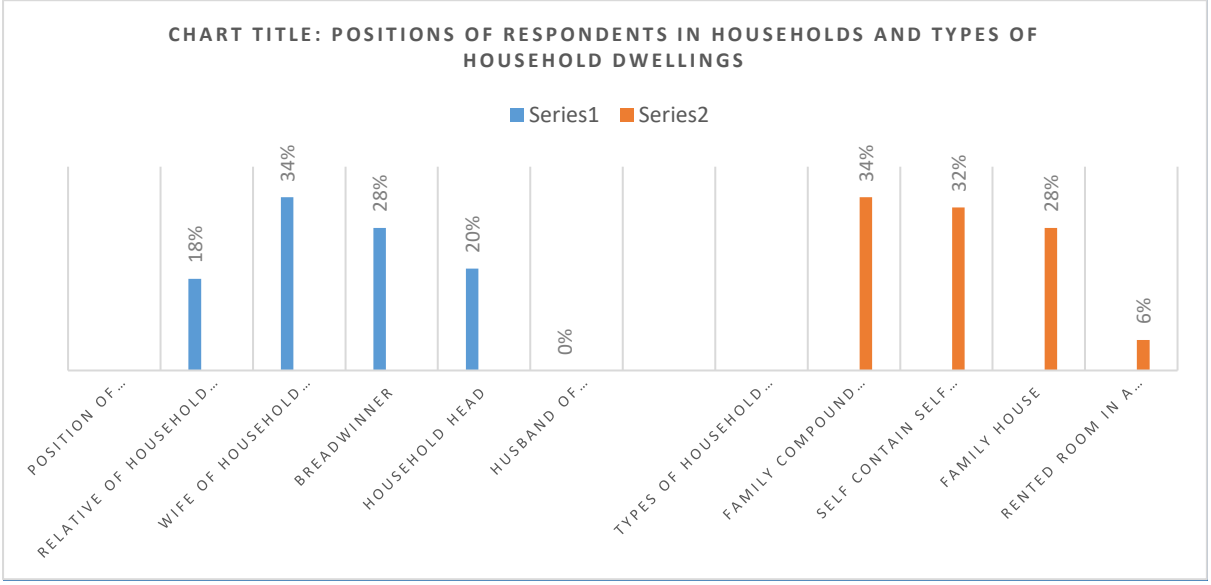

Figure 6-75 - Positions in Households and Types of Household Dwellings (Source: CARES Group Field Baseline Data, Feb-2024)

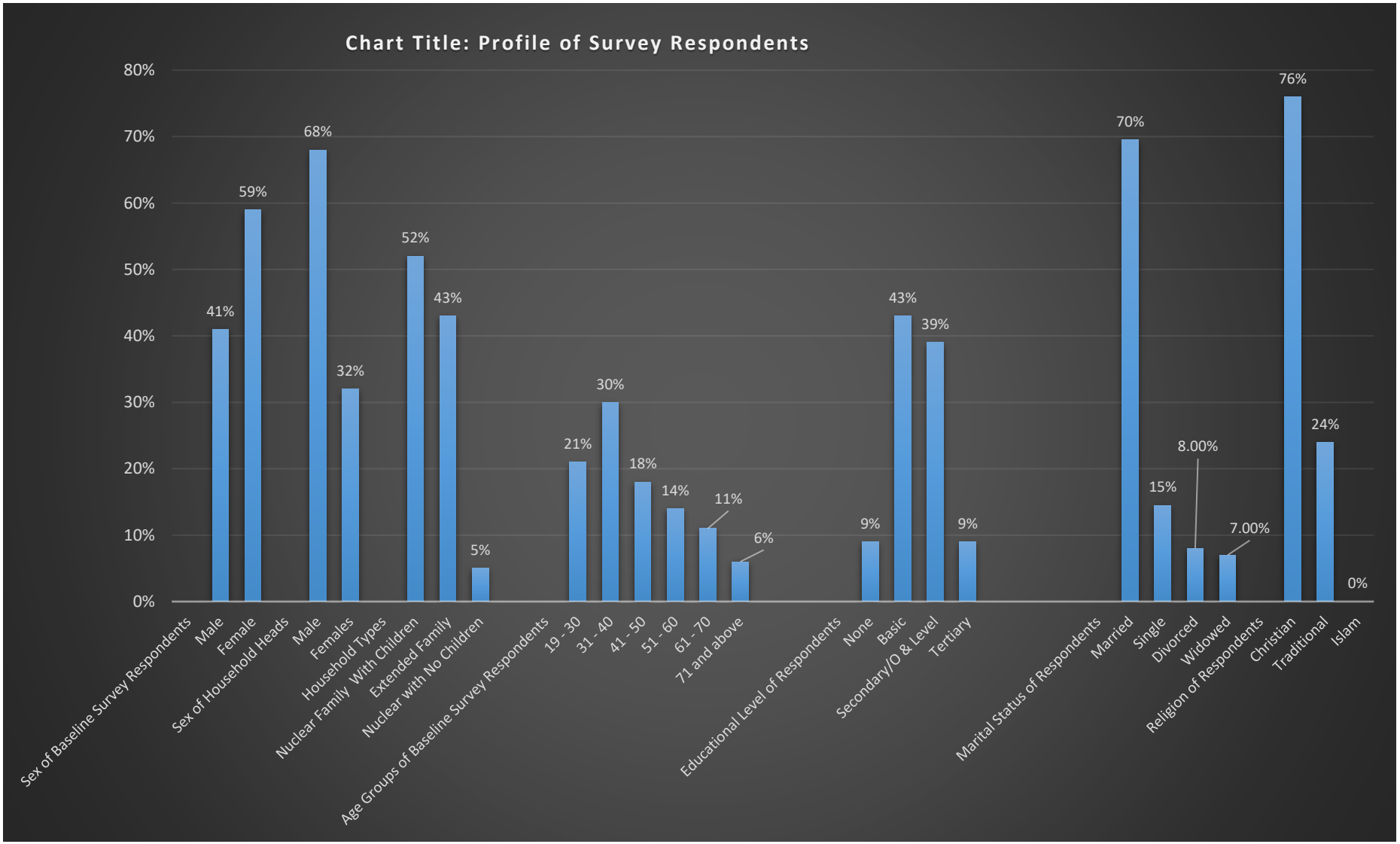

Figure 6-76 - Profile of Respondents
(Source: CARES Group Field Baseline Data, Feb-2024)

As shown in Table 6-21 below, the average household size per responses from respondents is 5.8, with 2.0 females per household, 2 minors / children per household, 0.4 aged in households and 0.15 vulnerable persons per household. The average number of children below eighteen enrolled in school were 2, with 0.3 infants per household not enrolled in school. The average number of rooms per household is 3.

Table 6-21 - Household Averages of Categories of Household Members (Source: CARES Group Field Baseline Data, Feb-2024)

Household Averages	
Average Household Size	5.8
Average Number of Females in Households	2.0
Average Number of Children / Minors in Households	2
Average Number of Aged in Households	0.4
Average Number of Vulnerable People in Households	0.15
Average Number of Rooms in Households	3
Average Number of Children Under 18 Enrolled in School	2
Average Number of Children Under 18 not Enrolled in School	0.3 (infants)

6.2.12. Employment / Occupation and Key Economic Activities

The Keta Municipality has 54,656 persons 15 years and above. From this, 29,717 persons are outside the labour force, and 28,900 are within the labour force. Within the labour force, 23,209 are employed and 5,691 are unemployed. Amongst those employed, 11,809 are males and 11,400 are females (GSS, 2021).

Of the 23,209 employed population, 15 years and older in the municipality are employed as skilled agricultural, forestry and fishery workers (25.2%), this is followed by wholesale and retail trade; repair of motor vehicles and motorcycles (17.3%), manufacturing (13.0%), accommodation and food service activities (9.9%), education (7.8%), and other service activities (6.1%) (GSS, 2021).

Keta Municipality is mainly an agrarian economy, with the majority of the population engaged in crop farming, livestock keeping, fishing and other agriculture related activities and trading. A wide range of industrial activities have been identified in the municipality including ceramics and salt production. The project enclave and the Keta Municipality is known for large-scale salt production in Anlo-Afiedenyigba, Seva, Anyako and within Havedzi, Kedzi, Vodza, etc. Currently salt is produced under natural (evaporation) conditions. About one-third of the lagoon can be harnessed to produce salt for export to countries less endowed in the sub-region. Seven Seas (operating at Adina, close to the project site), and Diamond Salt (operating at Weta) are producing salt in commercially large scales.

Figure 6-77 - Salt Production in Anlo-Afiadenyigba (Source: 2022 Medium Term Development Plan for KeMA)

Crop farming, especially in shallots along the lagoon in Keta and its environs, and other vegetables such as Okra, Pepper, Tomatoes and other crops such as Maize, Rice, Cassava, Sweet Potato, Cowpea, Sugar Cane, and Coconut are well documented.

The municipality is endowed with numerous water bodies including the Atlantic coastline, lagoons, and creeks, and fishing is carried out in the sea, lagoons and rivers. Fish resources are in abundance, including the cultivable species such as Sparidae, Tuna, Hering, Mullet, Oysters, Shrimps and Tilapia.

The municipality currently has the following key industrial activities that employs about 13.0 percent of its labour force:

- Agro-Based Activities: Fish Processing, Cassava Processing, Sugar Cane Juice Distilling, and Coconut-Oil Extraction.
- Mining: Exploitation of Salt and Sand Winning.
- Wood-Based: Carpentry, Standing Brooms Normally made from Coconut and Oil Palm Leaves.
- Textiles: Tailoring / Dressmaking, Kente Weaving.
- Services: Hairdressing, Vehicle Repair / Fitting / Mechanics, Radio / TV Broadcasting, Masonry.
- Ceramics: Pottery.
- Also, the Keta basin coastal and offshore areas have been delineated for oil and gas exploration activities.

Figure 6-78 presents the key occupations and income levels of survey respondents. The results showed that 32% of respondents are into fishing, 22% into salt mining, 15% into fish mongering, and 10% into petty trading / business. Other occupations include farming (5%), driving (3%) and teachers / nurses and bankers (3%), whilst 1% responded to being fishing boats and net owners. In terms of household incomes for 2023, 23% of respondents earn between GHC 5,000 and 10,000 household income per annum, 21% earn GHC 11,000-15,000, 18% earn GHC 16-20,000, etc. The highest annual income bracket of GHC 41,000 and above is earned by only 3% of the respondents who mostly are canoe / net owners and formal employees such as bankers / nurses / teachers.

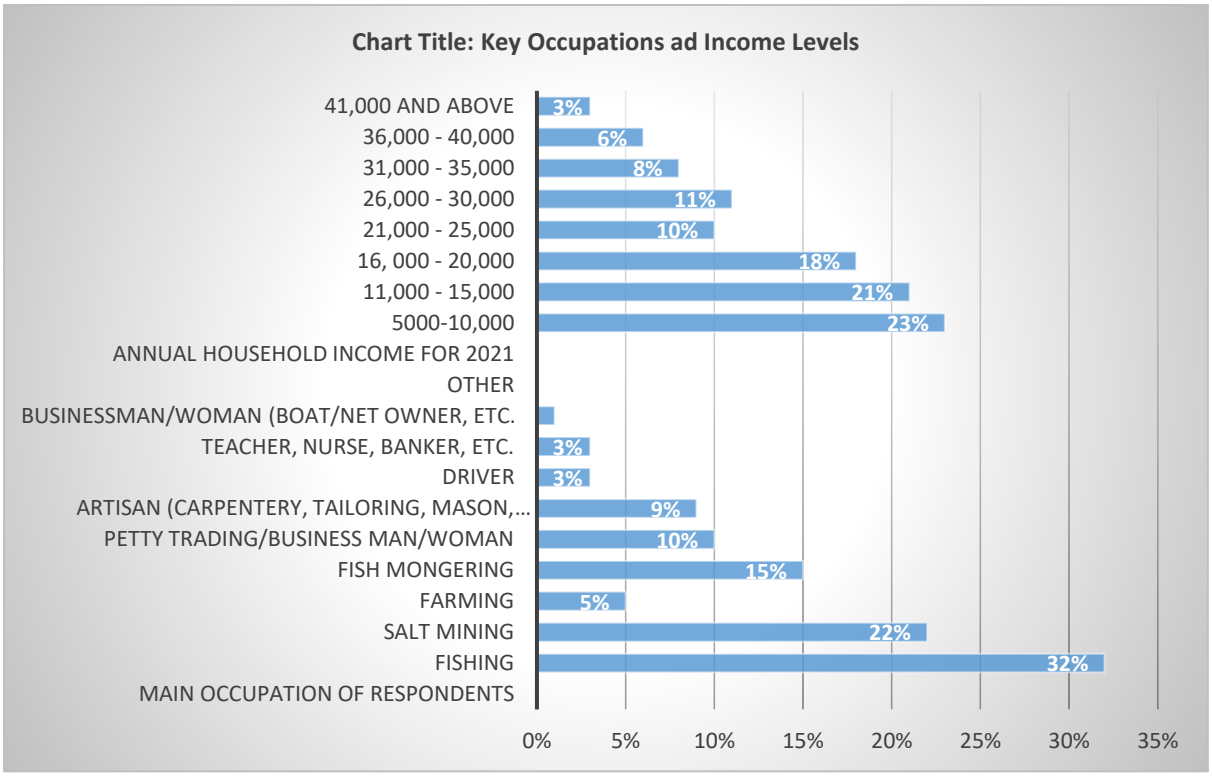

Figure 6-78 - Key Occupations and Income Levels
(Source: CARES Group Field Baseline Data, Feb-2024)

6.2.13. Business Environment and Commercial Enterprises

Figure 6-79 presents responses to the presence of large-scale commercial enterprises and their key issues. On whether any commercial enterprises or factories operates within the project communities, 58% of respondents responded 'YES'. Key industrial activities identified in the project vicinities and cited by respondents included:

- Cement Production by Diamond Cement.
- Large-Scale Commercial Salt Mining Activities .
- Hotels and Tourism Related Ventures.
- Illegal Sand Winning.
- Among Others.

All the companies were said to operate in harmony, with no community grievances and agitations except for grievances towards a 3rd party salt mining company operating in the area. Out of the 16 communities from which baseline data was collected, at least 8 communities complained about grievance issues with the 3rd party salt mining company, which anecdotal information suggests resulted in the intervention of the security forces on multiple occasions and the loss of life and injuries by some locals.

Promises made by a 3rd party salt mining company in regard to employment, wages, Corporate Social Responsibility (CSR), the nature of their operations, among others were said not to be adhered to. Locals were restricted from accessing some portions of lands around the lagoon, preventing them from undertaking artisanal salt mining and fishing. The company was also accused of depleting the groundwater for its salt production and processing when it had earlier assured the communities that it would pump sea water for its operations. The depletion of the groundwater was said to have resulted in shortage of water in wells and boreholes for community drinking water and irrigation purposes, as well as resulting in the withering and dying of coconut trees in the communities. Worst of all, the company was accused by the communities for dredging portions of the lagoon to depths that resulted in the drowning of unsuspecting community members who go fishing in the lagoon.

During engagement, the Volta Regional Coordinating Council (RCC) confirmed the numerous community agitations that arose from the operations of the 3rd party salt mining company and the endless efforts it took to stem the tide of the agitations. These concerns were rampantly raised, with man expressing their scepticism towards the Port of Keta Project - that assurances of economic development and job opportunities promised to result from the Port of Keta Project may be a mere mirage.

As to whether the operations of these companies posed any health and safety risks to the communities, 71% of those who cited the presence of their operations responded 'YES'. They mentioned drowning in portions of the lagoon dredged by the 3rd party salt mining company, and also mentioned frequent community clashes with the company which anecdotal information suggests resulted in injuries and death when the security forces intervened. Only 22% of respondents indicated some actions of public agencies to mitigate the problems encountered with the company. 78% responded 'NO' to the question as to whether public agencies act to intervene or mitigate the issues faced with the company. Many indicated their frustration with public officials, stating that, locals are always disregarded in such situations and the sides of the company taken by public officials. Anecdotal information suggests that some traditional leaders were involved in organizing their subjects to agitate against the company but to no avail. 28% of respondents indicated various measures, including dialogue with the companies, public officials and the youth to mitigate the agitations against the company. By and large, mistrust has built up against even traditional leaders and opinion leaders, as they were seen to have connived with agents of the 3rd party salt mining company against the interest of their subjects. The company was said to have taken no action to mitigate the challenges and impacts of their operations in the community. Yet some have admitted that the 3rd party salt mining company now pumps sea water at Agorko for the production and processing of its salt, abandoning the extraction of ground water for its activities / operations. However, it should be noted that this is anecdotal and unconfirmed information.

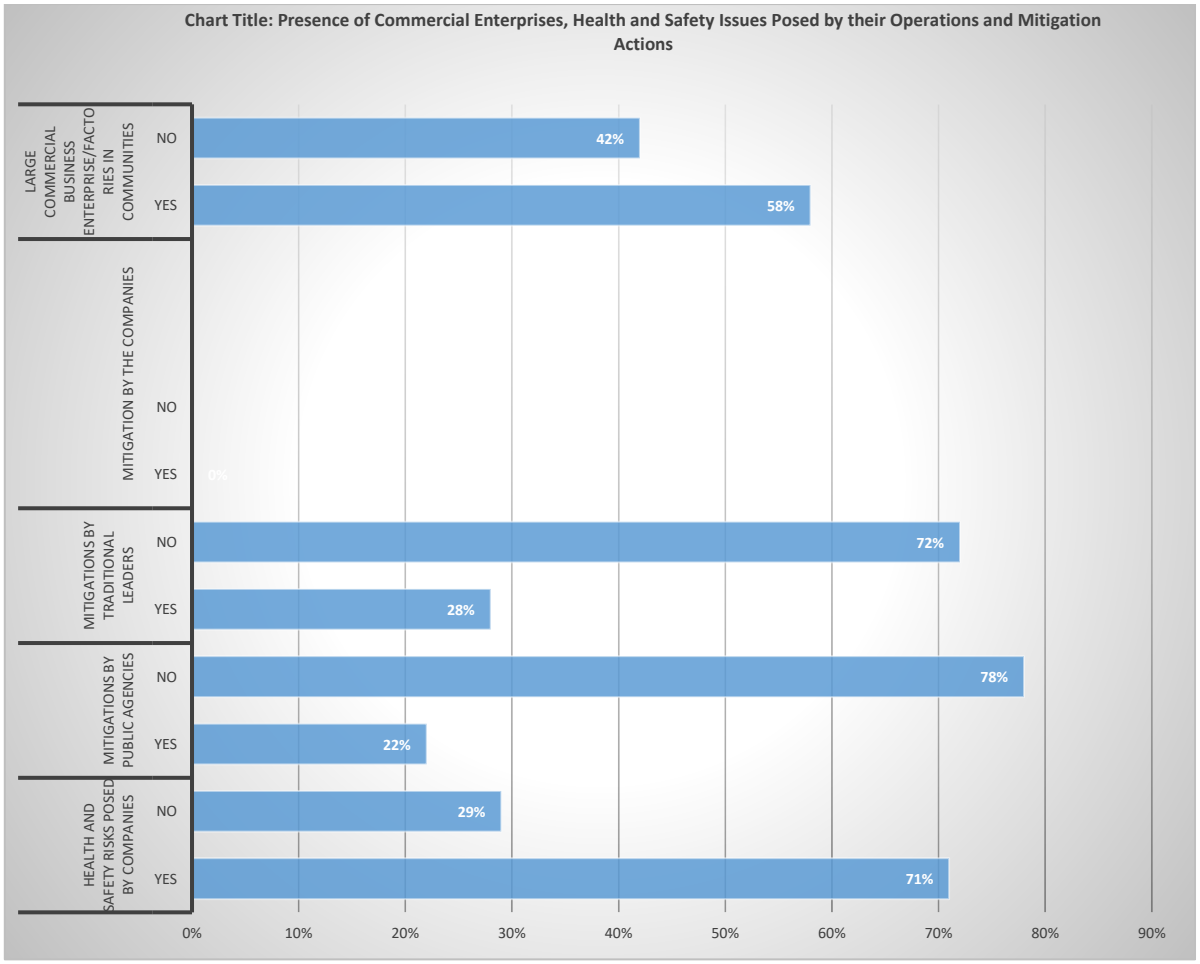

Figure 6-79 - Presence of Large-Scale Commercial Enterprises and Key Issues (Source: CARES Group Field Baseline Data, Feb-2024)

On the issue of safety on the lagoon, 92% of survey respondents have responded 'YES' to a question about known incidents of drowning during fishing or travelling on the lagoon. These incidents were often said to occur on parts of the lagoon with deeper depths not known to the victims. These also occur when travellers or fishermen / women on the lagoon use defective canoes. Participants of community engagements noted that any areas to be dredged on the lagoon as part of the port development project must be localized with clear warning signs around the specific locations.

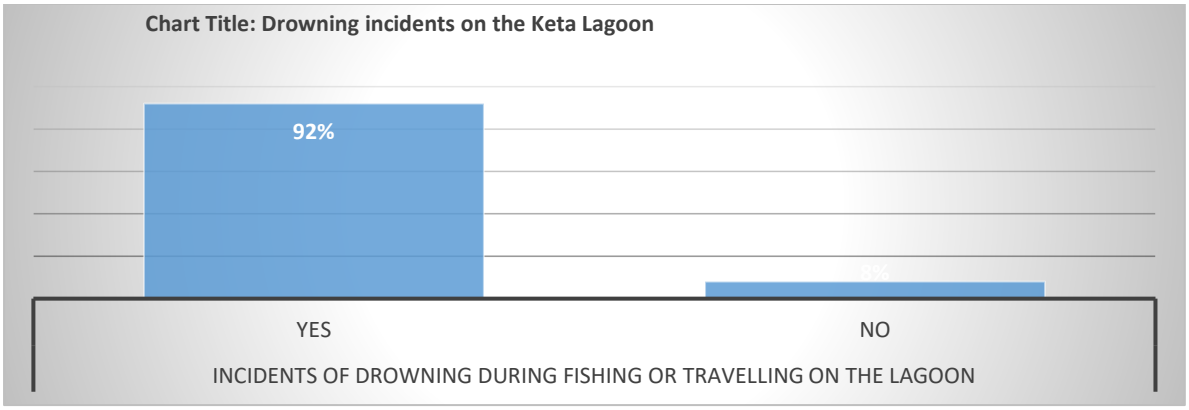

Figure 6-80 - Drowning Incidents on the Keta Lagoon (Source: CARES Group Field Baseline Data, Feb-2024)

Figure 6-81 shows that sand winning along the sea coast though deemed illegal, is rampantly thriving in Keta-Dzelukope where persons involved in the activities use old-rickety remodelled pick-up trucks to carte sand from the beach in broad day light for stockpiling at undisclosed locations. The stockpiled sands are then carted away using tipper-trucks. A brief field observation at the beach on Monday 27 February 2024, had about 5 trucks come in and go. Each truck was estimated to do about 20 trips per day at least.

Figure 6-81 - Pick-up Trucks Loading Sand at Keta-Dzelukope Beach
(Source: CARES Group Field Baseline Data, Feb 2024)

6.2.14. Gender Dimensions

Women in the project communities are actively involved in all the economic activities discussed in the previous sections of this report. Women are involved in helping men during the pulling to shore of drag-nets, in sorting and carting the fishes away after the fishermen land ashore, and buying, processing and selling the fishes that are harvested by the fishermen. They belong to associations of fishmongers and are the principal buyers, processors and traders of all fishes harvested. They have indicated that their livelihoods solely depend on fishing on the sea and on the lagoon. Women are involved in fishing on the lagoon, compared to only helping sea going fishermen land their dragnets from the sea.

Women noted that they are very integral in household and community decision making, and in some cases are heads of households. Queen mothers, and other prominent and women involved in business and trading participated in the engagement activities in very visibly vocal manners. No Gender-Based Violence (GBV) issues were identified during Focus Group Discussions (FGDs) with women engaged. Women engaged at this stage indicated their free engagement in economic activities as fish mongering and petty trading mostly, without any inhibitions from their husbands or men in their communities. They indicated that they have control over their own properties and are accorded the opportunities to participate in any community activities and decision-making processes. Women indicated that, the presence of the Domestic Violence and Victims Support Unit (DOVVSU) / Women and Juvenile Unit (WAJU) of the Ghana Police has helped eliminated any cases of abuse by their husbands and partners, as well as any forms of victimization of widows and witchcraft accusation in their communities. As such no responses were provided to the questions posed in regard to issues of GBV, Sexual Exploitation and Abuse (SEA), child trafficking, etc. as outlined in Table 6-22 below.

Table 6-22 - Response to Gender Based Violence Issues
(Source: CARES Group Field Baseline Data, Feb-2024)

Gender-Based Violence	Yes	No
Child Trafficking	0%	100%
Intimate Partner Violence	0%	100%
Non-Partner Sexual Violence	0%	100%
Early Child Marriage Situation (Teenage Marriages Rather than Child Marriages)	15%	85%

Gender-Based Violence	Yes	No
Witchcraft Accusations Against Women & its Related Violence	2%	98%
Inheritance Related Abuse / Violence Against Women	19%	81%
Male-Female General Violence	0%	100%
Male-Female Non-Partner Violence	0%	100%
Child Sexual Abuse	0%	100%
Widowhood Ritual Related Violence / Abuse	0%	100%

Regarding early childhood marriages, respondents elaborated that children and teenagers in this day and age stay in school, hence early childhood marriages are non-existent and not tolerated in their communities. Where teenagers become pregnant, they are encouraged to return to school after the babies are born. Household baseline data administered established no variance with the responses obtained from the FGDs carried out during the EIA Scoping Phase.

6.2.15. Vulnerable Groups

Per the baseline survey results, the average vulnerable persons per household was 0.15. Most vulnerability cases reported are aged persons with stroke and other chronic ailments such as high blood pressure, diabetes, etc. However, project area communities engaged noted that there are many vulnerable persons in their communities, especially very aged men and women whose homes were washed away by the sea and had nowhere to go but remained in some of the abandoned houses currently flooded by the lagoon. These homes are rampantly common in the municipality, and in Kedzi, within the designated project area. Some of these vulnerable elderly people expected to be allocated houses under the sea defence project but never got their allocations. They shared their grief and hope that the Port of Keta Project may be their last respite and opportunity to be relocated out of the flooded homes they currently reside in. In general, due to the excessive sea erosion, tidal waves, and rising levels of the lagoon as a result of the phenomenon of climate change, many homes inhabited within the Keta and Ketu-South municipalities are often flooded close to a minimum of four months in a year. Numerous individuals with the resources have relocated out of the Keta basin especially to other communities that do not experience the annual flooding situations. Numerous individuals / households with no resources are however stuck in the flooded homes. Most of these individuals are elderly relatives who have nowhere else to go.

Figure 6-82 shows that 72% of respondents responded to having been impacted by tidal waves / floods in recent years, whilst 72% of the respondents knew of others who were impacted by the tidal waves. These respondents generally were from communities by the sea. Properties including their homes, personal belongings were lost by most of the affected individuals. Whilst flooding of homes caused by rising lagoon waters occur from time to time, these was not seen as a threat to the communities, as the lagoon waters eventually recede and hardly damage any properties. Tidal waves and coastal erosion were the only threats the communities had to really grapple with, hence heir incessant demands that sea defence must be included in the port development initiative. 61% of the flood affected individuals indicated receiving all forms of assistance from public agencies and Non-Governmental Organisations (NGOs). Assistance received included food items such as oil and rice, blankets and clothes, mattresses, among others. Others have received relocation homes in the communities of Kedzi, Vodza and Adzido as part of the sea defence project. Some of the impacted individuals were allocated lands whilst others are yet to receive their land allocations.

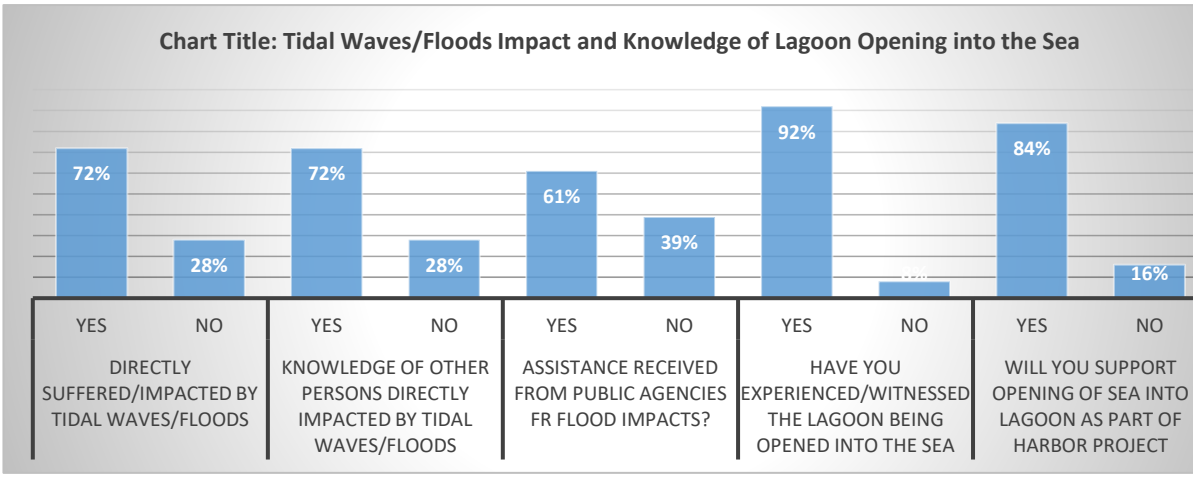

Figure 6-82 - Tidal Wave / Floods Impacts and Knowledge of Opening the Lagoon into the Sea (Source: CARES Group Field Baseline Data, Feb-2024)

The 2021 Population and Housing Census recorded a total of 11,578 persons with disability in the municipality (12.3% of the municipal population). The proportion of females with disability were slightly higher than those of males. Within the municipality, the Department of Social Welfare (under the Ministry of Gender, Children and Social Protection) has been providing financial support to the extreme poor and most marginalized groups who are also elderly aged 65 and above, disabled who are unable to work, or carers of Orphans and Vulnerable Children (OVCs) under the Livelihood Empowerment Against Poverty (LEAP) Programme. In 2022, 1,600 beneficiary households made up to 2,632 beneficiaries from 81 communities were covered by the LEAP Program (2022 Medium Term Development Plan for KeMA).

Table 6-23 presents the breakdown of beneficiaries of the LEAP Programme.

Table 6-23 - Breakdown of Beneficiaries of the LEAP Programme (Source: 2022 - 2025 Medium Term Development Plan for KeMA)

Beneficiaries	Number
No. of Communities	81
No. of CLIC Members (Male = 28, Female = 12)	40
Special Cases Communities	13
Total No. of Household Benefiting	1,600
Total No. of Beneficiaries	2,632
No. of OVC being cared for	1,340
No. of Aged 65 Benefiting	1,083
No. of PWDs Benefiting	209

6.2.16. Channelling the Lagoon into the Sea

In events related to the controlled spillage at Akosombo and Kpong Dams, as part of flood management in the Keta basin, a sand bar at Azizadzi, between Kedzi and Havedzi was breached in November 2023 to allow the lagoon flow into the sea to reduce flooding caused by the rising lagoon water. As to how many survey respondents have knowledge about this event, Figure 6-82 shows that 92% of all respondents responded 'YES' to the question as to whether experienced / witnessed the lagoon being opened into the sea. 84% of all respondents also responded 'YES' to the question as to whether they would support the channelling [breaching] of the sea into the lagoon as part of the Port of Keta Project. Their recent experience of the bumper catch of shrimps and crabs as a result of the lagoon and the sea joining prompted this response. Many recounted, how lucrative fishing has become in the past four months on the lagoon, with some fishermen making as much as GHC 3,000.00 on weekly basis. Key

concerns shared about the opening of the sand bar was the rapid draining of the lagoon water away from higher ground communities such as Sonuto, Tackscorner, etc., rendering the residents unable to fish or mine salt in the lagoon. They insisted, any future attempt to channel the sea and the lagoon into each other must be done to attain some balance.

6.2.17. Security and Justice

There are a number of public institutions responsible for the promotion of civic rights, security and justice in the Municipality. They include the Ghana Police Service (GPS), the District Magistrate Court (DMC) located in Abor, and the Commission on Human Right and Administrative Justice (CHRAJ), Ghana Ambulance Service, and the Ghana National Fire Service (GNFS) located in Anloga. However, none of these institutions are located within any of the potential project impacted communities. Although there is no police station, there were no reported cases of serious crimes such as armed robbery, murder, rape, kidnapping, burglary, etc. within the project area communities. However, the fishermen in Vodza noted that nine newly installed outboard motors were stolen from their fishing boats this year alone. All project communities and officials of MMDAs engaged complained of rampant cases of petty theft across all communities as well as the entire Keta, Ketu South and Anloga Districts due to the high levels of youth unemployment, and unbridled sense of entitlement and 'get-rich-quick' mentality of the youth.

6.2.18. Education

The Anlo Traditional Area is reputed for having some of the best second cycle educational institutions in the Volta Region / the country at large. Education has been a driving force for business activities and development in the area. As the local folklore pejoratively used to entice children to choose schooling and education goes, 'there are only two issues in Keta…to attend school or to go fishing'. As such, the Keta Municipality boasts of Secondary schools such as Ketasco, Ketabusco, Anyasco, Aborsco, Atiasec, Afiasec, Tsiamesco and Kedzi Vocational College. There is also the Keta Nursing Training School in the Municipality.

Regarding basic and second cycle education, the Municipal has high enrolment rates for its school going population as summarized in Table 6-24 below.

Table 6-24 - Summary Educational Enrolment Data in the Keta Municipality in 2021 (Source: GES Keta, 2021)

Levels	Enrolment			Levels	Enrolment		
	Male	Female	Total		Male	Female	Total
Kindergarten	1,346	1,269	2,615	Senior High School 1	1,565	1,515	3,080
Primary	4,873	4,787	9,660	Senior High School 2	1,679	1,688	3,367
Junior High School	2,125	2,036	4,161	Senior High School 3	1,739	1,760	3,499

For the Project Area communities, there are basic schools in all the communities and a second cycle educational institution - Kedzi Vocational School in Kedzi. The school however has no meaningful infrastructure. Community leaders expressed the desire that the Port of Keta Project when successful will adopt the school and help transform it into a model technical / vocational institute. Parts of the school land is however affected within the designated project area.

6.2.19. Child Labour

'Education has been the norm in our communities from time immemorial, hence children automatically are enrolled in school throughout their childhoods', Togbi Tsagli, Fia of Kedzi noted (during engagement on 14 September 2023).

Engagement with the communities revealed that children only go on fishing in the lagoon on weekends and holidays. Only youth that are 18 and above are allowed to go to sea for fishing. Hence, it is not a known circumstance for sensitization activities even on child labour in the project communities. When the sea defence

was being built for example, only adults participated, no child labour involved in any way, an elder from Keta noted. The baseline report also showed that children are enrolled in school throughout her childhood age, with many taking advantage of the Free Senior High School (SHS) policy to continue to high school uninterrupted.

6.2.20. Sexual Exploitation and Abuse (SEA)

SEA was said to not happen within the project communities, due to how closely knitted the communities are and how sternly frowned upon. Anyone who engages in that would carry a stigma of shame for life, apart from any criminal prosecution. Children were told to report any such occurrences to their mothers for prompt report to the police. No known cases within the immediate project communities.

6.2.21. Teenage Pregnancy

Incidents of teenage pregnancy were said not to be frequent within project communities. Very few instances were known in all communities engaged. Teenage girls who encountered these problems are always encouraged to go back to school after they are delivered of their babies.

6.2.22. Human Trafficking

No human trafficking situations were known to have occurred within the project communities in the past ten years - as indicated by all persons engaged.

6.2.23. Health

Figure 6-83 shows that the baseline survey revealed that malaria is the most frequent ailment in the project communities at 86%, high blood pressure at 6% and backpains at and strokes at 4% each. Data from the Keta Municipal Health Directorate (Table 6-25) however places malaria as the second leading cause of Out Patient Department (OPD) attendance among the top ten diseases in the municipality. Project communities noted the excessive breeding of mosquitos in the area due to the lagoon water. The health system used by most respondents of the baseline survey is 84% attendant conventional healthcare hospital / clinics, 12% rely on traditional herbal medicine, and 4% rely on self-medication. Reliance on spiritual consultations with pastors and traditional priests are also means by which many seek healings for their various ailments, albeit not exclusively from seeking conventional medical care or use of herbal medicines.

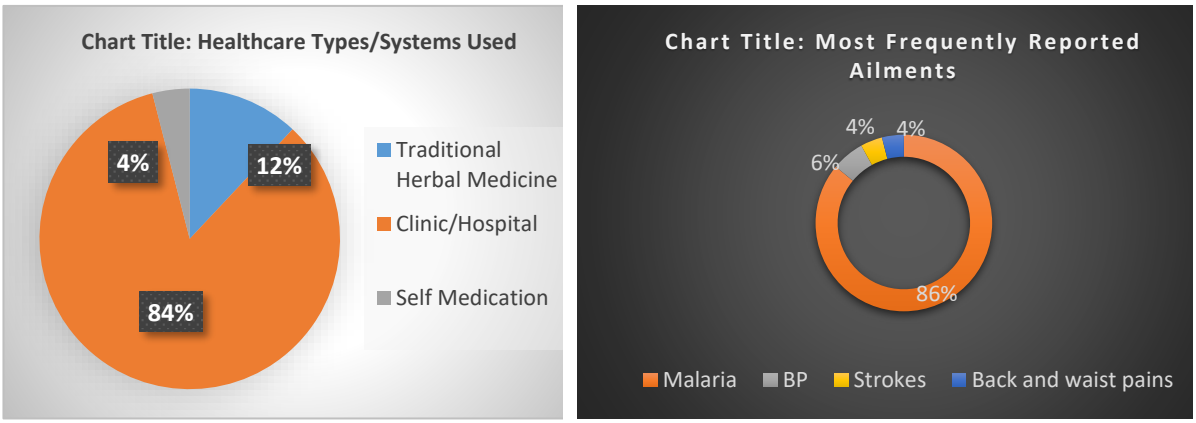

Figure 6-83 - Responses to Healthcare Types Used and Frequently Reported Ailments (Source: CARES Group Field Baseline Data, Feb-2024)

Table 6-25 - Trends of Top-Ten Diseases (2019 - 2021)
(Source: Municipal Health Directorate, 2021)

No.	2019	2020	2021
1	Rheumatism / Other Joint Pains / Arthritis	Rheumatism / Other Joint Pains / Arthritis	Rheumatism / Other Joint Pains / Arthritis
2	Malaria	Malaria	Malaria
3	Skin Diseases	Anaemia	Upper Respiratory Tract Infections
4	Anaemia	Skin Diseases	Skin Diseases
5	Pneumonia	Pneumonia	Anaemia
6	Upper Respiratory Tract Infections	Upper Respiratory Tract Infections	Pneumonia
7	Hypertension	Hypertension	Acute Urinary Tract Infection
8	Acute Urinary Tract Infection	Acute Urinary Tract Infection	Intestinal Worms
9	Intestinal Worms	Intestinal Worms	Diarrhoea Diseases
10	Diarrhoea Diseases	Diarrhoea Diseases	Acute Eye Infection

The municipality has a total of 15 healthcare facilities with a breakdown provided in Table 6-26. The Keta Municipal Hospital is the main referral point for all patients from all communities including communities from the Anloga District and communities such as Agavedzi, Adzina, Blekusu, etc. all in the Ketu South Municipality.

Table 6-26 - Distribution of Health Facilities in the Municipality
(Source: Municipal Health Directorate, 2021)

Sector	Facility	Number	Location
Public	Hospital	1	Dzelukope-Keta,
	Health Centres	5	Kedzi, Afiadenyigba, Anyako, Asadame, Atiavi
	CHPS Compounds	4	Aborlove / Norlopi, Tsiame, Sasieme, Seva
Private	Private Clinic	2	Abor
	Maternity Home	1	Abor
	Mission Health centre	1	Hatorgodo
	Mission Hospital	1	Abor

Project communities noted their fear for the likely spike in the spread of HIV-AIDS infections in their communities once the Port of Keta Project commences. At this point, they noted that none of such incidents exist in their communities and that if any at all, then it is unknown to them. The municipality however reported that the municipality is not spared in the HIV / AIDS epidemic in Ghana. The municipal health directorate has reported that the epidemic has grown steadily till its current state and that because serious prevalence surveys have not been carried out in the general population, data on actual prevalence and incidence is lacking. Nonetheless, females tend to be bearing a disproportionate portion of the burden. The productive age group 20-39 years followed by 40-60 years account for the majority of cases; however, HIV infection among young children due mostly to mother to child transmission is also a reality to be dealt with.

6.2.24. Communication

Network connection of mobile communication networks such as MTN, Vodafone, Airtel Tigo were present in the communities, albeit poor reception. Multi TV Digi box, a free satellite television broadcast platform that has all the major TV stations in Ghana and beyond broadcasted on it is relied on by almost all households for their television viewing. It was indicated during the engagement that this TV platform has made easier television viewing experiences in the area and has made possible the presence of television in all households. Most popular TV

stations viewed in the area include Joy News, TV3, etc. and other religious based channels. Radio stations have also become commonplace, giving listeners numerous choices and different stations to tune-in to for their favourite programs. Most popular radio stations listened to in the area included Jubilee FM, Klenam FM, Light FM, Sela FM and other Accra based radio stations such as Joy FM, Citi FM, etc. At the community levels, there are public address systems used to broadcast any information or announcements of importance. The Gong-Gong is sometimes used when the public announcements are restricted to a small area of a community.

6.2.25. Water, Sanitation and Hygiene

91.2% of households in the municipality derive their drinking water from five main sources:

- River / Stream
- Well
- Standpipes
- Dugout
- Borehole.

Pipe borne water forms the major sources of domestic water supply to the people in the municipality. A greater majority of households (40.5%) rely on pipe-borne water outside their dwellings. The proportion of urban (50.4%) is almost twice the rural population (28.8%) for pipe-borne outside dwellings. About 9 percent of households have pipe-borne inside dwellings. Above 22 percent of households in the district use public tap or stand pipes with a greater proportion of rural (35.3%) communities in the district relying on the public tap or standpipes and (11.6%) for urban communities. Most households (23.5%) use protected wells for domestic purposes with the urban to rural ratios been (34.9%) and (9.9%) respectively. Over 20% use unprotected well for domestic activities whilst (17.6%) use pipe-borne outside dwelling and (16.4%) use public tap or stand pipe for domestic activities.

Within the project communities, there was complaint of the Ghana Water Company Ltd. (GWCL) piped water not flowing regularly, sometimes with intervals of a week or two. Hence there is higher reliance on rainwater and well water.

As shown in the baseline data presented in Figure 6-84, 42% of respondents rely on piped GWCL water for drinking, 21% sachet water, 20% boreholes and wells, and 17% rainwater. Rainwater is not heavily relied upon because of rainfall patterns, many maintained. For other domestic use purposes, 49% of respondents rely on boreholes and wells, 24% on rainwater harvest, 18% on piped GWCL and 9% on tanker services. There is an ongoing GWCL pipeline project in the municipality to help resolve the irregular water challenges.

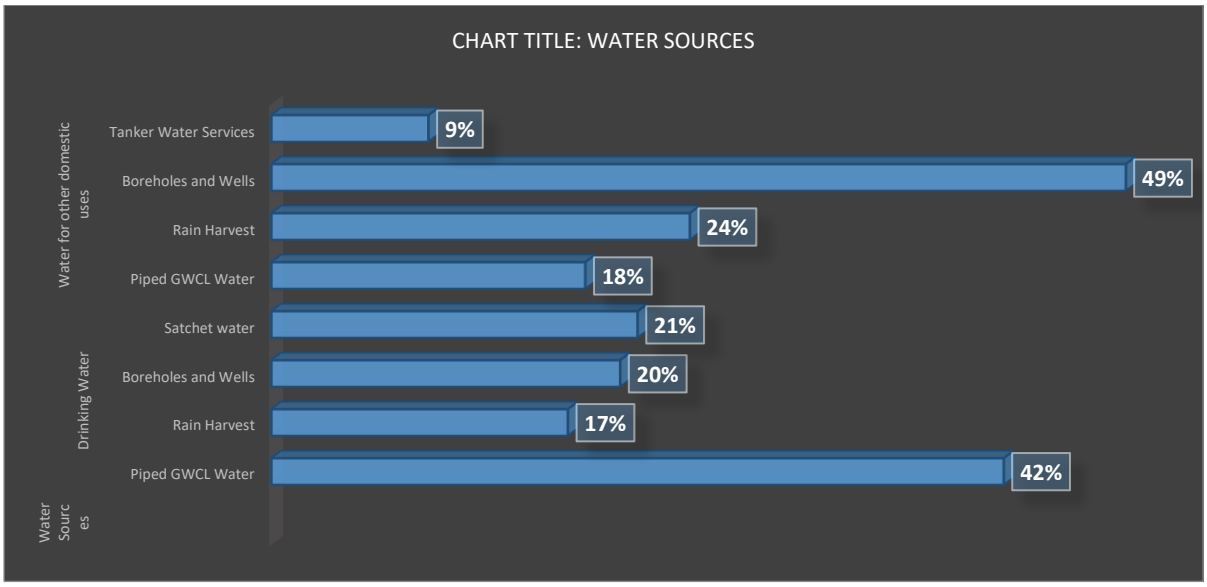

Figure 6-84 - Sources of Water for Drinking and Domestic Uses (Source: CARES Group Field Baseline Data, Feb-2024)

In regard to sanitation, the municipality with a population of 78,862 in 2021 with just 11,050 persons having access to toilet facilities. Engaging project affected communities on the issue, they lamented that it is practically impossible to build septic tanks for household toilets because of how shallow the water table in their communities are. That anytime they try to dig manholes; water gushes out of the grounds. New houses allocated under the sea defence project however came with household toilet facilities. Locals explained that it is easier to build Water Closet (WC) toilet systems that do not have septic tanks / manholes, but they are not resourced to undertake such expenses. Some pointed out that, until they are allocated their lands within the reclaimed lands, they cannot spend money putting up toilet facilities where they currently reside. As a result, the locals admitted to open defecation at sections of the beaches, especially where fishermen do not land, and gatherings are not held. They asked that, future considerations for public toilets should be the WC type. Also, it should be considered that a proper sewerage network would have to be developed if the port project comes to fruition. As it stands presently, the baseline survey results revealed that only 21% of respondents have access to household toilet facilities; of which 33% are WC toilets, 55% Kumasi Ventilated Improved Pit (KVIP) types, and 12% pit latrines. For those that have no access to household toilets, 74% responded to resorting to open defecation, 21% relying on KVIP type public toilets within their communities, and 5% using pit latrines.

Table 6-27 - General Household Sanitation Conditions (Source: CARES Group Field Baseline Data, Feb 2024)

Household Sanitation		
Access to Household Toilets	Yes	21%
	No	79%
Types of Household Toilets Used	Water Closet (WC)	33%
	Kumasi Ventilated Improved Pit (KVIP)	55%
	Pit Latrine	12%
Households Sharing Household Toilets	Yes	88%
	No	12%
Types of Public Toilets Accessed	Open Defecation	74%
	KVIP	21%
	Pit Latrine	5%
Drainage of Liquid Waste	Open Street	82%
	Drainage	12%
	Septic	6%
Disposal of Household Solid Waste	Community Refuse Dump	81%
	Collected by Municipal Waste Agents	15%
	Burning and Depositing in Holes Dug at the Beach	4%

6.2.26. Waste Management / Disposal

Waste disposal continues to be a rising challenge as population grows and along with the industrial development of municipality. Also, one of most difficult challenges of both urban and rural areas in the municipality and Ghana as a whole is adopting modern and hygienic solid and liquid waste disposal systems. Acceptable waste management helps to prevent the spread of some types of infections and improves the quality of the environment. Unfortunately, most of the project communities have no proper waste management systems. Apart from Kedzi and Vodza with one Zoomlion waste container each, the rest of the communities openly dump their refuse at the outskirts of their communities or dig holes at the beaches and dump their solid waste in them. Fortunately, apart from plastic waste, most waste generated in the project communities are organic in nature - from fish wastes, to broken canoes, tree leaves and palm / coconut fronds, etc. Liquid waste generated are generally bath water, and waste water from kitchens, washing and washing fishes. These wastewaters are open discharged / disposed of

on street corners. The survey response in this regard showed that 82% of respondents dispose their liquid waste via open streets, 12% through drainage / gutters and 6% through domestic septic tanks. Solid waste disposal per the results of the baseline survey showed that 81% disposal at community refuse dump (generally at low lying areas along the shores of lagoons), 15% collection by municipal agents, and 4% burning and burying in holes dug at beaches.

6.2.27. Energy / Utilities

Most parts of the Keta Municipality are connected to the National Electricity Grid. All the project communities are also connected to the grid, but many households complained of not getting connected to the electricity grid. Many completed homes are yet to receive their electricity meters even after several promises and following up. The Assembly Member for Adzido and Vodza noted that they contributed and bought their own electricity poles, but the areas of the community not connected to the grid remained unconnected after several years. The results of the baseline survey presented in Table 6-28 clearly showed that 88% of respondents have access to electricity in their homes, and 18% do not. Fuel for cooking is largely charcoal at 41%, Liquified Petroleum Gas (LPG) at 38% and firewood at 21%. Charcoal and firewood are sourced / purchased 91% from markets and 9% directly from farms / bushes by respondents.

Table 6-28 - Energy Sources for Households
(Source: CARES Group Field Baseline Data, Feb 2024)

Energy For Households		
Connection to National Electricity Grid	Yes	88%
	No	12%
Fuel Types used for Cooking	Charcoal	41%
	Firewood	21%
	LPG	38%
Sources of Charcoal and Firewood	Farm / Bush	9%
	Market	91%

Charcoal and fuel wood remain the main source of fuel for domestic cooking whilst very few people rely on LPG. Fishmongers rely solely on firewood they buy from Ketu North, Akatsi and South Tongu for their fish mongering activities.

6.2.28. Road Networks and Transportation

The project area is connected by only one main road. That is the Dabala-Anloga-Keta-Kedzi-Denu-Aflao Road. Per the 2022-2025 Medium Term Development Plan for KeMA, the Keta-Aflao stretch of the road was once completely destroyed / washed away by sea erosion between Keta and Horvi, and the road relocated and constructed as part of the Keta Sea Defence Project by the central government. Settlements in the north of the Municipality (Abor-Atiavi-Hatorgodo axis) are linked mostly by second class roads and are complemented by feeder roads. The middle and south western sections of the municipality (Angaw and Klomi lagoon basin) are poorly accessible mainly by third class roads and footpaths. Lagoon transport by means of small navigable non-motorable local canoes are frequently used by locals to ferry goods and people between the communities but it is poorly developed. The main setback is the seasonal fluctuations in the water level, which render movement very slow and even cumbersome. The siltation of the lagoon has also generally reduced the water level. The major routes are Anyako / Seva-Anloga, Afiadenyigba-Keta-Anloga, Atiavi-Keta-Anloga, and Alakple / Kodzi / Fiahor-Keta-Anloga. The seasonal drying up of the lagoon makes water transport unreliable and time consuming as opposed to road transport, with over 90% of the population using road transport regularly.

6.2.29. Proximity to Key Transportation Networks and Accessibility After Port Development

The development of the port will require commensurate improvements in the road network / road conditions in order to allow for easy access and links to the N1 (which constitutes part of the Abidjan-Lagos Corridor Project). Sections of the N1, from Tema Roundabout to Central University, about 17km has been earmarked for expansion into 6 lanes for traffic decongestion purposes along that stretch. This road connects the Sogakope-Dabala-Keta and Denu-Keta Trunk Roads, creating access to all the project site communities of Kedzi, Havedzi, Agavedzi, Horvi to Anlo-Afiadenyigba. Any planned future expansion of the existing two main access routes, i.e., Dabala-Anloga-Keta Road; and Keta-Kedzi-Denu-Aflao Road, will however result in huge physical and economic displacement and destruction of cemeteries. Buildings / structures and cemeteries are located close to the roads. Such a move will possibly create landlessness to affected landowners and may create unnecessary conflict. In addition to road and proposed rail development, water transport should also be explored for transport of cargo to and out of the Port of Keta.

Also, the project site should be considered and taken care of by the Keta Port Project to improve traffic within the Keta Port areas. The roads must be well designed and constructed at the port area to allow for free and easy access to and through the port by pedestrians through the provision of walkways and crossings at vantage points.

6.2.30. Housing

Land is the biggest constraint in the Keta area as evident in the linear nature of settlements and population density of the communities. Between Anloga and Keta, the population density is about 500 persons / km^2, which compares with the 609.7 persons / km^2 in Greater Accra Region, the highest in the country. Most lands between Vodza, Kedzi, and Havedzi were reclaimed lands from the lagoon during the sea defence project, with houses built by the Government of Ghana and allocated to some of the impacted families. All houses in the project area, including the flooded and abandoned houses were built with cement blocks and roofed with iron sheets. Some homes have coconut / palm fronds used to make the compound fences. These settlements along the coast are generally sandwiched between the lagoon and the sea with its attendant regular twin disasters of sea erosion and lagoon floodings.

6.2.31. Markets

There are five main markets in the Keta Municipality, namely, Keta, Abor, Afiadenyigba, Atiavi, and Anyako. Market days are arranged in every 5 days in reversal. Traders from Tema, Elmina, Lomé and Accra patronize these markets, especially Keta's market. Havedzi has a very small but important local fish market that is patronized daily except for Sundays. The market is on the northeastern boundary of the port project, along the coast of the lagoon. Market sheds, canoes and a few shops and taxi station are situated around the market.

6.2.32. Land Tenure Consultations / Engagements

Within the immediate project impacted communities, there currently exist no 'dry lands' as all exiting lands have been submerged by the sea. Lands available were reclaimed from the lagoon under the 1998-2003 sea defence project and placed under management of the Keta Municipal Assembly in Consultation with the Chiefs of Kedzi. Elders engaged in Kedzi and Vodza noted that portions of the reclaimed lands were allocated to persons displaced by the sea erosions that pervaded the area for decades. Some families have however lamented that they are yet to receive their allocations even after paying the necessary allocation fees. Some aggrieved individuals from Vodza engaged on 10 October 2023 have cautioned that they would not agree for any portions of the reclaimed lands to be taken for the Port of Keta Project whilst numerous community members are yet to receive their allocations. They insist that the Port of Keta Project must reclaim all lands required for the project and when that is accomplished, land swaps can be done where necessary.

Within the Keta Municipality and the Anlo State in general, lands are owned by clans / extended family units, nuclear family units, and individuals. 'There are no stool lands among the Anlo ethnic groups in the Volta Region', as confirmed by Agbotadua Kumassah, Spokesperson for Togbe Sri III, Awomefia of Anlo States, during an in-depth

interview with the Social Impacts Specialist. Nonetheless, any project initiatives that seek access to lands, land acquisitions are channelled through the chiefs and elders of the community in question. The traditional councils and their courts also have arbitration powers to mediate and settle conflicts related to and ownership.

6.2.33. Land Uses in Immediate Project Communities

During engagement of communities (Kedzi, Havedzi, Vodza) directly within the designated project area, the most important land use at the proposed Port of Keta site includes local fishing with landing sites for canoes and drag nets, beach soccer, and community park (location for annual Norvikporgbe Festival celebrated by Havedzi, Kedzi and neighbouring communities). Canoe / fishing boat repair, joining, and launching of fishing boats into the sea are also done at the beach. Other visible land uses include coconut and oil palm plantations along the sea shore and the coasts of the lagoon, docking bays for smaller canoes used for water transport between island communities of Seva, Anyako, to Kedzi, Havedzi, etc. The only crop farming activities observed within the project communities were immediately outside the project boundaries between Kedzi and Vodza. Shallots, Okra, Tomatoes, Maize and other crops are grown using sprinkler irrigation systems that rely on underground water. Individuals winning pebbles / stones from the sea were also spotted aggregating stones on the beach whilst fishing net menders were seated at the beach mending nets. Salt mining is also done along the coasts of the lagoon as the water recedes / dries up. At the time of field visits, the lagoon was said to be very high for that time of the year (October 2023), that there is no way salt mining could commence. All salt mining sites were closed due to the excessive rains and large volumes of water in the lagoon. The fringes of the port boundaries also have residential / settlements as well as commercial activities such as a taxi station, fishing market at Havedzi, shops / stores, and burial grounds / cemeteries at Kedzi and Havedzi. Due to lack of household toilet facilities, the beaches often serve as grounds for open defecation - a situation admittedly deplored by all persons engaged.

Users of these lands engaged in October 2023 in communities of Kedzi, Havedzi and Vodza proposed measures such as:

- Building of docking bays in the lagoon, with a channel created between the sea and the lagoon to allow passage of fishing boats / canoes into the sea and to dock their vessels in the lagoon upon return from the sea.
- Reclamation of some lands in the northern part of the Havedzi school could for the relocation locals currently enclosed within the project area.
- Give capacity to fishermen to acquire new fishing vessels and operating licensing in order to aid them in adopting new fishing methods that would eliminate the use of drag-nets.
- Build alternative park either on reclaimed lands or set aside nearby beaches for soccer teams and festival patrons to continue hosting their games and festivals. The beach soccer team hoped that the building of the port will draw much more attention to their team and games, and that opportunities for sponsorship deals / relationship could be established with the Port of Keta.

Figure 6-85 through to Figure 6-92 provides an indication of the land uses surrounding the Port of Keta site.

Figure 6-85 - Landing Site at the Site

Figure 6-86 - Beach at the Site

Figure 6-87 - Road Providing Access to the Beach

Figure 6-88 - Signboard on Kedzi-Havedzi Road

Figure 6-89 - Buildings on Perimeter of Site

Figure 6-90 - Lagoon on Perimeter of Site

Figure 6-91 - Low Tension Power Line

Figure 6-92 - Buildings on Perimeter of Site

6.3. Local Grievance Issues and Mechanisms

Within the project communities, there continues to be reverence for traditional institutions and dispute resolution mechanisms. The Chief, his elders - comprised of the linguist, chief priests, sub chiefs, family heads, are often engaged to resolve disputes and cases that are not criminal in nature. All criminal cases are reported / referred to the police service for prosecution. For a civil dispute to be heard, the linguist is first contacted. The linguist will then contact the Agbotadua, (chief's secretary / lieutenant) about the complaint received. The Agbotadua then report to the Chief and Queen Mother. Date is then set for arbitration. Both sides participate, answer to the issues and questions, judgement is passed, and they are required to abide by the judgements. Where the Chief and his

elders are unable to resolve an issue at the community level, the case is then referred / forwarded to a chief higher up the ladder. Most frequent grievance issues dealt with by traditional bodies in the project area communities include land disputes as a result of scarcity of land in the project community, quarrels, petty theft cases, marital disputes, false accusations and other civil cases. The same bottom-up hierarchical chieftaincy system described under Section 6.2.4 - Socio-Cultural Structure are relied upon for grievance redress within the family, community and the Anlo state.

Since grievances are envisaged throughout project implementation, a comprehensive grievance redress mechanism for the project shall include the participation of certain key figures from the communities, to be selected by members of the communities themselves, to represent, receive and forward grievances to the project grievance team. Where there is the need to resort to the local grievance resolution mechanism, and the project considers it as efficient in dealing with grievance issues - especially the ones that may arise between agents of the project and the communities, the attempt should not be shunned. As the locals insisted, all grievances should be routed through the traditional grievance system first before any other options are considered. That will breed mutual respect and cooperation between the project and the communities.

6.3.1. Potential Grievances / Disputes During Project Implementation

During project implementation, many grievances are likely to arise, mainly related to survey of structures, plots, relocation of Project Affected Persons (PAPs), and proposed values for compensation, land disputes, landing beach concerns, recruitment of local labour, workplace disputes between an employee and an employer or a supervisor, or between work colleagues, between a community and contractors, among others. An attempt is made in the following subsections to outline a standard grievance redress mechanism format that could be adopted to set-up grievance committees both at community levels and among worker groups during project implementation.

6.3.2. Grievance Mechanism

Grievance mechanism when well implemented will help the project deal with specific concerns raised by all PAPs and or others in relation to compensation, resettlement or livelihood restoration issues in an effective, transparent and timely manner. This will provide aggrieved persons the voice and opportunity for redress, hence mitigating litigation, bad publicity and delays in project execution. A grievance mechanism provides a formal and ongoing avenue for stakeholders to engage with project proponents and contractors, whilst the monitoring of grievance provides signals of any escalating conflicts or disputes. Protocols of the mechanism are equally useful for handling GBV / Sexual Harassment (SH) / SEA cases and emphasize community representation in grievance redress committees within the various project affected communities. The establishment of a Grievance Mechanism is a requirement of EPA and Environmental Impact Assessment rules international standards such as the World Bank Performance Standards. Effective grievance mechanism has the following components:

- Simple and culturally appropriate process.
- Staff arrangements with roles and responsibilities for the grievance management process.
- Training for operational staff and community / workers representatives.
- A set timeframe within which resolutions are attained with sign off action planned to resolve grievances considered to be of significant concern.
- System of response that's timely and transparent.
- Appeal process with involvement of third parties.
- Disclosure to make grievance redress processes widely known to affected communities / parties.
- Access to legal remedies without any impediments.
- Effective monitoring to guarantee grievances are well and duly dealt with and resolved.

6.3.3. Sensitization and Training for Grievance Redress Committees

It is important to sensitize project communities about the Grievance Redress Mechanism (GRM), its objectives and usefulness in project implementation, and the opportunity of access and voice it provides for all PAPs and the

general public to seek redress of all kinds of grievances. Reporting channels must be equally communicated to project communities / stakeholders to include:

- Face-to-face visits
- Telephones / Mobile phones & toll-free lines, text messaging and WhatsApp platforms
- Community Representatives / Grievance Officers
- Online platforms, emails, etc.
- Letters, Visits to Project Offices, District / Local Assemblies, etc.

6.3.4. Grievance Redress Committees

All project communities should be sensitized and trained to constitute grievance redress committees. Workers should equally be sensitized and supported to constitute grievance redress committees. These committees then become easily accessible to aggrieved persons within a project ecosystem, allowing them the opportunity to report any grievances experienced.

6.3.5. Grievance Redress Processes / Procedures

The following processes should be duly observed to effectively achieve the goals and objectives for which the GRM and committees are instituted. The general steps of the grievance process should comprise:

- Registration of complaints;
- Screening and Investigation for the determination and implementation of the redress action (by any of the GRM tier levels as appropriate in consultation with the complainant);
- Verifying the redress action (by any of the GRM tier level as appropriate); and
- Signing of the grievance or closing out (to be signed off between the complainant and the GRM tier level as appropriate).

6.3.6. Registration of Complaints

Effective registration of complaints is an essential component of a GRM. Key features of effective registration of complaints includes:

- **Records:** Recording of grievances should consider local languages and their resolution should be communicated to the complainants / stakeholders verbally and in writing and should be transparent, timely, affable and in line with local culture. All grievances and complaints, whether real or unreal, should be recorded according to the complaint's resolution procedure. As such, grievance forms should be provided to all grievance committees to make for easy recording of grievances.
- **Grievance File:** A file should be created for each grievance to include the date of the grievance; the complainant's contact details and a description of the grievance; a receipt given to the complainant at the time of registration of the grievance; a grievance follow-up form for recording the measures taken (investigation, corrective measures); and a file closure form, a copy of which will be given to the complainant after he / she has accepted the closure and signed the form. Grievances could also be directly recorded on an online system.
- **Resolution:** After screening and investigation, the resolution should be recorded and response given to complainant / stakeholder and based on the satisfaction of the complainant, the grievance closed.
- **Determination of Grievance:** If a grievance is unfounded, the project should record and note that it is not relevant. The project should provide a verbal and a written response to close the grievance.
- **Field Inspection:** Where necessary, a field inspection visit to verify the veracity and severity of the grievance should be made to obtain as much information as possible, meet with the complainant; determine whether the grievance is legitimate; classify the grievance as minor, medium, serious, major or catastrophic; close the grievance immediately (e.g., if it is unfounded) or propose a solution that will lead to another site visit (for possible measurement).

- **Disagreement with Resolution:** In case the complainant does not agree, and the solution requires internal consultations at (the project), complainant should be informed of a 7-day deadline for the investigation of his / her grievance and given a firm appointment;
- **External Referral:** If the grievance could not be resolved internally with the project at the local level (project site), it should be referred to the next level, thus the Grievance Redress Team at the Municipal / District level / Project Implementation Unit Level. The complaint could also be escalated to the level where the safeguards teams would see to the resolution of the complaint. At any of these referral levels, the committees should be furnished with basic technical information, such as the proposed amount of compensation, a list of meetings and interviews with the complainant and a description of the exact reason for the dispute / complaint. The complainant(s) will be invited before the committee for an acceptable resolution to be reached.

6.3.7. Cultural Heritage Sites and Shrines

The location of cultural heritage sites and shrines identified during the cultural heritage field survey are presented in Figure 6-93 (present-day cemeteries), Figure 6-94 (abandoned cemeteries), Figure 6-95 (palaces), and Figure 6-96 (shrines).

Within the immediate project area, there are some shrines that were identified and may require relocation. These included the Togbui Evo along the Kedzi-Vodza project boundary. Kedzi community also identified various clan / ancestral stool houses / shrines known as Togbe Ziwo. This include Dzahli, Togbe Ekpe and Ayayizikpui. Sacrifices and prayers are offered at these shrines for protection, blessings and good fortune by adherents of these shrines. These shrines can be relocated with the appropriate rites performed. The rites involve invocation of oracles by traditional priests for the shrines to stipulate what specific rites are to be performed, how and where they would prefer to be relocated. Some cemeteries are also in the designated area, notably in Kedzi and Havedzi. No cultural heritage sites were identified within the designated project area. Nonetheless, archaeological relics may be discovered within some areas of the project sites and in the sea during land reclamation due to the displacement of the original Kedzi township by the sea.

Fort Prinzenstein, a Danish Fort built between 1700-1784 at Keta is however one of the most spectacular relics of precolonial and colonial history in the Municipality. However, it is not within the project designated area. It played a key role in the now infamous triangular slave trade involving West Africa, England and North America (SIIPS, 2021). The fort was declared a world heritage site in 1975 and was initially damaged by the sea waves / erosion in 1980. It continued to be damaged by the sea erosion, and a third of the original structure lost, until a sea defence project in 2003. The caretaker of the port expressed the hope that the port of Keta Project when realized will partner with the Ghana Museums and Monuments Board to restore the fort to its former state. The Ghana Museums and Monuments Board is the official custodian of the fort. Other notable places of cultural value within the Anlo / Keta Municipality include the Atorkor Slave market (where a monument was raised for the wicked slave trade activities); the Anlo military headquarters in Tsiame; and Cape St. Paul light house, Woe.

A standalone Archaeology and Cultural Heritage Baseline Report is provided in Annex E, a summary of the report is provided in subsections 6.3.7.1 through to 6.3.7.2.

6.3.7.1. Cultural Heritage Field Survey

The purpose of the archaeological and cultural heritage study is to scope out the project area and document any relevant archaeological, cultural sites, and heritage resources that could be adversely affected by the proposed port development and to recommend mitigation measures. Archaeological and heritage resources are unique and non-renewable and as a result, any impact on such resources must be seen as an impact that should be mitigated where possible.

The following places and objects were investigated during the survey:

- Places, buildings, and structures.
- Places to which oral traditions are attached or which are associated with living heritage.
- Historical settlements and townscapes.

- Landscapes and natural features.
- Spiritual and religious sites.
- Archaeological sites.
- Graves and burial grounds.

The sites and project locations were assessed in the field. The assessment included the conduct of a reconnaissance survey at the proposed preferred sites to record key ethnographic objects and surface archaeological materials in the project areas . The location of possible heritage resources was recorded with the use of a GPS. The use of photographic documentation of sites, objects, landscapes, the built environment, and other tangible and intangible lifeways in the project area was also deployed.

In line with the requirements of IFC PS 8, the traditional leadership of the area (Paramount Chief and Overlords) were consulted for their indigenous knowledge to enable the team to identify any known cultural heritage sites that may be affected by the project works. It also involved the conduct of ethnographic research, interviews and focus group discussions, and the recording of the histories of the communities about the tangible and intangible heritage in the project areas. These are summarized below:

Table 6-29 - Stakeholder Engagement for the Cultural Heritage Impact Assessment

Dates	Location	Interviewees
06 February 2024	Kedzi	Community Elders and Priests
07 February 2024	Havedzi and Horvi	Community Elders and Priests
08 February 2024	Vodza / Adzido	Community Elders and Priests
09 February 2024	Whutti (near Dzelukope)	A spokesperson for Awoemefia and Community Elders
07 March 2024	Ghana Museums and Monuments Board	Deputy Executive Director, Volta Regional Director, Archaeologists and Curators

6.3.7.1.1. Findings from Consultations with Elders of Kedzi

An interaction with the elders of Kedzi took place on the 06 February 2024 at the former Assemblyman's residence. According to them, their heritage resources included their lagoon, traditional religion, traditional marriages, naming ceremonies, funerals, cemeteries, and Kente weaving. When asked how the development of the Port would impact their heritage, they indicated that it would not affect any of their heritage resources since the land would be reclaimed from the ocean and their abandoned settlement area. They pointed out that the Port would rather bring about job creation, and economic boom, foster trading activities, promote inter-marriages, and raise the standard of living. They said the Port when completed and operational will contribute to reducing their hardships, it will promote infrastructures, and raise educational standards as new and good schools will spring up, and markets will be established. However, they raised concerns that because of the diverse cultural interactions, security measures would need to be tightened and more security personnel deployed to the area. The elders said the Project was long overdue and are waiting for it to become a reality.

6.3.7.1.2. Findings from Consultations with Elders of Havedzi and Horvi

The interaction with the elders of Havedzi and Horvi took place on the 7th of February 2024 at the residence of the priest of the Togbui Gbadegbu shrine. They indicated that the development of the Port would not have significant negative impacts on their heritage resources. They were of the opinion that, the positive impacts of the Project far outweigh the negative impacts and were ready for it. As much as their heritage resources would not be affected except for some shrines that are located within the proposed Project development site, they suggest that those shrines be relocated. They suggested that since the area around the sand bar where they play their beach soccer would be affected, they would plead there should be a replacement if it would be possible.

6.3.7.1.3. Findings from Consultations with Elders of Vodza / Adzido

A meeting took place on the 8th of February 2024 at the Takpey shrine when some elders of the community decided to accompany the consultant to document the heritage resources in the community. They pointed out that they were

in full support of the Port development. They however cautioned that the Cultural Heritage Impact Assessment must be detailed and thorough so that the project does not affect any of the heritage resources at Kedzi, Havedzi, and Horvi since these communities are close to the proposed site for the Port development. In the meeting, they indicated that the negative impacts of the Port development cannot be compared to the positive impacts that they would benefit from and were ready for the Project.

6.3.7.1.4. Findings from Consultations with Elders of Whutti

A meeting was held at the residence of the spokesperson for the Awoemefia at Whutti on the 9th day of February 2024. The meeting was held to identify and document what constituted their heritage resources, and how the development of the Port would impact these resources negatively and positively, and the necessary mitigation strategies that could be implemented.

The elders identified their heritage resources as their culture, environment, knowledge systems, rites of passage, and language. They pointed out that their culture, language, and environment would be negatively affected. They indicated that there would be infiltration of new words into the Ewe language as a result of cultural interactions which could lead to language corruption and subsequent loss. They also indicated that there would be the introduction of new types of dressing, professional prostitution, alcoholism, drug abuse, worship songs in foreign languages, as well as intermarriages leading to cultural loss and adulteration. Child trafficking, child labour, and child abuse, stealing were the other negative impacts they mentioned.

Some of the mitigation strategies they suggested were to sensitize the people on the need to promote their indigenous language and teach them at schools whilst they prepare for some changes as well to avoid culture shock in the long run. They suggested that their people must be educated on appreciating their own culture by upholding it. They suggested that there should be a contractual agreement between the traditional council and companies that would evolve supported by the government to obey the traditional council. They also suggested that employment opportunities be given to indigenes who have the requisite qualifications. They emphasized the need to strengthen security in the area as well as to curb all sorts of misconduct that cross-cultural contacts would generate. However, they agreed that Port would create jobs, bring about the development of infrastructural facilities, and raise the standard of living for them.

6.3.7.1.5. Findings from Consultations with Ghana Museums and Monuments Board

In a meeting with some of the management and senior staff of the Ghana Museums and Monument Board, they were happy about the Project but raised a few concerns. One of such concerns was for the Project to acquire an excavation permit in advance since historically it is known that a greater part of ancient Kedzi has been submerged by the sea. The relocation of the shrines which are also considered antiquities by law would need permits before they are removed or relocated. Therefore, the permit would serve a dual purpose. Given that, it is likely the dredging and reclamation of land from the sea would expose some archaeological remains that would be worthy of salvaging. Once settlements have been submerged, they are likely to reveal archaeological materials once the project starts.

They indicated that chance find procedures must be developed and spotter training organized for those who would be working on the site to aid them in identifying archaeological and heritage objects and materials. The GMMB pointed out that there were some colonial structures and monuments at Keta and considerations should be made in developing some of these monuments and heritage resources to boost tourism in the area.

6.3.7.2. Cultural Heritage Resources Identified

Table 6-30 lists the cultural heritage resources identified during the survey and their locality. Two key informants supported the identification of the cultural heritage resources. Conrade Koesa Ayayee assisted in Havedzi with the identification of the Torgbui Gbadegbu Shrine and the Gidiglo and Xewukpo Shrine. Mawuli Gati supported with all the other cultural heritage resources.

Locations of the cultural heritage resources identified are provided in Figure 6-93 (Present-Day Cemeteries), Figure 6-94 (Abandoned Cemeteries), Figure 6-95 (Palace), and Figure 6-96 (Shrines).

Table 6-30 - Cultural Heritage Resources and their Locality

Site No.	Site	Type	Coordinates	Photograph
Keta				
1	St Michael Co-Cathedral, Keta	Historical Building	05º 54′ 47.6″ N, 000º 59′ 29.1″ E	Figure 6-97
2	Tsikata Family House	Historical Building	05º 55′ 12.1″ N, 000º 59′ 28.4″ E	Figure 6-98
3	Accra Brewery House	Historical Building	05º 55′ 11.6″ N, 000º 59′ 28.6″ E	Figure 6-99
4	Dolley House	Historical Building	05º 55′ 11.6″ N, 000º 59′ 31.4″ E	Figure 6-100
5	Woollams House	Historical Building	05º 55′ 09.5″ N, 000º 59′ 31.8″ E	Figure 6-101
6	Van-Lare House	Historical Building	05º 55′ 11.2″ N, 000º 59′ 32.3″ E	Figure 6-102
7	Lassey House	Historical Building	05º 55′ 21.6″ N, 000º 59′ 31.2″ E	Figure 6-103
8	First Palace	Historical Building	05º 55′ 21.0″ N, 000º 59′ 31.7″ E	Figure 6-104
9	Chapman Building	Historical Building	05º 55′ 22.6″ N, 000º 59′ 31.9″ E	Figure 6-105
10	Bremen Mission	Historical Building	05º 55′ 13.8″ N, 000º 59′ 34.2″ E	Figure 6-106
11	UAC Building	Historical Building	05º 55′ 20.7″ N, 000º 59′ 32.8″ E	Figure 6-107
12	Ben Sarah House	Historical Building	05º 55′ 25.3″ N, 000º 59′ 33.4″ E	Figure 6-108
13	Wulf Den House	Historical Building	05º 55′ 26.4″ N, 000º 59′ 33.7″ E	Figure 6-109
14	Fort Prinzenstein	Historical Building	05º 55′ 18.4″ N, 000º 59′ 36.1″ E	Figure 6-110
15	European Cemetery	Relocated Cemetery	05º 55′ 22.8″ N, 000º 59′ 35.4″ E	Figure 6-111
16	London Park	Historical Place	05º 55′ 23.2″ N, 000º 59′ 35.9″ E	Figure 6-112
17	Tay House	Historical Building	05º 55′ 27.4″ N, 000º 59′ 35.1″ E	Figure 6-113
18	Abdullah House	Historical Building	05º 55′ 28.2″ N, 000º 59′ 35.1″ E	Figure 6-114
Adzido				
19	Takpey Shrine	Shrine	05º 55′ 58.4″ N, 000º 59′ 51.7″ E	Figure 6-115
Vodza				
20	Kudolo Yaweh Shrine	Shrine	05º 56′ 26.4″ N, 000º 59′ 50.6″ E	Figure 6-116

Site No.	Site	Type	Coordinates	Photograph
21	Togbui Evo Shrine	Shrine	05º 56′ 33.4″ N, 001º 00′ 10.2″ E	Figure 6-117
Kedzi				
22	Towotor Shrine	Shrine	05º 57′ 15.9″ N, 001º 00′ 33.9″ E	Figure 6-118
23	Tenuidzahli Stool Shrine	Shrine	05º 57′ 42.2″ N, 001º 00′ 50.4″ E	Figure 6-119
24	Ayayaa Stool Shrine	Shrine	05º 57′ 43.6″ N, 001º 00′ 50.7″ E	Figure 6-120
25	Amadzahe Stool Shrine	Shrine	05º 57′ 46.5″ N, 001º 00′ 51.9″ E	Figure 6-121
26	Sallah Shrine	Shrine	05º 57′ 46.5″ N, 001º 00′ 51.9″ E	Figure 6-122
Havedzi				
27	Torgbui Gbadegbu Shrine	Shrine	05º 58′ 37.2″ N, 001º 01′ 10.6″ E	Figure 6-123
28	Gidiglo and Xewukpo Shrine	Shrine	05º 58′ 42.6″ N, 001º 01′ 17.5″ E	Figure 6-124
Horvi				
29	Torgbui Sidro Kokroko Shrine	Stool Shrine	05º 58′ 50.6″ N, 001º 01′ 40.2″ E	Figure 6-125
30	Agboloso Family Cemetery	Abandoned Cemetery	05º 57′ 14.7″ N, 001º 00′ 22.8″ E	Figure 6-126
31	Sosu Family Cemetery	Present-Day Cemetery	05º 57′ 19.0″ N, 001º 00′ 26.0″ E	Figure 6-127
32	Adexoke and Tsidi Family's Cemetery	Present-Day Cemetery	05º 57′ 16.0″ N, 001º 00′ 26.8″ E	Figure 6-128
33	Adagbedu, Dotse, Dogbatse-Gamor, Seklorwu, and Kpodo Family's Cemetery	Present-Day Cemetery	05º 57′ 12.8″ N, 001º 00′ 28.0″ E	Figure 6-129
34	Kwawuvi-Akpa, Somi, Doe-Akpabli, Seduida, Kakpoxa, and Nogbloe Family's Cemetery	Present-Day Cemetery	05º 57′ 19.2″ N, 001º 00′ 26.6″ E	Figure 6-130
35	Acolatse, Wemegah, and Ahiataku Family's Cemetery	Abandoned Cemetery	05º 57′ 16.7″ N, 001º 00′ 28.9″ E	Figure 6-131
36	Amenorhu-Akpoxolo, Agbodeka, and Ahiekpor-Sosu Family's Cemetery	Present-Day Cemetery	05º 57′ 18.9″ N, 001º 00′ 29.1″ E	Figure 6-132
37	Babanawo, Avorkliyah, Nutsugah and Acolatse, Amedonoo Family's Cemetery	Present-Day Cemetery	05º 57′ 16.3″ N, 001º 00′ 30.2″ E	Figure 6-133
38	Doe Family Cemetery	Present-Day Cemetery	05º 57′ 22.4″ N, 001º 00′ 29.5″ E	Figure 6-134
39	Awuvey and Agbolosoo Family's Cemetery	Present-Day Cemetery	05º 57′ 19.1″ N, 001º 00′ 31.0″ E	Figure 6-135
40	Akpoxolo Family Cemetery	Present-Day Cemetery	05º 57′ 24.3″ N, 001º 00′ 30.4″ E	Figure 6-136

Site No.	Site	Type	Coordinates	Photograph
41	Semenya Family Cemetery	Present-Day Cemetery	05º 57′ 21.5″ N, 001º 00′ 31.8″ E	Figure 6-137
42	Semador, and Sake-Kwawu Family's Cemetery	Present-Day Cemetery	05º 57′ 21.1″ N, 001º 00′ 32.0″ E	Figure 6-138
43	Sokpor-Sallah Family Cemetery	Present-Day Cemetery	05º 57′ 19.9″ N, 001º 00′ 32.5″ E	Figure 6-139
44	Kuwornu, and Gidiglo Family's Cemetery	Abandoned Cemetery	05º 57′ 21.4″ N, 001º 00′ 32.4″ E	Figure 6-140
45	Kpalekpor Family Cemetery	Present-Day Cemetery	05º 57′ 21.4″ N, 001º 00′ 32.4″ E	Figure 6-141
46	Segbedzi, Ali, Amevor, Nyavi, Kuborlor, Agbowotame, Setor, Kugbadzor, Damalie, Adukpo, Afetsi, and Zoiku Family's Cemetery	Present-Day Cemetery	05º 57′ 25.0″ N, 001º 00′ 31.9″ E	Figure 6-142
47	Azaletey, Horlortu, Tegladza, and Afeadido Family's Cemetery	Present-Day Cemetery	05º 57′ 24.9″ N, 001º 00′ 33.4″ E	Figure 6-143
48	Kotogbor Family Cemetery	Present-Day Cemetery	05º 57′ 25.5″ N, 001º 00′ 33.7″ E	Figure 6-144
49	Gedzia, Ashigbui, Kuodada, and Gati Family's Cemetery	Present-Day Cemetery	05º 57′ 28.3″ N, 001º 00′ 33.6″ E	Figure 6-145
50	Adzagbolu, Kwatshenu, Kofitse, Tay, Tsagli Family's Cemetery	Present-Day Cemetery	05º 57′ 32.1″ N, 001º 00′ 33.3″ E	Figure 6-146
51	Affizie, and Amenuku Family's Cemetery	Present-Day Cemetery	05º 57′ 28.5″ N, 001º 00′ 34.3″ E	Figure 6-147
52	Ahiadzi, Kudodah, Quarshigah & Kwawu, Ashienu, Awuvoe, Nuworkpor & Geraldo Family's Cemetery	Present-Day Cemetery	05º 57′ 33.2″ N, 001º 00′ 34.3″ E	Figure 6-148
53	Akpalo, Baccah, Bidda, Adiworkor, Nornorley, Pomevor, Ackornoo Family's Cemetery	Present-Day Cemetery	05º 57′ 31.6″ N, 001º 00′ 34.8″ E	Figure 6-149
54	Kedzi Public Cemetery	Present-Day Cemetery	05º 57′ 40.7″ N, 001º 00′ 33.1″ E	Figure 6-150
55	Hlordzi, Setordzi, Bentum, Nornorley, Nakeh, Ayayaa Family's Cemetery	Present-Day Cemetery	05º 57′ 36.8″ N, 001º 00′ 35.7″ E	Figure 6-151
Havedzi				
56	Tagbor Family Cemetery	Present-Day Cemetery	05º 58′ 53.3″ N, 001º 00′ 55.7″ E	Figure 6-152
57	Ehiekpor Family Cemetery	Present-Day Cemetery	05º 58′ 39.7″ N, 001º 01′ 11.0″ E	Figure 6-153
58	Torgbui Sewonu Gidiglo Palace	Palace	05º 58′ 43.0″ N, 001º 01′ 16.9″ E	Figure 6-154
59	Dadagbo and Gidiglo Family's Cemetery	Present-Day Cemetery	05º 58′ 47.4″ N, 001º 01′ 16.8″ E	Figure 6-155
60	Kudafa Family Cemetery	Present-Day Cemetery	05º 58′ 41.9″ N, 001º 01′ 18.8″ E	Figure 6-156
61	Babanawo Family Cemetery	Abandoned Cemetery	05º 58′ 44.7″ N, 001º 01′ 18.7″ E	Figure 6-157

Site No.	Site	Type	Coordinates	Photograph
62	Zevor Family Cemetery	Present-Day Cemetery	Could not access the site.	-
63	Kokroko Family Cemetery	Present-Day Cemetery	Could not access the site.	-
64	Kuwornu Family Cemetery	Present-Day Cemetery	Could not access the site.	-

Figure 6-93 - Location of Present-Day Cemetries
(Source: CARES Group Fieldwork, February 2024)

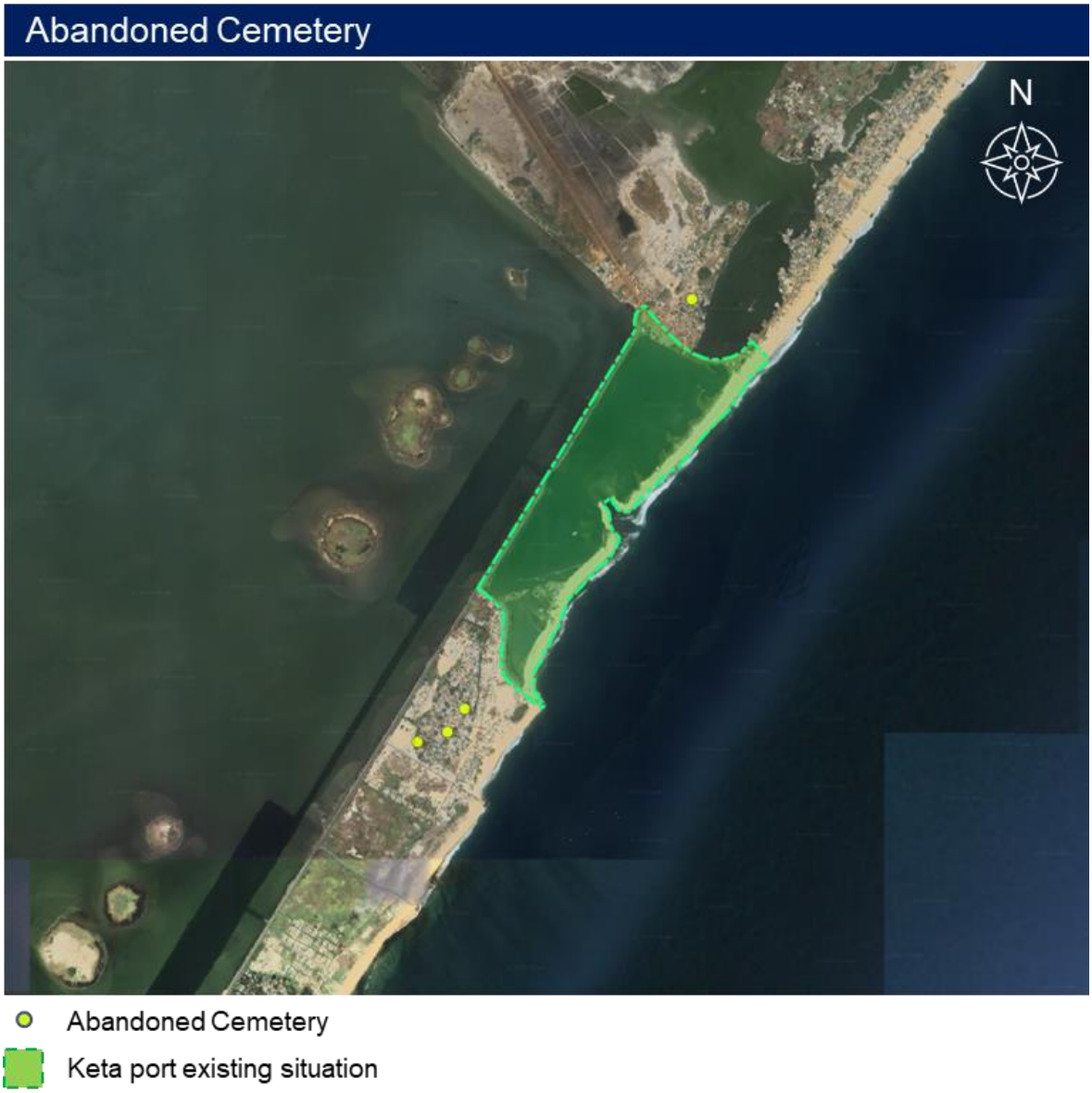

Figure 6-94 - Locations of Abandoned Cemetries
(Source: CARES Group Fieldwork, February 2024)

Figure 6-95 - Location of Palace
(Source: CARES Group Fieldwork, February 2024)

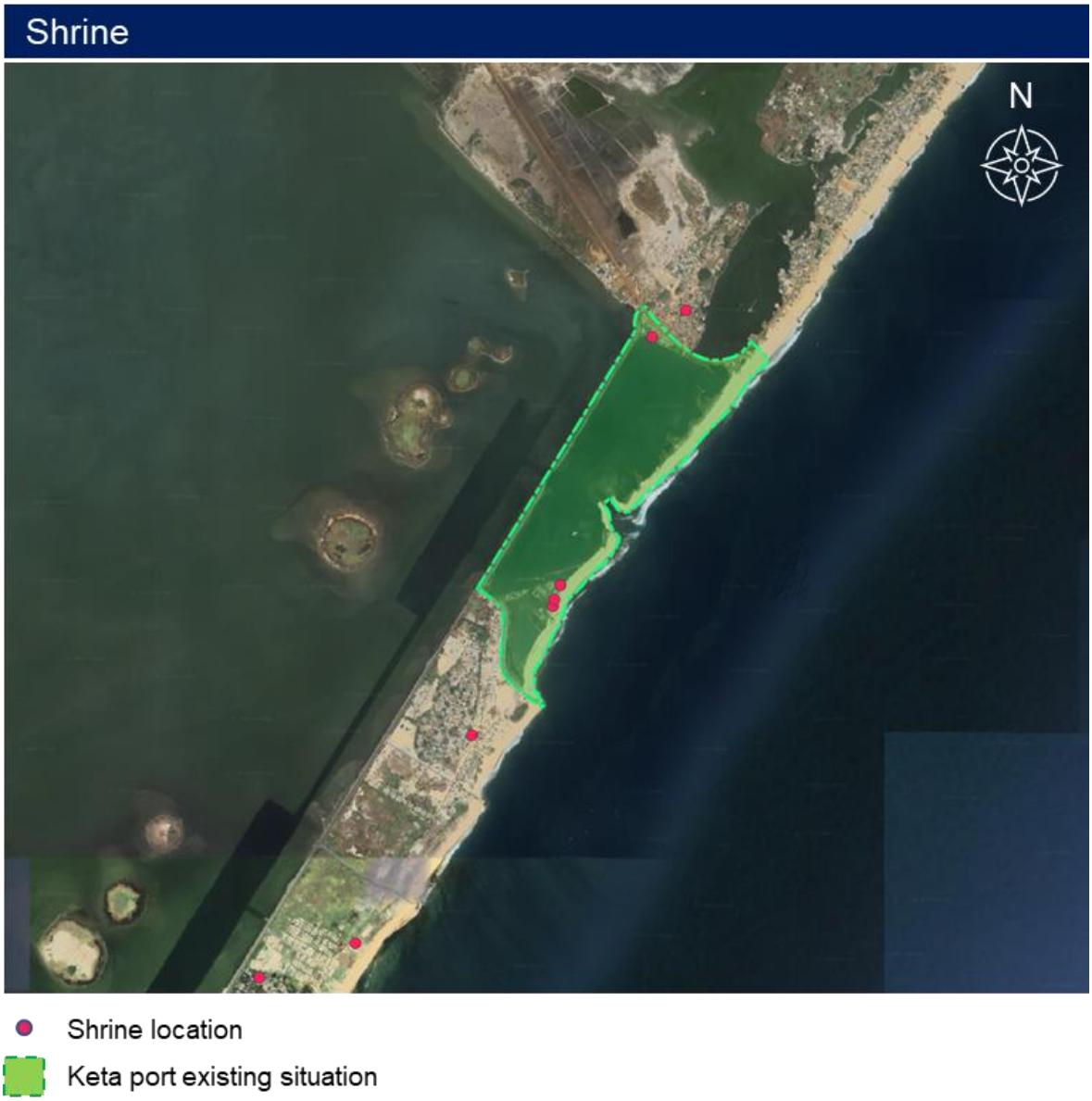

Figure 6-96 - Location of Shrines
(Source: CARES Group Fieldwork, February 2024)

Figure 6-97 - St Michael Church (First Keta Catholic Church)

Figure 6-98 - Tsikata Family House

Figure 6-99 - Accra Brewery House

Figure 6-100 - Dolly House

Figure 6-101 - Ruins of Wollam's House

Figure 6-102 - Van-Lare House

Figure 6-103 - Lassey's House

Figure 6-104 - First Keta Chief's Palace

Figure 6-105 - Chapman's House

Figure 6-106 - Bremen Mission

Figure 6-107 - The UAC Building

Figure 6-108 - Ben Sarah House

Figure 6-109 - Wulf Den's House

Figure 6-110 - Fort Prinzenstein

Figure 6-111 - Early Europeans Cemetery

Figure 6-112 - London Park

Figure 6-113 - Tay House

Figure 6-114 - Abdallah House

Figure 6-115 - Takpey Shrine

This is a community shrine that assists people in fishing for good catches, fights against enemies, and protects its people. The shrine is consulted through divination or soothsaying.

The taboos of the shrine include not fishing on Wednesdays, and not carrying black or black soothed utensils to the sea or close to the sea.

Sacrifices offered to the shrine include ram, cow, goats, fowls, food items, Gin, Akpeteshi, palm wine, and soft drinks.

Figure 6-116 - Kudolo Yaweh Shrine

The Kudolo Yahweh shrine protects the community spiritually. it offers healing to people who consult it and provides traveling mercies to people who consult it. The shrine also serves as an arbitrator for issues relating to it.

Prayers are offered there for people on Wednesdays and Saturdays. A sacrifice is offered to the shrine in July with maize. The priest claims the shrine or deity travels and returns by October.

In October another sacrifice or celebration called Tezah is offered to the shrine using yam. Every three years, the shrine is celebrated grandly, and the priest invites other priests and custodians of shrines to celebrate his shrine with him.

Some of the items offered to the shrine during this occasion are ram, maize, goats, fowls, Schnapps, gin, Akpeteshi, and a type of soft drink called Lion Killer.

The taboos of the shrine include not entering the shrine with footwear, shirt, blouse, hat, headgear, trousers must be rolled up to knee level, no fighting, and insults.

One must wrap a cloth around your waist before you can enter the shrine whilst women must wear vests to cover their upper body and wrap a cloth around their waist before you can enter the shrine.

Figure 6-117 - Togbui Evo Shrine

This shrine is known as Togbui Evo. The shrine offers protection to the community from spiritual sicknesses and calamities. Fisherfolks consult the shrine to obtain bumper catch when they go fishing.

Every July of each year, the priest of the shrine offers sacrifices to the shrine. Some of the sacrificial items are different fishes from the sea, corn, red oil, schnapps, Akpeteshi (sugarcane or palm type), and soft drinks. Four pots are presented to the deity and the shrine is painted with white paint.

The shrine abhors fishing on Sundays.

Figure 6-118 - Towotor Shrine

This shrine offers protection and assistance to people when consulted in the community. It is consulted through soothsaying or divination before any activity is carried out within the area. The people claim it works like magic. Once you are native and someone curses you with the thunder god (Nogokpo), and you remain in the community, the thunder curse cannot strike you.

The priest claims the shrine has taken a stance not to allow anyone to embark on any developmental project unless it is consulted.

The shrine taboos stealing, and it will disturb you until you leave the community. It abhors having sex with another man's wife, and if you are within the community and do not participate in community work when you die you will be fined a sum of about a thousand cedis (GHC 1,000.00) before you are allowed to be buried in the community.

If one must enter the shrine for consultation, it taboos wearing of upper dress (shirt, T-shirt, blouse, Kaba, etc.), slippers, headgear or hat, and wristwatch, and if one is wearing trousers, it must be rolled up. It also taboos formal greetings once in the shrine.

It is claimed that every year from May 15th to June 15th it travels to Ife and when it returns it is welcomed with sacrifices such as two (2) goats, four (4) red fowls, four (4) white fowls, four (4) black fowls, Gin, Akpeteshi, soft drinks, and food items.

Figure 6-119 - Tenuidzhale Stool Shrine

This stool shrine houses fifteen (15) deities and a stool. The people claim it was consulted in the past before they embarked on any war. It also helps people who want to succeed in life. The people visit the shrine and present their requests or petitions to it and promise to return to thank them once their requests and petitions are granted. The shrine also offers protection to its devotees as well.

Yearly sacrifices made to the shrine include ram, fowls, schnapps, minerals, Akpeteshi, and food items. Divination or soothsaying is done to ascertain other things that the shrine would need as a sacrifice.

Some of the taboos of the shrine include a menstruating woman, a flirting married woman and not washing down after sex.

This shrine is situated within the place earmarked for the project development and needs to be relocated. However, the shrine priests have indicated that consultation would have to be made for the shrine to permit them to relocate it and a new structure must be provided for it by the GPHA. Some of the items that would be needed for the relocation would include ram, goats, fowls, duck, schnapps, Akpeteshi, and soft drinks.

Figure 6-120 - Ayayaa Stool Shrine

This stool shrine accommodates three (3) deities. The people claim it was consulted in the past before they embarked on any war. It also helps people who want to succeed in life. The people visit the shrine and present their requests or petitions to it and promise to return to thank them once their requests and petitions are granted. The shrine also offers protection to its devotees as well.

Yearly sacrifices made to the shrine include ram, fowls, schnapps, minerals, Akpeteshi, and food items. Divination or soothsaying is done to ascertain other things that the shrine would need as a sacrifice.

Some of the taboos of the shrine include a menstruating woman, a flirting married woman and not washing down after sex.

This shrine is situated within the place earmarked for the project development and needs to be relocated. However, the shrine priests have indicated that consultation would have to be made for the shrine to permit them to relocate it and a new structure must be provided for it by the GPHA. Some of the items that would be needed for the relocation would include ram, goats, fowls, duck, schnapps, Akpeteshi, and soft drinks.

Figure 6-121 - Amadzahe Stool Shrine

This stool shrine accommodates four (4) deities. The people claim it was consulted in the past before they embarked on any war. It also helps people who want to succeed in life. The people visit the shrine and present their requests or petitions to it and promise to return to thank them once their requests and petitions are granted. The shrine also offers protection to its devotees as well.

Yearly sacrifices made to the shrine include ram, fowls, schnapps, minerals, Akpeteshi, and food items. Divination or soothsaying is done to ascertain other things that the shrine would need as a sacrifice.

Some of the taboos of the shrine include a menstruating woman, a flirting married woman and not washing down after sex.

This shrine is situated within the place earmarked for the project development and needs to be relocated. However, the shrine priests have indicated that consultation would have to be made for the shrine to permit them to relocate it and a new structure must be provided for it by the GPHA. Some of the items that would be needed for the relocation would include ram, goats, fowls, duck, schnapps, Akpeteshi, and soft drinks.

Figure 6-122 - Sallah Shrine

This shrine offers protection, and healing and assists people to be prosperous in their endeavours. The shrine taboos menstruating women, promiscuous women, and wearing of upper dresses, slippers, headgear, and hats.

There must be consultation of the deity to determine sacrifices that are made to it.

Figure 6-123 - Togbui Gbadegbu II Shrine

This shrine is owned by Conrade Koesa Ayayee. The name of the shrine is Togbui Gbadegbu II shrine. The shrine offers protection from evil forces and catastrophes, fchand healing, and people pray to it for success and opportunities.

Sacrifices offered to the shrine include cow, goat, fowls, ram, guinea fowls, Gin, Akpeteshi, and soft drinks.

Some of the taboos of the shrine are that women in their menses cannot enter, if one has had sex immediately, the person cannot enter until a cleansing ritual has been performed for you. If you are a devotee of the shrine, you cannot snatch someone's wife, no wearing of dress, footwear, headgear, hat, and trousers must be rolled up to knee level and all wrapped a cloth around your waist.

Figure 6-124 - Gidiglo Xewukpo Shrine

This shrine offers healing and solutions to spiritual problems. It also accepts and initiates people it has helped as children of the shrine after it has accepted them.

Figure 6-125 - Togbui Sidro Kokroko Shrine

This shrine has several deities including Azeglo, Amaga-Azor, Yewe, Eda, Afetor Eku, and Dulegba among others.

The priest claims Dulegba protects the town against external adversaries. The Azeglo is consulted before any community project is embarked on. The Amaga-Azor apprehends witches whilst the Yewe cult offers protection to its members and offers healing from sicknesses and protection from evil spirits.

Figure 6-126 - Agbolosoo Family Cemetery (Abandoned)

This cemetery is an abandoned cemetery that belonged to the above-named family for burying their dead

Figure 6-127 - Sosu Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-128 - Adexoke, and Tsidi Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-129 - Adagbedu, Dotse, Dogbatse-Gamor, Seklorwu, and Kpodo Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-130 - Kwawuvi-Akpa, Somi, Doe-Akpabli, Seduida, Kakpoxa, and Nogbloe Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-131 - Acolatse, Wemegah, and Ahiataku families' cemetery (Abandoned cemetery)

This cemetery is an abandoned cemetery that belonged to the above-named families for burying their dead.

Figure 6-132 - Amenorhu-Akpoxolo, Agbodeka, and Ahiekpor-Sosu families' cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-133 - Babanawo, Avorkliyah, Nutsugah and Acolatse, and Amedonoo families' cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead

Figure 6-134 - Doe Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-135 - Awuvey and Agbolosoo Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-136 - Akpoxolo Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-137 - Semenya Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-138 - Semador and Sake-Kwawu Families Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families' for burying their dead.

Figure 6-139 - Sokpor-Sallah Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-140 - Kuwornu, and Gidiglo Families' Cemetery (Abandoned)

This cemetery is an abandoned cemetery and belonged to the above-named families for burying their dead.

Figure 6-141 - Kpalekpor Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-142 - Segbedzi, Ali, Amevor, Nyavi, Kuborlor, Agbowotame, Setor, Kugbadzor, Damalie, Adukpo, Afetsi, and Zoiku Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-143 - Azaletey, Horlortu, Tegladza, and Afeadido Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-144 - Kotogbor Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-145 - Gedzia, Ashigbui, Kuodada, and Gati Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-146 - Adzagbolu, Kwatshenu, Kofitse, Tay, and Tsagli Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-147 - Affizie, and Amenuku Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-148 - Ahiadzi, Kudodah, Quarshigah & Kwawu, Ashienu, Awuvoe, Nuworkpor & Geraldo Families Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead

Figure 6-149 - Akpalo, Baccah, Bidda, Adiworkor, Nornorley, Pomevor, and Ackornoo Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-150 - Kedzi Public Cemetery

This cemetery is a present-day cemetery and belongs to the entire communities in the area for burying their dead.

Figure 6-151 - Hlordzi, Setordzi, Bentum, Nornorley, Nakeh, and Ayayaa Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead

Figure 6-152 - Tagbor and Ayaaye Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-153 - Ehiekpor Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-154 - Togbui Sewonu Gidiglo Palace

This is the palace of Togbui Sewonu Gidiglo of Havedzi.

Figure 6-155 - Dadagbo and Gidiglo Families' Cemetery

This cemetery is a present-day cemetery and belongs to the above-named families for burying their dead.

Figure 6-156 - Kudafa Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

Figure 6-157 - Babanawo Family Cemetery

This cemetery is a present-day cemetery and belongs to the above-named family for burying their dead.

7. Stakeholder / Public Consultations and Participation

Stakeholder participation during project planning and implementation is recognized as an integral part of environmental and social management for projects. It should be a two-way flow of information and dialogue between project proponents and stakeholders and should start at an early stage so that it can help shape project design. Hence, stakeholder identification process for the proposed project was based on an appreciation of the interest and influence of various organizations / institutions, communities, persons or groups in relation to the project.

7.1. Stakeholder Engagement as a Project Requirement

The Environmental Assessment Regulations, 1999 (LI 1652), makes for mandatory stakeholder / public engagements, requiring consultations with members of the public likely to be affected by the operations of the project and other regulatory and government institutions to be involved with the project. Effective public consultation and participation is an integral component of the Environmental Assessment procedures of Ghana.

The EPA Act 1994 (Act 490) also grants citizens the right to be informed about any development project carried out by either private or public institutions. This helps in obtaining local knowledge, addressing public views, concerns and values that can influence the project design, which in turn increases public confidence and minimises conflicts. Public participation is core to achieving an efficient and effective EIA practice and implementation.

Engagement should be based on timely and effective dissemination of relevant project information, including results of the process of identification of environmental and social risks and impacts and corresponding mitigation measures, in languages and forms preferred by the affected communities and allow for meaningful communication. There is a need to build upon channels of communication and engagement with affected communities established during the risks and impacts identification process.

7.2. Key Objectives of Stakeholder Consultations

The main objective of stakeholder consultations is to discuss the proposed project's environmental and social implications and to identify appropriate mitigation measures for adverse impacts.

Specifically, the consultations aimed to achieve the following objectives:

- To provide relevant information about the proposed project and its activities to stakeholders, areas and persons likely to be impacted.
- Seek participation of all interested parties, facilitate and maintain dialogue among stakeholders, and use the process to collect relevant information needed to make project decisions.
- Enhance the Port of Keta project development by learning from, and incorporating the expertise of individuals, professionals, communities and organizations.
- Provide opportunity to stakeholders and communities to discuss their opinions, potential project benefits and negative impacts, and to gauge the mood of locals toward project initiatives.
- To provide opportunities for stakeholders to discuss their concerns and offer recommendations.
- To gain insight on the role of each stakeholder in the implementation of the environmental and social safeguards as well as structures in place for the management of the proposed facilities.
- To provide and discuss with stakeholders the design options considered to reduce anticipated impacts.
- To identify and verify significance of environmental, social and health impacts.
- To inform the process of developing appropriate mitigation and management options.
- To establish the expectations and misconceptions of project communities in order to devise means to manage such expectations against any detriments such expectations may pose to the project, create solutions for addressing any concerns and integrating them into project design, construction, operations, and management.

- Reduce conflicts through early identification of issues causing disagreement, establish a mechanism for receiving and addressing grievances in a timely manner.

7.3. Stakeholder Identification Criteria

The stakeholder identification process for the Proposed Project is based on an appreciation of the interest and influence of various organizations / institutions / communities / persons or groups in relation to the project. The main criteria used to identify stakeholders is that relevant stakeholders should fall under one or more of these groupings:

- Funding agencies
- Project proponents
- Regulatory bodies / institutions
- Utility agencies / companies
- Other relevant government institutions
- Local government and administrative authorities
- Traditional authorities
- Local communities
- Project Affected Persons (PAPs)
- Neighbouring organisations
- Non-Governmental Organisations (NGOs) / Community Based Organisations (CBOs) / Civil Society Organisations (CSOs)
- The media
- The general public / citizenry.

7.4. Stakeholder Engagement Approach

For an effective stakeholder / community engagement process, there is the need for communicating project goals, activities, outcomes and impacts to various stakeholders using varied and appropriate methods of engagement.

The main methods of engagement with stakeholders included:

- Letters / Emails
- Community Announcements (Using Gong-Gong / Public Address Systems)
- Meetings (Face-to-Face / Virtual)
- Phone Calls
- Courtesy Visits
- Public Fora
- Focus Group Discussions (FGDs)
- Socioeconomic Surveys
- Local Radio Stations / Newspapers etc.
- Notice of any public fora will be by radio / FM stations and invitation letters.

The English Language was generally used during engagement with stakeholder institutions and other organisations. The Ewe language was used mainly during engagement with traditional representatives and locals of all the project communities. However, officials of the municipalities were engaged using the English language. During engagement with the project communities, members of the CARES Group team and GPHA who could not speak the Ewe language undertook their engagement in the English language with translations provided by a proficient interpreter.

Background information on the proposed project, areas likely to be affected, rationale for project development, likely impacts and opportunities etc., were discussed with stakeholders during consultations.

7.5. Stakeholder Groups and their Key Roles for the Proposed Project

The identified stakeholder groups and their roles as relevant to the proposed project are presented in Table 7-1 below.

Table 7-1 - Stakeholders and their Roles

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
Project Proponents	Ministry of Transport	The Ministry of Transport is responsible for the formulation, coordination and monitoring of Transport infrastructure policies and programmes for both public and private sectors of Ghana. The Ministry has direct supervision over the Ghana Ports and Harbours Authority as well as other institutions as Ghana Maritime Authority, Ghana Shippers Authority, PS Tema Shipyard, Regional Maritime University, Volta Lake Transport Company, etc.
	The Ghana Ports and Harbours Authority (GPHA)	GPHA, acting on behalf of the Ministry of Transport, under the Government of Ghana (GoG), are the Project Proponent currently developing the Port of Keta.
Regulatory Agencies / Bodies	Environmental Protection Agency (EPA)	Responsible for ensuring compliance with the laid down EIA procedures in the planning and execution of development projects, including compliance in respect of existing projects. The EPA is the regulator responsible for issuing of an Environmental Permit for the Proposed Project following approval of the EIA and will monitor to ensure compliance to the permit conditions and adherence to the Environmental Assessment Regulations, 1999.
	Ghana Maritime Authority (GMA)	Regulatory body of Ghana's maritime industry established under the GMA Act (ACT 630 of 2002), with responsibility for the monitoring, regulation, and coordination of all maritime activities of Ghana. The purpose of the GMA is to ensure the provision of safe, secure, and efficient shipping operations and protection of the marine environment from pollution from ships.
	Ghana National Fire Service	National Institution responsible for the prevention and management of undesired fires. Responsible for providing the fire permit / certificate for the Proposed Project facilities during construction and operation.
	Water Resources Commission	Responsible for regulating and managing Ghana's Water Resources, including the provision of Water Use Permits.
	Ministry of Fisheries and Aquaculture Development / Fisheries Commission	Regulator for the fishery industry. Responsible for the regulation and management of the utilization of the fishery resources of Ghana.
	Department of Factories Inspectorate	Responsible for the regulation of health and safety of workers and workplaces in general. To issue Facility / Project Registration Certificate or Approval and undertake monitoring of safety of workers at the project site.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
Other Relevant Government Institutions and Utility Companies	Ministry of Lands and Natural Resources	Mandated to ensure sustainable management and utilization of the nation's lands, forests, wildlife, and mineral resources for the flow of socio-economic growth and development. Ensures an enabling environment and adequate capacity and infrastructure are provided for both private entities and public agencies to perform at their best in the conservation and management of biodiversity. Plays a central role in the assessment and management of land-related social risks, hosting seven departments / agencies with roles in impact mitigation and management (Land Commission, Public and Vested Land Management Division, Land Registration Division, Survey and Mapping Division, Land Valuation Division, Office of the Administrator of Stool Lands).
	Lands Commission	The Lands Commission is established by article 258 of the 1992 constitution and the Lands Commission Act 767 in 2008. The Commission on behalf of the Government, manages public lands and other lands vested in the President by the Constitution or by any other law and any lands vested in the Commission, establishes, and maintain comprehensive land information. Hence, the Commission advises on the policy framework for the development of particular areas of the country to ensure land is coordinated with the relevant development plan for the area concerned; ensure that through sound, sustainable land use planning, socio-economic activities are consistent with long term national development goals; collaborate with other bodies to instil order and discipline in curbing land encroachment, unapproved development schemes, multiple or illegal land sales, minimize or eliminate protracted land boundary disputes, conflicts and litigations, promote community participation and public awareness at all levels in sustainable land management and development practices to ensure the highest and best use of land.
	Office of the Administrator of Stool Lands / Regional Office	The office was set up under Act 481, 1994. The administrator coordinates with lands commission and other relevant public agencies, traditional authorities and stools on matters relating to administration and development of stool lands and make available to them any relevant data/information. The Volta Regional Office of the OASL will be engaged regarding the proposed project and the EIA scoping activities. Insights on how stool lands in the region are administered will be sought and attestation/confirmation will be sought as to whether the proposed project lands are stool lands or private lands.
	Land Use and Spatial Planning Authority (LUSPA)	The LUSPA is the regulator for land use and spatial planning. It is the body that confirms zoning status of areas earmarked for development and provides development approvals for physical development of land within an MMDA in the jurisdiction in which the land is situated. LUSPA is decentralized at the MMDA level, and the project is situated within the jurisdiction of KeMA. The Planning Officer at the KeMA will be consulted regarding performance of their role in this regard.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
	Ministry of Fisheries and Aquaculture Development	The Ministry is responsible for promotion of accelerated Fisheries Sector Development as a viable economic segment that will contribute to the overall development of Ghana in line with Medium to Long term National Development Policy Frameworks. Keta being a major fishing hub in Ghana may require some intervention and mitigation support from the Ministry in order for investment in fishing activities as part of project intervention.
	Ministry of Trade and Industry (MoTI)	Lead policy advisor to the government on trade, industrial, and private sector development with responsibility for the formulation and implementation of policies for the promotion, growth, and development of domestic and international trade and industry.
	Hydrological Services Department of the Ministry of Works and Housing	The Ministry of Works and Housing (MWH) has the overall responsibility for the initiation, the formulation, implementation and co-ordination of policies and programmes for the systematic development of the country's infrastructure requirements in respect of Works, Housing and Flood Control Systems to ensure efficiency of the sector. Responsible for the programming and coordination of coastal protection works. Construction and maintenance of storm drains and the monitoring and evaluation of surface water bodies in respect of floods. Was involved with the Keta Sea Defence Project and may have site specific baseline information to share with the project.
	Ghana Shippers Authority	To manage Ghana's commercial shipping effectively and efficiently, and to protect and promote the interests of shippers in relation to international trade and transport logistics. Mandated to ensure registration, building, importation and licensing of ships and proprietary interest in ships follow industry standards.
	National Development Planning Commission (NDPC)	Advises the President (and Parliament on request) on development planning policy and strategy by providing a national development policy framework, preparing, and ensuring effective implementation of approved national development plans and to coordinate economic, and social activities country-wide in a manner that will ensure accelerated and sustainable development of the country to promote continuous improvement in living standards of all Ghanaians.
	Forestry Commission - Wildlife Division	Develops and implements national policies, programs, and legislation to protect and conserve Ghana's wildlife. In charge or responsible for the Keta Lagoon Complex Ramsar site; the proposed port location is partly within the Ramsar site.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
	Fisheries Commission	Implementing agency of the Ministry of Fisheries and Aquaculture Development (MoFAD). Responsible for all monitoring, control, surveillance, evaluation, and compliance functions in all areas of fisheries development and management. As the regulator for the fishery industry has a major interest in the fishing activities in the project area, i.e., in the lagoon and offshore. To advise on mitigation measures or recommendations for project adverse impact on fishing activities in the affected areas.
	Ghana Police Service	To be involved with the provision of security and maintenance of law and order in the project area during implementation.
	Ghana Navy	Act as a law enforcement agency under the Ministry of Defence with authority to police Ghanaian waters and to ensure maritime security. To provide or may be required to provide offshore security for the port facility within Ghana waters.
	Ghana Meteorological Agency (GMet)	Responsibilities include providing daily weather forecasts; collecting, processing, storing, and disseminating meteorological information; undertaking collaborative work with Agricultural Agencies and others on meteorological related matters and providing expert advice; providing expert advice on wetlands including birds' sanctuaries; and also providing meteorological information. Responsible for the provision of reliable climatic data for Ghana and can be contacted for climatic data for project design and implementation. Likely to provide regular weather information for project implementation especially during construction and operation.
	Minerals Commission	To confirm that quarries who will supply products for the proposed project have licenses and to provide permits for blasting of hard rock when the need arises during dredging or construction. To confirm large scale salt miners in the project area with licenses / concessions or in the process of acquiring concessions / licenses.
	Energy Commission and it's Key Agencies (i.e., Ghana Grid Company Ltd. (GRIDCo), ECG)	Regulator of the energy sector in general. Responsible for issuing various permits / licences for projects within the energy sector. Interested in the power infrastructure aspect of the proposed project and supply of power to the proposed port facility. To confirm if any existing power lines or infrastructure may be impacted.
	Ghana Tourism Authority (GTA)	The public entity (under the Ministry of Tourism) tasked with the promotion of tourism development activities in the country. Interested in the potential tourism aspect of the proposed project.
	Ghana Water Company Limited (GWCL)	Provides potable water for public use. Interested in the potable water supply aspect of the project and to ensure that expected water demands of the facility are catered for. To confirm if any existing water supply pipelines will be impacted during the construction phase.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
	Geological Survey Authority	May be able to provide baseline information on the geotechnical / soil conditions, and the seismic hazards.
	Ghana Highway Authority	Responsible for the key access routes to the project site including the N1 and the Dabala-Keta-Denu Road. Interested in any activity under the project that will adversely impact or improve these access routes. To give approval for and advise on the crossing of any of these roads under its jurisdiction.
	Ghana Railway Development Authority	Responsible for railway development in Ghana Interested in the railway infrastructure aspect of the proposed project and any planned extension of railway facility to the port.
	Ghana Museums and Monument Board (GMMB)	Regulator of cultural heritage (movable and immovable) in Ghana. Concerned about any chance finds of any relevant artefact (movable and immovable) during project implementation.
	Labour Department	To enforce labour laws and regulations in Ghana and provide, for the benefit of workers and employers, employment-related services such as job-matching, job counselling and mediation; and to generate reliable labour market information for employment policy and national development planning.
	Labour Commission	The Commission exists to develop and sustain a peaceful and harmonious industrial relations environment through the use of effective dispute resolution practices within the context of the law, promotion of cooperation among the labour market players and mutual respect for their rights and responsibilities.
	Ghana Standards Authority	Responsible for the management of the nation's quality infrastructure embracing the three (3) pillars of metrology, standardisation and conformity assessment (i.e., Testing, Inspection and certification). Responsible for Calibration, Verification and Inspection of weights, Measures and Weighing and Measuring Instruments Promoting Quality Management Systems in Ghana. Develops Environmental Standards for ambient air quality, noise control and effluent discharges, and makes available hardcopies of these Standards to the general public at a fee.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
	Water Resources Commission	Responsible for the regulation, management and utilisation of Ghana's water resources and the coordination of government policies in relation to them. Issues water rights to potential water users. WRC was established by an Act of Parliament (Act 522 of 1996) as the overall body responsible for water resources management in Ghana. The vision of the WRC is to achieve "sustainable water management by all for all. Its mission is 'to regulate and manage the sustainable utilization of water resources and to coordinate related policies by combining our core competencies and hard work through effective participation, monitoring and awareness creation for socio-economic development of Ghana'. The Commission was responsible for instituting the National Riparian Buffer Zone Policy and has since been responsible for its enforcement.
	Ghana Chamber of Telecommunications / Telecommunication Companies (MTN, Vodafone, AirtelTigo, Glo, etc.)	Interested in the telecommunication infrastructure aspect of the proposed project. To confirm if any of their existing telecommunication infrastructure is within the proposed project area and are likely to be impacted.
Local Government and Administrative Authorities	Keta Municipal Assembly (KeMA)	Keta Municipal Authority is the planning authority charged with the overall development of the Keta Municipality, under which the Port of Keta development is located. KeMA is responsible for the political administration and development of the project area and local communities within the municipality. KeMA to provide business registration / operating license for firms and companies working under the project within the municipality.
	Nearby District Assemblies (Ketu South, Ketu North, Akatsi South, South Tongue, Anloga)	May have interest in the proposed port project due to proximity to their jurisdiction and as all these districts share in the Keta Lagoon Complex Ramsar Site. May be impacted by some subproject activities and may also be recipient of some project adverse impacts due to their proximity to Keta Municipality.
Traditional Authorities	Anlo Traditional Council	Anlo Traditional Council has traditional/ cultural oversight of local communities in the project area.
Local Communities	Keta, Kedzi, Havedzi (Blekusi, Horvi, etc.)	Nearby communities to the Proposed Project site. Likely or possible recipient of project adverse impacts.
Direct Project Affected Persons (PAPs)	Land Owners, Owners of Structures / Properties, Fishermen, Local Salt Producers, Mangrove Cutters, Local Sand Winners	Any person, organisation, or group who may be identified to be affected during project implementation.
Research Institutions	Universities	May have useful baseline information, including on the Keta Lagoon Complex Ramsar Site.
	Council for Scientific and Industrial Research (CSIR)	Pursues the implementation of government policies on scientific research and development. CSIR research programmes cover a wide range of activities in the following areas: Industry, Agriculture, Agro-processing, Fisheries, Forestry, Water Resources, Human Settlement Infrastructure, Environment, Health, Natural and Social Sciences.

Stakeholder Group	Examples of Stakeholder(s)	Key Role of Stakeholder and Remarks
NGOs / CBOs / CSOs	To be Determined	May have interest in the Proposed Project and affected resource users / persons in the project area.
	Ghana Wildlife Society (GWS)	Non-governmental, non-political, and non-profit making conservation organisation, with a mission to conserve wildlife in all its forms to ensure a better environment and improved quality of life. A member of BirdLife International.
The Media	Mass Media, e.g., local FM stations at Keta and in Ghana as a whole.	Responsible for information dissemination, communication and education of the general public and local communities through electronic and print media.
General Public / Citizenry	Every Ghanaian	Public interest role.

7.6. Stakeholders Engaged

During the Scoping Stage, primary emphasis for engagement was on primary stakeholders such as Traditional Authorities of Anloga Traditional Council, Kedzi Traditional Council, community members, farmers, fishermen, fishmongers, Fishermen and Fishmongers Associations as well as youth and women groups of Kedzi-Agorta, Havedzi, Horvi, Vodza, and Adzido. Secondary stakeholders such as officials of the KeMA, as well as officials of Ketu South Municipal Assembly, Anloga and South Tongu District Assemblies - adjoining municipalities / districts of Keta Municipality were also engaged.

Additionally, institutional stakeholders were contacted to request for engagement.

7.7. Outcome of Consultations / Engagements and Key Concerns

Details of the primary stakeholder engagement activities are presented in Table 7-2, with photographs provided from Figure 7-3 through to Figure 7-14.

Details of the secondary stakeholder engagement activities are presented in Table 7-3, with photographs provided from Figure 7-43 through to Figure 7-50.

Table 7-2 - Summary of Primary Stakeholder Engagement Activities

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Introductory Meeting and Site Visit 30 August 2023 - Kedzi Palace Paramount Chief of Kedzi, Chiefs and elders of Kedzi and Havedzi; Agbotadua Kumassah (Spokesperson for the Awomefia of the Anlo States, Togbe Sri III), Municipal Chief Executive (MCE) and Keta Municipal Assembly (KeMA) Staff Officials of GPHA / Port of Keta Directorate CARES Ghana Team	GPHA noted that after completing the necessary procurement processes, they had finally selected a consultant to undertake an EIA as part of the ongoing Port of Keta development activities. Hence the need to introduce them to the Traditional Authorities, Municipal Assembly and communities prior to their conduction of their field assessment activities. GPHA noted that efforts are being made to expedite project activities, hence during the 6 months period of the EIA, evaluation of investors for the proposed port project is simultaneously ongoing. GPHA noted also that the EIA is a very important and necessary part of the project process without which the project cannot commence. As such GPHA is seeking for the support and approval from the Traditional Authorities, the Assemblies and communities for the EIA activities to be carried out in harmony. The Agbotadua Kumassah, spokesperson for Togbe Sri, the Awomefia of Anlo State, noted that, the Anlo Traditional Council (ATC) has been engaged preliminarily and updated about the proposed port project. He indicated that the project is generally endorsed by the ATC, in the hope that its potential impacts will include opportunity for jobs for the teeming masses, economic transformation of the area as well as bringing back the economic prominence and past glory of the Keta basin as it was in the past. The Paramount Chief of Kedzi welcomed the teams and underscored the point that the communities have long expected the commencement of the physical development of the project. And as Traditional Leaders of the communities, the confidence of the people as reposed in them require them to understand why the project as proposed is yet to take off. The KTA has honoured its responsibility to the project by releasing lands for the project. He noted further that, the people since settling on these lands have believed in the importance of the lagoon, the sea and its sandy beaches, hence an inheritance that finally is about to deliver a project of this nature and transform the economic fortunes of the people. The belief and expectation of the people is that their lives and livelihoods will be changed for the better even as positive and negative impacts are expected from a project of this magnitude. He noted that the undue delays characterized by the project has led many to be sceptical about the realization of the project, with many concluding that the project is a political ploy aimed at merely deceiving the people of the area and the country at large. He therefore wishes to see all the studies concluded in time for the project development proper to commence latest by next year. The MCE of Keta Municipal Assembly (KeMA) noted that the assembly has frequently been receiving enquiries from locals as to when the project will commence. He noted the Assembly is steadfast and available to provide all necessary support for project activities and objectives to be realized in time.
All engagement activities on 14 & 15 September 2023 were done with participation of GPHA Officials: Samuel Dzackah; Kwaku Dovlo; Kofi Inkoom; and Dominic Kumedzro. The CARES team included Matthew Baker; Nii Ofori Oblie; Dr. Edmund Nyarkoh; and Satch Avudzi.	
Community Entry and Commencement of Engagement Activities 14 September 2023 Kedzi Palace - Chiefs, Elders and Key Opinion Leaders of Kedzi and Havedzi 1. Togbi Tsagli – Fia, Kedzi, 0242215122	The meeting was chaired by Togbi Tsagli, Fia of Kedzi. He welcomed the CARES and GPHA team and indicated the availability of all key community persons and the general populace of Kedzi and Havedzi communities as well as surrounding communities to participate in all engagement activities, share their opinions, state their needs and provide alternative impact mitigation measures to aid project implementation. He noted that, all project activities should prioritize measures to mitigate the impact of sea erosion on the adjoining communities, provide safer environment for communities and locals to relocate to and inhabit and to guarantee opportunities for locals to continue their livelihood activities in

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
2. Agbotadua Zevor – Agbotadua for Kedzi, 0208187150 3. Regent Babanawo – Regent, Kedzi, 0242841359 4. Mc David Matsiador – Chief Fisherman, 0242648859 5. Augustus Sesenu, Assembly Member, Kedzi, 0243848012 6. Robert Kofi Gati – Elder Kedzi, 0240333597 7. Mawuli Fofone Kofi Gati – Secretary for Kedzi Traditional Authority, 0243846940 8. Dumegawo Amedome – Elder Kedzi, 0547668045 9. Freedom Nuworku – Unit Committee Member, Kedzi, 0245117513 10. Normegbor Charles – Unit Committee Member, Horvi-Havedzi, 0540705161 11. Peter Adzimah – Unit Committee Member Horvi-Havedzi, 0245742952 12. Ametsikor Kudzo - Unit Committee Member Horvi-Havedzi, 0243045744 13. Melody Tsormana – Havedzi Elder, 0240561039 14. Ayayee Eunice – Havedzi Elder, 0241765022 15. Janet Sosu – Unit Committee Member, Kedzi, 0247013381 16. Kudoda Amee Cherita – Unit Committee Member, Havedzi, 0546661693 17. Isaac Habada – Havedzi Elder, 0247290040 18. Ebenezer Ahorlu – Havedzi Elder, 0249980363 19. Joseph Kwabla Avorgbedor – Havedzi Elder, 0242828340 20. Joseph Acolatse – Security, 0243542741	fishing, farming, and salt mining as well as provide employment opportunities for the teeming youth during the construction and operation of the project. The Chief briefed all local persons present about the commencement of engagement activities towards the port project, and the need to introduce the project teams to the Anlo Traditional Council. <u>Key issues raised for the consideration of the project included:</u> 1. How much land will the project reclaim from the seas and lagoon for its port facilities and port city project. 2. What is the nature of the port facilities to be built? Apart from indications that it will be a commercial port what facilities will be provided for the direct benefit of locals? 3. How will the port project affect livelihood of locals especially those who rely on the sea and its coastlines for their fishing activities? If the harbour / port facilities are built, where will fishermen in the communities land their canoes? How will fishermen who use drag nets be able to drag their nets to the beaches / shore? 4. What are the considerations for the relocation of persons currently inhabiting the project areas, especially as it is widely known that there are very limited lands within the project catchment areas. 5. Where will workers reside prior to construction activities and during port operation activities? We are aware of places where facilities are developed for workers of companies to the neglect of the host communities. Should this approach be adopted by the project, locals will resent the project initiatives. We would want decent facilities developed and provided for local communities even if the project develops the same for their employees and officials. 6. Potable water supply and electricity is a challenge in the communities currently, what are the measures by the project to augment these utilities for the port project development? 7. The project area currently has a single road running through the lagoon, connecting all communities along the coast from Dabala through Anloga, Keta through Kedzi, Havedzi to Denu, Afiadenyigba, etc. The road is enveloped within the Port of Keta Project area, thus, consideration for additional road infrastructure should be provided at the commencement of project development in order not to create traffic congestions.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
21. Harvey Somi – Security, 0249510963 22. Agbotadua Etse Zevor – Agbotadua, 0243108555 23. Bartheomew Acolatse 24. Sitsope Acolatse 25. Ben Gidiglo 26. Benson Mensah – Unit Committee, Kedzi 27. Raphael Normegbor 28. Harvey Eda – Kedzi Elder, 0549837462 29. Thompson Enyonam – Unit Committee Member Kedzi 30. Olivia Gidiglo – 0541088886 31. C.K. Gidiglo 32. Celestine Zevor – 0546839209	
Community Entry Introduction Meeting and Commencement of Engagement Activities 14 September 2023 Anloga - Anlo Traditional Authority – Chiefs of Anlo, elders and representatives of various communities, together with Chiefs of Kedzi 1. Togbi Gbodzor II – Chairman, 0241962551 2. Togbi Goka – Traditional Ruler, 0245499372 3. Agbotadua Kumassah – Traditional Ruler, 0243833668 4. Togbi Adoblanui II – Traaditional Ruler, 0242383149 5. Togbi Satsriakor – Traditional Ruler 0243164851 6. Togbi Zewu IV – Traditional Ruler 0243065263 7. Togbi Subo II – Traditional Ruler, 0243269236	The Traditional Council chaired the meeting. Togbe Gbodzor III, Dufia of Woe, welcomed the project team after exchange of pleasantries, introduction of the team and the reason for the meeting. <u>Key issues / concerns raised:</u> 1. The Anlo's especially Keta and its surrounding communities currently have no adequate lands due to the loss of their townships and lands to sea erosion. One person noted that about 90% of the land area of the Keta township and its lands are currently in the sea. The chiefs noted that Keta had a natural port that allowed ships to dock in its coasts and smaller vessels used to cart goods from the main ships until 1963 when Tema Port was constructed. Tema port was also said to be the catalyst for the seas waves that affected Keta, and the Port of Keta was not developed mainly because of the level of how the sea ravaged and consumed the township, its facilities, warehouses, businesses. And the sea is still restless and encroaching. Hence, the intended Port of Keta project is received with mixed feelings. Thus, the question is, on which lands will the port be built? How much land will be reclaimed from the seas and the lagoons for the harbour and port city projects? If two square miles can be reclaimed from the seas and lagoon, we will be happy. Our people can then have some land for housing and other activities. Concrete plans and total area to be reclaimed from the sea needs to be communicated to the Traditional Council. 2. Before these kinds of engagement, project proponents should be very certain of their plans to build the project. Otherwise, it is difficult for the traditional rulers to engage their people and inform them of other impending project initiatives. It becomes more like a political gimmick to the people. Numerous project activities were brought to the community related to port development, fish landing sites, etc. with Hawa Koomson cutting sod on one occasion. None of these projects are being built. One Raymond Okudjeto (in partnership with some Chinese) also undertook feasibility studies for port development project in Keta during the last National Democratic Congress (NDC) regime. That project also did not materialize. Past GPHA consultants were provided with copies of that document.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
8. Mama Dzuti IV – Traditional Ruler, 0246330060 9. Tsiami Amuzu – Linguist, 0544128704 10. Awadada Agbesi Awusu II – Paramount Chief, 0208140560 11. Fiator Torbokor Amos Esso – 0257872514 12. Samuel Ekpe – Dumega, 0243042236 13. B.K Kperxah – Driver, 0245243518 14. Sewornu Ahiaba Prosper – ATC, 0246857337 15. Wisdom Bedzra – Secretary, ATC, 0544542868 16. Togbi Tsagli – Fia, Kedzi 17. Agbotadua Zevor 18. Regent Babanawo 19. Mc. Davidz Matsiador – Chief Fisherman 20. Hon. Augustus Sesenu – Assembly Member, Kedzi 21. Mawuli F.K Gati – Secretary, Kedzi Traditional Authority	3. One chief narrated his experience with a harbour project in Nigeria that resulted in the flooding of many adjoining communities, resulting in their relocation. Some parts of the seas were also dead with fishermen not able to catch any fish in those areas. Hence, project should make provisions for such situations especially for fishermen within immediate project communities as well as the impact of likely flooding of adjoining project communities. 4. The impact of the proposed port on local communities should be assessed thoroughly and adequate mitigation measures provided. Concerns by fishermen about landing sites, as well as beaches for their drag nets should be explored. Likely coastline and sea erosion on the adjoining communities as may be induced by the port project should be equally investigated and where necessary sea defence projects should be included as part of the project. 5. With regard to employment, priority must be given to recruitment of labour from the project communities. Benefit sharing arrangements that allow for locally owned businesses to provide basic essential services to the port project must be considered. 6. After extensive deliberation with the council, the council permitted the project team to go into the towns, farms, beaches and engage all persons available for the assessment. They indicated that, the outcome of the assessment and results of the baseline data must be disclosed to the council and the communities prior to the commencement of any development activities.
Keta Community Members **Public Forum Regarding the EIA Activities Towards the Port of Keta Project.** 15 September 2023 1. Agbotadua Kumassah – Agbotadua and Spokesperson for Togbe Sri III of Anlo Traditional Area, 0243833668 2. Mama Wui Amegashie III – Queen Mother of Keta, 0243508784 3. Regent Babanawo – Elder 4. Godwin Gidiglo – Fisherman, 0249792234 5. Lawrence Agbevade – Teacher, 0245430770	<u>Key issues / concerns raised:</u> 1. Loss of Local Language and other cultural heritages: One Sedem Abla Abui-Adzorlolo sharing her experience of staying in Tema indicated that the local Ga language and its cultural heritage and practices were totally lost as a result of the Tema township that developed around the Tema harbour. She emphasized that, port projects are known for wiping out the culture of local / host communities due to influx of many migrant workers. The Ewe language, of which the Anlo Ewe is the standard written Ewe may be at the risk of being lost. Agbotadua Akumassah buttressed this point by pointing out the similar development in the Aflao and Denu areas where a different variant of the Ewe dialect has emerged and only understood by the people who speak it. Emphasis was however laid on deliberate efforts that may be needed by the communities and the Anlo Traditional Authority / Council to ensure the continuous education of all persons who live within their territory to learn the Ewe language in all basic schools in the area. Other efforts to continue to celebrate cultural festivals and other key heritage ceremonies should be encouraged. 2. Challenges of access to Keta Port Director, hence the need for him to be accessible and available for frequent engagement with project communities. 3. Locals in Adina lost all their salt mines / lands to Seven Seas: The Seven Seas Salt Mining Project when initiated provided assurances to local salt miners as partners who would be integrated into the project activities. But locals

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
6. Daniel Yao Keteku – Lotto Writer, 0541479694 7. Andrew Darkey – 0243946488 8. Mawuli Atatsi – Fisherman, 0243228522 9. Ameamu Evans Worlanyo – 0241595098 10. Desewu Martin – School Principal, 0541797295 11. Joseph Adzoko – Tailor, 0245197607 12. Enyonam Thompson – Media, 0246046182 13. Hon. Seth K Azaglo Tony – Assembly Member, 0245785069 14. Bernard Worlali Awumee – Media 0245117519 15. Ewoenam Kpodo – Media, 0249251530 16. Hon. Benjamin Dzordzorme – Assembly Member, 0246187971 17. Hon. Aurelia Tudzi – GEO-GES, 0242628708 18. Sedem Abla Abui-Adzorlolo – 0243672103 19. Emmanuel Kofi Adonu – Ketasco, 0242180584 20. Collins Quarshie – Citizen, 0243227691 21. Samuel Fiashide – Mining Engineer, 0246894360 22. Peter Oko Johnson – Citizen, 0241965050 23. Simila Dawuso – 0556201643 24. Prosper Ashiagbor – 0240648118 25. Emmanuel K. Adisame - 053377972	were not given access and opportunities as promised. They were only recruited as laborers who often were paid GHC15.00 (fifteen Ghana Cedis per day). The situation has resulted in agitation and numerous grievances within the affected communities. It has become a reference point for the Port of Keta Project with many expressing their fear that they may be disposed of their remaining community lands with no tangible benefit to locals. 4. Project seen as a political tool: The project was highly publicized to commence prior to the 2020 general elections. The lands were acquired, signage designating project and temporal site office erected in 2018. The Port of Keta Director has announced on radio about the commencement of office administration block complexes and other structures this year. None of this has happened. And a year to election in 2024, the EIA activities are being announced. Hence many perceive motives behind project initiatives as political rather than realistic. 5. Implications when harbour projects lead to impact on farmlands: Some participants expressed fears that, when lands are reclaimed for the port activities, farm lands along the Keta Lagoon may be flooded, especially where a channel is opened between the lagoon and the sea. In such instance, locals expect measures to adequately mitigate these occurrences. 6. Land speculation: How will locals cope when land values skyrocket as a result of the harbour development. Already, lands are very limited and very expensive. Many locals have left their communities to settle in other districts / municipalities as a result of the erosion by the seas. 7. Outcome of feasibility studies not shared with locals. It is expected that results and outcome of the EIA report should be disclosed to the locals prior to any project development activities. 8. Type of harbour – rumours are being spread around that the harbour is meant mainly for oil production. Is that the case? 9. When lands are reclaimed from the seas for the port project, are families whose lands and properties lost to the seas receive any compensations / benefits?
Kedzi-Agorta Community Members – AME Zion Chapel, Kedzi **Public Forum Regarding the EIA Activities Towards the Port of Keta Project.** 15 September 2023	<u>Key issues / concerns raised:</u> 1. What are the relationships between the proposed port and the impending oil production in the area? The information available to some (per meetings held in Aborigines some months ago) revealed that the intended purpose of the port project was to transport oil from Dzita? GPHA responded that the port project is a multi-purpose commercial port facility for all manner of cargos for export and import. Hence the likelihood oil being transported through the proposed

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
1. John Adehoke – 0540210081 2. Edmund Wemegah – 0242515346 3. Dotse Abornyuie 4. Samuel Adehoke – 0249888226 5. Faustine Adrovi – 0247729336 6. Fidelia Adehoke – 0555314231 7. Frederick Assrigbi – 0546899562 8. Baccah Freeman – 0257687120 9. Wisdom Kporxa – 0532571949 10. Livingstone Dogbatsey – 0240544962 11. Francis Somi – 0240543939 12. Newland Francis – 0240917691 13. Louis Agbee – 0247601616 + 251 other participants	project one day cannot be ruled out. But GPHA has no knowledge and experience in relation to oil exploration / production, and that is within the exclusive remit of GNPC. 2. The entire ecosystem should be studied, and the reports disclosed to the communities as to the potential environmental impacts of the project. 3. Some assets / properties are identified within the project site. What will be done for the owners of the impacted assets? 4. Drones were flown over our communities to assess our buildings whilst no community engagements were conducted. 5. There are no more lands within the communities except for the reclaimed lands from the lagoon. Where will people affected within the project catchment areas be relocated to prior to the project development? 6. The sea defence project reclaimed some lands which were meant for houses to be built and allocated to locals displaced by the sea erosions, but the project was truncated along the way. A lot of people in the current port project area are yet to be allocated even bare lands. That process should be completed before the port project should begin. 7. Possibilities of opening a channel between the sea and the lagoon should be explored. This may help improve the lagoon ecosystem, lead to increased fish stock as it was once experienced.
Havedzi and Horvi Community Members – Havedzi AME Zion Chapel **Public Forum Regarding the EIA Activities Towards the Port of Keta Project.** 15 September 2023 1. Habada Isaac – 0247290040 2. Nyadedzor Babanawo Korsi – 0546042373 3. Ebenezer Ahorlu – 0249980363 4. Avorgbedor Kwablavitor – 0242928340 5. Festus Fiasorgbor – 0243263655 6. Pas Alobia James – 0543194773 7. Legbedze Rejoice – 0246256297 8. Ahiaba Cecilia – 0245590168 9. Ametsikor Mawuta – 0558728649 10. Wonder Kokoroko – 0542443863 + 107 other participants	<u>Key issues / concerns raised:</u> 1. Participants noted that their communities are on the verge of being washed away by the sea erosion. As a result, no lands are available for them to even build new homes. It would therefore be appropriate for the project to factor this into its development plans so that the towns around the project site can be revived to accommodate many more migrant workers and to boost business activities around the port project. Portions of the town flooded by the lagoon can be reclaimed and new homes built for all. 2. Participants also noted that they are mainly fisher folks and fishmongers and that project development along the coast will deprive them of the beaches for their landing sites and for their drag-net fishing activities. Hence, the project must consider alternatives ways for fisherfolks to continue their fishing activities unhindered. 3. The sea defence should be continued and extended properly around adjoining communities such as Horvi, Agavedzi, Blekusu, etc. 4. Concern was shared about the proximity of the proposed Port of Keta to Lomé Port. Many locals share their experience of cheaper goods from the duty-free port of Lomé. Hence, they believe that the Port of Keta may not attract enough businesses as to make it commercially viable. Others have the perception that some locals who conduct business at the Lomé Port are conniving against the success of the Port of Keta by spreading fear among locals that the Port of Keta will result in the sinking of their townships, displacement of locals by migrant workers, collapse of the local fishing industry as many will be deprived of accessing the beaches and coastlines, as well as the claim that the Port of Keta was being built to pave the way for oil production. Many believe that oil production in the Keta basin will lead to excessive pollution, oil spills, relocation of the locals away from their ancestral homes, and killing of the fishing industry.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Ketu South Municipal Assembly 05 October 2023 1. Gilbert Avemegah - Municipal Coordinating Director, 0246239836 2. Redeemer Mawunyo Sosa - Municipal Development Planning Officer, 0544622890 3. Adam Mohammed Halisu – Assistant Municipal Development Planning Offier, 0554007069 4. Reynolds Addo-Labi - Assistant Municipal Development Planning Offier, 0246094322 and some Assembly Members of Ketu South Municipal Assembly	Key issues / concerns raised: 1. Building the Port of Keta will be tantamount to tampering with the water body. The water may therefore be displaced towards Ketu South. Is there any guarantee the Port of Keta project will stabilize the tidal wave phenomenon in the area? 2. Have there been any studies regarding the impact of the Tema port on communities along the eastern coast? That should be done, and it will inform the impact the port project may have in nearby communities in Ketu-South. At present, there are widely held perceptions that coastal erosions, and tidal waves within the Keta basin are partly due to the Tema port. 3. Port activities may affect fishing activities even in Ketu South. 4. Engagements should be extensive and extended to adjoining port area communities such as Agavedzi, Blekusu, Salakope, Amutsinu, etc. The Seven seas project was accepted only among key community heads. Now the company is facing hostility with its catchment area communities. 5. The Port of Keta Project site is a Ramsar site, hence necessary mitigation measures should be adopted. 6. Corporate Social Responsibility (CSR) activities and benefit sharing arrangements should be included in project development frameworks. This will drive a sense of ownership of the port project, hence total acceptance. 7. Elite lifestyle may take over project communities as migrant workers move in. Local resources, especially lands should be fairly allocated to locals whilst efforts are made to prevent unbridled land speculation in the area. 8. When all conditions and mitigation measures are properly met and the port is built, it is safe to say the port project may lead to the development of an industrial enclave within the Keta-Anloga-Ketu South and South Tongu enclaves. Seven Seas and Diamond Cement currently rely on the Lomé port for their shipping services. Diamond cement has always been interested in the Port of Keta initiative and this is definitely good news for them.
Anloga District Assembly 05 October 2023 1. Wisdom Attigah – District Planning Officer, Anloga District Assembly (0242955875) 2. Hon Benjamin Dzordzorme – Assembly Member, Vui, 0246187971	Key issues / concerns raised: 1. Anloga may experience population influx as a result of the project. Keta has no lands for housing and any major commercial buildings, warehouses, etc. 2. Coastal erosion and flooding are key challenges in the district and adjoining districts. 3. Sea defence should be extended to adjoining communities within the port enclave. Otherwise, the rising sea levels may wipe out these communities and the harbour project get blamed for it. 4. Availability of lands for housing and other uses may hamper the acceptance of the port project. Interventions that include dredging of the lagoon, reclamation of more lands from the lagoon, allocation of lands to locals and the provision of affordable public housing schemes in the area may help boost project acceptability and improve housing needs in the entire area. 5. Housing codes should be changed in favour of multiple storey buildings. Hydrological studies in the area confirmed that buildings can go up to maximum of 6 storeys in the Keta basin enclave. But the challenge is that individual households cannot afford to put up multiple storey buildings. That is where the state should get involved to help with management of the scarce lands available in the area.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Engagement with KeMA Officials and some Assembly Members 06 October 2023 1. MCE, Keta Municipal Assembly (KeMA) – Hon. Gemega (0240369944) 2. Physical Planner (KeMA) – Isaac Fiagbe (0243438447) 3. Development Planner (Kema) – Harry Sitsofe (0243702302) 4. Assembly Member, Keta Central - James Ocloo Akorli (0244023531) 5. Assembly Member Horvi Havedzi - Raphael Normegbor (0242 320915) 6. Assembly Member, Vodza – Prosper Mensah (0242649276) 7. Assembly Member, Kedzi-Agorta – Augustus Sesenu (024384012)	Key issues / concerns raised: 1. MCE appreciated the team's previous visits during the introductory meeting and site visits. He assured the team of the availability of the officials of the Municipality to provide support in terms of experience and knowledge of the area, as well as security details to help the team conduct its assessments successfully. He indicated that the Port of Keta Project has become a source of hope for the people of Keta, Anloga and all the way to Ketu South; and seen as the panacea for economic development, job creation and the revival of the communities as they currently face adverse impacts of climate change. The Honourable MCE recounted the numerous challenges facing the Municipality – especially in the areas of coastal floods / erosion, the loss of properties and livelihoods and all efforts being made by the Assembly to mitigate these challenges. He asked the team to speak to the Physical and Development Planner for any data on the Municipality, and for a better appreciation of the potentials and challenges of the Municipality. 2. Municipal Development Planner noted that land is the biggest challenge in the area. Hence, land management in the Keta Municipality and the basin as a whole is critical but requires a lot of resources – technical and human expertise / resources as well as financial resources to undertake coastal erosion management, public housing schemes that can be transferred and owned by the locals, among others. These will help in better land management to free up land spaces for other commercial activities like the port project. 3. The Physical Planner noted that assessments were done for change of buildings codes but acceptance at local levels is yet to be attained. 4. Staff of the Municipality were in Germany through a GIZ supported program to participate in Remote Sensing / GIS technology trainings in order to be able to scientifically forecast and assess the impact of floods and to mitigate them. 5. Assembly members have generally supported the port project and hope that construction activities commence in earnest. The project they believe will help in promoting economic development activities, boost farming and fishing activities, and create jobs. Nonetheless, they sounded caution against project being implemented without accompanying opportunities for the locals, training opportunities in new fishing methods and provision of resources, housing for the impacted and affected persons, among others.
Ghana National Fishermen Council, Kedzi Members 06 October 2023 1. David Matsiador – Chief Fisherman, 0242648859 2. John Damali – Fisherman, 0243435343 3. Mathias Azasoo – Fishing Canoe Owner/Fisherman, 0596629926 4. Ernest Tagbor – Fisherman, 0545372456 5. Godfred Kwawu – Fisherman, 0243910445	Key issues / concerns raised: 1. All locals are fisher folks. Fishing is done on the seas by men and in the lagoon by men and women alike. Women help with drag nets when we dock at the shores. Women also help with sorting fishes as well as fish mongering, buying and selling of fishes. Net menders, canoe makers and menders, outboard motor mechanics, premix fuel dealers may all lose their livelihoods. Our entire existence is around the seas and the lagoon. 2. Project location is where we land our canoes, drag our nets, and where our premix fuel stations are. At least 37 canoes dock between Kedzi and Azizadzi on daily basis. Building the project at this location will destroy our existence. We may have no other sea shores / beaches for our fishing activities. 3. If the sea is channelled into the lagoon, it has its advantages for many fish species such as crabs, shrimps, etc. breeding largely in the lagoon, but it may result in a deeper lagoon that may frequently result in drownings, flooding of our communities, erosion, etc. It may affect salt mining (since salt mining is only possible when the lagoon dries / recedes) and affect communities that crop along the banks of the lagoon.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
	4. Relocation of landing site to other communities, may require the relocation of entire communities / households of fisher folks since the cost of travel between current communities to the new sites may be unbearable. 5. A solution to the landing beaches may require that a channel is created to enable fisher folks enter the lagoon for docking. But that may not be applicable to those who engage in drag net fishing. 6. The fishing harbour may come with new fishing vessels and fishing methods at high seas that locals may not be accustomed to or resourced enough to undertake. The project may have to assist in acquiring such vessels, facilitate licensing for trawlers, provide technical training, etc. to help fisher folks adopt new fishing methods. 7. Rescue equipment, premix fuel stations and other assets necessary for ease of fishing activities should be considered as part of project implementation.
National Association of Fish Processing and Traders Association (NAFPTA) - Fishmongers / Women of Kedzi-Agorta and Havedzi 06 October 2023 1. Melody Tsagli – NAFPTA Chairperson, Kedzi, 0240544151 2. Dzidzorli Quarshie – Vice Chair NAFPTA, Havedzi, 0551011796 3. Victoria Quashigah, Organizer NAFPTA, Kedzi, 0557760414 4. Kpotosu Martha – Asst. Secretary, NAFPTA Kedzi, 0242943002 5. Grace Azaleteh, Member NAFPTA, Kedzi, 0249523778	<u>Key issues / concerns raised:</u> 1. Fish processing and selling of fish in markets is the only work of women in our communities. 2. We support the project if a fishing harbour is included, and opportunities exist for our fishermen to continue going to sea. If our livelihoods will be jeopardized by the building of the port, then we don't want the port project in our communities. 3. A lot more fishes may be caught by fishermen when new fishing trawlers, vessels and techniques are adopted during the harbour operation. Fishmongers may need capacity enhancement support to be able to buy more fishes for processing. Support may include refrigerators for preserving fishes, ovens / grills for processing fish, markets for trading, business capital, etc. 4. Some of our members live within the areas designated for the project. Their houses were measured without any explanations as to what will happen to them. People will prefer to be relocated out of the project area to nearby communities, but not far away. No cash compensations are needed.
Youth of Kedzi-Agorta Community 07 October 2023 1. Benson Mensah – UCM, 0247571513 2. Jack Jonas Ayeyew – Youth Leader, 0242770046 3. Raphael Teliada – 0249625993 4. Babanawo Enoch Junior – 0504124491 5. Godfred Kpodo – 0241102929 6. Shine Elo – 0549780295 7. Mathew Dogbey – 0544056399 8. Godfred Gidiglo – 0555314559	<u>Key concerns raised:</u> 1. 3 youths participating in the engagement raised their hands to oppose the project. Their reason is that officials of the project are yet to provide details about the project to them, show them the proposed designs and specific plans for their communities. 2. Project should happen immediately if it is truly meant to be built. The promises and delays around the port project are unacceptable and makes many believe it is a mere political gimmick. 3. Project should make provision for relocation of persons within its footprint. Those to be relocated must be relocated within the project communities. People cannot be relocated to areas where there are no seas or lagoons for fishing activities. One youth emphasized in the Ewe language that "bleyio mienye, mietenu ave doge oh" – to wit, 'we are crabs, we can never go into forest'. 4. Construction activities are often associated with vibrations that result in houses developing cracks. Project should adopt measures to prevent these happenings or make provisions for compensating impacted households.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
9. Sallah Sunday Samuel – 0242009535 10. Cephas Yao Dogbey – 0248902361 11. Kuwornu Mark Bonney - 0248249611	5. Water supply and electricity should be extended to all communities within the Keta basin. Social amenities including health posts, police stations, etc. should be extended to all project communities. We will not accept the provision of such facilities to the port workers to the neglect of our communities. Memorandum of Understanding (MoU) should be signed to this effect before project commences. 6. We have many youths with technical skills to work on the project. As you can see, there are many technical / vocational schools within the Anloga / Keta enclave. We also have siblings who can perform administrative tasks. We should be given priority when it comes to employment. We are willing to learn on the job, including apprenticeship in operating machines, etc. 7. Scholarship schemes should be instituted to help locals, especially brilliant but needy students from primary to tertiary education.
Assembly Member and Unit Committee Members of Kedzi-Agorta 07 October 2023 1. Augustus K. Sesenu – Assembly Member, 0243848012 2. Benson Mensah - Unit Committee Member, 0247571513 3. Thompson K. Enyonam – UCM, 0544361890 4. Gidiglo Courage Agbeko – UCM, 0245251324 5. Freedom Nuworku – UM, 0245117513	<u>Key concerns raised:</u> 1. News about the port project was long welcomed. The challenge is the delays. Project is seen as a solution to the sea erosion problems in the area - the communities have suffered more than 50 years of raging sea waves that consumed vast lands and properties of the Kedzi and Keta communities. The project will also serve as opportunity for economic upliftment of the area. Employment opportunities that may come with the project may stem the tide of all our youth leaving our communities. 2. Community grievance redress processes, which entails settlement of non-criminal cases by our elders and chiefs must be followed first when there is disagreement during project implementation. 3. Communities currently have no alternative lands to relocate to. It means affected households must be relocated on reclaimed lands from the lagoon. Part of the Kedzi Vocational School is within the project area. Proper mitigation measures must be implemented regarding the school. The school should be adopted by GPHA and provided amenities befitting a technical / vocational school. 4. Social amenities and infrastructure are lacking and should be considered under project development.
Elders of Kedzi-Agorta 07 October 2023 1. Edward Amedonu – Chief Linguist, 0547668045 2. Robert Kofi Gati – Elder 3. Joseph Agbeli – Elder 4. Jack Sekliwu – Elder 5. Horvey Eda – Elder 6. Sogbo Agbornyuie – Elder 7. Minao Soglohu – Elder	<u>Key concerns raised:</u> 1. Project is of utmost importance to our community. It will help protect our communities against the sea erosion, provide opportunities for employment. Community members support the project but on condition that all affected persons are relocated to new lands within the project communities. It is expected that new lands are reclaimed from the lagoon for these purposes. “People prefer to be relocated to new houses to being given cash compensation. Even if you are given cash compensation for your affected houses, where will you go and buy land to build your own house, lands don’t exist in our communities anymore…and no one is readily willing to move out of their ancestral home” – the Chief Linguist, Edward Amedonu noted. 2. Area designated for project include the site for our annual festival celebration known as Norvikporgbeza. Most of the old town areas of Kedzi were declared a disaster zone in the 1990s / early 2000s. People living in those flooded and dilapidated homes are not supposed to be there but some of them never received any new houses built under the sea defence project.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
	3. New homes built under the sea defence project were much smaller compared to homes destroyed. It made it impossible to accommodate many more family members who were not allocated any houses. 4. Migrants coming to our communities must understand and adhere to certain taboos and practices. Some of these practices include no fishing on Sundays, insults not allowed towards chiefs, elders and traditional worshippers (Husio, Hunorwo), no sweeping allowed in the night, no sex in bushes, bare floors and at the beaches, no attendance / appearance at Yeve traditional rituals with full clothes on (you must be naked from your top to your waist and be barefooted). 5. There are certain shrines and community / family idols within the project footprint that must be duly relocated after consultation with elders, invocation of oracles and performance of rituals.
Elders and Unit Committee Members of Havedzi; and Assembly member of Havedzi 07 October 2023 1. Kudoda Cherita – UCM, 0546661693 2. Charles Normegbor – UCM, 0540705161 3. Kudzo Ametsikor – UCM, 0243045744 4. Akos Kukubor – Community Member 0545394336 5. Lokosu Kayi – Community Member, 0543104893 6. Peter Adzimah – UCM, 0245742952 7. Anthony Eklu – Opinion Leader, 0242659629 8. Kwame Nyamiasem – Community Member, 0245056546 9. John Kofi Nyamiasem – Community Member, 0247682830 10. Constance Ametsikor – Community Member, 0242544726	<u>Key concerns raised:</u> 1. Project is widely accepted by all community members. But many are in doubt about the realization of the project. 2. Our community is mainly at the edge of the designated project area. Our fish market, Gedzakordzi and Tagbor family cemeteries, coconut plantations, beach soccer park and grounds for our annual festivals are in the designated area. Some buffer must be kept between the port and some of these areas and proper relocation done for those that could not be avoided. 3. It is believed that port development will affects communities eastward of the port / harbour developed. Same way the Tema port is believed to have been the main cause of the rapid sea erosion in the Keta basin. Thus, it may result in sea waves and erosion affecting adjoining communities eastward of the project, including Havedzi, Horvi, Agavedzi, Blekusu, etc. Sea defence must be properly extended to all communities eastward of the port all the way to Aflao if possible. 4. Youth expect employment opportunities. That should be a priority of the project. 5. Potable water supply, toilet facilities, electricity are the key challenges of our communities and should be provided as part of project development. People often openly defecate at the beaches. Once the port is built, people can no longer have access to the beach.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Fishmongers and Salt Miners of Horvi and Agavedzi 08 October 2023 1. Kokoroko Cephas – 0249638253 2. Fiati Selasi – 0249720367 3. Kukwa Dzidedi – 0245200712 4. Faustina Dogbey – 0550395294 5. Rita Garr – 0243193878 6. Kukwa Grace Adzo – 0545276471 7. Getrude Kpodo – 0243982488 8. Enyo Hukporti – 0532598075 9. Sego Josephine – 0243820861 10. Kukwa Dofui – 0534310571 11. Ahadzi Tsoeke – 0554540662 12. Abla Tudi – 0555671453 13. Tina Agbewornu – 0246268533 14. Woyee Kwawu – 0549196070 15. Mary Amematsor – 0248920604 16. Samuel Kudzo – 0242349782 17. Mama Dorlevi – 0549195864 18. Lawson Adukpo Celestine – 0256962168 19. Vida Agedzi – 0546445047 20. Forgive Agbaley – 0530398411 21. Avoryi Vida Esi – 0240723070 22. Abigail Seshie – 0243188423 23. Vivian Lardy – 0550392576 24. Mary Doe – 0249122923 25. Peace Kudzo – 0249657984	<u>Key concerns raised:</u> 1. We have heard about the proposed harbour project but no sensitization as to what the project will entail. 2. Our main concern is how the project may impact on our salt mining and fishing / fish mongering livelihood activities. If the beaches are part of the harbour, drag-net fishing can no longer be carried out. That may disrupt the entire livelihood activities of our communities. 3. Fishing harbour should guarantee more fish for women to buy and process. Otherwise, project is not accepted. “Most of us are elderly people and cannot be employed to work at the harbour…hence our livelihood activities must be protected. Other livelihood opportunities may emerge along with the harbour project for elderly people like us but we cannot put our hopes on things we cannot be sure of” – one elderly woman noted. 4. The peak seasons for fishing in the lagoon are when it recedes / dries up a bit. That is when a lot of fishes are harvested. It is within the same period that salt mining is done. As you can see, not so much fishing is currently ongoing in the lagoon. Salt mining is completely halted at this time. All because of the large volumes of water in the lagoon. So, any proposals to open a channel between the lagoon and sea must be looked at critically. Otherwise, salt mining and bumper fishing seasons may become things of the past. 5. Drying floors will be needed for drying fishes. 6. Business capital and guarantee for fishes throughout the fishing seasons must be provided.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Engagement with Beach Soccer Team of Havedzi and Horvi at Azizadzi / Kedzi-Havedzi Sand Bar 08 October 2023 1. Robert Nyadedzor – National Goal Keeper of the Black Sharks, 0558014991 2. Promise Amegatse - Trainer of Havedzi Beach Soccer Team 3. +8 other players	Key issues / concerns raised: 1. We have heard about the project and were informed that the sand bar on which we play our tournaments/local leagues and matches is in the designated project area. This is the same area for our annual Norvikporgbeza Festival. 2. We support the port project, but if the beach is taken by the project, the project must build a beach soccer ground for the team. 3. We also hope that the harbour becomes the main sponsor and support system for our beach soccer team. 4. We are members of Havedzi Mighty Warriors beach soccer team. Five of our members are in the national team. Havedzi is known nationally for its beach soccer, and the sport has given us the opportunity to play matches in other countries. We can only hope the port project infuse better energy and opportunities into the beach soccer.
Anlo Traditional Area 09 October 2023 1. Agbotadua Kumassah – Agbotadua and Spokesperson for Togbe Sri III of Anlo Traditional Area, 0243833668	Key issues / concerns raised: 1. Project is very welcomed and critical for our future as a people. 2. Land reclamation plans should be carefully done. Lands reclaimed from the lagoon under the sea defence project could be blamed today for the flooding of certain parts of Keta township that in the past never experienced flooding. So, the assessments should be done properly to determine the impact on peripheral communities. 3. Critical assessments should be done to provide sustainable buildings as part of the project. People impacted may have to be relocated. But our people are not ready to be relocated far away from their ancestral homes. Because they are used to the environment and the attendant livelihood activities of fishing, fish mongering, salt mining, etc. 4. Building new types of homes for locals should be considered. Our people normally want to live in their own houses / family houses without any rent issues. Hence, project must build and provide direct ownership opportunities. 5. Migrant populations will come with attendant consequences of changing lifestyles, dilution of our culture practices and language, and we need support as traditional leaders and institutions to continue to celebrate our culture practices, transmit them through education and to ensure adherence to our customs and practices. Some level of acculturation may be acceptable, but the foundations and tenets of our culture practices must be preserved and carried forward. 6. Locals may be priced out of their own communities. Opportunities must be presented to locals to work in the port environment, in addition to other business and benefit sharing opportunities. Some of these details must be fine-tuned prior to project development. 7. All project impacts – noise and air pollution, waste, etc. must be duly mitigated during project implementation. It must be known that we as traditional leaders are often held to account by our subjects when things go wrong on projects of this magnitude. So, the project must work in tandem with the traditional leaders, their views, concerns and counsels heeded for successful project implementation. 8. Hierarchy of the Anlo Chieftaincy Institutions and its grievance redress mechanism for civil cases mainly were outlined.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Chief of Kedzi – Togbe Tsagli 09 October 2023	Key issues / concerns raised: 1. As you are aware, I was with the CARES team during our visit to the Anlo Traditional Council. I am also aware of the engagement activities with our community elders, youth, unit committee, Assembly Member, fisherman and fish mongers. I am aware of all what was discussed. We are in support of the project and hope it is materialized in our lifetime. What is important is that the project take into consideration key issues raised by the communities. All impacts must be duly mitigated. Otherwise, our people would think we the Chiefs and Elders have a hand in things that are not done right. 2. So, once the project continues to collaborate with us, engage with us, and the right things are done, we are 100 percent for the project.
Fort Prinzenstein Tour Guide and Assembly Member for Keta Central 09 October 2023 Engagement with James Ocloo Akorli - Tour Guide of Keta Fort (Fort Prizenstein) and Assembly Member for Keta Central, 0244023531	Key issues / concerns raised: 1. The fort constructed between 1700-1784 has been a Designated World Heritage Site since 1975. But its structures are dilapidated and falling apart. The Ghana Museums and Monuments Board are custodians of the fort. I work for them. In the future, I hope the Port of Keta when successfully built will rehabilitate / rebuild the fort to its former standing. 2. Floods in the area this year have been the worst since 1987 and we have been informed that more floods are expected this year. 3. Keta has historically been a port city (natural port) with numerous business enterprises, warehouses, sale of foreign goods, etc. 4. The fort at its current location was far away from the seashore (some 2 or more kilometres away). But most of the fort building has now been washed away by the sea, including the staircase to the upper floors of the fort. 5. The main road network was finally washed away in 1970s. That along with many shops, warehouses, private and public properties led to the collapse of business activities in Keta. 6. Building the port will revive economic activities in the area. But the port must be built by reinforcing the sea defence, building additional revetments, and groins along the coastline of Keta and Ketu South. 7. Revetments were not built under the sea defence project because they were very expensive and extensive, and also because fishermen complained of losing access to the beaches for their fishing activities. But new fishing approaches must be adopted without the direct docking at the beaches and drag nets being dragged to the beaches. 8. Many in the communities' fear that the Port of Keta when built may not last long due to the constant encroachment of the sea waves in all the coastal communities. Many hold the view that Keta township and other communities may not exist here beyond the next 20-30 years. But we believe, new technologies and approaches may be deployed to make the Port of Keta successful and protect the towns and communities.

Community Members of Vodza and Adzido 10 October 2023 1. Christopher Mensah – Assembly Member for Vodza Adzido, 0242649276 2. Joshua Agbey Agbezudor – Chief Fisherman, 0243155423 3. Richmond Dzaggay – Chief Fisherman, Adzido, 0242541527 4. Moses Nutsugah – Opinion Leader, 0550542386 5. Evelyn Emefa Kwawu – Fishmonger, 0549783753 6. Esther Hovor – NAFPTA President, Vodza, 0548949589 7. Cecilia Kartey – Fishmonger, 0540462729 8. Millicent Dzisah – Fishmonger, 0543748268 9. John Besa Adikah – Opinion Leader, 0246812270 10. Gladys Torgbenyui – Fishmonger, 0249443118 11. Mama Affizie – Fishmonger, 0240554228 12. Favour Kportiklah – Fishmonger, 0540223930 13. Enyonam Kartey – Fishmonger, 0547989694 14. Esiawonam Kwashie – Fishmonger, 0558146102 15. Patience Kwawu – Fishmonger, 0544704937 16. Vivian Sokpoli – Fishmonger, 0543597460 17. Martha Ametefe – Fishmonger, 0553230234 18. Bella Fianyo – Fishmonger, 0547563064 19. Alaska H. Hovor – Net Owner, 0240368314 20. Agnes Hovor – Fishmonger, 05525696976 21. Ama Kofitsey – Fishmonger, 541642488 22. Happy Agozie – Fishmonger, 0247562695 23. Dora Sokpoli – Fishmonger, 0559425820	<u>Key issues / concerns raised:</u> 1. News has long spread about the project. Details of the project are unknown, but it is highly welcomed. 2. The sea was eroding and encroaching on our homes before Ghana's independence. It became worse after the construction of the Tema Port. 3. Our community is at the boundary of the currently designated area for the project. Our town god / idol is very close to the designated boundary. Our farmers crop vegetables on reclaimed lands by the boundary of the port. 4. Fishing, fish mongering and farming are the main occupations in the area. 5. Electricity, potable water and toilet facilities are the main challenges in our communities. People often openly defecate at the beaches because of lack of household / public toilets. It is difficult to build household toilets because, there is too much water in the ground when you try to dig a manhole. Few homes allocated by the sea defence projects have toilet facilities. Best approach will be sewerage systems along all the coastal communities or public water closet toilets. 6. Agitations are currently ongoing in town because the allocation of resettlement homes / lands under the Keta Sea Defence Project are not completed. These agitations may spill to the Keta Port project if any such lands get allocated to the Harbour project whilst locals are yet to be allocated their lands. 7. As it stands now, prominent and influential people are able to get land allocations, buy reclaimed lands whilst the poor and vulnerable people in our communities are in queue yet to be allocated lands. Some public officials who do not even reside in our communities were allocated multiple resettlement houses under the Sea Defence Project. Some of our members who paid GHC3000 per plot (receipts provided during engagement as proof) to the Municipal Assembly for more than 2 years ago are still waiting to receive their land allocations. 8. The Port of Keta project should reclaim its own lands from the lagoon for its development activities. If the lands are reclaimed and viable, we don't mind being relocated to those areas whilst some of the already existing lands are used by the Port of Keta project. If that is not the case, then conflict may arise between our communities and the Port of Keta Project 9. Project may provide job opportunities for the youth and reduce the rampant theft cases in our communities. Outboard motors fixed on fishing boats / canoes are often stolen. Nine outboard motors stolen so far this year.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
24. Patience Attitsogbui – Fishmonger, 0241191413 25. Etsa Kpogli-Nyavor – Fishmonger, 0540738335 26. Daniel D. Kukubor – Net Owner, 02422862092 27. Faith Kwawu – Fishmonger, 0208694636 28. Moses Kukubor – Farmer, 0240111611 29. Rosina Liggie – Fishmonger, 0541803967 30. Akpene Gawugah – Fishmonger, 0558730737 31. Joyce Mensah – Fishmonger, 0548686087 32. Philo Makata – Fishmonger, 0556011206 33. Ami Afevienyeku – Fishmonger, 0541642567	
District Chief Executive (DCE) of South Tongu 10 October 2023 Sogakope Engagement with District Chief Executive of South Tongu; Hon. Seth Kwasi Agbi (0244962079)	Key issues / concerns raised: 1. The port project is good news and will help unearth the potentials of our communities. There are numerous potentials of large-scale sugarcane farming, rice farming, etc. ongoing in our district. 2. South Tongu currently has more and better habitable lands than the Keta areas. Thus, commercial business operations, real estate and housing, hospitability businesses, warehousing, etc. may set up in our district. Port of Keta will create job opportunities for the youth and there is a large number of unemployed in our district that may have such opportunities.
Volta Regional Coordinating Council 20 February 2024, Ho	Key issues / concerns raised: 1. The Keta Basin holds great potential for the country. Oil exploration and drilling for oil was done in the 1960s until activities were brought to a halt after the 1966 coup. Recent oil exploration activities reveal potential for commercial oil production in the basin. But there has been no specific update on the way forward. Beyond oil, the region has vast economic opportunities untapped – in salt mining, cocoa production, vegetables and grains, commercial fishing, etc. Development of the port will result in increased production and trade, establishment of businesses and industries in the region. 2. Transport integration plan was presented to key stakeholders 5 years ago about the rail network to connect the Volta Region to Northern parts of the country. But the ECOWAS crisis has slowed activities down and we do not know how the ports may fare commercially if relations with neighbouring landlocked countries continue to be strained. But those could be resolved diplomatically in good time to benefit the Keta Port Project. 3. The port presents opportunity for decongesting the Tema port, and also in security and economic terms provide diversified assets and resources for the state. But port policies must be revisited to make it commercially viable and sustainable since the nearby Lomé Port is a free port.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
1. August K. Awity – Chief Director, VRCC, 0243359451 2. Delali K. Amevor – Assistant Director, VRCC 0244852321 3. Karen Quaye – Acting Regional Director Community Development, 0200802557 4. Benjamin Mensah RD, LUPSA, 0547460656 5. Kwasi Apea Fenteng – National Security (VR RSLO, 0241936340 6. Stella M. Agbezuhlor – RD / Chief Social Development Officer VRCC Social Welfare, 0208413107 7. Saviour Kudiabor VRCC Budget (Ag. RBA) 0247924928 8. Hope Smith Lomotey – Regional Director EPA, Ho, 0501301624 9. Ing. Maxwell Zu-Cudjoe – Area Head, EPA Sogakope, 0501301641 10. Thodore Nelson – Ass. Program Officer, EPA Sogakope, 0543390892 11. Linda Akpene Eleblu – Dep. Reg. Direcotor, Fisheries Commission, 0249705206 12. Victoria Asamoah – Ass. Planning Officer, Regional Planning Coordinating Unit, VRCC 0549367513	4. Environmentally, the Keta township and its neighbouring communities will be salvaged from the rapid sea erosion and tidal events when the port is built. It will serve as a sea defence, revive economic life in the areas, and attract national attention to the needs of the communities in general. 5. Lands reclaimed under the projects should be publicly owned and fair and transparent allocation criteria established to ensure locals are duly allocated lands. Resettlements townships could be created on these lands. Access road to other neighbouring communities with vast lands should be developed to aid resettlement efforts as well as the establishment of adjunct facilities, warehouses, etc. in the closest proximity to the port. Key infrastructures, including water supply and energy, sanitation and major road infrastructure should be integrated into the port development. 6. Flooding often happens in the Keta basin; hence extensive drainage networks should be built to improve the drainage situation in the communities. Structural plans are being developed under an SDF (Spatial Development Framework) for Ketu South, Anloga and Keta in anticipation of the potential for these areas to expand rapidly. These plans should be reviewed and integrated in port development. 7. Fishing should be a major sector for consideration in the port development activities. Nonetheless, pressure on the ecosystem, biodiversity in the lagoon and Keta basin must be of major concern and priority in the development of the project. Where dredging may result in potentially irreversible negative impacts on the ecosystem, it should not be undertaken. 8. Naval training school in South Tongu should be liaised with and collaborated with by the Keta Port Project. 9. Key challenge faced by the project presently is disinformation and politicization of the project. Media engagements, using cinema and videos to show how ports were built in the past, the processes, funding requirements and duration, and how the port will save the towns along the coast should be intensified by GPHA. Community engagements should also be intensified leading to and during the development of the project.
Oti Regional Coordinating Council 20 February 2024, Dambai	<u>Key issues / concerns raised:</u> 1. OTI is glad to be considered for inclusion in the project plans for the Port of Keta Project. The Region is still a sister sibling and very much linked with the Volta Region and will remain so indefinitely. The port project has since being good news and a good initiative to aid the rapid economic development of both regions. 2. The region holds massive potential in agricultural and natural resources. Yam is produced in 5 main districts and exported in commercial quantities with new initiatives with GEPA to establish parks at the harbor by investors to house yam for export. Cassava is also grown and dried in commercial quantities in all nine districts in the region for export to some pharmaceutical companies in China. Other crops such as cocoa, rice (grown in 6 districts), coffee, cashew, ginger are produced in commercial quantity in the region. A commercial agriculture project is being developed in the region to help commercial farmers easily gain access to large tracts of lands for various cropping activities. These prospects will be boosted by the port project.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
1. Issaka Braimah Basintale – Chief Director OTI RCC, 0243114764 2. Innocent K Agbolosu – Regional Director, Dept of Social Welfare, 0247572100 3. Frank Asoni – RAO Crops, Regional Agric Dept, 0243462665 4. Bansah Y. Isaac ADPO, ORCC, 0246824913 5. Seth Kpodze RBA, ORCC, 0243414555 6. Collins Kwamikorkor Regional Director, GEA, 0244865018 7. Asante Wiafe REPO ORCC, 0247773034 8. Amidu Mohammed A.S, ORCC, 0266161031	3. Prospecting for iron ore deposits were done and found to be in commercial quantities in all districts in the region except for Nkwanta North, Krachie West and Krachie Ntumuro. GISDEC (Ghana Integrated Iron and Steel Development Corporation) has facilitated some engagements with Chiefs and Opinion leaders through the RCC about these deposits and the likely mining activities in he future. 7concescions were given to 7 companies involved in the prospecting. No mining and production timelines are set yet. Further engagements with communities and agreement with communities are yet to be undertaken. Lessons from mining activities should guide these activities. Some locals are already opposed to any proposed mining activities in the region in fear of the potential environmental impacts. Concerns that everything is being done in Accra without recourse to involvement of local stakeholders and actors is rife. This may jeopardize proposed mining plans. Officials of the port project should make these points known for officials in charge of the GISDEC and ministries to make the right decisions. 4. Road network in its present form may not be helpful in connecting the region to the Keta port. Rail lines are non-existent even though there are plans to extend rail lines through the Eastern corridor. How soon these infrastructures are built, expanded and integrated into the port project will determine the extent to which the region can fully benefit from the port project. 5. Further engagement of officials of the region on the proposed port project, how it can be sustainably run and linked to the region, and the kinds of economic activities in the region that will benefit the ports commercial survival should be thoroughly planned going forward.
Oti Regional House of Chiefs 28 February 2024, Dambai Attendance list yet to be included.	<u>Key issues / concerns raised:</u> 1. Proposed port project has been known to the house. It is a laudable project. But the area for the proposed port is known to suffer tidal waves and sea erosions, how is the project going to deal with these environmental threats. What are the potential environmental impacts? Do the host communities accept the project? If they do, then we are all ok with it? 2. What impact will it have on the region beyond the socio-economic impacts? Chiefs and elders would like to be engaged extensively regarding the proposed port project, with presentations on how the project will be developed and how economic activities in the region will be integrated into it. Brochures and documentations on the project should be shared with the house of chiefs. This will inform the house and enable the house to deliberate appropriately about what the region can offer he project. 3. The region has vast lands for the production of various cash crops, ranging from yam, cocoa, rice, coffee, etc. The port project will help in expanded production of these crops. 4. Very crucial in the region presently is the iron ore discovery. Chiefs across the region are concerned about the impending iron ore mining due to the bad image associated with illegal gold mining activities (Galamsey) across gold mining regions in the country and the environmental havocs wrought by these activities. Where these illegal mining activities are pervasive, chiefs are blamed for allowing them. Meanwhile, mining concessions and protection for miners are allocated and sanctioned from Accra. As it stands now, chiefs and the people of the Oti region are not adequately engaged on the iron ore prospects and potential mining activities. Letters sent by the Oti Regional House of Chiefs to the authorities regarding the iron ore issues are not responded to. If there is any linkage between the Keta port and the iron ore mining, at this stage, we cannot guarantee that our people will permit or allow any iron ore mining in the region. Unless proper due diligence and engagements are conducted with our people, leaders and

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
	chiefs, we will not accept any decisions taken in Accra regarding concessions and mining activities in the region. This message should be passed onto the authorities in charge of the port project as well as those in charge of the iron ore prospecting and mining issues.
Volta Regional House of Chiefs 18 April 2024	Key issues / concerns raised: 1. Engagement took place on 18 April 2024 and so will be reported in the EIA Report.
Health Directorate, Keta Municipal Assembly	2. Request for data submitted and officials briefed about the Port of Keta Project and data requirements for its EIA baseline reports.
Education Directorate, Keta Municipal Assembly	Request for data submitted and officials briefed about the Port of Keta Project and data requirements for its EIA baseline reports.
Blekusu Community Members 16 February 2024 1. Raphael Nkamewor (Assembly Member) 2. Leonard Kunkrah 3. Kwaku Adator 4. Paul Agbodzakey 5. Ophelia Alordzinu (Mama) 6. Jarry Davor 7. Kofi P.K.K. Senazah 8. Samson Sewornu 9. Kwaku Vasco Damalie 10. Kwadzo Sandy Amuzu 11. Livingstone Torgbivia 12. Bruce Kokoroko 13. Davidz Tagbor 14. + 30 others	Key issues / concerns raised: 1. Project was promised long ago. It should commence for locals to believe that these are not merely political talk. 2. Blekusu is the most devastated by the sea and efforts must be made to it and other nearby communities. Issues of sea defence is very important in these communities. The project cannot be developed without sea defence as a first priority component. Communities eastward of the project fear that the harbour will result in severe sea erosion towards their communities. Tema harbour is known to have caused some severe sea erosion in Kpone. Assurances and proposals on how these potential impacts can be mitigated has to be outlined to the communities. 3. Environmental pollution is likely to occur as a result of the development and operation of the harbour. Some of these impacts should be clearly outlined and the plans to manage or mitigate them explained to the communities. 4. There may be restrictions on access to parts of the seas and the lagoon, what will be the opportunities for our people, in terms of jobs, businesses, scholarships, etc. to mitigate these restrictions.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Agavedzi and Salakope Community Members 17 February 2024 1. Samuel Doe Alobuvia 2. Dogbeda Obey 3. Simon Bibah 4. Wisdom Lartey 5. Christopher Agedzi 6. Forster Vidzah 7. Midao Kpligi 8. Lawrence Lartey 9. Comfort Ayee Akahoho 10. George Sawugah 11. Eben Assah (Assembly Member) 12. Fafali Amenuvor 13. Doris Doe-Ayi 14. Happy Nanewortor 15. Anna Juliana 16. + 20 others	Key issues / concerns raised: 1. The opened sand bar / channel into the lagoon is resulting in the beach sands being washed towards the opened channel. This has affected some houses that are collapsed. Officials who opened the sand bar are yet to return to monitor the situation. 2. Investors who would bring workers to abuse locals should not be accepted for project development. Homosexual relationships and many other immoral activities may be introduced by these investors / foreign migrants, affecting our culture, and family life. 3. Fishing harbour being a component of the project will move fishing business activities into the harbour. We face a lot of challenges entering the Lomé harbour to buy fish for example. And similar challenges could be faced here in the future where local fish traders may not be allowed to enter the port freely. 4. Women tend to fight among themselves in order to have access to fishes brought into the harbour. Similar incidents may occur when all fish related businesses are centralized at the harbour. 5. Landing beach should be built in all major fishing communities.
Adina and Amutsinu Community Members. 15 February 2024 1. Susana Klomegah 2. Nicholas Kormarati 3. Napoleon Kobi Morladza 4. Tina Morladza 5. Rebecca Amedume 6. Akpene Ahiabode 7. Juliet Anyidoho 8. Samuel Akeleafashi 9. Danyo Klomegah 10. Francis Attitsogbui 11. Sylvester Kumawu	Key issues / concerns raised: 1. Sea defense must be built from Kedzi to Aflao to protect project communities along the Eastern Coast of the project. Initial plans to extend sea defense to cover all communities along he sea coast were abandoned. Whilst Sea erosion and tidal wave events and impacts on the communities are largely ignored by state agencies. Whilst the communities were neglected throughout these periods, what is the guarantee that the harbor development will be done to the full benefit and protection of local communities against sea erosion? 2. Project engineers should be available to engage communities and provide explanation on how project development will be undertaken and how sea erosions can be mitigated by the project. Communities need to be sensitized on the extent of dredging to be done in the sea or the lagoons for the construction activities and how this will be managed to prevent water flooding the communities. 3. Road networks in the area is terrible. Project must build roads leading to Afiadenyigba and Denu to ease up traffic congestion during project implementation.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Sonuto-Agbozume Community Members 18 February 2024 1. John E.K Kporvie 2. Joseph Sedor 3. Mensah Yedzesiwo 4. Gabriel Kpornu 5. Noah Setsoafia 6. Bridget Kumadey 7. Israel Gedza 8. Kofi Kugbortsor 9. Wonder Avi 10. Prophet Agbatsorla 11. Ametefe Agbenyegah 12. Raymond Amekube 13. Francis Dokorku Kportsiklah (Assembly Member)	Key issues / concerns raised: 1. Roads along the lagoon to connect Agbozume communities to Havedzi and Kedzi area will make for easy access to the area for the youth who may seek work on the project. It will also help expand business opportunities in the area, as well as access to lands in the Agbozume enclave. 2. When the lagoon is dredged and land is reclaimed under the proposed port city project, wouldn't that result in the draining of the lagoon water to the areas dredged, thereby affecting higher ground lagoon communities as Sonuto, etc.? When the sand bar was opened in December for example, all the lagoon water drained towards Keta and Afiadenyigba. Our communities were unable to go fishing or salt mining. For salt to yield, water has to be retained in the lagoon over a long period for salt mining between November to February. But because it rained continuously last year into December, and because the sand bar was opened – draining away the lagoon water, the communities are unable to mine salt this year. Any plans to dredge and to open the lagoon into the sea must be regulated to achieve the necessary balance required for fishing and salt mining to continue uninterrupted.
Tackscorner Community Members 18 February 2024 1. Dotsey Lord Agbogedenu (Assembly Member) 2. Torgbui Agboyibor II 9 Chief of Tackscorner) 3. Zikpuitor Gbloenadodzi Mileba 4. Jonas Torsu 5. Regent Gameli Draffor 6. Gbeda Kudah 7. Ametefe Agbenyegah 8. Sylvanus Sosu 9. Joe Kumevi Mileba 10. Alex Anyidoho 11. Kwashie Awafia 12. Noah Agbogedenu	Key issues / concerns raised: 1. Safeguarding the lagoon is of paramount importance and non-negotiable. Project activities should ensure the lagoon ecosystem is preserved after the development. 2. Will all communities along the lagoon be pushed back as part of project development? Communities need to see the proposed development plan when finalized before development is commenced. 3. Seven seas salt mining company came to convince the lagoon enclave communities with good job offers, CSR activities, among others to gain the trust of locals for its salt mining operations. Now, the attendant negative impacts of their projects, including low wages for workers has resulted in locals abandoning their employment with the company. The company has restricted access to lands along the lagoon, preventing locals from being able to undertake artisanal salt mining. The company was initially drawing ground water for its operation, resulting in depletion of ground water resources, leading to death of coconut plantations along the coast and luck of water for domestic uses. Some locals have also perished in areas of the lagoon dredged by the company. All these issues have resulted in agitations that resulted in clashes with the police/military and some youth losing their lives. When these things occurred, state institutions take the side of the company, claiming government has granted/authorized the concessions to the company. Will it not be the case that, the proposed port development project will repeat some of these ordeals on the locals after they gain the acceptance and endorsement of locals to build the port.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
13. Favour Mikoto 14. Anthony Torsu 15. Richard Dorah 16. Douglas Barabu 17. Kwaku Donkui Mileba 18. +34 others	
Kpedzakope, Dzaglame and Ahorkpoe / Bayikope Community Members. 19 February 2024 1. Owusu Romeo Selikem (Assemblyman Kpedzakope) 2. Sokatsi Famous Yanzo (Assemblyman Dzaglame) 3. Saviour Agbeko Awoye (Assemblyman Ahorkpoe/Bayikope) 4. Agbota Yakee Atrohu 5. Samuel Katamani 6. Gayarfe Kwame 7. Ebutor Wisdom 8. Agble Daniel 9. Lebene Nyadenu 10. Dzogbati Evans 11. Mawuli Ackey 12. Nutsukpui Majority 13. Lawson Agbesi 14. Mamaga Asadey 15. Nuvor Christian 16. Agbemehia Freedom 17. Cudjoe Eric 18. Abu	<u>Key issues / concerns raised:</u> 1. Similar grievances regarding the operations of seven seas expressed by Tackscorner community members. Community members expressed the concern that persons engaging them about the proposed port project cannot guarantee that similar challenges faced with seven seas may not occur under the port project where wages may be low, fishermen may be prevented from accessing the fishing harbor, salt mining may be diminished and concerns and grievances raised by locals may be treated with contempt and community members brutalized and killed by security forces for agitating. 2. Community liaison and grievance redress focal persons must be included as part of project implementation to aid resolution of disputes and other issues of contention. 3. The need for support for local artisanal salt mining was emphasized 4. Clinic and hospitals should be improved 5. Schools in Some and Klikor should be improved.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
Dogbeykope Community Members. 22 February 2024 1. Prosper Kumedzro (Assembly Member) 2. Victoria Fiagadzi 3. John Maro Kwame Worclachi 4. Amuzu Klomegah 5. Rita Sena Adzogah 6. Ama Klomegah 7. George Afeadi 8. Paul Gbeve 9. Yaovi Festus Wordatsi 10. Israel Kudzi Xorlali 11. Christine Fiagadzi 12. Mawutor Agorkpa 13. Edith Ashiabi 14. Mawusi Kunugbe 15. Tsakpe Agbasi 16. Ppapa Dogbey Abotsi 17. Appiashi Sewornu 18. Rejoice Awutey	Key issues / concerns raised: 1. The lagoon when dredged may result in the draining of the lagoon water towards the areas dredged, thereby affecting higher ground lagoon communities as Dogboekope, etc. Our experience from the opening of the sand bar at Kedzi-Azizadzi has shown that, communities on higher ground along the lagoon are the ones that suffer when the lagoon is drained towards Kedzi, Keta, Afiadenyigba and other communities. Whilst the joining of the sea and lagoon has resulted in bumper crab and shrimps catch in these communities, the lagoon has receded very far away from the higher ground communities – affecting fishing and salt mining activities. 2. Future joining of the sea and the lagoon must be regulated to guarantee adequate water in the lagoon to benefit all communities at all times. These actions must be based on consensus between all communities facilitated by the MMDAs. 3. Project should prioritize development of basic social amenities such as roads to connect the project area communities to the nearby communities to shorten the distance between them. 4. Challenges may be faced operating the Keta port next to the Lome free port. What policies will be in place to make this successful? 5. Will the authorities in Lome allow the port to be built when it is commonly believed that sea erosion often happens eastward of built harbours?
Awalavi Community Members 23 February 2024 1. Kuli Akrobortu – Dumegah 2. Hanua Kposuglo Sallah 3. Klue Sowudey 4. Famous Kwadzo Gada 5. Rushall Fialor 6. Awudi Attitsogbui 7. Vincent Fialor 8. Jacob Ahiadorme 9. Ami Adadey	Key issues / concerns raised: 1. Project has given hope to all nearby communities. Unemployment is too rampant. Jobs will be created as well as businesses will be opened in nearby towns. Our communities have vast lands to accommodate the operations of factories and warehouses. Only when the project is realized that we can look forward to these opportunities. 2. Many see the project as political tool. It is often mentioned on local radios and described as part of an elaborate political gimmick. Any engagements at this time of the year will not be meaningful unless the project is truly commenced. 3. Detailed project designs and plans should be provided to all communities once the project commences.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
10. Amavi Akrobortu 11. Comofort Akrobortu 12. Robert Nukpui (Assembly Member) 13. + 60 others	
Assembly Members of Weta Traditional Area 23 February 2024 1. Wonder Fomevor (Adzoatsi Electoral Area) 2. Oscar Dodo Normanyo (Huive-Adzinukope E.A) 3. Enoch Kwaku Amedagbe (Huive-Adzinukope E.A) 4. Detsikey Hope K (Adrome Electoral Area) 5. Tsifokor Christian (Ehiga-Biase E.A) 6. Johnson D. Mensah (Atiteti-Adevukope E.A) 7. Klu Lormawu (Avekordome E.A) 8. Christian Nutekpor (Anyiwome-Dzogato E.A.) 9. Christian Dziwornu (Tadzi-Horme E.A) 10. Charles Awudi (Xikpe-Ative E.A) 11. Emmanuel Agbotui (Davego-Dalame E.A) 12. Robert Nepui (Klenormadi E.A)	Key issues / concerns raised: 1. The project is generally good news for the region and our localities, but chiefs and key community elders and leaders should be equally engaged about the projects. 2. News about the project was well received and all locals are in anticipation of its commencement. Project designs, development duration and related benefits to the localities must be shared with the communities. 3. Key concerns will be what the impacts of the projects are likely to be. Will it affect fishing, salt mining, etc. in the localities? Is oil production part of the project? Many people assume that the port project is a disguise to commence oil production in the basin. Further engagements are needed around all communities in the adjoining districts/Municipalities to clarify these points. 4. As we are aware the proposed project area and its environs have very limited lands. Hence, road infrastructure in the adjoining communities will be critical for auxiliary business operations to locate their businesses, warehouses, etc. in nearby communities. 5. Employment opportunities must go to locals first before all other group of migrants are considered.
Abeliakope-Aflao Community Members. 25 February 2024 1. Seth Kwasi Abelia – Assembly Member 2. Tigi Alebia – Cchief Fisherman 3. Agbesi Atisu - Fisherman 4. Richard Atisu – Community Elder 5. Mawuko Abelia – Fisherman 6. Kweku Mensah Dakpo Fisherman 7. Afatsawo Kpodo – Fisherman 8. Ibrahim Adzigbleku – Fisherman	Key issues / concerns raised: 1. Sea defence should be included in project development. All communities eastward of the port has to be protected. Our community is constantly being eroded by the sea. Proper sea defence walls should be built to protect our communities. Groins are not as effective as sea defence walls proper. Proper sea defence development was done in Lome. Some of this is being done under WACA project. Ghana should make efforts to benefit from the WACA initiative to enable proper sea defence projects to be built. The sea defence will help protect our boats against turbulent waves and winds between May-July that topples and smashes our boats. 2. Some of us work in the Lome Port and see how beneficial it is. We expect the port project to bring similar opportunities and more. People need to know the kinds of skills required to work at the port so they can prepare themselves and acquire some of these skills before the project commences. Artisans and casual labourers should be recruited from local communities, not brought from Accra and Tema.

Stakeholders / Group of Persons Engaged, Phone Numbers and Key Persons	Summary of Salient Points Made / Raised:
9. David Kpodo – Fisherman 10. Stephen Anumu – Fisherman 11. +28 others	3. Many wonders if the project will come to reality. It is seen as a political tool. When project commences, further engagement with communities will be necessary.

Figure 7-1 - Introductory Meeting with Dufia of Kedzi, MCE & Staff of KeMA, GPHA and CARES

Figure 7-2 - Introductory Meeting with Dufia of Kedzi, MCE & Staff of KeMA, GPHA and CARES

Figure 7-3 - Presentation on Port Layout

Figure 7-4 - Group Picture after Presentation

Figure 7-5 - Engagement of Kedzi Chiefs and Elders at Commencement of Community Engagements

Figure 7-6 - Engagement of Kedzi Chiefs and Elders at Commencement of Community Engagements

Figure 7-7 - Engagement with Anlo Traditional Council at the Commencement of Community Engagements

Figure 7-8 - Engagement with Anlo Traditional Council at the Commencement of Community Engagements

Figure 7-9 - Public Forum / Engagement in Dzelukope, Keta

Figure 7-10 - Public Forum / Engagement in Dzelukope, Keta

Figure 7-11 - Public Forum / Engagement in Kedzi-Agorta

Figure 7-12 - Public Forum / Engagement in Kedzi-Agorta

Figure 7-13 - Public Forum / Engagement in Havedzi & Horvi

Figure 7-14 - Public Forum / Engagement in Havedzi & Horvi

Figure 7-15 - Woman Processing Catch from the Lagoon (within Designated Area at Kedzi)

Figure 7-16 - Woman Processing Catch from the Lagoon (within Designated Area at Kedzi)

Figure 7-17 - Landing Beach with Sand Bar Separating Sea from Lagoon at Kedzi (within Project Area)

Figure 7-18 - Project Area showing Some Flooded Homes by the Lagoon

Figure 7-19 - Homes Impacted by Sea Erosion and Lagoon Floods

Figure 7-20 - Homes Impacted by Sea Erosion and Lagoon Floods

Figure 7-21 - Premix Fuel Station Marked Out by Lands Commission within Designated Area

Figure 7-22 - Local Pub Marked Out by Lands Commission within Designated Area

Figure 7-23 - Net Menders at the Shores of Kedzi / Vodza

Figure 7-24 - Stones / Pebbles Mined from the Sea at Kedzi / Vodza

Figure 7-25 - Town Idol Togbui Evo at the Designated Project Boundary Between Kedzi and Vodza

Figure 7-26 - Whale Washed Ashore at Kedzi

Figure 7-27 - Consultative Engagement with Volta RCC

Figure 7-28 - Consultative Engagement with Volta RCC

Figure 7-29 - Consultative Engagement with Oti RCC

Figure 7-30 - Consultative Engagement with Oti RCC

Figure 7-31 - Consultative Engagement with Oti Regional House of Chiefs

Figure 7-32 - Consultative Engagement with Oti Regional House of Chiefs

Figure 7-33 - Socioeconomic Baseline Data Collection

Figure 7-34 - Socioeconomic Baseline Data Collection

Figure 7-35 - Socioeconomic Baseline Data Collection

Figure 7-36 - Socioeconomic Baseline Data Collection

Figure 7-37 - Community Engagement at Amutsinu

Figure 7-38 - Community Engagement at Adina

Figure 7-39 - Community Engagement at Kpedzakope

Figure 7-40 - Community Engagement at Sonuto

Figure 7-41 - Community Engagement with Members of Weta Traditional Area

Figure 7-42 - Community Engagement at Abeliakope-Aflao

Table 7-3 - Summary of Secondary Stakeholder Engagement Activities

Stakeholder Details	Key Issues Raised / Discussed
Environmental Protection Agency (EPA) Ing. Maxwell Zu-Cudjoe, Area Head, EPA 0501 301 641 Alex Dasacl Dawanye, Officer, EPA 0546 506 906 Theodore Tello Helson, EPA 054 339 0892 Thomas Katsu Agboblu, Internship, EPA 0503 831 265 19 November 2023 09:30am – 10.50am (Lagoon Beach Hotel & Project Site, Keta) (CARES – Matthew Baker & Nii Ofori Tackie-Oblie)	A project brief was given by CARES Group at the southwest corner of the project site. The project brief including pointing out key areas to be developed under the different phases and demonstrating in the field their general location. The site inspection also included visiting the northwest corner of the Port of Keta. *Main issues raised and discussed:* • EPA enquired about the total land area that would be needed for the Port of Keta, and the extent to which the project would extend into the sea. Whilst a figure for the total land area could not be provided the boundaries of the site were visited and EPA were advised of the length of the main breakwater (Phase 1 - 2.4km, Phase 2 - 2.9km) and the secondary breakwater (670m). • EPA queried on the potential impact on the community and the need for provision to be made for the community members affected in terms of resettlement, and the need to determine the extent of this since no document was currently available documenting this. • EPA indicated that the affected beach may well be a landing site for fishermen which could affect community livelihoods. • EPA advised that flooding, tidal waves, and erosion should be considered. • EPA requested that they be involved in community engagement, public forums, potentially a public hearing, and socioeconomic data gathering. • EPA indicated that the impact from traffic on the roads should be considered and that a 2-lane highway would be needed to avoid destructions of the roads.
Ghana Geological Survey Authority (GGSA) Maxwell Boateng, Acting Deputy Director 024 936 5939 maxyboat@yahoo.com Seidu Alidu, Head, Geochemistry & Laboratories Seidu.alidu@ggsa.gov.gh Samuel Atta, Head Geophysics Sammy_atta@yahoo.com Karen H.Osekre, Head of Engineering 026 444 4111 karen.osekre@yahoo.com Isaac K. Mwinbelle; Acting Director General ikuuwan@yahoo.com Joseph Atichogbe, Asst. Geologist (PA to DG) 020 319 4563 24 October 2023 9:35am – 10:24am	A project brief was given by CARES Group. The project brief included projecting the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GGSA indicated that it would have been proper for GPHA to have formally introduced CARES Group to GGSA. • GGSA enquired on the total area of the Port of Keta and the exact location (coordinates) of the corners of the project. CARES Group provided details on the proposed lengths of the breakwaters, some areas of the port sizes, and a central coordinate to GGSA. • GGSA indicated that work should be done to determine the geological conditions, and that there had been two exploratory hydrocarbon wells drilled, and that the project should ensure there is no conflict with these wells and hydrocarbon exploration. GNPC should be engaged to assist with this, whilst members of the community could likely point out the specific locations of the two wells that have been capped. • GGSA indicated that key issues for consideration should be coastal erosion and flooding, with enquiries made about the reasons why the specific location had been chosen when there is a flood gate, and there is current ongoing consideration being given to opening this due to the Akosombo Dam Spillage. Enquiry was made to the specific width of the channel leading from the flood gate and whether this would be adequate. • GGSA highlighted that the area is within the Volta Basin, which is a collection of unconsolidated material, so the geological properties won't be strong. Consideration should be given to excavating until reach strong material and that

Stakeholder Details	Key Issues Raised / Discussed
(GGSA, Ridge, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	since a geotechnical survey had not been conducted this would need to be completed before construction. An example was provided in the challenges that Dangote experienced in building refinery on the Nigerian coastline. Use of piles would have to be considered and these can be very costly. The seismicity of the area will need to be considered. • GGSA highlighted that the area contains shallow groundwater that the communities use for irrigation in the Dry Season, and that if this was impacted this would affect livelihoods. • GGSA indicated that the lagoon provides a water cleansing function, cleaning water before discharging to the sea. • GGSA indicated that ecosystem / fishery impacts should be considered with a specific reference made to small tilapia that are from the area that people enjoy eating. • GGSA indicated that they could provide geological maps, geological description, geophysical information, and seismicity.
Ghana Shippers' Authority (GSA) Emmanuel Arkun, Head, Research, Monitoring & Evaluation 024 334 7099 Emmanuel.arku@shippers.org.gh Helena Claudia Amanfu, Principal Research Monitoring & Evaluation Officer 020 953 3168 Helena.amanfu@shippers.org.gh Kwesi Saforo, Senior Research Monitoring & Evaluation Officer kwesi.saforo@shippers.org.gh 25 October 2023 11:30am – 12:00noon (GSA, Ridge, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. GSA gave a brief into their operations and activities of the Authority: • GSA are an agency under the Ministry of Transport; their responsibilities include providing operational support to shippers who bring cargo to/from Ghana by air, ship, or road. They are also interested in operations that bring the shipper efficiency (i.e., cost and time). They are also involved in training by educating shippers, stakeholders, negotiation with GPHA for better charges for shippers. For any intended increase in prices, GPHA are obliged to have formal discussions with them to agree on the prices. • GSA's major concern is how long cargo stays at the port (i.e., payment of demurrage, storage). • GSA's major stakeholders are GPHA, freight forwarders and shipping lines. *Main issues raised and discussed:* • GSA were happy that, an alternative port for shippers will increase competition which will likely benefit the activities of shippers and boost efficiency. GSA advised that any problems that occur in a port that result in delays (cargo dwell time), increases the shipping cost (demurrage cost, storage cost). • GSA indicated that whilst they had heard about the potential project, it was the first they had heard that (master) plans were available. • GSA expressed the view that all activities around the port happen because shippers want to move cargo, so it is important that shippers interests are considered. GSA raised a concern about GPHA being the sole planner, designer, and operator. • GSA indicated that it would be good for a port in the east of the country to specialise in iron and cement.
Ministry of Lands and Natural Resources (MLNR) Maxwell Adu-Nsafoa; Technical Director (Lands) 0244 606 931	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • MLNR asked about the acquisition of land for the rail corridor and where the line would meet other lines.

Stakeholder Details	Key Issues Raised / Discussed
Husein Pymaya Yakubu; Asst. Programme Officer 0242 123 910 25 October 2023 01:35pm – 2:00pm (MLNR, Ridge, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	• MLNR asked the status of the land (i.e., stool land, family land) where the port will be cited and if it has been properly acquired from the natives. • MLNR advised that GPHA should obtain a well-documented land title to avoid the natives from claiming that proper procedures in acquiring the land were not done. • MLNR stated that, their key concern of the ministry was with the proper acquisition of the land and ownership to avoid any subsequent anger from the natives. Such cases will be brought to the ministry for settlement, which in this case should be avoided. • MLNR enquired if the land for the city area had been acquired.
Electricity Company of Ghana (ECG) Kamuah Hammond, Manager – Health & Safety 024 450 1561 hkamuah@ecggh.com Pearl Essel; Manager Safety 020 818 7500 pessel@ecggh.com Emmanuel Asante; Senior Environmental Officer 027 686 7876 kkasante@ecggh.com James Nortey; Senior Environmental Asst. 059 395 7240 jnortey@ecggh.com 26 October 2023 10:00am – 10:30am (ECG Project Office, Circle, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • ECG indicated that the areas primary 33kV transmission line is from Aflao, whilst the secondary 33kV transmission line is between Sogakope and Anloga, where there is a switching station. • ECG indicated that because only the Aflao line is currently working (due to Akosombo Dam overspill) Sogakope does not have power. • ECG highlighted that the there is a main sub-transmission 33kv lines located on the Keta to Afla stretch which supplies power to the whole township of Keta and some parts of the Volta and Oti Regions. When the Aflao power supply goes down the whole township of Keta and surrounding area will be in darkness. There is another sub-transmission line located in Sogakope, which also supplies power to Sogakope and its environs. • ECG indicated that, the major concerns of the project were power outages (revenue loss), damages to their network / equipment and the provision of a dedicated substation for the port. Therefore, the masterplan should make provisions for a dedicated substation for the port to prevent an overload on the community. • ECG also mentioned that they should be informed adequately for preparations to be carried on the construction of the substation. • ECG requested that they should be kept informed of progress and that if power outage is to be caused by the construction activities that they would need at least 72 hours' notice.

Ministry of Fisheries and Aquaculture (MoFAD) Eric Baah; Director-PPBMED 020 255 9888; ericbaah16@yahoo.com Samuel Quartey; MOFAD, Technical Advisor 054 3077 358; samquaatey@yahoo.com Enock Boadu Amo; Deputy Director PPMED enock.amo@mofad.gov.gh Kwasi Owusu-Sekyere; Senior Planning Officer, PPMED kwasi.owusus-sekyere@mofad.gov.gh 26 October 2023 11:30pm – 12:20pm (MoFAD, Ministries, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • MoFAD asked if the design of the port was a fishing port or a commercial port, and how the two would work together. Highlighting some challenges that occurred at Takoradi, and how the separate fishing harbour entrance at Tema is beneficial for safety. • MoFAD iterated that the construction of the port will affect fishing activities in both the short term (during construction) and long term in the various communities and will likely impact both sea and lagoon fishing, with a likely impact on biodiversity. • MoFAD mentioned that the construction of the port will affect the landing sites, fishermen and fish processors and other related activities in and around Keta. They gave the statistics from a recent study as follows: ○ To the East, there are thirteen (13) landing sites with twelve (12) fishing communities. ○ To the West (i.e., Anloga area), there are eighteen (18) landing sites with eight (8) fishing communities with two hundred and ninety (290) canoes ○ In the Keta Municipality, there are nine (9) landing sites with three hundred and sixty (360) canoes ○ Keta has 3,440 fishermen; Anloga 2,980 fishermen, Ketu South has 6,600 fishermen ○ 400 canoes in Ketu South. • MoFAD mentioned that the construction of the port will also affect the natural production of salt in the Keta lagoon; the lagoon is one of the largest that produces salt naturally. Some major species like shrimps will also be affected. • However aside the negative impact, the site will also open the area for business activities which will boost the economy of the area and the country. Vessels will dock at Keta to serve the northern / eastern sector of Ghana reducing the duration of transportation for business activities. Moreover, some neighbouring countries can also use the port for business activities to ease pressure on the ports of Tema and Takoradi. MoFAD suggested that Lomé port is small. • MoFAD asked, if provisions have been made for the operators of these canoes and fishermen during the construction of the port and indicated that fishermen are very localised – preferring to fish in the same area. • MoFAD suggested that GPHA should share their experiences on the construction of Terminal 3, Tema to serve as a guide. Also, what happened during Jamestown fishing harbour construction when the fishermen were moved. • MoFAD suggested that an office should be created as part of the project for fishing industry administrators. • MoFAD indicated that, there is a detailed report titled Report on the 2022 Ghana Marine Canoe survey dated November 2022 which is currently in printing. They can share a copy with us after printing at no cost but in the hope that CARES Group will sponsor their upcoming Fish Festival to be held this November. The festival will host all stakeholders in the fishing industry, and it will be a great opportunity for CARES Group to meet these stakeholders for future business. • MoFAD enquired about details of the fishing area and whether provision will be made for canoes, industrial trawlers etc., and whether the appropriate depths were available / would be dredged. MoFAD indicated that canoes should not pay for access to the fishing harbour. • MoFAD indicated that there was previously a small harbour in Keta that had been lost due to erosion. • MoFAD suggested that impact of dredging on biodiversity and spawning grounds would be important areas to consider.

Stakeholder Details	Key Issues Raised / Discussed
	• MoFAD indicated that it is the women that control the fish industry, and that effective engagement with the women can result in them becoming advocates for the project. • MoFAD enquired about where the material for the breakwater construction would likely be sourced from i.e., would it be imported or sourced from within Ghana. • MoFAD indicated that if the lagoon was destructed this would affect Anloga freshwater site. • MoFAD advised that the Keta Lagoon is well known for its Pink Shrimp, and that the species needs a mix of fresh and salt water.
Ghana Meteorological Agency (GMet) Joseph Portuphy; Deputy Director of Forecasting jportuphy@gmail.com Charles Badoo; Director of Administration bredu_gh@yahoo.com 26 October 2023 01:30pm – 2:00pm (GMet, East Legon, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GMet expressed some concern about the low elevations in the coastal area, and where the displaced water would go. • GMet indicated that they did not have any MetOcean data for the Keta area – only atmospheric. However, they advised that there are permanent MetOcean monitoring stations at Tema and Takoradi which collect data on currents, waves (significant wave height), and Sea Surface Temperature (SST).
Energy Commission (EC) Joyce Ocansey; Senior Officer-Social, Environment Impact Assessment 024 340 9710 ocansey@energycom.gov.gh Catherine Achuliwor; Officer, Environment, Gender Impact Assessment 020 492 0988 kachuliwor@energycom.gov.gh 26 October 2023 15:35pm – 16:05pm (EC, Airport, Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included showing a printed copy of the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • The Energy Commission is the regulator of the power industry (i.e., GRIDCO, ECG) and they felt they were not a relevant stakeholder. • Issues of flooding as currently being experienced with the Akosombo dam spillage was discussed and were concerned if the port will not be flooded. Is there a backup plan for flooding in the instance during the construction of the port • ESIA should factor gender impact assessment, how the construction of the site will impact activities of both males and females in the communities. • Energy Commission suggested, the ESIA should factor the impact of the construction of the port on aquatic ecology. • Energy Commission were also concerned if the use of electricity on the project will not affect the community's use; will there be a dedicated ECG transmission for the project so as not to affect the community's usage.

Ghana Navy Commodore Solomon Asiedu-Larbi, Flag Officer Commanding Riverine Command 0244 260 313 sglosa31@gmail.com Naval Captain Ramzey Bamba, Deputy Chief Staff Officer (Logistics) 0244 260 214; ramzy1bambar@gmail.com Naval Captain Ebenezer K. Yirenkyi, Director Naval Operations 0244 417 422 kwame3032@gmail.com Commander De-Graft Okyere-Manu, Director Special Projects 0559 136 655 desaintz@yahoo.com Naval Captain Dennis Eghan, Director Naval Training 0245 341 842 abismallgh@yahoo.co.uk Lieutenant Commander Michael K. Awuah, Deputy Director, Policy 0244 529 708 mkawuah@gmail.com Lieutenant Commander Emilio Okyere-Dadzie, Deputy Director, Research & Development 0207 005 796 justemilio2@gmail.com 31 October 2023 12:00pm – 13:00pm (Naval Headquarters, Burma Camp Accra) (CARES – Matthew Baker, Nii Ofori Tackie-Oblie & Erica Imbrah)	CARES Group gave an overview of the project. The project overview included projecting the masterplans and an overview explanation of GPHAs plans. A representative from the Ghana Navy also gave a presentation on the ESIA of the port of Keta from their perspective. Some of the highlights of the presentation were: • Environmental impacts (i.e., habitat destruction, air pollution, water quality degradation, dredging related disturbances to the community and the potential harm to marine life) • Social impact: these impacts may be positive or negative (i.e., infrastructure development, economic development, employment opportunities, community displacement, safety and security challenge, oil & gas activities, cultural heritage. Social services and social cohesion. *Main issues raised and discussed:* • The Ghana Navy (GN) were very emphatic that, provision should be made for the construction of a befitting naval base and harbour for security related issues and to avoid the current situation in the Tema port where there is no naval base. GN requested this should include accommodation for 50, an armoury, and Marine Operations Centre (MOC). • Discussion was held around the size of the navy area, with CARES advising that the berth was currently planned to be 100m long. GN enquired about whether office space and accommodation space was to be provided. • GN highlighted that the project could contribute to safety and security concerns in both the local and national area (crime, terrorists, piracy, stowaways), and that a robust security plan should be developed. • GN indicated that consideration should be given to the National Oil Spill Contingency Plan, as well as international conventions, and local laws. • GN indicated that if the project negatively affected social cohesion resulting in conflict / tension then this becomes a national security issue. GN advised that this could be mitigated against by properly engaging with the communities, proper spatial planning (ecotourism, ecoparks etc.), preservation of cultural heritage, security enhancement (navy base). • GN indicated that security should be ensured at the anchorage. • A VTS system should be included to relay information to vessels such as MetOcean conditions. • GN indicated that having an incident centre and ensuring maritime security were the key issues. • GN indicated that there were plans to build a naval harbour at Tema, but there is only a navy base, which has contributed to crime in the area as there are security issues which the police cannot handle. • GN indicated that if resettlement is necessary, it should not be near the harbour as this can result in the creation of slums where crime can persist. The adjoining areas should be developed to reduce crime. • Should ensure the safety of navigation. • GN raised the point that should carefully manage the expectations of the community with regards to the socioeconomic impact. They are mostly involved in fishing and salt mining, so what role would they be able to play? This is important as it is after it is built that challenges with the community will occur if their expectations are not fulfilled. All these issues result in security challenges. Corporate Social Responsibility (CSR) activities can help ensure communities feel a positive impact of the project.

National Development Planning Commission (NDPC) Dr. Opare-Djan Nana, Director, Monitoring & Evaluation Division 0244 149 954 Nana.oparedjan@ndpc.gov.gh 15 November 2023 11:05pm – 11:36pm (NDPC Office, Accra) (CARES – Matthew Baker & Erica Imbrah)	The CARES team introduced our purpose for the meeting. Dr.Opare-Djan mentioned that he was specifically interested in the economic and socio-cultural impact of the port on the community. *Main issues raised and discussed:* • NDPC mentioned that Keta is a challenged area considering the geographical settings in terms of flood and as such, was there a proper feasibility study to ascertain if floods and the sea will not swallow the port in the future when the port is built. • NDPC mentioned if there was any policy or plans in place to protect the interest of the people and the community. • NDPC questioned that in terms of engineering activities, was it feasible that a port could be constructed in the community? • Will there be a free port? • Did we take into consideration the close by port located in Lomé and the possibility of choice for traders. • What is the economic feasibility of the Keta port since it is there is a close by port in Lome? In terms of the Housing Needs, NDPC highlighted that: • The Keta community is vulnerable with respect to the building materials used in the construction of the houses, as such if the housing needs of the people have been considered and if there was any support put in place to support them? • NDPC suggested resilient housing structures should be put in place to support the people. • NDPC also suggested that the housing delivery should come with healthcare facilities for the people. In terms of Economic Activity affecting the people, NDPC highlighted the following: • How will the needs of the fisherfolks be addressed? • Are there any options in place to improve on the economic activity of the people (i.e., fisherfolks, women etc)? • Salt mining in the community serves as a source of employment, therefore how can salt mining be sustained in the long term? • How will coconut farmers be assisted to have a more resilient coconut farming in the community? • The activities of women - proper market stores should be provided for the women to be able to continue trading their activities. In summary, the construction of the port will have a great impact on the community, i.e., the citizenry will benefit and economic activity as well as the informal sector will also thrive. The construction of the port will also expedite trading activities through the eastern corridor to the northern part of Ghana.
Ministry of Employment and Labour Relations Emmanuel Kwasi Adjei, Senior Planning Officer, 0244 670 221 emmanuel.adjei@melr.gov.gh Sarah Adom, Assistant Planning Officer 0261 710 344	Following introductions, CARES Group highlighted the purpose of the meeting, the ESIA process, and the status of GPHAs plans. Emmanuel Kwasi Adjei (KWA) led the discussions for the Ministry of Employment and Labour Relations (MELR). • KWA indicated that MELR number one concern will be ensuring that international employment and labour regulations that Ghana has ratified and incorporated into local law are adhered to – in particular, those from the International Maritime Organization (IMO), and the International Labour Organization (ILO). Areas that MELR would be interested in includes the working conditions of seafarers. • KWA indicated that the MELR's National Labour Department are concerned with ensuring that the Labour Act 2003 (Act

sarah.adom@melr.gov.gh 21 November 2023 11.55am – 12.15pm (Ministry of Employment and Labour Relations, Ministries, Accra) (CARES – Matthew Baker)	651) is enforced, whilst the MELR's Department of Factories Inspectorate is concerned with ensuring that matters of Occupational Safety and Health (OSH) are enforced with provisions made in the Factories, Offices and Shops Act, 1970 (Act 328). KWA also indicated that the Department of Cooperatives deals with matters related to groups / cooperative societies, and that they could play a key role in Corporate Social Responsibility (CSR) activities and other social interventions that may be implemented. • KWA indicated that the first thing the MELR will check is compliance with the relevant regulations, and not lowering standards just because the project is in Ghana or Keta. • KWA indicated that in terms of local content, should first be indigenes, then Ghanaians, then others. Additionally, where the capacity is not available in terms of skills etc., there should be measures in place to develop them. • KWA indicated that MELR have a National Green Jobs Strategy 2021-2025, which deals with issues such as climate change. • KWA highlighted the right for workers to form unions / associations, contracts, treated fairly, and social security. KWA highlighted MELR's role in social dialogue / tripartism (between government, employers, and employees) to seek amicable solutions to labour disputes. • KWA highlighted that there are regional agreements that the port would play a key role through trade. • KWA enquired about when the actual construction would start. • KWA indicated that close attention will need to be paid to the fishing component.
Ghana Tourism Authority (GTA) Ekow Sampson, Deputy CEO / OPS 0244 573 353 / 0208 159 580 ekowsampson@gmail.com esampson@ghana.travel Charles Buabin, Director Product Development and Inventory 024 420 2777 c.buabin@ghana.travel 22 November 2023 13.39pm – 14.20pm (GTA Head Office, Accra) (CARES - Matthew Baker)	Following introductions, CARES Group highlighted the purpose of the meeting, the ESIA process, and the status of GPHAs plans including the intention for the project to promote tourism with a marina, access to the lagoon through the sea lock, promotion of cultural festivities etc. Ekow Sampson (ES) and Charles Buabin (CB) raised the following points: • Keta is within the Southern Ghana Tourism Masterplan, which was developed with funding from the World Bank. A softcopy would be made available to CARES Group. • Enquiry was made about how the project would impact upon the hospitality facilities of the area. CARES indicated that at this point of the assessment it was not possible to tell. GTA indicated that as the regulator of the industries they were interested. • CB advised that the name Keta means 'on top of the sand'. • ES indicated that in addition to environmental and social impacts there may be a political impact. • ES indicated that there is a serious erosion problem / concerns in the area and referred to the Keta Sea Defence Project and that trying to relocate people from their ancestral homes was challenging. For the project to be successful it must resolve the erosion problems - that should be the number one priority. • GTA indicated that Volta Region (Ewe's in particular) as a whole is attractive for tourists for snake tourism culture and local traditions - with every community encouraged and willing to withhold festivities & traditions. • ES stressed that with the two communities (Kedzi & Havedzi) due to be separated by the port that it was important for the project to consider how it brings the communities together as conflicts are likely. Particularly when the expected / promised benefits for the community are not realised. • Issues raised by GTA included jobs, fishing, job creation, livelihoods, culture.

	• CB enquired about the size of the marina and if cruise ships would be able to dock, indicating that the Ghanaian coastline is on cruise ships routes to South Africa / South America, and that GTA are actively promoting the cruise industry, with cruise ships occasionally calling at Tema and Takoradi. • CB enquired about the specific location of Fort Prinzenstein on the drawing. • GTA highlighted the need for sacred sites to be carefully located / mapped, with measures needing to be implemented for their protection. • CB suggested that there should be tourist reception facilities available in the port and environs, that could be leveraged upon for private sector investment. Reference was made to the success of Maaha Beach Resort. • ES indicated that it was important for a holistic plan to be developed for the surrounding area - so that the developments that will spring up around the port are properly planned.
Ghana Railway Development Authority (GRDA) Yaw Owusu, Chief Executive Officer 054 354 5707 eruiecu@yahoo.com Susan Delali Akosua Kudjoe, Deputy CEO susana.kudjoe@grda.gov.gh Godson Simpri, Manager, HSE 024 496 0907 Nana Kwame Owusu Absah, Deputy Director, Projects Development 024 012 1797 Samuel Asiamah; Deputy Director, PPRME 026 057 8630 Lawrence Mensah; Snr Manager, Projects 024 276 2017 lawrence.mensah@grda.gov.gh Mavis Agyeiwaa; Manager-PPRME Mavis.agyeiwaa@grda.gov.gh Al-Amin Al-Hassan; Director-PPRME 055 386 7262 al-amin.al-hassan@grda.gov.gh Dr. Divine Okata; PM R&L 024 539 1122 dbokata@yahoo.co.uk 23 November 2023 10:00pm – 11:10pm	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* GRDA asked: • Whether the project conforms to the IFC standards. • If a contractor has already been engaged. • The volume of iron ore that is expected to be exported connecting to the port; will the iron ore be a more viable option for the rails? • The timeline to commence the construction of the port. • The timeline between constructing phase 1 and phase 2. • The duration of expiry of the ESIA. • Issues of land reclamation on the community and if any provision has been put in place to resettle the people. GRDA mentioned that: • When a railway interconnects with a port, there should be a consideration for a Railhead Terminal to be operated by the port operator to clear goods. • The Tema-Mpakadan railway is 90% complete. • The new Railway Masterplan of 2020 has an expansion line called the “Ghana Burkina Faso Railway Interconnectivity Project”. The railway starts from Mpakadan, which will connect to Kpeve, Ho and Sheini (where the Iron Ore deposit is found). There is also a branch at Kpong, which can connect to Keta. • Their biggest concern was the timeline of the project - especially as the export of iron ore via rail would be a key component to make the port feasible. The feasibility of the port and railway are mutually dependent upon one another. • There would be the need for a marshalling yard (maintenance etc.) to be developed.

(GRDA, Accra) (CARES – Matthew Baker & Erica Imbrah)	
Water Resources Commission (WRC) James Aggrey, Senior Engineer 024 227 2445 Jamesaggrey04@yahoo.com Priscilla Daddah, Project Manager 050 369 1758 daddahp@gmail.com 23 November 2023 12:00pm – 12:40pm (WRC, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. The WRC mentioned that the Commission was in charge of regulating all water resources / bodies in the country, issues related to transboundary, and all water related stakeholders in the country. *Main issues raised and discussed:* • WRC mentioned that the flood gate was recently in opened in October to allow the free flow of the lagoon into the sea, mitigating the devastating flooding caused by the Akosombo dam spillage. • WRC mentioned that discussions are in on-going (between WRC, Hydrological Services Authority and the Ministry of Environment, Science and Technology) to select a place in Ghana to pilot sand motor technology which will act as a buffer against the sea-level rise to the selected communities. • WRC asked whether there were measures in place to prevent oil spill in the future? • WRC asked about the proximity of the fort to the port and if the fort will be affected. • WRC asked if the breakwater will not cause coastal erosion. • WRC expressed concern on the impact of the port on the activities of salt mining, the livelihood of the people, the fisherfolks and fishmongers. • The need for a bathymetric survey. • WRC wondered if the port was being developed too close to the communities. WRC finally expressed their key concerns as: • The development of the port should not affect the water quality of water resources (sea, lagoon, groundwater). Highlighting that there are shallow wells used for economic activities • The interaction between the lagoon and the sea and how the port will affect this; the lagoon should not dry up as a result of the construction of the port. • As a result of the dredging activities, a dredging permit / license should be obtained from the Commission. This could however be waived but there should be a request to obtain an emergency dredging permit. • Impact upon salt production and if livelihoods will be impacted, this should be addressed.
Ghana Highway Authority (GHA) Joseph Atsu Amedzake, Director Road Safety and Environment Joeatsu@yahoo.com Ing. Bernard Owusu; Highway Design Manager 024 411 3784 owusu.bernard@highways.gov.gh Abraham Aulinzua Abunkudug, Snr Technical Engineer	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GHA asked the effect of reclamation of the land on the community and if any provision has been put in place to resettle the people. • GHA were concerned on the effect of the port on the community and the livelihood of the people. • GHA requested the provision of a weighbridge / axle load station within the port to ensure that overweight vehicles are not permitted to leave the port facility, to reduce the safety risk and impact upon the road network.

abrahamaabunkud@highway.gov.gh 23 November 2023 13:35pm – 13:57pm (GHA, Accra) (CARES – Matthew Baker & Erica Imbrah)	• GHA asked if there were any social intervention plans in place to enhance the livelihood of the people, and the need for compensation. • GHA asked if there will be a Safety Management Scheme in place for construction workers. • GHA asked the expected start of the construction of the port. • GHA mentioned that there is a proposed construction of a new bridge over the Volta at Volivo. Their key concerns were: • The impact of the construction on the road network • Recommended the development a Fishing harbour for the locals to sustain their livelihood and to also allow them to benefit from the port in their community. • Recommended a Trucking Parking Area for the parking of trucks; a rest area or lodge should be provided for drivers to sleep over whilst waiting overnight to offload or load their trucks. Drivers sleeping around their vehicles is a problem at Tema that should be avoided at Keta. Forecasting numbers should be carried out. • The impact of dredging and reclamation on the animals etc. • Erosion along the coastline between Tema and Keta.
Ghana Chamber of Telecommunications (GCT) Ing. Kenneth Ashigbey, CEO 0244 315 864 06 December 2023 09:50am – 10:10am (GCT, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GCT highlighted that the location of existing submarine cable landing sites and telecom towers would have to be considered. • GCT asked if there were plans in place for telecommunication lines in terms of copper cables and fibre cables. • GCT requested for the coordinates of the area. This will be sent to the various telecoms to assess the potential of the area if there is any possible landing site. • GCT asked the size of the port compared to the Tema and Takoradi ports.
Land Use and Spatial Planning Authority (LUSPA) Chapman Owusu-Sekyere, Ag. Deputy CEO 0246 277 528 Chapman.owusu-sekyere@lupsa.gov.gh 15 January 2024 10:35am – 11:00am (LUPSA, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* LUPSA mentioned: • According to the Land Use and Spatial Planning Act 925, a spatial plan is supposed to be prepared for the project, which must be approved before the construction commences. • There are 3 types of plans (i.e., Spatial Development Framework (SDF), Strata Plan and Local Plan) • Spatial Development Framework (SDF) is a long-term spatial plan indicating the strategic vision of the area (i.e., 20years etc). Every assembly should have this plan in place, where names of projects or projects are captured for future development purposes. The Strata Plan however indicates broad land zones such as industrial, residential lands, whereas the Local Plan indicates parcel by parcel use of land. A property is acquired from the local plan. • Every district is mandated by law to have both the strata and local plans to ensure demarcated zones before any project

	starts. • The Project sponsors will have to check with the Keta assembly if there's a strata or local plans for the area before work can commences since it is a high-profile project. Without the strata or local plan, work cannot commence. If there is no plan currently in place, the project sponsors will have to assist the assembly to get these plans done. • Apart from the port, adjourning lands should also be earmarked for other purposes in the SDF plan. • Some foreign developers had plans to develop wind energy in the Keta area some years ago, because the area was viable for such developments. • Ghana has a Marine Spatial plan sponsored by the UK government. • Why the need for the Keta port since the Tema port keeps expanding and improving on its facilities.
Ghana Maritime Authority (GMA) Capt. Inusah A. Nasir, Director, Technical Division 0244 037 367 Inusah.a.nasir@ghanamaritime.org 17 January 2024 12:15pm – 12:30pm (GMA, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GMA mentioned that it is their responsibility to ensure that, the project sponsors pay careful attention to Maritime Security Act 675. The act is mainly concerned with international ISPS which calls that every port facility must comply with ISPs code. • GMA will have particular interest in the construction of the port to ensure the safety of all stakeholders involved. • The port operator will need to undertake a Port Facility Security Assessment to identify vulnerabilities, and to develop a Port Facility Security Plan, to address the vulnerabilities. GMA would check compliance and provide a 5-year Statement of Compliance (SOC), with yearly site inspections. • Safety of Navigation – The port would have to comply with safety issues in the construction of the port to ensure situations of vessels sinking etc. Notice to Mariners – navigational warnings should be broadcast to mariners to inform them the construction of the port. Charts will need to be updated to indicate construction works ongoing. There may be fishing industry complaints. • Port Limits – How deep is the port into the sea? what are the coordinates of the port? • Port Reception Facility – Very important to provide this facility to prevent marine pollution. The facility also ensures vessels to discharge garbage, sewage is properly handled. • Traffic Systems – Must institute vessel traffic systems to regulate entry of vessels. • Strict adherence to Acts – In the construction of the port, these acts (i.e., the Maritime Pollution Act (932) and Shipping Act (645) of Ghana must be strictly adhered to, with GMA supervising the Acts. • To be safe and to protect the marine environment, all construction vessels must obtain permits from GMA. There are 2 forms of Operating Permits (i.e., Operating Permit and Safety Permit). Operating Permit – only vessels not registered in Ghana require operating permits. Safety Permit – This is a mandatory permit for both local and foreign vessels. • What is the estimated quantity of dredging material, location of dredging / proposed disposal (there are no existing sites nearby)?
Ghana Hydrological Authority (GHA) Yiadom B. Akoto, Head of Coastal Division	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans.

024 772 1427 yiadom.akoto@hydro.gov.gh Dr. Richard Asumadu, Coastal Engineer Expert 059 321 1897 asumadu@yahoo.com Emmanuel Asamoah-Frimpong, Drainage Engineer emmanuel.asamoah@hydro.gov.gh Kwaku Asante kwaku.asante@hydro.gov.gh 19 January 2024 10:20pm – 11:15pm (GHA, Accra) (CARES – Matthew Baker & Erica Imbrah)	*Main issues raised and discussed:* • GHA mentioned that their primary activities involve hydrology, coastal protection, and flood control. • GHA indicated it is their responsibility to ensure the coast is protected. Therefore, what plans / measures will be put in place to protect the coast. • GHA asked what interventions will be put in place to prevent flooding like what happened some few months ago during the Akosombo Dam spillage, which caused massive havoc to the communities, and required the flood gates to be opened to reduce the lagoon by 1.6m and the flood waters in the communities to recede within 5-days. • GHA asked if there were any plans to cater for impacts to marine turtles and birds. • GHA asked, the total size of the port. • GHA asked that, in the event that dredged material were not suitable for reclamation what would be the plan for sourcing suitable material. Additionally, where would unsuitable dredged material be disposed. • GHA highlighted that consideration should be given to the effect on the Keta Sea Defence Project. This includes Phase 2: Blekusu-Denu which is yet to be started - Feasibility Study underway). • GHA mentioned potential adverse effects of dredging and discharges from vessels etc. Also, how the project will address potential threats to the environments, marine lives, water pollution, beach erosion, existing coastal protection works, oil leakage / spillage from vessels, air pollution and overall socio-cultural impact on the community. • GHA mentioned that the project will affect both upstream and downstream of the port. Coastal towns like Denu, Blekusu and onwards to Aflao may be affected by changes to sediment supply. • Once the port has been designed GHA should be asked to check. Comment was made about the data used and how it is verified. Also, that lots of the coastline is unstable – not like the Central and Western Regions and this should be incorporated into the designs. • Potential impacts identified included water pollution, bottom sediment pollution, marine life / ecology, erosion, seabed morphology, oil spills / leakage, air pollution and sociocultural. *GHA stressed that their key concerns were:* • The impact upon coastal erosion due to the expected reduction in sediment supply. Impacts to coastal hydrology / coastal erosion should not be underestimated. • Addressing the impact of the project on coastal hydrology and existing sea defence projects. • Need to ensure preservation of the Keta Lagoon Complex, and measures put in place to address potential impacts to coastal hydrology, and water pollutants and any potential oil spillage. • The port has not been considered in expansion of coastal protection schemes designs. If information provided in time, it can be considered.
Forestry Commission (FC) – Wildlife Division Dickson Agyeman, Operations Manager 0244 843 464 Yaw652006@yahoo.com 23 January 2024	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • The Keta Lagoon Complex is one of five Ramsar sites on the Ghanaian coast • FC asked: if the flood gate will be closed during Phase 2, and replaced with the sea lock in a different location, will it be

10:35pm – 11:15pm (FC, Accra) (CARES – Matthew Baker & Erica Imbrah)	able to perform its original function? Recent events including gate opening will have likely changed the salinity. • FC highlighted that consideration should be given to the impact of the port on the environment and livelihoods. This includes impacts from vessel pollution, population influx (crime etc.), beach becoming inaccessible. • FC were concerned about the destruction of some parts of the beach, lagoon, and aquatic lives during construction, highlighting that consideration should be given to protecting marine turtles' species - the area is known for Leatherback's. The issue of Fidelity was raised - whereby mature turtles come back to the site where they were hatched to lay eggs. Therefore, there would be a need for alternative nestings sites. A hatchery was developed as part of Tema Port Expansion - if an egg is laid in an inappropriate place it is relocated to the hatchery. Issue raised that population influx may result in an increase in people that eat turtles - particularly if slums develop. Training port security on this issue can help. Financial commitment from the project is needed. The international community will likely be interested due to the turtle nesting sites. • FC indicated that a key concern / problem related to the Tema Port Expansion was that the project delivery (management plans) was not the same as what was documented. Similarly, situations changed related to the Tema Port Expansion that would have benefitted from measures being implemented - but a response by the Project Proponent was "it is not in the management plan". There were other misunderstandings between the FC and Port Security and there is a need for a flexible, adaptable approach. • FC mentioned that there should be a lot of engagements with the community to get the buy-in of the project and to avoid them resisting the construction port because it may take away their livelihoods. • FC mentioned that Ramsar sites are categorised into three zones: (i) Core Zone, (ii) Buffer Zone / Land Management Area, and (iii) Transition Zone / Land Use Area. Within the Core Zone (the lagoon itself), some physical activities (i.e., development of structures) is not allowed. FC indicated that it was likely that the project site is likely within the Transition Zone, and that once an ESIA has been conducted there should not be any barrier to development. • FC indicated that the International Union for Conservation of Nature (IUCN) has supported the development of an updated Keta Lagoon Management Plan (possibly in 2023). • FC previously patrolled the beach and lagoon to monitor for the incorrect use of chemicals and nets, but their boat is no longer functional. Consequently, they go into the communities and beach to conduct provide environmental education and to identify volunteers in the communities to be a 'third eye' for infringements.
Ministry of Transport (MOT) Prosper Amewode, Head of Monitoring & Evaluation 024 327 8308 pee134@hotmail.com Daniel Essel, Head of Public Investment desseldd@hotmail.com Irene O. Messiba, Director, Policy Planning, Monitoring & Evaluation iremess@yahoo.com Irene Naa Lamiley Jones-Nelson, Planning Officer	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • MOT asked if we have been able to map out the affected area. • MOT asked if there were any resettlement plans in place for the affected inhabitants? • MOT asked if there were any solution or plans put in place to help aquatic ecology. • MOT requested for a copy of the inception report and TOR of the ESIA.

renejnelly5@gmail.com Nana Ama B. Appay-Gyekye; Planning Officer nanaamabisagio56@gmail.com Mavis Tei; Senior Programs Officer mavistei2002@yahoo.com 29 January 2024 02:25pm – 02:55pm (Office, MOT, Accra) (CARES – Matthew Baker & Erica Imbrah)	
Ghana Wildlife Society (GWS) Professor Owusu Henaku, Acting CEO 0244 656 359 Erasmus67@yahoo.com 30 January 2024 09:00am – 09:55am (University of Ghana - Legon, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GWS has done a lot of work in the sea and along the shore. Shorebirds have been monitored since 1985, and marine turtles since 1996. Data has been collected on coastal areas from Ada, Prampram, Winneba, to Half Assini. • Some of their major key projects was to monitor children trapping shore birds (attracted to fishermen); based on this work, Wildlife Clubs were established throughout the country to provide conservation education. • GWS has also been involved in a number of projects on the Keta coast / lagoon for over 40 years including collecting data on marine turtles. There are lots of marine turtles in Big Ada. • GWS enquired about the size of the port development area. Key concerns raised was pressure placed upon wildlife resources (birds and marine turtles). Marine turtles are threatened and under pressure from the communities because they are a delicacy for the Ewes / in the Anloga Area. Additionally, they can be chocked by plastic. With population influx this will place more pressure on natural resources. Biological resources (i.e., marine turtles, migrant birds) would likely be affected by the port. • Ghana has signed the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). AEWA covers 254 species of birds ecologically dependent upon wetlands, and Ghana is obliged to protect migrant birds habitat, with the Keta Lagoon located on the East Atlantic Flyway (migratory route). GWS is the implementer of the East Atlantic Flyway Initiative. • GWS highlighted that there is limited vegetation in the project area, and only a few mammals in significant numbers. There is a community-based project initiated by the Nature Conservation Research Centre (NCRC) to protect a swamp-dwelling medium sized antelope – the sitatunga. • GWS suggested that the Ghana chapter of “Important Bird Areas in Africa and associated islands” be consulted, and that a bird database hosted by BirdLife International (GWS a partner) could be a useful source of information. • GWS mentioned that there are five major species of marine turtles (which are all threatened and need to be protected). Three of these are often recorded in the project area (Oliver Ridley, Green, and Leatherback), whilst the Hawksbill is occasionally encountered. GWS have not recorded the Loggerhead Turtle. One turtle can lay approximately 100 eggs and they can take three months to hatch. The deepness in which eggs are buried (temperature) affects which sex the turtles will be - this in turn can affect productivity. There are two key ways to protect the eggs - building a cage around

	the eggs on the beach or the use of a hatchery.
Ghana National Fire Service (GNFS) DOIII Hubert A. Nyame-Boame, Fire Safety Officer, husbertanboame@gmail.com ACEOI George A. Wiafe, Fire Safety Officer, asantewiafe5364@gmail.com DOII Winifred Newodz; Fire Safety Officer; winifredfine@gmail.com DOII Seth Paintsil, Fire Safety Officer; abeikupaintsil83@gmail.com DOII Godwin Mensah Senchi; Fire Safety Officer Godwinmensah93@yahoo.com ACFOII Lily Ashone Robertson; Deputy Director, Fire Safety; lilyrob21@gmail.com 30 January 2024 11:15am – 11:35pm (GNFS, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GNFS indicated that they are responsible for reducing fire outbreaks and that their major concerns related to the project were oils spillage and associated mitigating measures. Additionally, the proximity to households would be carefully considered. • GNFS requested, before construction, a Fire Safety Permit would be needed, this would spell out all the necessary fire safety measures to be incorporated into the buildings. To support this design drawings should be provided, and a site visit would need to be organised - as this would be a complex assessment. Masterplan should also be provided to enable comments to be made and to provide input on the necessary fire protection measures. • GNFS mentioned that the communities livelihoods are dependent on the sea / lagoon and suggested that measures be put in place to provide alternative livelihoods / ensure their livelihoods are sustained. They also requested that the necessary stakeholders (especially community) should be engaged to get their buy-in, to ensure the project to be successful.
Department of Factories and Inspectorate (DFI) Emmanuel Sawyerr, Office of the Chief Inspector; 0244 510582 emmanuel.ssawyerr@dfi.gov.gh Collins Odame; Regional Director, Ho collins.odame@gmail.com Bartholomew Agbanyo, Head of Inspector, Head Office Bartholomew.agbanyo@dfi.gov.fg February 14, 2024 12:15pm – 12:42pm (Office, DFI, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* DFI mentioned that: • DFI are responsible for occupational health and safety issues and concerns in Ghana; including ensuring yet to be constructed buildings for commercial purposes meet the required occupational, health and safety measures. • Section 57 (Act 328) is the most relevant section of the law. • Before construction proponents must submit building plan for approval. The Chief Inspector will then assess the health and safety issues. The Pre-Registration stage involves the technical inspection of the plan before construction, and the training of workers on issues of occupational, health and safety related issues. During the main construction stage there should be a machinery health & safety survey (forklifts, cranes, hoists, air compressors etc.), industrial hygiene monitoring (dust, gas, noise), and periodic visits to site check hazards, and PPE adherence. • During construction welfare facilities must be provided for workers. This includes potable drinking water, changing room / cloakroom, trained first aider / nurse / doctor, washing facility (i.e., where workers can wash after work), decent sanitary facilities (a minimum of 25 persons to 1 toilet facility) with separate facilities for men and women. • During the construction stage, it is mandatory to report or notify of any incidents, accidents, dangerous occurrences and

	unsafe acts. These should be reported to the nearest DFI inspectorate. A record book would be provided for this. • After construction, the tank farms (in particular) would be inspected, and office space measured to ensure acceptable spacing. Two copies of "A Short Guide to the Factories, Offices and Shops Act, 1970" were presented to us.
Ghana Grid Company Ltd. (GRIDCo) Kingdom Galley, Geodetic Engineer 0244 895 254 Kingdom.gallery@gridcogh.com Kwame Owusu-Boadi, Environmental Officer 0244 845 124 Kwame.owusu-boadi@gridcogh.com Winefred Agyeman, Environmental Officer 0244 983 698; wineabena2020@yahoo.com February 26, 2024 11:00am – 11:37am (Office, GRIDCO, Tema) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* • GRIDCO asked how they were identified as stakeholders • GRIDCO asked if the transmission station has been integrated. • GRIDCO mentioned that a facility of this nature, energy can either be obtained from either ECG or GRIDCO, this is the sponsor's prerogative and decision. Therefore, the provision of power by GRIDCO will be the decision of GPHA to determine who to go with • GRIDCO mentioned that, in providing energy, a reasonable space should be provided for a substation. • GRIDCO asked the total energy consumption intended for the port • GRIDCO mentioned that the consumption power should factor all the industries that would be cited in the port.
Ghana Museums and Monument Board (GMMB) Mohammed Malite Saako, Archaeologist malik.mohammed@gmmb.gov.gh George Anorchie, Archaeologist 0265 120 019/0594 976 393 george.anorchie@gmmb.gov.gh Prince Buertey Lawerh, Archaeologist 0244 963 900 Prince.lawerh@gmail.com March 07, 2024 10:25am – 11:45am (Office, GMMB, Accra) (CARES – Edward Adum Nyarko & Erica Imbrah)	Erica Imbrah from CARES Group gave an overview of the project. Edward Adum Nyarko from CARES Group gave an overview the Cultural Heritage Impact Assessment so far carried out on the site. *Main issues raised and discussed:* GMMB mentioned that: • GMMB operations strictly adhered to UN and World Bank conventions, one of which is the International Financing Operation Agreement • The sponsors of the project will have to provide to GMMB an Archaeological Impact Assessment Report. The report will help ascertain if the project will positively or negatively impact on archaeological monuments and traditional resources of the area. • An Archaeological Permit would need to be obtained from GMMB before any excavation works can commence; the Permit comes with a fee. • Per the Law, one cannot remove any antiquity from its original place without any permit • The issue of Chance Find Procedure (CPF) should be dealt with appropriately. The CFP aims to protect archaeological monuments and traditional cultural resources from the impacts of construction activities to preserve the land and the community. • There should be a proper community engagement with the traditional leaders, priests to reach a mutual understanding for traditional monuments (i.e., shrines etc) that may need to be relocated or destroyed.

	The necessary traditional rituals expected by the traditional leaders, priests should also be performed to ensure the smooth operation of the project.
Ministry of Trade and Industry (MOTI) Dr. John-Hawkins Asiedu, Technical Advisor jhasiedu@gmail.com Veronica A. Aboagye, Industrial Park & Special Economic Zones;<akidannia@gmail.com> Belinda Boamah, Industrial Park & Special Economic Zones; <berllaboamah@gmail.com> Michelle Akpakli, Industrial Park & Special Economic Zones; <akpaklimichelle@gmail.com> Hans-Reuben Armah, Industrial Park & Special Economic Zones; <hansreubenarmah@yahoo.com> Nikita Lithur, Industrial Park & Special Economic Zones; <Nikita.lithur@moti.gov.gh> April 03, 2024 11:05am – 11:47am (Office, MOTI, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* MOTI asked that: • How will the flood situation in the area will be managed in future occurrences • How will the Sea Defence project be managed? will the project affect the sea defence wall? will the sea defence be re-enforced? • Who will resettle the displaced communities? (i.e., GPHA, Government of Ghana) • How much budget is involved for the construction? • How competition will be managed considering the proximity to the Lome port (which has a duty-free port). • Which industries will be located within the port MOT mentioned that: • The Government of Ghana would have to support the project with basic infrastructure like utilities, roads etc • The sponsors should consider a discussion with Togo to operate a Cross Border economic zone as is being done in countries like Nigeria and Benin, Mali and Senegal • Keta being noted for the production of vegetables like baby corn; this can boost the economic situation in the future when the port is constructed.
Ghana Water Company Limited (GWCL) Abdul Fatawou Tambro, Safeguards Specialist 024 709 0918; <aftambro@gwcl.com.gh> April 03, 2024 12:30pm – 12:57pm (Office, GWCL, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* GWCL mentioned that: • There is a water treatment plant at Agordume, which supplies water from Oti to Anloga to Keta. There is currently an expansion works on the plant to boost water supply to the communities involved • There is a booster station in Anloga. With the construction of the port, further expansion work would need to be done due to the expected increase in the demands. However, there is no GWCL pipelines in the area of construction. GWCL asked: • How displaced locals will be resettled? • Since tidal waves are a common trend in the area, what are the implications to shift the tidal waves; what's the impact of the tidal wave to the project • What's the impact of the tidal wave on the Keta Sea Defence • Will the construction damage existing infrastructure? Is there any consideration for existing infrastructure in terms of utilities?

Ghana Standard Authority (GSA) Mr. Kojo Eshun, Director Certification Kojo.eshun@gsa.gov.gh Ing Arthur Daniel Vicent, Head of Engineering Department Daniel.vicentarthur@gsa.gov.gh Ing Tsaku Mawuli, Civil Eng Lab Mawuli.tsaku@gsa.gov.gh April 04, 2024 (Office GSA) (CARES – Nii Ofori Tackie-Oblie)	Nii Tackie-Oblie gave a brief of the project. *Main issues raised and discussed:* GSA mentioned that: • During construction stage all materials to be used will have to be tested by the Authority to make sure they meet the standard (All material that GSA has the capacity to test) • During Operation an import inspection regime is in place to handle products that will be going through the port • Space must be made available for GSA operations.
Fisheries Commission (FC) Esi Bordah Quayson, Director 0244 889 704; <bhyaqub@gmail .com> April 08, 2024 08:45pm – 09:07pm (Office, FC, Accra) (CARES – Matthew Baker & Erica Imbrah)	Matthew Baker from CARES Group gave an overview of the project. The project overview included showing the masterplans and an overview explanation of GPHAs plans. *Main issues raised and discussed:* FC mentioned that, • Their major concern was the encroachment of the lagoon as a Ramsar site and the source of livelihood of the community that will be destroyed • The possibility of losing the lagoon if the port is constructed, furthermore, ecological services will be lost • What compensation measures has been put in place for the people who will be affected • The encroachment of the lagoon should be given a second thought • However, are happy that, there is a fishing harbour which will provide a better livelihood for the people in the community. She recommended: • That a Fisheries Impact Assessment should also be carried out • We engage the Regional Director of the Volta Region since he is on the ground and has more insights on the area and further valuable information.

Figure 7-43 - Engagement with EPA on Site

Figure 7-44 - Engagement with GGSA

Figure 7-45 - Engagement with GSA

Figure 7-46 - Engagement with MLNR

Figure 7-47 - Engagement with ECG

Figure 7-48 - Engagement with GMet

Figure 7-49 - Engagement with Ghana Navy

Figure 7-50 - Engagement with Ghana Navy

7.7.1. Primary Stakeholders Key Concerns

Stakeholder engagements were successful. In general, parties received the project positively. Some participants from project communities had hoped that construction activities had commenced already. They indicated their awareness about the proposed project and the areas designated for the project. Some members of the engagement noted that their houses / properties were marked / numbered by the Lands Commission as within the project footprint.

Key issues raised during the primary stakeholder engagement included the following:

- **Landing Beach for Fishermen**: Being fishermen (men) and fishmongers (women) mainly, most participant were worried about where they would land and dock their canoes and drag their dragnets once the port development takes off. Others proposed that a channel is created to enable sea goers dock their canoes in the lagoon whilst the dragnet method of fishing is modified.
- **Community Park**: The sand bar at Azizadzi near Havedzi at the eastern corridor of the designated project area serves as the venue for the annual Norvikporgbeza festival celebrated every Easter among communitas of Kedzi, Havedzi, Horvi, Adzido, Vodza, etc. The venue also serves as the pitch for the Havedzi Mighty Warriors, a popular beach soccer team in Ghana. Once the port is developed the park will be lost with no likely alternative park at hand. The soccer team has asked that the project consider building an alternative beach soccer park for them on some portions of the lands proposed to be reclaimed by the project.
- **Lands for Housing**: Surrounding communities currently have inadequate lands due to the loss of their townships and lands to sea erosion. Agitations are currently ongoing in some communities because the allocation of resettlement homes / lands under the Keta Sea Defence Project is not completed. These agitations may spill to the Keta Port project if any such lands get allocated to the Port of Keta project whilst locals are yet to be allocated their lands. Locals insist the port project must reclaim its own lands. Locals equally are nervous that project activities may lead to increased land speculation within the Anlo area, thereby pushing locals out of land market.
- **Relocation**: As a result of the experiences from the Keta Sea Defence Project where scores of PAPs are yet to receive allocation of houses and lands, locals have sent caution to the Port of Keta project that PAPs would have to be relocated properly out of the project area before the project can commence. They indicated that financial compensations will not be accepted, and relocations must be done within their ancestral communities and not far away from their relations.
- **Population Influx and Impact on Cultural Values**: The Port of Keta project is feared to likely result in loss of the local Ewe language, dilution of culture values and norms, thus deliberate measures must be employed by traditional leaders, supported by authorities of the Port of Keta to ensure such impacts are mitigated.

- **Sea Erosion**: Concern that potential sea erosion and flooding of adjoining eastern communities in Ketu South will be worsened as a result of the Port of Keta project. Belief that developing the Port of Tema has worsened the sea erosion problems of Keta and it is anticipated that the Port of Keta will do the same for communities east of it.
- **Deeper Lagoon**: Many feared that when the lagoons are dredged for land reclamation, the lagoons may become too deep, resulting in drownings and the inability of persons without canoes and fishing boats to fish in the lagoon.
- **Loss of Economic Livelihoods in Salt Mining, Farming, and Fishing in the Seas**: Many envisaged that the Port of Keta project may lead to the demise of salt mining if the sea is opened into the lagoon. Traditional salt mining techniques require the lagoon to recede / dry out before salt can be mined. Farmers shared the view that increased water in the lagoon may flood their farms along the shores of the lagoon especially in the Anloga areas.
- **Employment Opportunities and Benefit Sharing Opportunities**: Employment opportunities and benefit sharing opportunities for locals should be included in project plans.
- **Social Amenities and Provision of Utilities**: Social amenities and provision of utilities such as water, electricity, waste management, public parks, etc. should be equally extended to project communities without discrimination. Locals envisage that the Port of Keta project may be built with facilities provided for their workers to the exclusion of the host communities. The locals believe such practices will not augur well for the mutual relationship and benefits expected from the project.
- **Alternative Fishing Methods**: The fishing harbour may come with new fishing vessels and fishing methods at high seas that locals may not be accustomed to and be resourced enough to undertake. The project may have to assist in acquiring such vessels, facilitate licensing for trawlers, provide technical training, etc. to help fisherfolks adopt new fishing methods.
- **Rescue Equipment and Support**: Rescue equipment and support should be provided in the future as the port is likely to lead to higher risks at sea for local fishermen. Other assets and resources necessary for ease of fishing activities should be considered as part of project implementation, including training to adopt new fishing practices, support and facilitation to acquire modern fishing vessels and fishing licenses / permits.

7.7.2. Potential Positive Socioeconomic Impacts, Benefits and Opportunities Identified

Various positive impacts were listed by stakeholders engaged including:

- Generation of revenue for the government, assembly and GPHA.
- Creation of employment opportunities for the youth in the local communities and the country at large.
- Opening up of the Volta / Oti Regions for more development.
- New business and commercial opportunities to spring up in the project area and its environs.
- Creating an avenue for the export of existing products / commodities in the area such as salt and cement, thus enabling salt mining companies to increase production.
- Potential to serve as an export point for oil from the Keta basin and iron-ore deposits from the northern part of Ghana.
- Promoting tourism and economic activities in the Keta-Anlo territories with spillover effect in South Tongu, Ketu South and Ketu North.
- Facilitating the improvement of infrastructure and social amenities in the project area.
- Opportunity for hinterland or landlocked countries such as Burkina Faso, Niger and Mali to use the Port of Keta instead of the Port of Tema due to reduction in transportation cost of goods using the eastern corridor.
- Serving as a sea defence for the communities of Kedzi, Havedzi, Horvi, Adzido, Vodza, etc.
- Potentially improving efficiency for shippers (time in port / distance).
- Brackish waters needed for shrimps - in particular, Pink Shrimps.

7.7.3. Potential Negative Socioeconomic Impacts, Risks and Challenges Identified

Various negative impacts were listed by stakeholders engaged as indicated in Table 7-2 and Table 7-3. Other points included:

- Loss of cultural identity, values, and norms as well as the local Ewe language due to influx of migrant workers.
- Pressure on limited social amenities such as water, electricity, housing.
- Unavailability of lands to support massive infrastructure development as well as to host numerous commercial entities that may spring up within the nearby project communities. These may lead to higher cost of land, worsening the plight of locals and causing unbridled land conflicts among locals.
- Potential impact of truck axle loads on existing roads in the project area.
- Vibrations during construction, leading to cracks in homes / houses of project affected communities.
- Port sustainability concerns as many in the communities' fear that the Port of Keta when built may not live long due to the constant encroachment of the sea waves in all the coastal communities. Many hold the view that Keta township and other communities may not exist within the next 20 to 30 years.
- Relocation or displacement of local fishers and other resource users in the project areas, and the impact on fishery resources.
- Concerns over safety of vessels during construction phase.
- Developing a fishery port will make fishing commercial, displacing the local fishermen.
- Marine safety and security concerns for the port (including safety challenges related to fishing and commercial parts of the port being within the same harbour) and how it may contribute to local / national / regional security challenges.
- Need to ensure there is no conflict with hydrocarbon exploration and existing exploratory wells.
- Concerns over flooding exacerbated due to the events associated with the 2023 Akosombo Dam spillage.
- Concern over the suitability of unconsolidated material for construction of a port.
- Concern over the shallow groundwater depth and impact upon communities.
- Concern about GPHA being the sole port planner, designer and operator.

8. Key Potential Environmental Issues and Impacts

The identification of potential key issues and impacts at the scoping stage has been facilitated by the project scope, literature / project documents review, field visits, as well as the stakeholder consultations and the concerns raised.

The construction and operation of the proposed Port of Keta project may result in several potential impacts on the physical, biological, and social environments. These potential impacts could be positive or negative.

8.1. Project Area of Influence

According to the World Bank Safeguard Policy OP / BP 4.01, the Project Area of Influence is the area likely to be affected by the project, including all its ancillary aspects, such as power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, and construction camps, as well as unplanned developments induced by the project (e.g., spontaneous settlement, logging, or shifting agriculture along access roads). The area of influence may include, for example:

- The watershed within which the project is located.
- Any affected estuary and coastal zone.
- Off-site areas required for resettlement or compensatory tracts.
- The airshed (e.g., where airborne pollution such as smoke or dust may enter or leave the area of influence.
- Migratory routes of humans, wildlife, or fish, particularly where they relate to public health, economic activities, or environmental conservation.
- Areas used for livelihood activities (hunting, fishing, grazing, gathering, agriculture, etc.) or religious or ceremonial purposes of a customary nature (World Bank, 1999a).

GPHA “appreciates that areas to be considered under this study (social and environmental impacts) are likely to be affected by:

- The project itself (direct activities at the project sites, immediate airshed, and watershed or transport corridors) and the client’s activities and facilities that are directly owned, operated, or managed (including by contractors) and all that are direct components of the project, as and when the various phases are rolled out.
- Unplanned but predictable developments caused by the port project that may occur later or at a different location e.g., city development, migration, quarry activities, increased commercial and industrial activities, etc.
- Indirect project impacts on biodiversity or on ecosystem services upon which affected communities’ livelihoods are dependent.
- Associated facilities, which are facilities that may not be directly part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable (e.g., railways, roads, transmission lines, pipelines, warehouses, logistics terminals).
- The cumulative and / or incremental impact on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted (e.g., incremental contribution of gaseous emissions to an airshed, reduction of waterflows in an airshed due to multiple withdrawals, increases in sediment loads to watershed, interference with migratory routes or wildlife movement, or more traffic congestion and accidents due to increase in vehicular traffic on community roadways”.

8.2. Project Activities of Environmental / Social Concern

Table 8-1 presents the main project activities that have been identified to be of environmental and / or social concern.

Table 8-1 - Potential Project Activities of Potential Environmental and Social Concern

Phase	Activities of Likely Environmental and Social Concern
Preparatory	Project land / site acquisition. Acquisition of Right-of-Ways (RoW). Survey works and feasibility studies. Identification of Project Affected Persons (PAPs). Resettlement / relocation planning and compensation activities. Procurement of labour. Procurement of construction materials and machinery. Transportation of construction materials and machinery to site. Stakeholder consultations. Statutory permitting activities - from EPA, GMA etc.
Construction	Procurement of labour. Construction of site office, work camp and storage facilities. Site and RoW preparations. Demolition of properties at site / RoWs. Transport and movement of equipment / material / workers. Resource utilization. Dredging. Underwater blasting (if it becomes necessary during dredging). Disposal of dredged material. Site reclamation works. Supply of quarry materials to the site. Construction of breakwaters. Construction of quay walls, wharfs, berths. Construction of multipurpose terminal. Construction of buildings, port offices, and offices for other statutory bodies e.g., Customs etc. Construction of sea lock to the lagoon. Drainage works and stormwater management. Civil, concrete, paving works, and surface markings. Installation of cargo handling and berthing furniture. Construction and installation of utility facilities especially water and electricity services. Construction and or improvement of access roads to port / site. Construction of rail systems. Post-construction activities including dismantling of construction work camps. Waste generation and disposal (including human waste). Lagoon / wetlands and flood basins management. Grievance and complaints management. Emergency responses.
Operation and Maintenance	Procurement of labour. Cargo loading / offloading or handling. Storage of cargo and containers. Storage and dispensing of fuel to vessels. Maintenance of equipment / machinery. General maintenance of port facilities. Maintenance dredging of port basin and access channel. Traffic management activities. RoW management activities. Wastewater and sewage treatment and disposal.

Phase	Activities of Likely Environmental and Social Concern
	Solid waste generation and disposal. Ship waste handling. Stormwater management activities. Hazardous waste and material handling including waste oil. Resource utilization. Provision of security in and around the port. Lagoon / wetlands and flood basins management. Grievance and complaints management. Emergency responses. Coastal reclamation and or protection. Operation of sea lock to the lagoon. Commercial fishing vessels using the fishing harbour. Stockpiling of bulk (solid & liquid) materials. Provision of housing and other amenities for workforce.
Decommissioning	Post construction: Dismantling of construction work camps. Relocation of equipment / machinery. Disposal of wastes. Construction workers lay-offs. Post operation / maintenance: Dismantling and relocation of offshore / onshore infrastructure and waste disposal Retrenchment of workers.

8.3. Identification of Key Potential Environmental / Social Impacts

Key potential environmental / social impacts have been identified. These have been identified based upon fieldwork / site visits, desk study / literature review, project and baseline description, public participation / stakeholder engagement, and the identified potential project activities of environmental or social concern.

8.3.1. Preparatory / Pre-Construction

Potential impacts during the preparatory / pre-construction phase have been identified to be:

- Increased land speculation in response to the anticipated project.
- Suspension of expansion in economic or physical development in fear of project impacts etc.
- Land tenure agitations, as people try to re-establish their land boundaries in anticipation of benefits from project as well as likely spillover interests generated in community.
- Anxiety on the part of PAPs / PACs on the extent of likely disruption in livelihood / socio-economic activities, as well as physical assets, homes, cemeteries, shrines, etc.
- Confrontations / conflicts with locals who may not be in favour of the project or are not aware about proposed project and its related activities.
- Exposure of technical teams carrying out topographical survey works, geotechnical survey, and environmental baseline studies to injury and bites from insects and dangerous reptiles such as snakes, scorpions, bees, ants, etc.
- Risk of accidents and incidents of drowning.
- Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.
- Fishing livelihoods affected by field survey, office set up and mobilisation to site.

8.3.2. Construction Phase

Potential impacts during the construction phase have been identified to be:

- Air pollution from plant emissions and fumes / dust emissions from use of equipment / machinery / vehicles.
- Capsized boats, and risks of drowning.
- Change in natural sediment deposition / shoaling.
- Change of local flow patterns together with associated scouring / siltation.
- Community agitations from unmet expectations for benefits such as employment, economic packages and economic livelihoods, resulting in obstruction of workers from carrying out their respective services, vandalization of equipment, public demonstration and violent behaviour.
- Construction wastewater can contain sediment, cement, and other pollutants, while domestic wastewater can have elevated BOD, COD, and can contain oils along with other pollutants.
- Destruction of crops and economic trees such as coconut trees, oil palm trees, etc. along the shores of the sea and lagoon.
- Destruction of physical assets such as houses, public buildings such as schools (Kedzi Vocational Technical Institute), churches, etc.
- Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.
- Disruption of fishing including damage to fishing nets.
- Disruption of livelihoods / socio-economic activities such as fishing, salt mining, etc. due to restricted access to parts of the sea coast and lagoon.
- Dredging operations causing an impact to flora and fauna.
- Dust inhalation, causing respiratory diseases; dust nuisance resulting in dirt blown on washed clothes on drying lines, windows of residences and offices nearby.
- Electrocution and fire risks from welding works may also occur.
- Exposure to dangerous reptiles, snakes and other animals.
- Fish catch and therefore fish revenue lowered due to impact of construction on fish habitats.
- Fishing activities - especially beach seine fishers adversely affected by construction activities.
- Forced and child labour, Sexual Exploitation and Abuse (SEA), discriminatory practices, resulting in social and labour conflicts.
- Impact / destruction of cultural heritage sites such as public and private shrines, public and private cemeteries, etc.
- Impact upon air quality (noxious gases / dust) from vehicle emissions in the local communities and along the haul routes.
- Impact upon water resources and the hydrological cycle through the reclamation works and changes in surface cover.
- Improper disposal of sanitary waste
- Improper handling of hazardous materials posing health risks to workers.
- Improperly covered trenches may result in stagnant water and breed mosquitoes.
- Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.
- Increased noise and vibration from HGV transportation of equipment and materials which can disturb fauna as well as local communities and those along the haul route.
- Increased open defecation at beaches within the project area.
- Indirect labour influx will result from mainly non-local traders, generating some conflict between them and the locals.
- Labour / population influx and its attendant sexual behaviour, leading to increased teenage pregnancies HIV / AIDS and other STD infections.
- Labour agitations / issues can result in prolong and costly grievance redress cases, pose security threats and endanger communal cohesion.

- Loss of landing beaches for fishermen and fish markets, community parks and playgrounds (venues for beach soccer and Norvikporgbeza Festival at Kedzi-Azizadzi for example) and other social gatherings.
- Loss of lands for housing and other community development projects.
- Movement of the construction vessels and the disturbance of fishing and consequent risk of collision.
- Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.
- Negative impact upon air quality from the generation of particulate matter during construction activities.
- Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.
- Noise and vibration from plant operations and movement of trucks.
- Noise nuisance, affecting the peaceful resting and relaxation of people, causing hearing challenges, etc.
- Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.
- Noise, light and general disturbance from the marine works operations causing loss / disturbance of flora and fauna.
- Non-compliance with socio-cultural norms of local communities: The tendency for non-local employees not to conform or abide by the sociocultural norms of local communities is high.
- Perceptions of unfair or inequitable compensation arrangements for lands or other project benefits resulting in community agitations, obstruction of project activities, vandalization of equipment, public demonstration and violent behaviour.
- Potential conflict with (capped) hydrocarbon exploration wells that are reportedly found in Keta area.
- Potential impact to telecommunications (existing submarine cable landing sites and telecom towers).
- Potential temporary impact to the provision of utility services to PACs (i.e., power outages, damage to the power network / equipment).
- Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc.
- Restricted access and usage of public roads, bridges and access ways, with attendant traffic build ups.
- Security / threats and human right abuses – theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc.
- Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)
- Speculative job seekers migrating to project communities in search of job putting pressure on existing social facilities and could induce anti-social behaviours.
- Suitable dredged material is due to be used for reclamation. Reclamation works may have an impact upon air quality by increasing the amount of particulate matter in the air which can have health and nuisance impact.
- Suitable dredged material is due to be used for reclamation. This may have an impact upon surface water quality in the Keta Lagoon.
- Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)
- The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.
- The increased noise and vibration can have a negative impact upon both humans and fauna and can be both a nuisance and a health impact.
- The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.
- The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side.

- The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.
- The transportation of materials, equipment / machinery to site can increase traffic and contribute to congestion in the local communities and along the haul route which can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.
- The turbidity caused by the agitation, raising, overflow and disposal of dredged material.
- The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.
- This can be both construction wastewater, and domestic wastewater produced by the construction workers.
- Unhygienic working conditions.
- Unsecured excavations may compromise public safety.
- Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated.
- Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.
- Water and soil pollution from oil and fuel spills, transport of sediment laden storm-runoffs from the plant site into water with its consequent impact on aquatic life / water ecology.
- When the sea lock is constructed, it is planned to close the existing floodgate on the causeway as the sea lock will be designed to allow water to be released from the Keta Lagoon to the port basin. As the two locations are different, the sea lock may not provide the same flood protection as the floodgates.
- Whilst there is some evidence to suggest that creating the sea lock may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.), the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services that the Keta Lagoon provides.
- Impact upon the physico-chemical conditions in the Keta Lagoon (i.e., salinity), including ecology which may be protected, endangered, and / or rare provide important ecosystem services.
- Workers exposed to risks and hazards from operation of construction machinery / equipment, transportation of construction materials, inhalation of dust and fumes, accidents from falling objects, etc.

8.3.3. Operations Phase

Potential impacts during the operations phase have been identified to be:

- Accidental events such as boats colliding and capsizing on the sea and lagoon, drownings due to the depth of the dredged lagoon and impact on nearby properties and ecology.
- Capsized boats, and risks of drowning.
- Change in natural sediment deposition / shoaling.
- Change of local flow patterns together with associated scouring / siltation.
- Changing economic opportunities and livelihoods may affect locals who do not have the skills to integrate into the new economy. This may be attended with high standards / high cost of living, pushing local populations and the vulnerable further into poverty.
- Conflict between merchant and fishing vessels; and between industrial and artisanal fishing vessels.
- Constructing the main breakwater is expected to prevent littoral material movement along the coast. In the long term this may cause erosion on the downdrift side (Denu, Blekusu, onwards to Aflao) but lead to sediment accretion on the upstream side for sediment transport (i.e., areas on the coast to the south-southwest) and helping with land reclamation.
- Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.
- Disruption of fishing including damage to fishing nets.
- Dredging operations causing an impact to flora and fauna.

- Electrocution and fire risks from welding works may also occur.
- Excessive speed incidents, accidents and road traffic situations.
- Exposure to dangerous reptiles, snakes and other animals.
- Forced and child labour, SEA, discriminatory practices, resulting in social and labour conflicts.
- Impact upon the physico-chemical conditions in the Keta Lagoon (i.e., salinity), including ecology which may be protected, endangered, and / or rare provide important ecosystem services.
- Improper handling of hazardous materials posing health risks to workers.
- Increased flooding of project communities due to population pressure and changing landscape and land use.
- Increased traffic volumes will cause a quicker deterioration of the road surface, which can further impact congestion and incidents / accidents on the roads.
- Local and national safety & security concerns (crime, terrorists, piracy, stowaways).
- Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.
- Movement of vessels and the disturbance of fishing and consequent risk of collision.
- Movement of vessels and the use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.
- Negative impact upon air quality (particulate matter) from wind distributing stockpiled bulk materials to the surrounding environment causing an impact to water quality, having a nuisance effect, and an impact upon human health.
- Negative impact upon air quality from the generation of particulate matter from exhausts of vessels, vehicles, machinery, and equipment.
- Negative impact upon climate change and air quality from gaseous emissions from vessels, vehicles, machinery, and equipment operation.
- Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.
- Noise, light and general disturbance from the movement of vessels and the use of equipment causing loss / disturbance of flora and fauna.
- Open defecation is rampant at the beaches across all communities. Dumping of solid waste along the lagoon coast is also commonplace. Poor sanitation conditions may further pollute the environment and communities.
- Poor waste management significantly affecting safety and health in the workplace.
- Population influx during the beginning of the operation period may result to increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs. The impact may be permanent or irreversible in nature.
- Potential for traffic incidents / accidents on the public / community roads may be increased.
- Potential negative impact on coastal flooding events.
- Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc.
- Pressure on public infrastructure, social amenities, housing, among others.
- Restricted access to security zone installations, affecting livelihood activities such as salt mining, fishing, eco-tourism, etc.
- Security / threats and human right abuses - theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc.
- Sewerage and wastewater (including hazardous) from the port facilities (and an ever-increasing population), posing risks to the environment potentially leading to suspension of toxic, harmful substances in the water column with a consequent impact on aquatic life / water ecology and the local population if not treated properly prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).
- Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)
- Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column and sediments (harbour basin and Keta Lagoon).

- Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)
- The increased movement of trucks and other vehicles will result in increased noise and vibration and contribute to a reduction in air quality in the project communities and communities along the surrounding road network, this can have a negative impact on people in these areas. This can be both a nuisance (affecting peaceful resting and relaxation of people) and can have a health impact (stress, hearing challenges, etc.).
- The influx of migrant workers and populations seeking opportunities in the project area communities may come with attendant consequences of changing lifestyles, dilution of local culture practices, traditions, norms, value systems and language.
- The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.
- The port will significantly increase traffic volumes in the project communities and surrounding road network. This can cause congestion which may bring delays, can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.
- The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side.
- The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.
- The turbidity caused by the agitation, raising, overflow and disposal of dredged material.
- The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.
- There is potential for stormwater collected from the port and surrounding environment to contain pollutants (as a result of the storage of cargo and containers, stockpiling of bulk (solid and liquid) materials, and the maintenance of equipment / machinery / general port facilities, and the handling of hazardous waste and materials including waste oil) which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.
- There is potential for stormwater collected from the port and surrounding environment to contain pollutants as a result of the stockpiling of bulk materials which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.
- Trucks parking overnight / for extended periods in an informal manner (i.e., along the roadside) with drivers sleeping in their trucks can have a negative impact upon PACs through improper disposal of sanitary waste / increased open defecation at the beaches, improper disposal of solid / liquid waste (litter), increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs.
- Unhygienic working conditions, discriminatory practices, forced labour, and engagement of child labour by third party service providers may trigger labour rights concerns.
- Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated.
- Wastewater generated could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.
- Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.) due to the easy flow of water between the sea and the Keta Lagoon contributing positively to fishing livelihoods, the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services.
- Workers exposed to risks such as fire, hazards from operation of equipment, haulage, accidents from falling objects, forklift accidents, collisions, etc.
- Workplace conflicts, labour agitations and unrests.

8.4. Potential Impact Evaluation Approach

The potential environmental / social impacts identified were evaluated and analysed by completing the following steps impact classification, determining impact magnitude, determining receptor sensitivity, and assessing impact significance. These steps are described in section 8.4.1 to section 8.4.4 below.

8.4.1. Impact Identification and Classification

The impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency).

The definitions of the terms to be used are described in Table 8-2.

8.4.2. Determining Impact Magnitude

Once an impact's characteristics are defined, the next step in the impact assessment phase was to assign each impact a 'magnitude'. Magnitude is typically a function of some combination (depending on the resource / receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency.

Magnitude (from small to large) is in practice a continuum, and evaluation along the spectrum requires the exercise of professional judgement and experience. Each impact is evaluated on a case-by-case basis, and the rationale for each determination is noted. The universal magnitude designations, for negative effects, are:

- Negligible
- Small
- Medium
- Large.

The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation has been assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the project is expected to result in a positive impact.

Table 8-2 - Impact Characteristics

Characteristic	Definition	Terms
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	**Direct** - Impacts that result from a direct interaction between the Project and a resource / receptor (e.g., between occupation of a plot of land and the habitats which are affected). **Indirect** - Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land. **Induced** - Impacts that result from other activities (which are not part of the Project) that happen because of the Project. **Cumulative** - Impacts that arise because of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.

Characteristic	Definition	Terms
Duration	The period over which a resource / receptor is affected	**Temporary** - Up to 1 year (associated with the notion of reversibility). **Short Term** - Up to 2 years. **Medium Term** - Between 2 and 5 years. **Long Term** - Between 5 and 20 years. **Permanent** - Over 20 years.
Extent	The physical distance an impact will extend to	**On-Site** - Impacts that are limited to the Project site. **Local** - Impacts that are limited to the Project site and adjacent properties. **Regional** - Impacts that are experienced at a regional scale, i.e., beyond adjacent properties, covering the metropolis / municipalities / districts and beyond. **National** - Impacts that are experienced at a national scale. **Transboundary / International** - Impacts that are experienced outside of Ghana
Scale	Quantitative measure of the impact (e.g., the size of the area damaged, the fraction of resource that is lost etc.) or the professional viewpoint of the measure of impact	Quantitative measures as applicable for the feature or resources affected / professional viewpoint of expert as applicable for the feature or resource in terms of severity of impact measure (i.e., minor, moderate, severe).
Frequency	Measure of the constancy or periodicity of the impact.	No fixed designations: intended to be a numerical value or a qualitative description e.g., intermittent
Likelihood	Characteristic that pertains to unplanned events determined either qualitatively or quantitatively estimated based on experience and / or evidence that such an outcome has previously occurred.	**Unlikely** - The event is unlikely but may occur at some time during normal operating conditions. **Possible** - The event is likely to occur at some time during normal operating conditions. **Likely** - The event will occur during normal operating conditions.

8.4.3. Determining Receptor Sensitivity

The other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be considered when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource / receptor basis. The sensitivity of receptor used is low, medium, and high as shown in Table 8-3 below.

Table 8-3 - Sensitivity Criteria

Value / Sensitivity	Low	Medium	High
Biological and Species Value / Sensitivity Criteria	Not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g., key prey species to other species).	Not protected or listed but may be a species common globally but rare in Ghana with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.	Specifically protected under Ghana legislation and / or international conventions e.g., species listed as rare, threatened or endangered e.g., International Union for Conservation of Nature (IUCN)
Socio-Economic Sensitivity Criteria	Those affected are able to adapt with relative ease and maintain preimpact status.	Able to adapt with some difficulty and maintain preimpact status but only with a degree of support.	Those affected will not be able to adapt to changes and continue to maintain pre-impact status.

Value / Sensitivity	Low	Medium	High
Physical Sensitivity Criteria	The resource remains unaffected and maintains pre-impact status.	Pre-impact status is temporarily altered. May be restored over time naturally or through specific interventions.	Pre impact status is permanently altered by the development. Receptor or resource is held in high esteem by stakeholders

8.4.4. Assessing Significance

Once magnitude of impact and sensitivity of a receptor have been characterised, the significance can be determined for each impact. The impact significance / severity rating has been determined using the matrix provided in Table 8-4. The definitions / explanations of the impact significance ratings are provided in Table 8-5.

Table 8-4 - Impact Significance Rating

		Sensitivity / Vulnerability of Resource / Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negligible**	Negligible	Negligible	Minor
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Table 8-5 - Definition of the Impact Significance / Severity Assessment Rating

Rating	Impacts
Negligible	Impacts that are hardly distinguishable from background conditions and expected development in a no-project situation Impacts very unlikely to happen
Minor	Impacts of low intensity, limited in scale (site-specific) and low / medium duration (temporary) Impacts unlikely to happen and/or the sensitivity of receiving environment is very low and / or project designs have installed sufficient control mechanisms Impacts can be mitigated and minimized to a negligible level through adoption of best practice, continuous improvement and optimization measures
Moderate	Adverse impacts on people and/or environment of medium intensity, which may have a regional spatial scale of influence or a long-term duration Impacts that are measurable and able to change some characteristics of the receptor / resource, but not to generate irreversible, unprecedented or multiple adverse effects or damage Impacts can be avoided, managed, and / or mitigated with relatively uncomplicated accepted measures.
Major	Significant adverse impacts on human populations and / or environment, high in intensity and / or spatial extent (e.g., large geographic area, large number of people, transboundary impacts, cumulative impacts) Permanent and / or irreversible impact Areas impacted include areas of high value and sensitivity (e.g., valuable ecosystems, critical habitats) Impacts may give rise to significant social conflict Impact may not always be reduced by implementing mitigation measures. In this case, further options have to be considered in order to avoid any critical significance driven by project (analysis of alternative strategy). Therefore, significant resources or fundamental changes in the activities and systems are required where necessary.

8.5. Potential Impact Evaluation

Based upon the impact evaluation approach described in Section 8.4, this section provides the identified potential impacts, the predicted magnitude of their impact, and the sensitivity / vulnerability of the resource / receptor.

These are presented according to the main project phases of preparatory / pre-construction (Table 8-6), construction (Table 8-7), and operations (Table 8-8).

Key to					
M	= Magnitude of Impact	N = Negligible	S = Small	M = Medium	L = Large
S	= Sensitivity of Resource / Receptor		L = Low	M = Medium	H = High
Impact	= Impact Significance Rating	Negligible	Minor	Moderate	Major

Table 8-6 - Preparatory / Pre-Construction Phase

Activity / Issue	Impact	M	S	Impact
Preparatory / Pre-Construction Phase				
Land acquisition and designation / demarcation of project areas during survey works and feasibility studies and stakeholder consultations.	Increased land speculation in response to the anticipated project. Suspension of expansion in economic or physical development in fear of project impacts etc. Land tenure agitations, as people try to re-establish their land boundaries in anticipation of benefits from project as well as likely spillover interests generated in community. Anxiety on the part of PAPs / PACs on the extent of likely disruption in livelihood / socio-economic activities, as well as physical assets, homes, cemeteries, shrines, etc. Confrontations / conflicts with locals who may not be in favour of the project or are not aware about proposed project and its related activities.	M	L	Minor
OHS during survey works and feasibility studies – technical teams for consultants and contractors.	Exposure of technical teams carrying out topographical survey works, geotechnical survey, and environmental baseline studies to injury and bites from insects and dangerous reptiles such as snakes, scorpions, bees, ants, etc. Risk of accidents and incidents of drowning. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.	S	L	Negligible
Field surveys, office setup and mobilisation to the site.	Fishing livelihoods affected by field survey, office set up and mobilisation to site	N	L	Negligible

Table 8-7 - Construction Phase

Activity / Issue	Impact	M	S	Impact
Construction Phase				
Land take for construction and development activities and its impact on project communities.	Loss of lands for housing and other community development projects. Loss of landing beaches for fishermen and fish markets, community parks and playgrounds (venues for beach soccer and Norvikporgbeza Festival at Kedzi-Azizadzi for example) and other social gatherings.	L	H	Major

Activity / Issue	Impact	M	S	Impact
Construction Phase				
	Destruction of physical assets such as houses, public buildings such as schools (Kedzi Vocational Technical Institute), churches, etc. Impact / destruction of cultural heritage sites such as public and private shrines, public and private cemeteries, etc. Destruction of crops and economic trees such as coconut trees, oil palm trees, etc. along the shores of the sea and lagoon.			
Disruption of livelihoods, and access and usage of roads and pathways by communities.	Disruption of livelihoods / socio-economic activities such as fishing, salt mining, etc. due to restricted access to parts of the sea coast and lagoon. Restricted access and usage of public roads, bridges and access ways, with attendant traffic build ups. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities. Perceptions of unfair or inequitable compensation arrangements for lands or other project benefits resulting in community agitations, obstruction of project activities, vandalization of equipment, public demonstration and violent behaviour.	M	M	Moderate
Labour influx issues affecting local communities.	Speculative job seekers migrating to project communities in search of job putting pressure on existing social facilities and could induce anti-social behaviours. Indirect labour influx will result from mainly non-local traders, generating some conflict between them and the locals. Non-compliance with socio-cultural norms of local communities: The tendency for non-local employees not to conform or abide by the sociocultural norms of local communities is high. Labour agitations / issues can result in prolong and costly grievance redress cases, pose security threats and endanger communal cohesion. Community agitations from unmet expectations for benefits such as employment, economic packages and economic livelihoods, resulting in obstruction of workers from carrying out their respective services, vandalization of equipment, public demonstration and violent behaviour.	M	M	Moderate
OHS and labour issues with workers.	Workers exposed to risks and hazards from operation of construction machinery / equipment, transportation of construction materials, inhalation of dust and fumes, accidents from falling objects, etc. Unhygienic working conditions. Forced and child labour, Sexual Exploitation and Abuse (SEA), discriminatory practices, resulting in social and labour conflicts.	M	M	Moderate

Activity / Issue	Impact	M	S	Impact
Construction Phase				
	Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses – theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.			
Public health & safety issues likely to impact PAC and workers.	Labour / population influx and its attendant sexual behaviour, leading to increased teenage pregnancies HIV / AIDS and other STD infections. Increased open defecation at beaches within the project area. Improperly covered trenches may result in stagnant water and breed mosquitoes. Unsecured excavations may compromise public safety. Improper disposal of sanitary waste Dust inhalation, causing respiratory diseases; dust nuisance resulting in dirt blown on washed clothes on drying lines, windows of residences and offices nearby. Noise nuisance, affecting the peaceful resting and relaxation of people, causing hearing challenges, etc. Air pollution from plant emissions and fumes / dust emissions from use of equipment / machinery / vehicles. Noise and vibration from plant operations and movement of trucks. Water and soil pollution from oil and fuel spills, transport of sediment laden storm-runoffs from the plant site into water with its consequent impact on aquatic life / water ecology.	M	M	Moderate
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	S	M	Minor
Land take / general construction activities.	Fishing activities - especially beach seine fishers adversely affected by construction activities. Fishermen are very localised.	S	M	Minor
Land take / general construction activities.	Fish catch and therefore fish revenue lowered due to impact of construction on fish habitats.	M	H	Major

Activity / Issue	Impact	M	S	Impact
Construction Phase				
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	M	H	Major
Dredging (including underwater blasting if necessary) and construction of breakwaters.	Potential impact to telecommunications (existing submarine cable landing sites and telecom towers).	L	M	Major
Dredging (including underwater blasting if necessary).	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	S	M	Minor
Dredging (including underwater blasting if necessary)	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	L	L	Moderate
Dredging (including underwater blasting if necessary)	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	M	M	Moderate
Dredging (including underwater blasting if necessary)	Disruption of fishing including damage to fishing nets.	M	M	Moderate
Dredging (including underwater blasting if necessary)	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	S	M	Minor
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	M	M	Moderate
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	L	H	Major
Site reclamation works.	Suitable dredged material is due to be used for reclamation. This may have an impact upon surface water quality in the Keta Lagoon.	S	H	Moderate
Site reclamation works.	Impact upon water resources and the hydrological cycle through the reclamation works and changes in surface cover.			
Site reclamation works.	Suitable dredged material is due to be used for reclamation. Reclamation works may have an impact upon air quality by increasing the amount of particulate matter in the air which can have health and nuisance impact.	S	M	Minor
Site reclamation works	Potential conflict with (capped) hydrocarbon exploration wells that are reportedly found in Keta area.	M	H	Major

Activity / Issue	Impact	M	S	Impact
Construction Phase				
Supply of quarry and other construction materials and vehicles, machinery and equipment to the site.	The transportation of materials, equipment / machinery to site can increase traffic and contribute to congestion in the local communities and along the haul route which can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties. Increased noise and vibration from HGV transportation of equipment and materials which can disturb fauna as well as local communities and those along the haul route. Impact upon air quality (noxious gases / dust) from vehicle emissions in the local communities and along the haul routes.	M	M	Moderate
Construction of breakwaters	Movement of the construction vessels and the disturbance of fishing and consequent risk of collision.	S	M	Minor
Construction of breakwaters.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	M	M	Moderate
Construction of breakwaters.	Disruption of fishing including damage to fishing nets.	M	M	Moderate
Construction of breakwaters.	Noise, light and general disturbance from the marine works operations causing loss / disturbance of flora and fauna.	S	M	Minor
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	The increased noise and vibration can have a negative impact upon both humans and fauna and can be both a nuisance and a health impact.	M	M	Moderate
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	N	M	Negligible
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon air quality from the generation of particulate matter during construction activities.	S	M	Minor

Activity / Issue	Impact	M	S	Impact
Construction Phase				
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation. This can be both construction wastewater, and domestic wastewater produced by the construction workers. Construction wastewater can contain sediment, cement, and other pollutants, while domestic wastewater can have elevated BOD, COD, and can contain oils along with other pollutants.	M	H	Major
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	S	H	Moderate
Construction and installation of utility facilities especially water and electricity services.	Potential temporary impact to the provision of utility services to PACs (i.e., power outages, damage to the power network / equipment).	S	M	Minor
Construction / upgrade of port access roads.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	N	M	Negligible
Construction / upgrade of port access roads.	Negative impact upon air quality from the generation of particulate matter during construction activities.	S	M	Minor
Construction / upgrade of port access roads.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	S	M	Minor
Construction of rail systems.	The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.	L	L	Major
Construction of sea lock to the Keta Lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity). Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.), the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services that the Keta Lagoon provides.	L	H	Major

Activity / Issue	Impact	M	S	Impact
Construction Phase				
Construction of sea lock to the Keta Lagoon.	When the sea lock is constructed, it is planned to close the existing floodgate on the causeway as the sea lock will be designed to allow water to be released from the Keta Lagoon to the port basin. As the two locations are different, the sea lock may not provide the same flood protection as the floodgates.	M	M	Moderate

Table 8-8 - Operations Phase

Activity / Issue	Impact	M	S	Impact
Operations Phase				
Population Influx, acculturation and loss of cultural identity and language of the local amenities.	The influx of migrant workers and populations seeking opportunities in the project area communities may come with attendant consequences of changing lifestyles, dilution of local culture practices, traditions, norms, value systems and language. Changing economic opportunities and livelihoods may affect locals who do not have the skills to integrate into the new economy. This may be attended with high standards / high cost of living, pushing local populations and the vulnerable further into poverty. Pressure on public infrastructure, social amenities, housing, among others	M	M	Moderate
OHS concerns and labour issues	Workers exposed to risks such as fire, hazards from operation of equipment, haulage, accidents from falling objects, forklift accidents, collisions, etc. Unhygienic working conditions, discriminatory practices, forced labour, and engagement of child labour by third party service providers may trigger labour rights concerns. Poor waste management significantly affecting safety and health in the workplace. Excessive speed incidents, accidents and road traffic situations. Workplace conflicts, labour agitations and unrests. Forced and child labour, SEA, discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses - theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	M	M	Moderate

Activity / Issue	Impact	M	S	Impact
Operations Phase				
Public health & safety issues - workers and communities	Population influx during the beginning of the operation period may result to increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs. The impact may be permanent or irreversible in nature. Open defecation is rampant at the beaches across all communities. Dumping of solid waste along the lagoon coast is also commonplace. Poor sanitation conditions may further pollute the environment and communities. Potential for traffic incidents / accidents on the public / community roads may be increased. Sewerage and wastewater from the port facilities and an ever-increasing population, posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	M	M	Moderate
Community safety and general disturbance of PACs.	Accidental events such as boats colliding and capsizing on the sea and lagoon, drownings due to the depth of the dredged lagoon and impact on nearby properties and ecology. Increased flooding of project communities due to population pressure and changing landscape and land use. Restricted access to security zone installations, affecting livelihood activities such as salt mining, fishing, eco-tourism, etc.	M	M	Moderate
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	S	M	Minor
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	M	H	Major
Maintenance dredging of the port basin and access channel.	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	S	M	Minor
Maintenance dredging of the port basin and access channel.	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	L	L	Moderate
Maintenance dredging of the port basin and access channel.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	M	M	Moderate

Activity / Issue	Impact	M	S	Impact
Operations Phase				
Maintenance dredging of the port basin and access channel.	Disruption of fishing including damage to fishing nets.	M	M	Moderate
Maintenance dredging of the port basin and access channel.	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	S	M	Minor
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	M	M	Moderate
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	S	H	Major
Physical presence of the breakwaters.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. Constructing the main breakwater is expected to prevent littoral material movement along the coast. In the long term this may cause erosion on the downdrift side (Denu, Blekusu, onwards to Aflao) but lead to sediment accretion on the upstream side for sediment transport (i.e., areas on the coast to the south-southwest) and helping with land reclamation.	M	H	Major
Physical presence of the breakwaters.	Potential negative impact on coastal flooding events.	N	H	Minor
General port operations.	Conflict between merchant and fishing vessels; and between industrial and artisanal fishing vessels.	M	H	Major
Movement of vessels.	Movement of vessels and the disturbance of fishing and consequent risk of collision.			
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Movement of vessels and the use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	L	M	Major
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Noise, light and general disturbance from the movement of vessels and the use of equipment causing loss / disturbance of flora and fauna.	M	M	Moderate
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon climate change and air quality from gaseous emissions from vessels, vehicles, machinery, and equipment operation.	S	L	Negligible
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon air quality from the generation of particulate matter from exhausts of vessels, vehicles, machinery, and equipment.	S	M	Minor
Wastewater and sewage treatment and disposal.	Wastewater generated could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	M	H	Major

Activity / Issue	Impact	M	S	Impact
Operations Phase				
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	S	H	Moderate
Operation of sea lock to the lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity). Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.) due to the easy flow of water between the sea and the Keta Lagoon contributing positively to fishing livelihoods, the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services.	L	H	Major
Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment.	Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column and sediments (harbour basin and Keta Lagoon).	L	M	Major
Trucks and other vehicles visiting the port.	The port will significantly increase traffic volumes in the project communities and surrounding road network. This can cause congestion which may bring delays, can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.	L	H	Major
Trucks and other vehicles visiting the port.	Increased traffic volumes will cause a quicker deterioration of the road surface, which can further impact congestion and incidents / accidents on the roads.	L	M	Major
Trucks and other vehicles visiting the port.	The increased movement of trucks and other vehicles will result in increased noise and vibration and contribute to a reduction in air quality in the project communities and communities along the surrounding road network, this can have a negative impact on people in these areas. This can be both a nuisance (affecting peaceful resting and relaxation of people) and can have a health impact (stress, hearing challenges, etc.).	M	M	Moderate
Trucks and other vehicles visiting the port.	Trucks parking overnight / for extended periods in an informal manner (i.e., along the roadside) with drivers sleeping in their trucks can have a negative impact upon PACs through improper disposal of sanitary waste / increased open defecation at the beaches, improper disposal of solid / liquid waste (litter), increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs.	M	M	Moderate
Provision of security in and around the port.	Local and national safety & security concerns (crime, terrorists, piracy, stowaways).	M	H	Major
Ship waste handling	Sewerage and wastewater (including hazardous) from the port facilities (and an ever-increasing population), posing risks to the environment potentially leading to suspension of toxic, harmful substances in the water column with a consequent impact on aquatic life / water ecology and the local population if not treated properly prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	L	M	Major

Activity / Issue	Impact	M	S	Impact
Operations Phase				
Stormwater management activities	There is potential for stormwater collected from the port and surrounding environment to contain pollutants (as a result of the storage of cargo and containers, stockpiling of bulk (solid and liquid) materials, and the maintenance of equipment / machinery / general port facilities, and the handling of hazardous waste and materials including waste oil) which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	M	H	Major
Stockpiling of bulk materials.	There is potential for stormwater collected from the port and surrounding environment to contain pollutants as a result of the stockpiling of bulk materials which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	M	H	Major
Stockpiling of bulk materials.	Negative impact upon air quality (particulate matter) from wind distributing stockpiled bulk materials to the surrounding environment causing an impact to water quality, having a nuisance effect, and an impact upon human health.	M	M	Moderate

9. Mitigation Measures

The mitigation measures adopted may be grouped under three major types which comprise:

- Preventive Measures.
- Control Measures.
- Compensatory Measures.

Further details are provided in the following subsections.

9.1.1. Preventive Measures

Preventive measures are measures to be incorporated during the design and pre-construction phase to avoid an identified impact / risk. They are aimed at avoiding or minimising potential major impacts at source. Avoiding or reducing an impact at source is essentially designing the project so that a feature with the potential of causing an impact is designed out, altered, or avoided.

Examples of preventive measures that design out, alter, or avoid impacts are provided in Table 9-1 below.

Table 9-1 - Example Preventive Measures

Preventive Measure	Example
Designed Out	Exclusion of Areas Identified as High Social or Environmental Risk
Altered	Altering the Phasing of Development to Reduce Social or Environmental Risk
Avoided	Community Sensitization Programmes to Avoid Conflicts or Confrontations

9.1.2. Control Measures

Control measures are measures adopted to abate or remedy the impacts. Impacts can be abated on site or at the receptor end. Repair or remedy of impacts involves unavoidable damage to a resource, e.g., vegetation clearing during land preparation. In this case, repair essentially involves re-vegetation of the affected parts.

9.1.3. Compensatory Measures

Where other mitigation measures are not possible or fully effective, then compensation in some measure for loss, damage or general intrusion might be appropriate.

9.2. Mitigation Measures

The proposed mitigation measures and residual impact for the project phases are detailed in the following tables. The proposed preparatory / pre-construction phase mitigation measures are provided in Table 9-2, the construction phase mitigation measures are provided in Table 9-3, and the operations phase mitigation measures are provided in Table 9-4.

Table 9-2 - Preparatory / Pre-Construction

Activity / Issue	Impact	Mitigation Measures	Residual
Pre-Construction			
Land acquisition and designation / demarcation of project areas during survey works and feasibility studies and stakeholder consultations.	Increased land speculation in response to the anticipated project. Suspension of expansion in economic or physical development in fear of project impacts etc. Land tenure agitations, as people try to re-establish their land boundaries in anticipation of benefits from project as well as likely spillover interests generated in community. Anxiety on the part of PAPs / PACs on the extent of likely disruption in livelihood / socio-economic activities, as well as physical assets, homes, cemeteries, shrines, etc. Confrontations / conflicts with locals who may not be in favour of the project or are not aware about proposed project and its related activities.	Adequate education and dissemination of information with regards to the scope, schedule and impact of the proposed project. Engage stakeholders early to confirm project boundaries, share project plans and designs, sensitize communities on impact mitigation measures and options available to them, conduct assets inventory for resettlement action plan, prepare and implement resettlement action plan for potentially affected structures, and a livelihood restoration plan for disrupted livelihood activities as fishing, fish mongering, salt mining, tourism, etc. for loss of proven income activities. Develop and implement grievance mechanism as a part of a wider Stakeholder Engagement Plan enabling community concerns to be documented and resolved in a timely fashion. Work closely with local authorities and reps who have established presence and command in the communities. Leverage on WACA project being implemented in the 3 adjoining MMDAs (KeMA, Ketu South and Anloga Districts) for impact mitigation measures.	Minor
OHS during survey works and feasibility studies – technical teams for consultants and contractors.	Exposure of technical teams carrying out topographical survey works, geotechnical survey, and environmental baseline studies to injury and bites from insects and dangerous reptiles such as snakes, scorpions, bees, ants, etc. Risk of accidents and incidents of drowning. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.	A site-specific health and safety plan to be developed for the surveys. Consultants / contractors must comply with Ghana's OHS Policy, use PPEs for field works, provide first aid kits on site to treat minor ailments, cuts and bruises, insect and snake bites, etc. and promptly refer severe cases to nearby clinics or Keta Government Hospital for treatment. Ensure well-trained and experienced licensed drivers, boat captains and lifeguards are deployed for all field studies. Work closely with local authorities and reps who have established presence and command in the communities.	Negligible

Activity / Issue	Impact	Mitigation Measures	Residual
Pre-Construction			
Field surveys, office setup and mobilisation to the site.	Fishing livelihoods affected by field survey, office set up and mobilisation to site	Small sized area utilised for initial survey and effective sampling design of survey to minimise disturbance to fishing livelihoods. Standalone Fisheries Impact Assessment (FIA) should be conducted, and mitigation measures implemented.	Negligible

Table 9-3 - Construction Phase

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
Land take for construction and development activities, its impact upon the shoreline, and following impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	Major
Land take for construction and development activities and its impact on project communities.	Loss of lands for housing and other community development projects. Loss of landing beaches for fishermen and fish markets, community parks and playgrounds (venues for beach soccer and Norvikporgbeza Festival at Kedzi-Azizadzi for example) and other social gatherings. Destruction of physical assets such as houses, public buildings such as schools (Kedzi Vocational Technical Institute), churches, etc. Impact / destruction of cultural heritage sites such as public and private shrines, public and private cemeteries, etc. Destruction of crops and economic trees such as coconut trees, oil palm trees, etc. along the shores of the sea and lagoon.	Reclamation of adequate lands to offset lost community / individual lands prior to commencement of project development. Allocation of reclaimed lands to locals affected by the land take. Resettlement of all PAPs prior to commencement of project development. Preserve / relocate cultural heritage sites, shrines and cemeteries where possible. Adopt new burial approaches (vertical burial / stacked tombs, etc.) that promotes minimal land use. Provide ample time for affected persons to remove crops and structures prior to the start of construction.	Major

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
Disruption of livelihoods, and access and usage of roads and pathways by communities.	Disruption of livelihoods / socio-economic activities such as fishing, salt mining, etc. due to restricted access to parts of the sea coast and lagoon. Restricted access and usage of public roads, bridges and access ways, with attendant traffic build ups. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities. Perceptions of unfair or inequitable compensation arrangements for lands or other project benefits resulting in community agitations, obstruction of project activities, vandalization of equipment, public demonstration and violent behaviour.	Community engagements and notice prior to commencement of construction activities. Seek clarity on any rites to perform, any taboos to observe and any shrines / cultural heritage sites that require identification, preservation or relocation. Fair and commensurate livelihood restoration and compensation activities showing affected persons. Alternative routes and traffic management personnel. Work closely with community liaisons, local authorities and reps who have established presence and command in the communities.	Minor
Labour influx issues affecting local communities.	Speculative job seekers migrating to project communities in search of job putting pressure on existing social facilities and could induce anti-social behaviours. Indirect labour influx will result from mainly non-local traders, generating some conflict between them and the locals. Non-compliance with socio-cultural norms of local communities: The tendency for non-local employees not to conform or abide by the sociocultural norms of local communities is high. Labour agitations / issues can result in prolong and costly grievance redress cases, pose security threats and endanger communal cohesion. Community agitations from unmet expectations for benefits such as employment, economic packages and economic livelihoods, resulting in obstruction of workers from carrying out their respective services, vandalization of equipment, public demonstration and violent behaviour.	Prepare and implement labour influx management plan to holistically address labour influx issues. Engage and sensitize project communities about increases in workforce and potential for influx. Give priority to locals when hiring non-essential and un-skilled workers. Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding labour influx. Develop a feedback and grievance mechanism to collect any feedback or complaints related to labour influx associated with the project. Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions.	Minor
OHS and labour issues with workers.	Workers exposed to risks and hazards from operation of construction machinery / equipment, transportation	Maintain high standards of OHS and environmental protection at work.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
	of construction materials, inhalation of dust and fumes, accidents from falling objects, etc. Unhygienic working conditions. Forced and child labour, Sexual Exploitation and Abuse (SEA), discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses – theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	Prepare and implement HSE protection at the workplace to guide construction activities to comply with relevant national and international laws and regulations on OHS. Maintain safe plant, machinery and equipment and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. Security at site must be maintained to ensure only authorized persons are allowed into the construction area. Develop a site specific OHS plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on OHS policy. Train elected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged. Only drivers with the requisite licenses must be allowed to handle vehicles and earth-moving equipment. Provide workers with PPE and monitor usage compliance. Phasing out of material movements / scheduling material movements.	
Public health & safety issues likely to impact PAC and workers.	Labour / population influx and its attendant sexual behaviour, leading to increased teenage pregnancies HIV / AIDS and other STD infections. Increased open defecation at beaches within the project area. Improperly covered trenches may result in stagnant water and breed mosquitoes. Unsecured excavations may compromise public safety.	Preparation of a construction phase health and safety manual and site / task specific health and safety plans. Collaborate with KeMA and Ghana Health Service (GHS) for HIV / AIDS and STIs sensitization campaigns. Provide adequate toilet facilities for construction workers as well public toilets for nearby project communities.	Negligible

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
	Improper disposal of sanitary waste Dust inhalation, causing respiratory diseases; dust nuisance resulting in dirt blown on washed clothes on drying lines, windows of residences and offices nearby. Noise nuisance, affecting the peaceful resting and relaxation of people, causing hearing challenges, etc. Air pollution from plant emissions and fumes / dust emissions from use of equipment / machinery / vehicles. Noise and vibration from plant operations and movement of trucks. Water and soil pollution from oil and fuel spills, transport of sediment laden storm-runoffs from the plant site into water with its consequent impact on aquatic life / water ecology.	Use warning signs, uncovered trenches or deep excavations should be protected using indicator linings or illustrative warning notices or wire mesh to prevent fall hazards. All trenches and excavation must be covered at all times. Caution / warning signs should be placed at vantage points around the project site. Schedule work to ensure that transport of equipment and materials is carried out during low peak periods. Flagmen should be employed to man all major intersections to assist with traffic flow. Announcements and notices for work schedule on affected roads through local FM stations as well as through community leaders and community information centres. Trucks transporting products materials to site should be covered and labelled with appropriate warning signals such as red flag and rotating amber lights. Appropriate speed limits should be instituted, observed and enforced. Carry out regular inspections of haulage roads. In the event of truck failure along haulage routes, such trucks should be towed within 12 hours. Untarred roads have to be watered frequently to suppress dust. Any damaged sections of the roads must be reinstated by the contractor. Properly manage oil change on site to prevent oil spills and runoffs into water bodies. Provide proper septic tanks for liquid waste disposal. Use exhaust mufflers to reduce noise from heavy trucks.	
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to	Negligible

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
	discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	specify procedures to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.	
Land take / general construction activities.	Fishing activities - especially beach seine fishers adversely affected by construction activities. Fishermen are very localised.	Beach seine fishers encouraged to relocate to adjacent landing sites. Standalone FIA conducted and mitigation measures implemented.	Negligible
Land take / general construction activities.	Fish catch and therefore fish revenue lowered due to impact of construction on fish habitats.	Construction activities phased over small areas at a time.	Major
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Major
Dredging (including underwater blasting if necessary) and construction of breakwaters.	Potential impact to telecommunications (existing submarine cable landing sites and telecom towers).	Further engagement with GCT / various telecommunication companies to determine if a possible submarine cable landing site is in the area.	Negligible

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
Dredging (including underwater blasting if necessary).	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers.	Minor
Dredging (including underwater blasting if necessary)	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	Only Hydraulic Dredgers (CSD, or TSHD) will be used for vertical transport of dredged material. When using a TSHD the application of water jets will be delayed until the Drag Head is in contact with the seabed and the suction pump is running. The water jets will also be switched off before the dredge pump is disengaged and the draghead lifted off the seabed. When using a CSD the speed (revolution and swing) of the cutter and ladder will be carefully controlled in order to minimise the spillage (material that is cut but not sucked up by the suction pipe) by maintaining a balance between cutter speed and pump capacity. The cutter head / drag head selected will be suitable for the material likely to be encountered. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available. CSD / TSHD will be equipped with on-board systems for determining solids / water ratio or density of dredged material; and electronic positioning and depth control system for defining the location and depth of dredging.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
		All plant and equipment will be well-maintained and inspected prior to and periodically during use. Any TSHD that is used will have well maintained hopper seals / doors.	
Dredging (including underwater blasting if necessary)	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on dredgers / support vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
		Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Dredging (including underwater blasting if necessary)	Disruption of fishing including damage to fishing nets.	Conduct a standalone Fisheries Impact Assessment (FIA) and develop a Fisheries Management Plan (FMP). Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding dredger to be checked before commencing works to minimise risk of damaging fishing nets.	Minor
Dredging (including underwater blasting if necessary)	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Minor
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	Develop a Dredging and Reclamation Management Plan. Dredged material will be tested and discharged accordingly. Suitable dredged material disposal site to be identified.	Minor
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	Develop a Dredging and Reclamation Management Plan. No mitigation measure proposed.	Major
Site reclamation works.	Suitable dredged material is due to be used for reclamation. This may have an impact upon surface water quality in the Keta Lagoon.	Develop a Dredging and Reclamation Management Plan.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
		Dredged material will be tested and discharged accordingly.	
Site reclamation works.	Impact upon water resources and the hydrological cycle through the reclamation works and changes in surface cover.	Develop a Dredging and Reclamation Management Plan.	
Site reclamation works.	Suitable dredged material is due to be used for reclamation. Reclamation works may have an impact upon air quality by increasing the amount of particulate matter in the air which can have health and nuisance impact.	Develop a Dredging and Reclamation Management Plan. Rainbowing of dredged material shall not occur during periods of high wind. Dredged material will be promptly compacted. Implementation of a dust suppression system in the dry season e.g. regularly spraying construction sites and surrounding roads (unpaved and paved) with water to reduce dust levels. Sweeping of unpaved and paved roads to minimise dust and remove mud and debris. When carrying dusty materials vehicles shall be sheeted to prevent materials being blown from the vehicles whilst travelling. Speed of vehicles over any unpaved landscape will be controlled.	Minor
Site reclamation works	Potential conflict with (capped) hydrocarbon exploration wells that are reportedly found in Keta area.	Identification of wells with the assistance of GNPC and members of the community.	Negligible
Supply of quarry and other construction materials and vehicles, machinery and equipment to the site.	The transportation of materials, equipment / machinery to site can increase traffic and contribute to congestion in the local communities and along the haul route which can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties. Increased noise and vibration from HGV transportation of equipment and materials which can disturb fauna as well as local communities and those along the haul route.	Preparation and implementation of a Traffic Management Plan. Minimise movement at peak hours, only use approved routes, stick to speed limits. Materials and equipment will only be transported to the sites during the day, i.e., from 6am to 6pm. Regular and scheduled maintenance will be done on vehicles and other machines to reduce noise nuisance and emissions and the likelihood of breakdown along the roads. They will be checked and inspected prior to mobilisation.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
	Impact upon air quality (noxious gases / dust) from vehicle emissions in the local communities and along the haul routes.	When carrying dusty materials vehicles shall be sheeted to prevent materials being blown from the vehicles whilst travelling.	
Construction of breakwaters	Movement of the construction vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers.	Minor
Construction of breakwaters.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on construction vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
		Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Construction of breakwaters.	Disruption of fishing including damage to fishing nets.	Conduct a standalone Fisheries Impact Assessment (FIA) and develop a Fisheries Management Plan (FMP). Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding construction to be checked before commencing works to minimise risk of damaging fishing nets.	Minor
Construction of breakwaters	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	Major

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
Construction of breakwaters.	Noise, light and general disturbance from the marine works operations causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Minor
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	The increased noise and vibration can have a negative impact upon both humans and fauna and can be both a nuisance and a health impact.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used. Low-noise equipment shall be used wherever possible.	Negligible
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port	Negative impact upon air quality from the generation of particulate matter during construction activities.	Minor impact - no mitigation measure proposed.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.			
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation. This can be both construction wastewater, and domestic wastewater produced by the construction workers. Construction wastewater can contain sediment, cement, and other pollutants, while domestic wastewater can have elevated BOD, COD, and can contain oils along with other pollutants.	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity.	Moderate
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.	Moderate
Construction and installation of utility facilities especially water and electricity services.	Potential temporary impact to the provision of utility services to PACs (i.e., power outages, damage to the power network / equipment).	Development of a dedicated substation for the port to prevent an overload on the community. The substation capacity should factor in all industries that would be cited in the port. ECG to be kept informed of progress and if a power outage is to be caused by the construction activities they would need at least 72 hours' notice.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
Construction / upgrade of port access roads.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible
Construction / upgrade of port access roads.	Negative impact upon air quality from the generation of particulate matter during construction activities.	Minor impact - no mitigation measure proposed.	Minor
Construction / upgrade of port access roads.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	Management of aqueous discharges and waste.	Minor
Construction of rail systems.	The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.	Standalone environmental and social assessments would be required for the construction of a rail system to link with Ghana's railway network. Appropriate mitigation measures would be identified through these assessment processes.	Major
Construction of sea lock to the Keta Lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) along with the ecology which may be protected, endangered, and / or rare provide important ecosystem services. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.), the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible.	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
CONSTRUCTION			
	This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services that the Keta Lagoon provides.		
Construction of sea lock to the Keta Lagoon.	When the sea lock is constructed, it is planned to close the existing floodgate on the causeway as the sea lock will be designed to allow water to be released from the Keta Lagoon to the port basin. As the two locations are different, the sea lock may not provide the same flood protection as the floodgates.	Detailed study on the impact upon flood control functionality to be undertaken as part of the design of the sea lock to the Keta Lagoon. If found to be necessary to achieve the same level of flood protection the existing flood gates could be left operational.	Negligible

Table 9-4 - Operations Phase

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
Port operations impact upon the shoreline, and ongoing impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Ongoing implementation of the standalone Ecology Management Plan which will need to be developed prior to construction.	Major
Population Influx, acculturation and loss of cultural identity and language of the local amenities.	The influx of migrant workers and populations seeking opportunities in the project area communities may come with attendant consequences of changing lifestyles, dilution of local culture practices, traditions, norms, value systems and language. Changing economic opportunities and livelihoods may affect locals who do not have the skills to integrate into the new economy. This may be attended with high standards / high cost of living, pushing local populations and the vulnerable further into poverty. Pressure on public infrastructure, social amenities, housing, among others	Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding population influx Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions. Utilities such as water, electricity, waste management, public parks, etc. that may come with the port city should be equally extended to the project communities. Livelihood opportunities, including facilitation of skills training for local youth should be prioritized.	Negligible
OHS concerns and labour issues	Workers exposed to risks such as fire, hazards from operation of equipment, haulage, accidents from falling objects, forklift accidents, collisions, etc.	Maintain high standards of OHS and environmental protection at the port to comply with relevant national and international laws and regulations on OHS.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
	Unhygienic working conditions, discriminatory practices, forced labour, and engagement of child labour by third party service providers may trigger labour rights concerns. Poor waste management significantly affecting safety and health in the workplace. Excessive speed incidents, accidents and road traffic situations. Workplace conflicts, labour agitations and unrests. Forced and child labour, SEA, discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses - theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	Maintain safe and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. Appropriate speed limits should be instituted, observed and enforced. Safe exit points, fire extinguishers and sprinklers should be placed at vantage points. Security at the port must be maintained to ensure only authorized persons are allowed into the construction area. Develop an OHS Plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on health and safety policy. Train selected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged. Operate the harbour in compliance with environmental, social, health and safety laws, regulations and policies.	
Public health & safety issues - workers and communities	Population influx during the beginning of the operation period may result to increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs. The impact may be permanent or irreversible in nature. Open defecation is rampant at the beaches across all communities. Dumping of solid waste along the lagoon coast is also commonplace. Poor sanitation conditions may further pollute the environment and communities. Potential for traffic incidents / accidents on the public / community roads may be increased.	Collaborate with the Keta Municipal Assembly (KeMA) / GHS for awareness for all workers and the general public on the behavioural changes required to prevent the spread of HIV / AIDS and other STDs. Provide adequate public toilet facilities and solid waste management systems for host communities. Provide security installations such as the police service in the project communities to help manage traffic congestion when the need arises. Build mini sewerage treatment plants for liquid waste treatment and disposal, as well as solid waste management systems and landfill sites.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
	Sewerage and wastewater from the port facilities and an ever-increasing population, posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).		
Community safety and general disturbance of PACs.	Accidental events such as boats colliding and capsizing on the sea and lagoon, drownings due to the depth of the dredged lagoon and impact on nearby properties and ecology. Increased flooding of project communities due to population pressure and changing landscape and land use. Restricted access to security zone installations, affecting livelihood activities such as salt mining, fishing, eco-tourism, etc.	Build integrated drainage systems for communities in the catchment areas of the port to help mitigate any flooding situations. Structural plans being developed under an SDF (Spatial Development Framework) for Ketu South, Anloga and Keta in should be adopted and integrated into port development. Rescue equipment and support should be provided as part of port operation activities. Provide training to local fishermen on how to undertake rescue activities on the sea / lagoon. Engage community liaison officers to ensure all port operation activities are in sync with project communities – with clearer awareness of security zones, safety zones etc.	Minor
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to specify procedures to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.	Negligible

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side. The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Major
Maintenance dredging of the port basin and access channel.	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers. Navigational charts updated.	Minor
Maintenance dredging of the port basin and access channel.	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	Only Hydraulic Dredgers (CSD, or TSHD) will be used for vertical transport of dredged material. When using a TSHD the application of water jets will be delayed until the Drag Head is in contact with the seabed and the suction pump is running. The water jets will also be switched off before the dredge pump is disengaged and the draghead lifted off the seabed. When using a CSD the speed (revolution and swing) of the cutter and ladder will be carefully controlled in order to minimise the spillage (material that is cut but not sucked up by the suction pipe) by maintaining a balance between cutter speed and pump capacity.	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		The cutter head / drag head selected will be suitable for the material likely to be encountered. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available. CSD / TSHD will be equipped with on-board systems for determining solids / water ratio or density of dredged material; and electronic positioning and depth control system for defining the location and depth of dredging. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Any TSHD that is used will have well maintained hopper seals / doors.	
Maintenance dredging of the port basin and access channel.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	All crew on dredgers / support vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding).	Minor

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Maintenance dredging of the port basin and access channel.	Disruption of fishing including damage to fishing nets.	Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding dredger to be checked before commencing works to minimise risk of damaging fishing nets.	Minor
Maintenance dredging of the port basin and access channel.	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Minor
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	Dredged material will be tested and discharged accordingly. Suitable dredged material disposal site to be identified.	Minor
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	No mitigation measure proposed.	Major

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
Physical presence of the breakwaters.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. Constructing the main breakwater is expected to prevent littoral material movement along the coast. In the long term this may cause erosion on the downdrift side (Denu, Blekusu, onwards to Aflao) but lead to sediment accretion on the upstream side for sediment transport (i.e., areas on the coast to the south-southwest) and helping with land reclamation.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment. *(WRC, Hydrological Services Authority and Ministry of Environment, Science and Technology, are currently in discussion to identify a suitable location to pilot a Sand Motor / Building with Nature project).*	Major
Physical presence of the breakwaters.	Potential negative impact on coastal flooding events.	No mitigation measure proposed - it is believed that constructing the Port of Keta will not influence coastal flooding events.	Minor
General port operations.	Conflict between merchant and fishing vessels; and between industrial and artisanal fishing vessels.	Sensitisation for coexistence. Spatial arrangements to contain each group of vessels.	Moderate
Movement of vessels.	Movement of vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. All navigational / communication equipment in good working order. Emergency procedures are in place / carried out in case of incident. Vessel Traffic System (VTS) implemented to communicate information (such as MetOcean conditions) to vessels. Navigation Simulation Study (NSS) conducted to allow pilots to practice ship handling procedures to help ensure the safety of navigation. Navigational charts updated.	Minor
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Movement of vessels and the use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on construction vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Noise, light and general disturbance from the movement of vessels and the use of equipment causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon climate change and air quality from gaseous emissions from vessels, vehicles, machinery, and equipment operation.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Negligible
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon air quality from the generation of particulate matter from exhausts of vessels, vehicles, machinery, and equipment.	Minor impact - no mitigation measure proposed.	Minor
Wastewater and sewage treatment and disposal.	Wastewater generated could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity. Port reception facility provided.	Moderate
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.	Moderate
Operation of sea lock to the lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) the ecology which may be	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
	protected, endangered, and / or rare provide important ecosystem services. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.) due to the easy flow of water between the sea and the Keta Lagoon contributing positively to fishing livelihoods, the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services.	to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	
Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment.	Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column and sediments (harbour basin and Keta Lagoon).	Development of an Oil Spill Contingency Plan (OSC). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels.	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Trucks and other vehicles visiting the port.	The port will significantly increase traffic volumes in the project communities and surrounding road network. This can cause congestion which may bring delays, can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Major
Trucks and other vehicles visiting the port.	Increased traffic volumes will cause a quicker deterioration of the road surface, which can further impact congestion and incidents / accidents on the roads.	Provision of a mandatory weighbridge to ensure that overweight vehicles do not leave the port. Access roads improved.	Moderate
Trucks and other vehicles visiting the port.	The increased movement of trucks and other vehicles will result in increased noise and vibration and contribute to a reduction in air quality in the project communities and communities along the surrounding road network, this can have a negative impact on people in these areas. This can be both a nuisance (affecting peaceful resting and relaxation of people) and can have a health impact (stress, hearing challenges, etc.).	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Moderate
Trucks and other vehicles visiting the port.	Trucks parking overnight / for extended periods in an informal manner (i.e., along the roadside) with drivers sleeping in their trucks can have a negative impact upon PACs through improper disposal of sanitary waste / increased open defecation at the beaches, improper disposal of solid / liquid waste (litter), increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs.	Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks. Effective scheduling system for truck port entry.	Minor
Provision of security in and around the port.	Local and national safety & security concerns (crime, terrorists, piracy, stowaways).	Robust Security Plan developed including ensuring security at anchorage. Proper ongoing engagement with the communities. Proper spatial planning (ecotourism, ecoparks, etc.).	Moderate

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		Port Facility Security Assessment to identify vulnerabilities, develop a Port Facility Security Plan. MOC to be developed, in addition to an Incident Management Centre. CSR activities undertaken to ensure communities feel a positive impact. Restricted access to security zone and compliance with ISPS.	
Ship waste handling	Sewerage and wastewater (including hazardous) from the port facilities (and an ever-increasing population), posing risks to the environment potentially leading to suspension of toxic, harmful substances in the water column with a consequent impact on aquatic life / water ecology and the local population if not treated properly prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	Port reception facility provided.	Moderate
Stormwater management activities	There is potential for stormwater collected from the port and surrounding environment to contain pollutants (as a result of the storage of cargo and containers, stockpiling of bulk (solid and liquid) materials, and the maintenance of equipment / machinery / general port facilities, and the handling of hazardous waste and materials including waste oil) which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	Treatment of stormwater prior to release to the environment. A Spill Prevention and Response Plan shall be developed (including an OSCP). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. Secondary containment systems will be constructed with materials appropriate for the materials being contained and adequate to prevent loss to the environment (e.g. bunding). Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times. Establish and maintain a controlled fuelling, maintenance, and servicing protocol to minimize leaks and spills. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice	Major

Activity / Issue	Impact	Mitigation Measures	Residual
OPERATIONS			
		on the Packaging, Handling and Storage of Chemical Wastes. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum and have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	
Stockpiling of bulk materials.	There is potential for stormwater collected from the port and surrounding environment to contain pollutants as a result of the stockpiling of bulk materials which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	Treatment of stormwater prior to release to the environment (including from iron ore stockpiles).	Major
Stockpiling of bulk materials.	Negative impact upon air quality (particulate matter) from wind distributing stockpiled bulk materials to the surrounding environment causing an impact to water quality, having a nuisance effect, and an impact upon human health.	Appropriate stockpile suppression methods to be implemented dependent upon the stockpiled material. Stockpiled materials to be covered during periods of high winds.	Moderate

10. Environmental Management Plan

This chapter presents the Provisional Environmental Management and Monitoring Plan (in accordance with the requirements of Ghana's Environmental Assessment Regulations).

The previous sections of this report have assessed the potential environmental impacts associated with the Port of Keta project and have provided recommendations for mitigation measures in order to manage these impacts.

This chapter provides an overview of the strategies for implementation of the EIA study recommendations; including the actions and measures that should be taken to reduce or eliminate negative impacts and promote positive impacts of the proposed project. These measures have been developed based upon the basis of the potential impacts identified in Chapter 8; and the mitigation / enhancement measures proposed in Chapter 9 of this report.

10.1. Aim

As the potential impacts of the Port of Keta will be both negative and positive the aim of this EMP is to provide an environmental management tool that defines in specific terms the management strategy for ensuring that undue or reasonably avoidable adverse impacts of the proposed project are mitigated or prevented; and that the positive benefits of the project are enhanced.

10.2. Objectives

It is intended that this Provisional Environmental Management Plan along with EPA Permit Conditions would be used to develop a revised Environmental Management and Monitoring Plan which would be a working management document to be used during the project implementation.

The primary objectives of the Provisional Environmental Management Plan are therefore as follows:

- Provide effective, site-specific, and implementable procedures and mitigation measures to monitor and control potential environmental impacts throughout the project implementation phases.
- Ensure that the development and operation of the Port of Keta does not adversely impact the environment and socio-economic systems in the surrounding area.
- Present the potential environmental impacts and define the management strategies that will be used to address them.
- Establish approaches for monitoring the successful implementation of the mitigation measures, as well as their frequency / timeframe, performance criteria, and responsibilities.
- Demonstrates GPHAs intention to comply with the findings of the EIA.

10.3. Environmental Management and Monitoring Matrix

The Preliminary Environmental Management and Monitoring Matrix for the various project phases are detailed in the following tables. The preparatory / pre-construction phase matrix is provided in Table 10-1, the construction phase mitigation measures are provided Table 10-2, and the operations phase matrix is provided in Table 10-3. The tables indicate the agencies responsible for implementing the environmental management and monitoring measures. These agencies may need capacity building and / or the recruitment of appropriate staff in order to effectively implement these measures. This need would need to be assessed immediately prior to the relevant phase.

Table 10-1 - Preparatory / Pre-Construction

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Pre-Construction						
Land acquisition and designation / demarcation of project areas during survey works and feasibility studies and stakeholder consultations.	Increased land speculation in response to the anticipated project. Suspension of expansion in economic or physical development in fear of project impacts etc. Land tenure agitations, as people try to re-establish their land boundaries in anticipation of benefits from project as well as likely spillover interests generated in community. Anxiety on the part of PAPs / PACs on the extent of likely disruption in livelihood / socio-economic activities, as well as physical assets, homes, cemeteries, shrines, etc. Confrontations / conflicts with locals who may not be in favour of the project or are not aware about proposed project and its related activities.	Adequate education and dissemination of information with regards to the scope, schedule and impact of the proposed project. Engage stakeholders early to confirm project boundaries, share project plans and designs, sensitize communities on impact mitigation measures and options available to them, conduct assets inventory for resettlement action plan, prepare and implement resettlement action plan for potentially affected structures, and a livelihood restoration plan for disrupted livelihood activities as fishing, fish mongering, salt mining, tourism, etc. for loss of proven income activities. Develop and implement grievance mechanism as a part of a wider Stakeholder Engagement Plan enabling community concerns to be documented and resolved in a timely fashion. Work closely with local authorities and reps who have established presence and command in the communities. Leverage on WACA project being implemented in the 3 adjoining MMDAs (KeMA, Ketu South and Anloga Districts) for impact mitigation measures.	Inventory of all potential project affected assets and persons. Inventory of all potential project affected livelihoods/ socio-economic activities. Records / reports of community engagements and consensus on impact mitigation measures. Regular community engagement and sensitization campaigns about project activities. Follow-ups to ensure mitigation measures are duly implemented.	Temporal through project planning phase.	Participatory engagements and meetings, and sensitizations and consensus with project communities to ensure land acquisition and involuntary resettlement compensation and relocation uncertainties delays and communication gaps on project activities are eliminated and project generally accepted with good will. Develop stakeholder engagement plans, GRM, form committees with key focal persons enabling community concerns to be documented and resolved promptly.	GPHA / Client, Port of Keta (PoK) Project Unit, KeMA, Consultants and other Stakeholders
OHS during survey works and feasibility studies – technical teams for consultants and contractors.	Exposure of technical teams carrying out topographical survey works, geotechnical survey, and environmental baseline studies to injury and bites from insects and dangerous reptiles such as snakes, scorpions, bees, ants, etc. Risk of accidents and incidents of drowning. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities.	A site-specific health and safety plan to be developed for the surveys. Consultants / contractors must comply with Ghana's OHS Policy, use PPEs for field works, provide first aid kits on site to treat minor ailments, cuts and bruises, insect and snake bites, etc. and promptly refer severe cases to nearby clinics or Keta Government Hospital for treatment. Ensure well-trained and experienced licensed drivers, boat captains and lifeguards are deployed for all field studies. Work closely with local authorities and reps who have established presence and command in the communities.	The site-specific health and safety plan should be signed off by GPHA, consultants and contractors.	Monitoring work permits issued by GPHA prior to commencing work.	Work permits issued prior to commencing work.	GPHA, Consultants and Contractors.
Field surveys, office setup and mobilisation to the site.	Fishing livelihoods affected by field survey, office set up and mobilisation to site	Small sized area utilised for initial survey and effective sampling design of survey to minimise disturbance to fishing livelihoods. Standalone Fisheries Impact Assessment (FIA) should be conducted, and mitigation measures implemented.	None proposed	During preparatory work and pre-contruction activities.	None proposed.	Team of consultants and contractors.

Table 10-2 - Construction Phase

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
Land take for construction and development activities, its impact upon the shoreline, and following impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or	Monitoring carried out in line with the standalone Ecology Management Plan.	Standalone Ecology Management Plan developed prior to construction.	Mitigation measures and commitments are properly maintained and implemented.	Contractor / consultant.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
		rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	To monitor that the standalone Ecology Management Plan has been carried out and implemented prior to construction.	Standalone Ecology Management Plan implemented prior to construction and maintained throughout.		
Land take for construction and development activities and its impact on project communities.	Loss of lands for housing and other community development projects. Loss of landing beaches for fishermen and fish markets, community parks and playgrounds (venues for beach soccer and Norvikporgbeza Festival at Kedzi-Azizadzi for example) and other social gatherings. Destruction of physical assets such as houses, public buildings such as schools (Kedzi Vocational Technical Institute), churches, etc. Impact / destruction of cultural heritage sites such as public and private shrines, public and private cemeteries, etc. Destruction of crops and economic trees such as coconut trees, oil palm trees, etc. along the shores of the sea and lagoon.	Reclamation of adequate lands to offset lost community / individual lands prior to commencement of project development. Allocation of reclaimed lands to locals affected by the land take. Resettlement of all PAPs prior to commencement of project development. Preserve / relocate cultural heritage sites, shrines and cemeteries where possible. Adopt new burial approaches (vertical burial / stacked tombs, etc.) that promotes minimal land use. Provide ample time for affected persons to remove crops and structures prior to the start of construction.	Evaluation of RAP implementation with records showing PAP beneficiaries. Reports and follow-ups by consultants and project regulation boards / units.	Monthly.	RAP, resettlement frameworks. Grievance redress reports. Work permits after social impact mitigations are met.	GPHA / Client, PoK Project Unit, KeMA, consultants and other stakeholders.
Disruption of livelihoods, and access and usage of roads and pathways by communities.	Disruption of livelihoods / socio-economic activities such as fishing, salt mining, etc. due to restricted access to parts of the sea coast and lagoon. Restricted access and usage of public roads, bridges and access ways, with attendant traffic build ups. Incidents of confrontations and conflicts with locals who may not be favourably receptive to the project or are not aware about proposed project and its related activities. Perceptions of unfair or inequitable compensation arrangements for lands or other project benefits resulting in community agitations, obstruction of project activities, vandalization of equipment, public demonstration and violent behaviour.	Community engagements and notice prior to commencement of construction activities. Seek clarity on any rites to perform, any taboos to observe and any shrines / cultural heritage sites that require identification, preservation or relocation. Fair and commensurate livelihood restoration and compensation activities showing affected persons. Alternative routes and traffic management personnel. Work closely with community liaisons, local authorities and reps who have established presence and command in the communities.	Periodic reporting and monitoring of field and project implementation activities.	Monthly.	Grievance redress reports. Livelihood restoration and RAP implementation reports.	GPHA / Client, PoK Project Unit, KeMA, consultants and other stakeholders.
Labour influx issues affecting local communities.	Speculative job seekers migrating to project communities in search of job putting pressure on existing social facilities and could induce anti-social behaviours. Indirect labour influx will result from mainly non-local traders, generating some conflict between them and the locals. Non-compliance with socio-cultural norms of local communities: The tendency for non-local employees not to conform or abide by the sociocultural norms of local communities is high. Labour agitations / issues can result in prolong and costly grievance redress cases, pose security threats and endanger communal cohesion. Community agitations from unmet expectations for benefits such as employment, economic packages and economic livelihoods, resulting in obstruction of workers from carrying out their	Prepare and implement labour influx management plan to holistically address labour influx issues. Engage and sensitize project communities about increases in workforce and potential for influx. Give priority to locals when hiring non-essential and un-skilled workers. Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding labour influx. Develop a feedback and grievance mechanism to collect any feedback or complaints related to labour influx associated with the project. Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions.	Periodic reporting and monitoring of field and project implementation activities.	Monthly.	Influx manangement and mitigation measures, priority employment for locals.	GPHA / client, PoK Project Unit, KeMA, consultants and other stakeholders.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
	respective services, vandalization of equipment, public demonstration and violent behaviour.					
OHS and labour issues with workers.	Workers exposed to risks and hazards from operation of construction machinery / equipment, transportation of construction materials, inhalation of dust and fumes, accidents from falling objects, etc. Unhygienic working conditions. Forced and child labour, Sexual Exploitation and Abuse (SEA), discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses – theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	Maintain high standards of OHS and environmental protection at work. Prepare and implement HSE protection at the workplace to guide construction activities to comply with relevant national and international laws and regulations on OHS. Maintain safe plant, machinery and equipment and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. Security at site must be maintained to ensure only authorized persons are allowed into the construction area. Develop a site specific OHS plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on OHS policy. Train elected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged. Only drivers with the requisite licenses must be allowed to handle vehicles and earth-moving equipment. Provide workers with PPE and monitor usage compliance. Phasing out of material movements / scheduling material movements.	Periodic reporting on compliance with OHS safeguard measures, incident reporting. Periodic site supervisions. Workers grievance redress mechanism.	Monthly. Permits to work issued by the client on submission of all required risk assessments.	Worker rights and wellbeing: contractor must develop and implement a Human Resource Policy and Plan that adheres to the requirements of IFC PS2, ILO conventions on labour and human rights including requirements for workers to have contracts, workers grievance mechanism and develop retrenchment plans if there is a requirement for collective dismissals and all in compliance with the Ghanaian Labour Act.	Contractors and Consultants, PoK Project Unit.
Public health & safety issues likely to impact PAC and workers.	Labour / population influx and its attendant sexual behaviour, leading to increased teenage pregnancies HIV / AIDS and other STD infections. Increased open defecation at beaches within the project area. Improperly covered trenches may result in stagnant water and breed mosquitoes. Unsecured excavations may compromise public safety. Improper disposal of sanitary waste Dust inhalation, causing respiratory diseases; dust nuisance resulting in dirt blown on washed clothes on drying lines, windows of residences and offices nearby. Noise nuisance, affecting the peaceful resting and relaxation of people, causing hearing challenges, etc. Air pollution from plant emissions and fumes / dust emissions from use of equipment / machinery / vehicles. Noise and vibration from plant operations and movement of trucks.	Preparation of a construction phase health and safety manual and site / task specific health and safety plans. Collaborate with KeMA and Ghana Health Service (GHS) for HIV / AIDS and STIs sensitization campaigns. Provide adequate toilet facilities for construction workers as well public toilets for nearby project communities. Use warning signs, uncovered trenches or deep excavations should be protected using indicator linings or illustrative warning notices or wire mesh to prevent fall hazards. All trenches and excavation must be covered at all times. Caution / warning signs should be placed at vantage points around the project site. Schedule work to ensure that transport of equipment and materials is carried out during low peak periods. Flagmen should be employed to man all major intersections to assist with traffic flow. Announcements and notices for work schedule on affected roads through local FM stations as	Periodic reporting on compliance by dedicated safeguards team.	Monthly. / (Weekly during key phases of the construction).	National laws, regulations and policies on the environment and public health, complemented by other internaional performance standards, conventions and practices.	Contractors and consultants, PoK Project Unit

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
	Water and soil pollution from oil and fuel spills, transport of sediment laden storm-runoffs from the plant site into water with its consequent impact on aquatic life / water ecology.	well as through community leaders and community information centres. Trucks transporting products materials to site should be covered and labelled with appropriate warning signals such as red flag and rotating amber lights. Appropriate speed limits should be instituted, observed and enforced. Carry out regular inspections of haulage roads. In the event of truck failure along haulage routes, such trucks should be towed within 12 hours. Untarred roads have to be watered frequently to suppress dust. Any damaged sections of the roads must be reinstated by the contractor. Properly manage oil change on site to prevent oil spills and runoffs into water bodies. Provide proper septic tanks for liquid waste disposal. Use exhaust mufflers to reduce noise from heavy trucks.				
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to specify procedures to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.	Records of the quantities of wastes generated, recycled and disposed. Periodic reporting on compliance by dedicated safeguards team.	Monthly.	National laws, regualtions and policies on the environment and public health, complemented by other international performance standards, conventions and practices.	Contractor / consultant.
Land take / general construction activities.	Fishing activities - especially beach seine fishers adversely affected by construction activities. Fishermen are very localised.	Beach seine fishers encouraged to relocate to adjacent landing sites. Standalone FIA conducted and mitigation measures implemented.	Numbers of beach seine fishing gears affected.	Weekly throughout construction period	Beach seine fishers able to ply their trade at adjacent beaches.	Contractors / Client Fisheries Liaison Officers / Leadership of Fishers.
Land take / general construction activities.	Fish catch and therefore fish revenue lowered due to impact of construction on fish habitats.	Construction activities phased over small areas at a time.	Fishing incomes and livelihoods.	Weekly throughout construction period.	Fish spawning and nursery grounds not heavily impacted.	Contractors / Client.
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
	The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.					
Dredging (including underwater blasting if necessary) and construction of breakwaters.	Potential impact to telecommunications (existing submarine cable landing sites and telecom towers).	Further engagement with GCT / various telecommunication companies to determine if a possible submarine cable landing site is in the area.	None proposed.	N/a	No submarine cable landing site in the project area.	GPHA.
Dredging (including underwater blasting if necessary).	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No health and safety incidents / complaints. No Stop Work Orders issued.	Dredging contractor.
Dredging (including underwater blasting if necessary)	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	Only Hydraulic Dredgers (CSD, or TSHD) will be used for vertical transport of dredged material. When using a TSHD the application of water jets will be delayed until the Drag Head is in contact with the seabed and the suction pump is running. The water jets will also be switched off before the dredge pump is disengaged and the draghead lifted off the seabed. When using a CSD the speed (revolution and swing) of the cutter and ladder will be carefully controlled in order to minimise the spillage (material that is cut but not sucked up by the suction pipe) by maintaining a balance between cutter speed and pump capacity. The cutter head / drag head selected will be suitable for the material likely to be encountered. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available. CSD / TSHD will be equipped with on-board systems for determining solids / water ratio or density of dredged material; and electronic positioning and depth control system for defining the location and depth of dredging. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Any TSHD that is used will have well maintained hopper seals / doors.	Regular inspections of vessels to be used for dredging works. Turbidity levels shall be monitored against background concentrations. Monitor and keep records of water quality characteristics and check compliance with regulatory limits. The number of complaints / incidents shall be monitored. Visual inspection.	Monthly reporting.	Vessel, plant and equipment log books are maintained and available for viewing. Turbidity levels against background concentrations. No water quality related complaints. No visual reduction in water quality. No indication of direct impacts on flora as a result of the dredging works.	Dredging contractor.
Dredging (including underwater blasting if necessary)	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on dredgers / support vessels will be appropriately trained and certified.	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers,	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm.	Dredging contractor.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
		Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.		Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	
Dredging (including underwater blasting if necessary)	Disruption of fishing including damage to fishing nets.	Conduct a standalone Fisheries Impact Assessment (FIA) and develop a Fisheries Management Plan (FMP). Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding dredger to be checked before commencing works to minimise risk of damaging fishing nets.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No incidents / complaints.	Dredging contractor.
Dredging (including underwater blasting if necessary)	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Investigation of any light, noise or general disturbance complaints Aural inspection of equipment for excessive noise.	Monthly.	No light, noise or general disturbance complaints shall be received. Complaint responded to within 24 hours and complaint resolved. Noise levels are in accordance with the equipment specification.	Dredging contractor.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	Develop a Dredging and Reclamation Management Plan. Dredged material will be tested and discharged accordingly. Suitable dredged material disposal site to be identified.	Use of tracers to investigate the fate of dredged material.	Following construction.	No evidence that disposed dredged material is re-entering the channel or harbour basin.	Port operators.
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	Develop a Dredging and Reclamation Management Plan. No mitigation measure proposed.	Monitoring of benthic infauna, zooplankton, phytoplankton, and chlorophyll a. Monitoring of fish catch assessments.	Monthly.	No negative impact upon commnuities of benthic infauna, plankton, or chlorophyll a. No negative impact identified in montoring of fish catch assessments.	Dredging contractors. Port operators.
Site reclamation works.	Suitable dredged material is due to be used for reclamation. This may have an impact upon surface water quality in the Keta Lagoon.	Develop a Dredging and Reclamation Management Plan. Dredged material will be tested and discharged accordingly.	Physico-chemical and biological monitoring of the Keta Lagoon.	Monthly.	No deterioration in water quality in the Keta Lagoon.	Dredging contractors. Reclamation contractors.
Site reclamation works.	Impact upon water resources and the hydrological cycle through the reclamation works and changes in surface cover.	Develop a Dredging and Reclamation Management Plan.				
Site reclamation works.	Suitable dredged material is due to be used for reclamation. Reclamation works may have an impact upon air quality by increasing the amount of particulate matter in the air which can have health and nuisance impact.	Develop a Dredging and Reclamation Management Plan. Rainbowing of dredged material shall not occur during periods of high wind. Dredged material will be promptly compacted. Implementation of a dust suppression system in the dry season e.g. regularly spraying construction sites and surrounding roads (unpaved and paved) with water to reduce dust levels. Sweeping of unpaved and paved roads to minimise dust and remove mud and debris. When carrying dusty materials vehicles shall be sheeted to prevent materials being blown from the vehicles whilst travelling. Speed of vehicles over any unpaved landscape will be controlled.	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Dredging contractors. Reclamation contractors.
Site reclamation works	Potential conflict with (capped) hydrocarbon exploration wells that are reportedly found in Keta area.	Identification of wells with the assistance of GNPC and members of the community.	Location of hydrocarbon exploration wells identified and confirmed to be outside the development area.	Prior to commencing reclamation works.	Location of hydrocarbon exploration wells identified and confirmed to be outside the development area prior to commencing reclamation works.	GPHA.
Supply of quarry and other construction materials and vehicles, machinery and equipment to the site.	The transportation of materials, equipment / machinery to site can increase traffic and contribute to congestion in the local communities and along the haul route which can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties. Increased noise and vibration from HGV transportation of equipment and materials which can disturb fauna as well as local communities and those along the haul route. Impact upon air quality (noxious gases / dust) from vehicle emissions in the local communities and along the haul routes.	Preparation and implementation of a Traffic Management Plan. Minimise movement at peak hours, only use approved routes, stick to speed limits. Materials and equipment will only be transported to the sites during the day, i.e., from 6am to 6pm. Regular and scheduled maintenance will be done on vehicles and other machines to reduce noise nuisance and emissions and the likelihood of breakdown along the roads. They will be checked and inspected prior to mobilisation.	Journey management records. Monitoring incidents on the roads. Visual inspections on enforcement of speed limits and traffic levels in the PACs. Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Periodic noise monitoring along the haul route.	Daily	No noticeable increase in congestion. Zero traffic related accidents / incidents. Traffic impacts resulting from carting of equipment and materials will be limited in line with the Traffic Management Plan to be prepared by the contractor for the movement of materials.	Contractor

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
		When carrying dusty materials vehicles shall be sheeted to prevent materials being blown from the vehicles whilst travelling.	Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles). Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery.			
Construction of breakwaters	Movement of the construction vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No health and safety incidents / complaints. No Stop Work Orders issued.	Marine works contractor.
Construction of breakwaters.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on construction vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels.	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Marine works contractor.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
		Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.				
Construction of breakwaters.	Disruption of fishing including damage to fishing nets.	Conduct a standalone Fisheries Impact Assessment (FIA) and develop a Fisheries Management Plan (FMP). Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding construction to be checked before commencing works to minimise risk of damaging fishing nets.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No incidents / complaints.	Marine works contractor.
Construction of breakwaters	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Development and implementation of a standalone Ecology Management Plan prior to construction, which is likely to include a detailed survey identifying all habitats and nesting sites of protected, endangered, and / or rare species that may be impacted by the Port of Keta. Based upon the detailed survey that will be conducted prior to construction specific measures should be implemented to mitigate against any loss of habitat.	Monitoring carried out in line with the standalone Ecology Management Plan. To monitor that the standalone Ecology Management Plan has been carried out and implemented prior to construction.	Standalone Ecology Management Plan developed prior to construction. Standalone Ecology Management Plan implemented prior to construction and maintained throughout.	Mitigation measures and commitments are properly maintained and implemented.	Contractor / consultant.
Construction of breakwaters.	Noise, light and general disturbance from the marine works operations causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Monthly.	No light, noise or general disturbance complaints shall be received. Complaint responded to within 24 hours and complaint resolved. Noise levels are in accordance with the equipment specification.	Marine works contractor.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	The increased noise and vibration can have a negative impact upon both humans and fauna and can be both a nuisance and a health impact.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used. Low-noise equipment shall be used wherever possible.	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Investigation of any noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Before construction works.	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles.	Contractors.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Contractors.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
Installation of cargo handling and berthing furniture.		so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Visual inspection for black smoke from exhausts.			
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for other statutory bodies and administration. Installation of cargo handling and berthing furniture.	Negative impact upon air quality from the generation of particulate matter during construction activities.	Minor impact - no mitigation measure proposed.	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Contractors.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation. This can be both construction wastewater, and domestic wastewater produced by the construction workers. Construction wastewater can contain sediment, cement, and other pollutants, while domestic wastewater can have elevated BOD, COD, and can contain oils along with other pollutants.	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity.	Physico-chemical and biological monitoring of the Keta Lagoon. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Civil, concrete, and paving works for the construction of quay wall, terminals, berths, SEZ etc. and the construction of buildings, port offices, and offices for statutory bodies and administration. Installation of cargo handling and berthing furniture.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.	Physico-chemical and biological monitoring of nearby waterbodies. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction and installation of utility facilities especially water and electricity services.	Potential temporary impact to the provision of utility services to PACs (i.e., power outages, damage to the power network / equipment).	Development of a dedicated substation for the port to prevent an overload on the community. The substation capacity should factor in all industries that would be cited in the port. ECG to be kept informed of progress and if a power outage is to be caused by the construction activities they would need at least 72 hours' notice.	The number of power outages caused by the port development will be monitored.	Continually throughout the construction period.	No unplanned power outages caused by the port development.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction / upgrade of port access roads.	Negative impact upon climate change and air quality from gaseous emissions from vehicles, machinery, and equipment operation during the construction works.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Visual inspection for black smoke from exhausts.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Contractors.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Construction Phase						
Construction / upgrade of port access roads.	Negative impact upon air quality from the generation of particulate matter during construction activities.	Minor impact - no mitigation measure proposed.	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	Contractors.
Construction / upgrade of port access roads.	Wastewater generated during construction could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	Management of aqueous discharges and waste.	Physico-chemical and biological monitoring of the Keta Lagoon. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	Monthly monitoring throughout the construction period. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction of rail systems.	The feasibility of a railway line to Keta and the Port of Keta are interdependent of one another. At present there is no railway line near to Keta. Therefore, the development of any railway line connection to Keta (for example, from a branch line at Kpong) would need to be subject to its own environmental and social assessments. Due to the scale of such a project, there would likely be large magnitude impacts, sensitive / vulnerable receptors, and therefore major impacts.	Standalone environmental and social assessments would be required for the construction of a rail system to link with Ghana's railway network. Appropriate mitigation measures would be identified through these assessment processes.	None proposed - to be developed as part of standalone environmental and social assessments.	N/a	N/a	Ghana Railway Development Authority (GRDA).
Construction of sea lock to the Keta Lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) and ecolgy which may be protected, rare, endangered or provides important ecosystem services. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.), the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services that the Keta Lagoon provides.	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	Physico-chemical and biological monitoring of the Keta Lagoon.	Monthly monitoring throughout the construction period.	No deteoriation in water quality in nearby waterbodies.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Construction of sea lock to the Keta Lagoon.	When the sea lock is constructed, it is planned to close the existing floodgate on the causeway as the sea lock will be designed to allow water to be released from the Keta Lagoon to the port basin. As the two locations are different, the sea lock may not provide the same flood protection as the floodgates.	Detailed study on the impact upon flood control functionality to be undertaken as part of the design of the sea lock to the Keta Lagoon. If found to be necessary to achieve the same level of flood protection the existing flood gates could be left operational.	None proposed.	N/a	N/a	Contractor / Sea Lock Design Consultant.

Table 10-3 - Operations

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
Port operations impact upon the shoreline, and ongoing impact upon ecology.	Destruction and loss of habitat of nesting site for turtles, manatee, reptiles, fish, birds and other species, some of which are protected, endangered, or rare.	Ongoing implementation of the standalone Ecology Management Plan which will need to be developed prior to construction.	Monitoring carried out in line with the standalone Ecology Management Plan.	Standalone Ecology Management Plan implemented and maintained throughout	Mitigation measures and commitments are properly maintained and implemented.	Port operator.
Population Influx, acculturation and loss of cultural identity and language of the local amenities.	The influx of migrant workers and populations seeking opportunities in the project area communities may come with attendant consequences of changing lifestyles, dilution of local culture practices, traditions, norms, value systems and language. Changing economic opportunities and livelihoods may affect locals who do not have the skills to integrate into the new economy. This may be attended with high standards / high cost of living, pushing local populations and the vulnerable further into poverty. Pressure on public infrastructure, social amenities, housing, among others	Engage and partner with local government / traditional authorities on issues, risks and opportunities regarding population influx Sensitize migrant workers on codes of conducts, and steps to integrating into local communities, with due regard for local customs and traditions. Utilities such as water, electricity, waste management, public parks, etc. that may come with the port city should be equally extended to the project communities. Livelihood opportunities, including facilitation of skills training for local youth should be prioritized.	Develop and implement a comprehensive population influx plan over a period of 10 years during the operational phase of the port with periodic annual reporing.	According to the population influx plan.	Provision of social infrastructures and amenities, social and cultural awareness programs and mass media education / sensitization.	GPHA, KeMA, Traditional Authorities.
OHS concerns and labour issues	Workers exposed to risks such as fire, hazards from operation of equipment, haulage, accidents from falling objects, forklift accidents, collisions, etc. Unhygienic working conditions, discriminatory practices, forced labour, and engagement of child labour by third party service providers may trigger labour rights concerns. Poor waste management significantly affecting safety and health in the workplace. Excessive speed incidents, accidents and road traffic situations. Workplace conflicts, labour agitations and unrests. Forced and child labour, SEA, discriminatory practices, resulting in social and labour conflicts. Potential traffic incidents / accidents on the public / community roads from transportation of material, equipment / machinery, traffic congestions. Unattended broken vehicles / trucks, road rage, etc. Electrocution and fire risks from welding works may also occur. Security / threats and human right abuses - theft of project property, human right abuse of trespassers by project site security personnel, robberies, etc. Improper handling of hazardous materials posing health risks to workers. Exposure to dangerous reptiles, snakes and other animals. Capsized boats, and risks of drowning.	Maintain high standards of OHS and environmental protection at the port to comply with relevant national and international laws and regulations on OHS. Maintain safe and healthy work place for all workers to guarantee incident and injury-free working environments. Prevent occupational related diseases / illness among workers; and promote and maintain a clean, healthy and hygienic environment. ppropriate speed limits should be instituted, observed and enforced. Safe exit points, fire extinguishers and sprinklers should be placed at vantage points. Security at the port must be maintained to ensure only authorized persons are allowed into the construction area. Develop an OHS Plan to international standards, including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc. Educate workers on health and safety policy. Train selected workers as first aid givers and provide adequate first aid kits. Promptly refer severe cases to Keta Hospital, etc. Ensure that well-trained workers are engaged. Operate the harbour in compliance with environmental, social, health and safety laws, regulations and policies.	Periodic reporting on compliance with OHS safeguard measures, incident reporting. Periodic port supervisions by regulatory institutions.	Periodic reporting.	Designated assembly points, periodic emergency preparedness trainings / drills for users of facilities. Develop and implement a Human Resource Policy and Plan that adheres to the requirements of IFC PS2, ILO Conventions on Labour and Human Rights including requirements for workers to have contracts, Workers Grievance Mechanism and develop retrenchment plans if there is a requirement for collective dismissals and all in compliance with the Ghanaian Labour Act.	GPHA / PoK operators.
Public health & safety issues - workers and communities	Population influx during the beginning of the operation period may result to increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs. The	Collaborate with the Keta Municipal Assembly (KeMA) / GHS for awareness for all workers and the general public on the behavioural changes required to prevent the spread of HIV / AIDS and other STDs.	Develop and implement a comprehensive population influx plan as well as public health awareness programs for a period of 10	According to the population influx plan.	Social and sanitation infrastructure, and set public health milestones	GPHA / KeMA.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
	impact may be permanent or irreversible in nature. Open defecation is rampant at the beaches across all communities. Dumping of solid waste along the lagoon coast is also commonplace. Poor sanitation conditions may further pollute the environment and communities. Potential for traffic incidents / accidents on the public / community roads may be increased. Sewerage and wastewater from the port facilities and an ever-increasing population, posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks).	Provide adequate public toilet facilities and solid waste management systems for host communities. Provide security installations such as the police service in the project communities to help manage traffic congestion when the need arises. Build mini sewerage treatment plants for liquid waste treatment and disposal, as well as solid waste management systems and landfill sites.	years during the operational phase of the port with periodic annual reporing.			
Community safety and general disturbance of PACs.	Accidental events such as boats colliding and capsizing on the sea and lagoon, drownings due to the depth of the dredged lagoon and impact on nearby properties and ecology. Increased flooding of project communities due to population pressure and changing landscape and land use. Restricted access to security zone installations, affecting livelihood activities such as salt mining, fishing, eco-tourism, etc.	Build integrated drainage systems for communities in the catchment areas of the port to help mitigate any flooding situations. Structural plans being developed under an SDF (Spatial Development Framework) for Ketu South, Anloga and Keta in should be adopted and integrated into port development. Rescue equipment and support should be provided as part of port operation activities. Provide training to local fishermen on how to undertake rescue activities on the sea / lagoon. Engage community liaison officers to ensure all port operation activities are in sync with project communities – with clearer awareness of security zones, safety zones etc.	Develop and implement a comprehensive population influx plan over a period of 10 years during the operational phase of the port with periodic annual reporing.	According to the population influx plan.	According to the population influx plan.	GPHA / KeMA
Waste management / disposal and impact on the work environment and communities.	Waste such as scrap metals, wood, concrete debris and garbage (pieces of plastic bags, food wrappers, etc.) would be generated. Sewerage and wastewater from workers camp posing risks to the environment if not treated prior to discharge (either by on-site treatment or removal for disposal via local sewage network or septic tanks.)	Ensure proper management and disposal of waste generated and continue to educate workers on its waste management plan. Appoint a waste management coordinator to prepare and implement a Waste Management Plan (WMP) to specify procedures to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Ensure proper treatment and safe containment of sewerage via septic tanks or discharge to designated sites.	Records of the quantities of wastes generated, recycled and disposed. Periodic reporting on compliance by dedicated safeguards team.	Monthly.	National laws, regualtions and policies on the environment and public health, complemented by other international performance standards, conventions and practices.	Contractor / consultant.
Maintenance dredging of the port basin and access channel.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. The possible effect of the dredging area acting as a littoral sink and preventing littoral material from passing alongshore causing erosion on the down drift side.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment.	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
	The project would increase water depth. Tidal current speeds would be changed as a result, but these would be barely perceptible.					
Maintenance dredging of the port basin and access channel.	Movement of the dredger / support vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. Work only carried out during favourable weather conditions. Final work schedule developed in consultation with stakeholders to minimise disturbance. All navigational / communication equipment in good working order. Other vessels warned of activities as necessary / appropriate. Emergency procedures are in place / carried out in case of incident. Create navigational exclusion zone around dredgers. Navigational charts updated.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No health and safety incidents / complaints. No Stop Work Orders issued.	Dredging contractor.
Maintenance dredging of the port basin and access channel.	The turbidity caused by the agitation, raising, overflow and disposal of dredged material.	Only Hydraulic Dredgers (CSD, or TSHD) will be used for vertical transport of dredged material. When using a TSHD the application of water jets will be delayed until the Drag Head is in contact with the seabed and the suction pump is running. The water jets will also be switched off before the dredge pump is disengaged and the draghead lifted off the seabed. When using a CSD the speed (revolution and swing) of the cutter and ladder will be carefully controlled in order to minimise the spillage (material that is cut but not sucked up by the suction pipe) by maintaining a balance between cutter speed and pump capacity. The cutter head / drag head selected will be suitable for the material likely to be encountered. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available. CSD / TSHD will be equipped with on-board systems for determining solids / water ratio or density of dredged material; and electronic positioning and depth control system for defining the location and depth of dredging. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Any TSHD that is used will have well maintained hopper seals / doors.	Regular inspections of vessels to be used for dredging works. Turbidity levels shall be monitored against background concentrations. Monitor and keep records of water quality characteristics and check compliance with regulatory limits. The number of complaints / incidents shall be monitored. Visual inspection.	Monthly reporting.	Vessel, plant and equipment log books are maintained and available for viewing. Turbidity levels against background concentrations. No water quality related complaints. No visual reduction in water quality. No indication of direct impacts on flora as a result of the dredging works.	Dredging contractor.
Maintenance dredging of the port basin and access channel.	The use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	All crew on dredgers / support vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use.	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment.	Dredging contractor.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
		Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.		All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	
Maintenance dredging of the port basin and access channel.	Disruption of fishing including damage to fishing nets.	Final work schedule developed in consultation with stakeholders to minimise disturbance. Identify in-situ fishing nets and remove before works commence. Area surrounding dredger to be checked before commencing works to minimise risk of damaging fishing nets.	The number of incidents / complaints will be monitored.	Weekly inspection of works.	No incidents / complaints.	Dredging contractor.
Maintenance dredging of the port basin and access channel.	Noise, light and general disturbance from the dredging operations causing loss / disturbance of flora and fauna.	All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Noisy operations shall be scheduled to avoid sunset and sunrise. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Daily during dredging operations.	No light, noise or general disturbance complaints shall be received. Complaint responded to within 24 hours and complaint resolved. Noise levels are in accordance with the equipment specification.	Dredging contractor.
Disposal of dredged material.	Suitable dredged material is due to be used for reclamation. Unsuitable material will need to be disposed of appropriately to avoid material re-entering the channel and harbour basin and to reduce the impact upon flora and fauna (through smoothing of bottom biota, habitat loss etc.)	Dredged material will be tested and discharged accordingly. Suitable dredged material disposal site to be identified.	Use of tracers to investigate the fate of dredged material.	Following construction.	No evidence that disposed dredged material is re-entering the channel or harbour basin.	Port operators.
Dredging and disposal of dredged material.	Dredging operations causing an impact to flora and fauna.	No mitigation measure proposed.	Monitoring of benthic infauna, zooplankton, phytoplankton, and chlorophyll a.	Prior to, during, and following maintenance dredging operations.	No negative impact upon commnuities of benthic infauna, plankton, or chlorophyll a. No negative impact identified in montoring of fish catch assessments.	Dredging contractors. Port operators.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
			Monitoring of fish catch assessments.			
Physical presence of the breakwaters.	Change in natural sediment deposition / shoaling. Change of local flow patterns together with associated scouring / siltation. Constructing the main breakwater is expected to prevent littoral material movement along the coast. In the long term this may cause erosion on the downdrift side (Denu, Blekusu, onwards to Aflao) but lead to sediment accretion on the upstream side for sediment transport (i.e., areas on the coast to the south-southwest) and helping with land reclamation.	Consideration given to disposing suitable dredged material on the down drift side of the port to provide material for beach nourishment. *(WRC, Hydrological Services Authority and Ministry of Environment, Science and Technology, are currently in discussion to identify a suitable location to pilot a Sand Motor / Building with Nature project).*	Shoreline monitoring.	Yearly.	Extent of any erosion on the down drift side of dredging.	Port operator.
Physical presence of the breakwaters.	Potential negative impact on coastal flooding events.	No mitigation measure proposed - it is believed that constructing the Port of Keta will not influence coastal flooding events.	None proposed.	None.	No increase in the frequency or magnitude of coastal flooding events	None.
General port operations.	Conflict between merchant and fishing vessels; and between industrial and artisanal fishing vessels.	Sensitisation for coexistence. Spatial arrangements to contain each group of vessels.	Numbers of conflicts occurring and numbers resolved	Weekly and throughout first year of operation	Numbers of conflicts effectively prevented and resolved	Client / Leadership of fishers.
Movement of vessels.	Movement of vessels and the disturbance of fishing and consequent risk of collision.	All crew on vessels will be appropriately trained and certified. All navigational / communication equipment in good working order. Emergency procedures are in place / carried out in case of incident. Vessel Traffic System (VTS) implemented to communicate information (such as MetOcean conditions) to vessels. Navigation Simulation Study (NSS) conducted to allow pilots to practice ship handling procedures to help ensure the safety of navigation. Navigational charts updated.				
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Movement of vessels and the use of plant and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column.	Development of an Oil Spill Contingency Plan (OSC). All crew on construction vessels will be appropriately trained and certified. Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels from support vessels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water.	The number of incidents / complaints will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Port operators.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
		Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with 'dry coupling', will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	appropriate to the level of risk.			
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Noise, light and general disturbance from the movement of vessels and the use of equipment causing loss / disturbance of flora and fauna.	Develop an Ecology Management Plan. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Silencers / mufflers shall be used on equipment where possible. Crew will be well experienced, appropriately trained and certified including in the use of any control and monitoring systems that are available.	Investigation of any light, noise or general disturbance complaints. Aural inspection of equipment for excessive noise.	Monthly.	No light, noise or general disturbance complaints shall be received. Noise levels are in accordance with the equipment specification.	Port operators.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon climate change and air quality from gaseous emissions from vessels, vehicles, machinery, and equipment operation.	Regular and scheduled maintenance will be done on vehicles, generators, and other machines to reduce noise nuisance and emissions. They will be checked and inspected prior to mobilisation. Vehicles, generators, and other machines shall be switched off when not in use (and safe to do so). This includes ensuring all vehicles switch off engines when stationary - no idling vehicles. Only skilled personnel and certified equipment will be used.	Records of maintenance and repair are kept and are available for viewing. The records cover vehicles, generators, and other machinery. Visual inspection for black smoke from exhausts.	Daily	Vehicles, generators, and other machines are switched off when not in use. No idling vehicles. No black smoke can be observed from exhausts.	Port operators.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	Negative impact upon air quality from the generation of particulate matter from exhausts of vessels, vehicles, machinery, and equipment.	Minor impact - no mitigation measure proposed.	Monitoring of particulate matter in accordance with regulatory requirements.	Monthly monitoring. Constant visual inspection.	No deterioration in ambient air quality monitoring results.	Port operators.
Wastewater and sewage treatment and disposal.	Wastewater generated could impact on the water quality of the Keta Lagoon, which can have a consequent impact upon aquatic ecology. It may also impact upon the shallow groundwater used by the communities in the dry season for irrigation.	Management of aqueous discharges and waste. Secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the total storage capacity, or 25% of the total storage capacity. Port reception facility provided.	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent producedin line with EPA requirements. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Movement of vessels and the use of equipment for cargo loading / offloading and handling.	The Keta Lagoon and shallow groundwater may be impacted by water pollution caused by fuel spills, and transport of storm-runoffs from the site with its consequent impact on aquatic life / water ecology.	Establish and maintain a controlled fuelling, maintenance, and servicing protocol for construction machinery at the worksite to minimize leaks and spills. A Spill Prevention and Response Plan shall be developed.	Physico-chemical and biological monitoring of nearby waterbodies in line with EPA requirements.	Monthly monitoring throughout the construction period. Site inspections completed daily	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Contractors carrying out construction works. Consultants carrying out

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
		Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. The outflow from any drainage grooves and settlement ponds will be regularly inspected. Management of aqueous discharges and waste.	Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. Contractors HSE Inspection Reports. Construction Supervision Progress Reports.	throughout the construction period. Weekly reports.		construction supervision.
Operation of sea lock to the lagoon.	Will impact the physico-chemical conditions in the Keta Lagoon (i.e., salinity) and ecolgy which may be protected, rare, endangered or provides important ecosystem services. Whilst there is some evidence to suggest this may be beneficial for some fishing activities (crustaceans - crabs, shrimps etc.) due to the easy flow of water between the sea and the Keta Lagoon contributing positively to fishing livelihoods, the overall impact upon the Keta Lagoon may be negative and likely to be irrreversible. This could include an impact, for example, upon natural salt production, cleansing function of the Keta Lagoon, and other ecosystem services.	Detailed study on the impact upon the physico-chemical conditions and ecology of the Keta Lagoon to be undertaken as part of the design of the sea lock to the Keta Lagoon (planned to be developed during Phase 2). Mitigation measures to be incorporated into the detailed design of the sea lock.	Physico-chemical and biological monitoring of the Keta Lagoon.	Monthly monitoring throughout the construction period.	No deteoriation in water quality in nearby waterbodies.	Contractors carrying out construction works. Consultants carrying out construction supervision.
Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment.	Storage and dispensing of fuel and other chemicals to vessels, vehicles, machinery, and equipment poses a risk of spills of fuels, oils and chemicals potentially leading to suspension of toxic, harmful substances in the water column and sediments (harbour basin and Keta Lagoon).	Development of an Oil Spill Contingency Plan (OSC). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. All plant and equipment will be well-maintained and inspected prior to and periodically during use. Implement protocols for transfer of fuels. Have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum. Where possible conduct refuelling during daylight hours and in favourable weather conditions. Close scuppers on vessels to ensure any contaminants on deck are not discharged into the surface water. Apply industry standard for storage and handling of fuels and chemicals (e.g. bunding). Transfer hoses fitted with ‘dry coupling’, will be fit-for-purpose, not outside design life limits and regularly checked for damage to prevent leaks. Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times, including on small vessels. Contain on board spills and clean-up immediately. Risk assess activities involving hazardous substances.	The number of incidents / will be monitored. Visual inspection of storage areas, containers, transfer hoses and valves for fuel / lubricants / hydraulic fluids. Review of inventory of chemicals and MSDS. Regular visual environmental inspections shall be carried out. Regular checks of equipment to check for evidence of leaks / defects as well as conduct maintenance or repairs as necessary to prevent drips, leaks and equipment failures. Audits are carried out to ensure vessels carry response equipment that is appropriate to the level of risk.	Monthly.	No incidents involving hazardous substances that cause or have the potential to cause serious or material environmental harm. Chemicals are correctly stored and no visual evidence of leaking equipment / damaged equipment. All hazardous materials are in the inventory and all MSDS are available. No noticeable pollution e.g. oil sheen in water. Logs of checks, maintenance and repairs of equipment. The spill kits are well stocked and accessible by all crew.	Port operators.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
		Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.				
Trucks and other vehicles visiting the port.	The port will significantly increase traffic volumes in the project communities and surrounding road network. This can cause congestion which may bring delays, can cause stress and can also contribute to incidents / accidents on roads which can cause loss of life, injury and / or damage to vehicles and properties.	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Visual observations of congestion levels. The number of incidents / accidents in the PACs will be monitored. The number of complaints will be monitored.	Continually	Zero traffic related accidents / incidents / complaints in the PACs.	Port operators.
Trucks and other vehicles visiting the port.	Increased traffic volumes will cause a quicker deterioration of the road surface, which can further impact congestion and incidents / accidents on the roads.	Provision of a mandatory weighbridge to ensure that overweight vehicles do not leave the port. Access roads improved.	Visual observations of the road surface in the main access roads. Number of overweight vehicles not permitted to leave the port.	Continually	No overweight vehicles are permitted to leave the port.	Port operators.
Trucks and other vehicles visiting the port.	The increased movement of trucks and other vehicles will result in increased noise and vibration and contribute to a reduction in air quality in the project communities and communities along the surrounding road network, this can have a negative impact on people in these areas. This can be both a nuisance (affecting peaceful resting and relaxation of people) and can have a health impact (stress, hearing challenges, etc.).	Access roads improved. Development and implementation of a Traffic Management Plan including the requirement to only use approved routes, stick to speed limits. Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks.	Periodic sound level monitoring in the PACs and along the main access routes.	Quarterly	Sound levels are within the limits set by GSA.	Port operators.
Trucks and other vehicles visiting the port.	Trucks parking overnight / for extended periods in an informal manner (i.e., along the roadside) with drivers sleeping in their trucks can have a negative impact upon PACs through improper disposal of sanitary waste / increased open defecation at the beaches, improper disposal of solid / liquid waste (litter), increased sexual behaviour which could lead to teenage pregnancies HIV / AIDS and other STIs.	Truck park with a rest area and washrooms to reduce issues with drivers sleeping in their trucks. Effective scheduling system for truck port entry.	Visual inspections of trucks parking overnight in an informal manner with drivers sleeping in their trucks.	Continually	No reports of drivers sleeping in their trucks in PACs or alongside port access roads.	Port operators.
Provision of security in and around the port.	Local and national safety & security concerns (crime, terrorists, piracy, stowaways).	Robust Security Plan developed including ensuring security at anchorage. Proper ongoing engagement with the communities. Proper spatial planning (ecotourism, ecoparks, etc.). Port Facility Security Assessment to identify vulnerabilities, develop a Port Facility Security Plan. MOC to be developed, in addition to an Incident Management Centre. CSR activities undertaken to ensure communities feel a positive impact. Restricted access to security zone and compliance with ISPS.	Monitoring safety and security incidents.	Continually	No increase in the number of safety and security incidents related to port operations in Ghana.	Marine police. Ghana navy. Port operators.
Ship waste handling	Sewerage and wastewater (including hazardous) from the port facilities (and an ever-increasing population), posing risks to the environment potentially leading to suspension of toxic, harmful substances in the water column with a consequent impact on aquatic life / water ecology and the local population if not treated properly prior to discharge (either by	Port reception facility provided.	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. Regular site inspections to ensure that mitigation	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.

Activity / Issue	Impact	Mitigation Measures	Monitoring	Frequency / Timeframe	Performance Criteria	Responsibility
Operations						
	on-site treatment or removal for disposal via local sewage network or septic tanks).		measures and commitments are properly maintained and implemented.			
Stormwater management activities	There is potential for stormwater collected from the port and surrounding environment to contain pollutants (as a result of the storage of cargo and containers, stockpiling of bulk (solid and liquid) materials, and the maintenance of equipment / machinery / general port facilities, and the handling of hazardous waste and materials including waste oil) which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	Treatment of stormwater prior to release to the environment. A Spill Prevention and Response Plan shall be developed (including an OSCP). Personnel will be trained in safe handling of harmful substances and procedures in place; including the use of funnels and drip pans. Secondary containment systems will be constructed with materials appropriate for the materials being contained and adequate to prevent loss to the environment (e.g. bunding). Have at hand spill kits (containment and clean up material (e.g. absorbent)) at all times. Establish and maintain a controlled fuelling, maintenance, and servicing protocol to minimize leaks and spills. Where required, temporary drainage grooves will be installed and, if required settlement ponds, for the collection of surface water runoff. Ensure chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Store chemicals, fuels and oils in accordance with MSDS requirements as a minimum and have in place Material Safety Data Sheets (MSDS) for all chemicals reviewed for Health, Environment and Safety (HES) requirements prior to purchase. Regular maintenance of work areas, storage areas, transfer equipment and spill equipment.	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. Regular site inspections to ensure that mitigation measures and commitments are properly maintained and implemented. The outflow from any drainage grooves and settlement ponds will be regularly inspected.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.
Stockpiling of bulk materials.	There is potential for stormwater collected from the port and surrounding environment to contain pollutants as a result of the stockpiling of bulk materials which if released untreated may have a negative impact upon marine and Keta Lagoon water quality.	Treatment of stormwater prior to release to the environment (including from iron ore stockpiles).	Physico-chemical and biological monitoring of the Keta Lagoon. Physico-chemical and biological monitoring of wastewater / effluent produced. The outflow from any drainage grooves and settlement ponds will be regularly inspected.	Monthly monitoring. Site inspections completed daily throughout the construction period. Weekly reports.	No deteoriation in water quality in nearby waterbodies. Mitigation measures and commitments are properly maintained and implemented.	Port operators.
Stockpiling of bulk materials.	Negative impact upon air quality (particulate matter) from wind distributing stockpiled bulk materials to the surrounding environment causing an impact to water quality, having a nuisance effect, and an impact upon human health.	Appropriate stockpile suppression methods to be implemented dependent upon the stockpiled material. Stockpiled materials to be covered during periods of high winds.	Monitoring of particulate matter in the dry season in accordance with regulatory requirements. Visual inspection of any dust generated in the surrounding environment (road surfaces, vegetation, vehicles).	Weekly monitoring throughout the dry season. Constant visual inspection.	No visible dust plumes generated. No deterioration in ambient air quality monitoring results.	

11. Conclusion

This Environmental Impact Assessment Report / Environmental Impact Statement for the EIA of the Port of Keta Project has been carried out in line with the Environmental Assessment Regulations, 1999 (LI 1652). The major potential environmental and socio-economic issues and impacts have been identified and duly assessed.

GPHA will ensure that the project is implemented in line with all the relevant national policies, laws, and standards to enhance the intended benefits of the Port of Keta Project and reduce potential negative impacts to acceptable levels, whilst enhancing the positive impacts.

The successful implementation of the Port of Keta Project will significantly improve the socio-economic well-being of the region by acting as a trigger to stimulate economic development in the area.

Additionally, some other potential benefits may include:

- Providing physical protection from erosion to the coastline.
- Providing additional capacity to correspond with the anticipated increase in import and export volumes based on anticipated volumes of seaborne trade. This is expected due to Ghana's socio-economic development as well as population growth.
- Reducing the distance travelled by road for goods imported / exported from the Eastern Corridor (e.g., salt / salt products, clinker, fertilisers).
- Providing stimulus for potential industries located close to the port (This could support developing clusters, including a fishery cluster, agriculture cluster, shipyard / vessel recycling cluster, and energy cluster).
- Improving shipping efficiency for shippers.
- Increased revenue, opportunity for the economy and general local and government services through export and import activities and other port businesses and clustering activities.
- Direct and indirect employment generation and opportunities.
- Create an avenue for increased production and export of existing products in the area such as salt, fish, tomatoes, etc., thus creating increased business opportunities for the locals and investors / entrepreneurs.
- Revive and promote tourism in the area.
- Facilitate and improvement of infrastructure in the project area as electricity, water, sewage, road, rail, etc., will be improved or constructed as part of the port development.
- Improvement in local and national economies and opening the eastern section of the country for more development and business opportunities and will lead to improvement in the socioeconomic life of the people.
- Create opportunities for hinterland or landlocked countries such as Burkina Faso, Niger and Mali to use the Port of Keta instead of Tema Port due to the reduction in transportation cost of goods using the Eastern Corridor.
- Accretion at the western edge of the breakwater leading to useful reclamation of lands.

Mitigation and management measures for the identified impacts have been proposed for the preparatory / preconstruction, construction, and operations phases in order to minimise significant adverse effects and enhance the positive impacts. A monitoring programme to help detect changes arising from the predicted adverse impacts has also been prepared and incorporated into a Provisional Environmental Management Plan.

12. References

Addo, K.A., Nicholls, R.J., Codjoe, S.N.A., and Abu, M.A. (2018) Biophysical and Socioeconomic Review of the Volta Delta, Ghana. *Journal Coastal Research*. 2018, 345, pp.1216–1226.

Agyekumhene A. (2009) *Nesting Ecology, Hatching Success and Management of Sea Turtles in Ada Foah, Ghana*. M. Phil. Thesis. University of Ghana, Legon, 2009.

Agyekumhene, A., Arjuna, E., Abule, C., Dah, A., Dossou-Bodjrenou, J., Adegbile, O., Formia, A., and Tiwari, M. (2023) Guiding Framework to Address Sea Turtle Poaching in a Local Community: A Case Study from Ghana. In: M. Tiwari (Eds.) *African Journal of Sea Turtle Biology and Conservation*. 1 (2023) pp. 46.

Agyekumhene, A., Yankson, P., Stemle, L., and Allman, P. (2021) Sea Turtle Nesting Activity in Ghana, West Africa. *Chelonian Conservation and Biology.* 20 (2) pp. 273–280. doi: https://doi.org/10.2744/CCB-1487.1.

Akrasi, S.A. (2011). Sediment Discharges from Ghanaian Rivers into the Sea. *West African Journal of Applied Ecology*. 18, pp. 1-13.

Amatepkor J. (1997) *Soils and Land use in the Lower Volta Mangrove Project Area*. Technical Report No. 8. Series Editor: Gordon C. DFID / Ghana Wildlife Department / EPA. 37p.

Amedekey, B. (2021). *An Archaeology of African and German Interactions at Adaklu-Waya, Volta Region.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

American Public Health Association (APHA) (1998) *Standard Methods for the Examination of Water and Wastewater* (20th ed.). Washington, DC: American Public Health Association.

Ameyaw-Akumfi. C., Attuquayefio, D., Amakye, J, Dankwa, H. and Nyame. S. (1998). *Ghana National Wetland Faunal Diversity Information Study*. Coastal Wetlands Management Project Report. 66p

Amiteye, B.T. (2002) *Distribution and Ecology of Sea Turtles in Ghana*. M. Phil. Thesis. University of Ghana, Legon, 2001.

Angnuureng, B., Appeaning Addo, K., Wiafe, G. (2013). Impact of Sea Defence Structures on Downdrift Coasts: The Case of Keta in Ghana. *Academia Journal of Environmental Sciences.* 1(6), pp. 104-121.

Anloga District Assembly (2020) *Background of the Anloga District*. [Online] Available at: https://anda.gov.gh/ova_doc/tourism/ (Accessed 17 May 2024).

Anquandah, J. R. (1982). *Rediscovering Ghana's Past*. Harlow, Essex and Accra: Sedco and Longman.

Anzecc, A. (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, 1, pp. 1-314.

Apoh, W. and K. Gavua. (2016). "We Will Not Relocate until Our Ancestors and Shrines Come with Us." Heritage and Conflict Management in the Bui Dam Project Area, Ghana. In Peter Schmidt, and Innocent Pikirayi (eds), Community Archaeology and Heritage in Africa: Decolonizing Practice. Pg 204-249. Routledge

Apoh, W., K. Wissing W., Treasure, and J., Fardin. (2017). Law, Land and What Lies Beneath: Exploring Mining Impacts on Customary Law and Cultural Heritage Protection in Ghana and Western Australia. *African Identities*. 15(4), 367-389. Francis Taylor

Armah, A.K., and Amlalo, D.S. (1998) *Coastal Zone Profile of Ghana: Accra*, Gulf of Guinea Large Marine Ecosystem Project. Accra: Ministry of Environment, Science and Technology.

Atorkor Development Foundation (c2024) *About Atorkor*. [Online] Available at: https://www.adfatorkor.org/about-atorkor/ (Accessed 17 May 2024).

Ayipey, P. (2016). *A Preliminary Archaeological Investigation of Mountain Agbenu, Abutia, Ghana.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Biney C. deGraft-Johnson, K. and Opoku. A. (1995) *The State of Wetlands in Ghana.* Institute of Aquatic Biology. Technical Report No. 144, pp. 13.

Boateng (2009) *Development of Integrated Shoreline Management Planning: A Case Study of Keta*. Ghana FIG Working Week, 2009 Surveyors Key Role in Accelerated Development Eilat, Israel, 3-8 May 2009.

Boateng, Bray, M. Hooke, J. (2012). Estimating the Fluvial Sediment Input to the Coastal Sediment Budget. A Case Study of Ghana. *Geomorphology.* 138 (1), pp. 100-110.

Bolle, A., das Neves, L., and Rooseleer J. 2015. Coastal protection for Ada, Ghana: a case study". In: Proceedings of the Institution of Civil Engineers - Maritime Engineering 168.3, pp. 125–133.

Brinkhoff, T. (c2024) *City Population: Keta Municipal.* [Online] Available at: https://www.citypopulation.de/en/ghana/admin/volta/0402__keta_municipal/ (Accessed 14 May 2024).

CLS France (2023) *Global Ocean L3 Significant Wave Height from Reprocessed Satellite Measurements*. [Online] Available at: https://data.marine.copernicus.eu/product/WAVE_GLO_PHY_SWH_L3_MY_014_00 (Accessed 03 November 2023).

Coastal Wetland Management Project (2021) *Report* (Unpublished).

Cornille, O., Patry, M., Piche, A., Pigeon, J. (2021) *Environmental Impact Statement (EIS) Pwalugu Multi-Purpose Dam Project (PMDP)*. P.015214-RP-02-Rev 03.

Dankwa, H.R., Agyakwah, S.K., Agbogah, K., Kolding, J., Abban, E. K., and Amerdome, E. (2014) Catch Composition and Efficiency of Major Fishing Gears Used in Stratum II of the Volta Lake - Implications for Managing the Fisheries. *Ghana Journal of Science*, 54, pp. 83-92.

Danyo, O. (2006). *A Study of The Early Settlement History of Vume Dugame*. (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Davies, O.A. (2009) Spatio-Temporal Distribution, Abundance and Species Composition of Zooplankton of Woji-okpoka Creek, Port Harcourt, Nigeria. *Research Journal of Applied Sciences, Engineering and Technology*, 1(2), pp. 14-34.

Davies, O.A., and Otene, B.B. (2009) Zooplankton Community of Minichinda Stream, Port Harcourt, Rivers State, Nigeria. *European Journal of Scientific Research*, 26(4) pp. 490-498.

Deacon, J. (1993). Archaeological Sites as National Monuments in South Africa: A Review of Sites Declared since 1936. *South African Historical Journal*, 29: 118-31

Deltares (2016) *Human Interventions and Climate Change Impacts on the West African Coastal Sand River. A Preliminary Quantitative Assessment*. Deltares Report, Delft, The Netherlands.

Derbu V. (1985) *Engineering Review and Recommendations for Solving the Keta Sea Erosion Problem*. Report Dorbu and Associates, Clairton, Pennsylvania. 47pp.

Dogbey, V. S. (2015). *Historical Archaeology of German Colonial Heritage at Ziavi, in the Ho Municipality, Volta Region, Ghana.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Duku, E.; Dzorgbe M., and Angnuureng, D.B. Assessment of Wetland Ecosystem Services and Human Wellbeing Nexus in Sub-Saharan Africa: Empirical Evidence from a Socio-Ecological Landscape of Ghana. *Environmental Sustainability Indicators*. 2022, 15, pp. 100-186

DY Engineering (2012) *Feasibility Study Report for Keta New Port Development Project in Ghana*.

Egbert, G. and Erofeeva, S. (2002) Efficient Inverse Modelling of Barotropic Ocean Tides. Journal of Atmospheric and Oceanic Technology, 19 (2) pp. 183–204.

Environmental Protection Agency (EPA) (2010) Environmental Assessment Guidelines for Transport Sector (Aviation, Maritime, Rail and Road Sub-Sectors). EPA. Accra, Ghana.

EPA, (2002). National Primary Drinking Water Regulations: Long Term Enhanced Surface Water Treatment Rule. Final Rule. Federal Register. 67(9) pp. 1811-1844.

Equator Principles Limited (2020) *The Equator Principles.* EP4, July 2020 [Online] Available at: https://equator-principles.com/app/uploads/The-Equator-Principles_EP4_July2020.pdf (Accessed 18 April 2024).

Etse, P. Y. (2003). The Roles of the Ghana National Museum in the Management of Archaeological and Cultural Resources. Unpublished Undergraduate Dissertation, University of Ghana.

EUMETSAT (2023a) *ASCAT*. [Online] Available at: https://www.eumetsat.int/ascat (Accessed 03 November 2023).

EUMETSAT (2023b) *Metop-A*. [Online] Available at: https://www.eumetsat.int/our-satellites/metop-series (Accessed 03 November 2023).

Evadzi, Prosper I., Zorita, E., and Hunicke, B. (2017) *Quantifying and Predicting the Contribution of Sea-Level Rise to Shoreline Change in Ghana: Information for Coastal Adaptation Strategies*. *Journal of Coastal Research,* 33 (6) pp. 1283-1291.

FAO / TJNDP (1981) Tropical Forest Resources Assessment Project. Forest Resources of tropical African Part II; Country Briefs FAO home, Italy, pp. 586.

Fighting Coastal Erosion in Keta Area, West Africa Coastal Areas Management Program, World Bank Group.

Finlayson, C.M., Gordon, C., Ntiamoa-Baidu, Y., Tumbulto, J. and Storrs, M. (1998). Hydrobiology of the Songor and Keta lagoons: Implications for Wetland management in Ghana. Ghana Coastal Wetland Management Project. 135p

Finlayson, C.M., Gordon, C., Ntiamoa-Baidu, Y., Tumbulto, J., and Storrs, M. (2000) *Hydrobiology of the Songor and Keta Lagoons: Implications for Wetland Management in Ghana. Supervising Scientist Report*. 152, 167.

Forestry Commission (1999) *Keta Lagoon Complex Ramsar Site Management Plan*. Coastal Wetlands Management Project (CWMP). Prepared by Prof. K. Tufour for Ghana Wildlife Division of the Forestry Commission.

Fowler D. D. (1982). Cultural Resource Management. In Schiffer; M.B (ed). *Advances in Archaeological Method and Theory* Volume 5. Academic Press. New York

Fowler J. M, (1974). Protection of the Cultural Environment in Federal law. In Dolgin, E.L and Guilbert, T.C (eds) *Environmental Law.* West Publishers Co. St. Paul

Gavua, K. and Apoh, W. (2011)a. Alternative site conservation strategies in Ghana: The Adome Ancient Ironworking Site. *Conservation and Management of Archaeological Sites* 13 (2-3): 212-230 -2011b Report on Salvage Archaeology at the Bui Dam Project Site Prepared for Bui Power Authority.

Ghana Districts (2017) *Keta Municipal: Cultural Heritage and Customs*. [Online] Available at: https://ghanadistricts.com/Home/LinkDataDistrict/3553 (Accessed 17 May 2024).

Ghana Statistical Services (GSS) *Ghana 2021 Population and Housing Census 2021*. [Online] Available at: https://census2021.statsghana.gov.gh/dissemination_details.php?disseminatereport=MjYzOTE0MjAuMzc2NQ==&Publications (Accessed 14 May 2024).

Giardino, A., Schrijvershof, R., Nederhoff, C., de Vroeg, H. (2018) A Quantitative Assessment of Human Interventions and Climate Change on the West African Sediment Budget. *Ocean & Coastal Management.* 156, pp. 249-265.

Gidisu, G. K. (2011). *An Investigation of Shell Midden Deposits at Alabonu, Volta Region, Ghana.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Gokah, B. (2017). *An Archaeological Investigation of Selected Ewe Danish Contact Sites at Keta, Volta Region, Ghana.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Green, M.O., and Coco, G. (2014) Review of Wave-Driven Sediment Resuspension and Transport in Estuaries. Reviews of Geophysics. 52(1) pp. 77-117.

GSA (2018a) *Ghana Standard for Health Protection - Requirements for Ambient Noise Control (GS 1222:2018).* Ghana Standards Authority. Accra, Ghana.

GSA (2018b) *Ghana Standard Acoustics – Guide for Measurement of Outdoor A-Weighted Sound Levels (GS 1253:2018).* Ghana Standards Authority. Accra, Ghana.

GSA (2018c) *Ghana Standard - Requirements for Motor Vehicle Emissions (GS 1219-2018).* Ghana Standards Authority. Accra, Ghana.

GSA (2019a) *Ghana Standard for Environmental Protection - Requirements for Effluent Discharge (GS 1212:2019).* Ghana Standards Authority. Accra, Ghana.

GSA (2019b) *Ghana Standard for Environment and Health Protection – Requirements for Ambient Air Quality and Point Source / Stack Emissions (GS 1236:2019).* Ghana Standards Authority. Accra, Ghana.

GWD (1998) *Managing Ghana's Wetlands: Policy Strategy and Action Plan*.

Gyau-Boakye, P. and Tumbulto J. (1999). Volta Lake: Declining Rainfall and Streamflows in the Volta Basin. *Journal of the Ghana Institution of Engineers*. 20 (1)

Hersbach, H., Bell, B., Berrisford, P., Hirahara, S., Horányi, A., Muñoz-Sabater, J., Nicolas, J. Peubey, C., Radu, R., Schepers, D., Simmons, A., Soci, C., Abdalla, S., Abellan, X., Balsamo, G., Bechtold, P., Biavati, G., Bidlot, J., Bonavita, M., De Chiara, G., Dahlgren, P., Dee, D., Diamantakis, M., Dragani, R., Flemming, J., Forbes, R., Fuentes, M., Geer, A., Haimberger, L., Healy, S., Hogan, R., Hólm, E., Janisková, M., Keeley, S., Laloyaux, P., Lopez, P., Lupu, C., Radnoti, G., de Rosnay, P., Rozum, I., Vamborg, F., Villaume, S. and Thépaut, J.N. (2020) The ERA5 Global Reanalysis. *Quarterly Journal of the Royal Meteorological Society*, 730 (2)

Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J. Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., and Thépaut, J. (2023) *Era5 Hourly Data on Single Levels from 1940 to Present. Copernicus Climate Change Service (C3S)* Climate Data Store (CDS), DOI: 10.24381/cds.adbb2d47.

Holden, M.J., and Reed, W (1972) *West African Freshwater Fish*. (No Title).

ICOMOS (c2003) Ghana: Fort Prinzenstein in Keta. [Online] Available at: https://www.icomos.org/public/risk/2002/ghana2002.htm (Accessed 17 May 2024).

ING (2024) *The Equator Principles.* [Online] Available at: https://www.ing.com/Sustainability/Partnerships-and-collective-action/Equator-Principles.htm (Accessed 16 January 2024).

Jayson-Quashigah, P., Appeaning Addo, K., Kufogbe, S.K. (2013) Medium Resolution Satellite Imagery as a Tool for Monitoring Shoreline Change. Case Study of the Eastern Coast of Ghana. *Journal of Coastal Research*, Special Issue No. 65, pp. 511-516 doi:10.2112/S165-087.1

Jiang, C., de Swart, H.E., Li, J., and Liu, G. (2013) Mechanisms of Along-Channel Sediment Transport in the North Passage of the Yangtze Estuary and their Response to Large-Scale Interventions. *Ocean Dynamics*, 63, 283-305.

KeMA (c2024) *A Brief about Keta Municipal*. [Online] Available at: https://ketama.gov.gh/about-us/ (Accessed 17 May 2024).

KeMA (c2024a) *Central Administration of Keta Municipal Assembly*. [Online] Available at: https://ketama.gov.gh/departments/ (Accessed 17 May 2024).

Keta Municipal Assembly (KeMA) (2018) *Keta Municipal Assembly: Medium Term Development Plan (2018 - 2021).* Municipal Planning Co-ordinating Unit. [Online] Available at: https://ndpc.gov.gh/resource_and_publications/plans (Accessed 17 April 2024).

Keta Municipal Assembly (KeMA) (2021) *Keta Municipal Assembly: Medium Term Development Plan (2022 – 2025).* Municipal Planning Co-ordinating Unit.

Keta Water Project (2022). Report (Unpublished)

King, T. F. (2005). Doing Archaeology: A Cultural Resource Management Perspective. Left Coast Press Inc. California.

Kusimi, J.M., and Dika, J.L. (2012) Sea Erosion at Ada Foah: Assessment of Impacts and Proposed Mitigation Measures. *Natural Hazards*, 64, pp. 983-997.

Kutu (2013) Seismic and Tectonic Correspondence of Major Earthquake Regions in Southern Ghana with Mid-Atlantic Transform-Fracture Zones. *International Journal of Geosciences*. 4, pp. 1326-1332.

Lamptey, A., Ofori-Danson, P., Abbenney-Mickson, S., Glud, R., Madsen, H. and Abekoe, M. (2013) The Influence of Land-Use on Water Quality in a Tropical Coastal Area: Case Study of the Keta Lagoon Complex, Ghana, West Africa. *Open Journal of Modern Hydrology.* 3, pp. 188-195.

Leys, V., Mulligan, R.P., and Ginsberg, S.S. (2011) Modelling Coastal Sediment Transport for Harbour Planning: Selected Case Studies. *Sediment Transport.*

Logah, F., Amisigo, A., Obuobie, E., Kamkam-Yeboah, K. (2017) Floodplain Hydrodynamic Modelling of the Lower Volta River in Ghana. *Journal of Hydrology: Regional Studies.* 14 (2017), pp.1-9.

Ly C. (1980). The Role of the Akosombo Dam on the Volta River in Causing Erosion in Central and Eastern Ghana (West Africa), *Marine Geology.* 37, pp. 323-332.

Ly, C.K. (1980) The Role of the Akosombo Dam on the Volta River in Causing Erosion in Central and Eastern Ghana (West Africa). *Marine Geology.* 37 pp. 323–332.

Maneechan, W., and Prommi, T.O. (2015) Diversity and Distribution of Aquatic Insects in Streams of the Mae Klong Watershed, Western Thailand. *Psyche: A Journal of Entomology*, 2015 pp. 1-7.

Mensah, M. (1979) *The Hydrology and Fisheries of Lagoons and Estuaries of Ghana*. Marine Fishery Research Report No. 7. Fishery Research International. Ghana.

Mensah, M. (2017). *Bremen Missionary Interactions with the Peki: An Archaeological Perspective.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Mercator Ocean International (2023) *Global Ocean Physics Reanalysis.* [Online] Available at: https://data.marine.copernicus.eu/product/GLOBAL_MULTIYEAR_PHY_001_030/description (Accessed 03 November 2023).

MoFA (2021) *Keta Municipal* [Online] Available at: https://mofa.gov.gh/site/directorates/district-directorates/volta-region/286-keta-municipal (Accessed 17 May 2024).

Moratto, M. J. (1975). Conservation Archaeology: A Bibliography. *San Francisco State University Conservation Papers, No.1*

Naim R., Macintosh K., Hayes M., Nai, G., Anthonio S., and Valley, W. (1998) Coastal Erosion at Keta Lagoon, Ghana. Large Scale Solution to a Large-Scale Problem. Coastal Engineering Proceedings. 1 (26). https://doi.org/10.9753/icce.v26.%p

NASA (2023) *MODIS - Moderate Resolution Imaging Spectroradiometer*. [Online] Available at: https://modis.gsfc.nasa.gov/about/ (Accessed 03 November 2023).

Ntiamoa-Baidu, Y. and Hepburn, I. (1988) Wintering Waders in Coastal Ghana. *RSPB Conservation Review*. 24, pp. 46-62.

Ocloo, D. K. (2017). *An Archaeology of African-German Encounters at Amedzofe, Ghana*. (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

OGIMET (2023) Professional Information about Meteorological Conditions in the World. [Online] Available at: https://www.ogimet.com/metars.phtml.en (Accessed 03 November 2023).

Owusu-Ansah, D. (2018). *An Archaeology of Nkonya Wurupong and its German Encounters, Volta Region, Ghana.* (Unpublished M.Phil. Thesis). Department of Archaeology and Heritage Studies, University of Ghana, Legon.

Petr, J. (1986). The Volta River System. In: Davies, R. and Walker, K. *The Ecology of River Systems*. W. Junk Publishers Dordrecht.

Petroleum Commission (c2024) *Sedimentary Basins / Upstream Operators* [Online] Available at: https://petrocom.gov.gh/sedimentary-basins/ (Accessed 17 May 2024).

Piersma, T. and Ntiamoa-Baidu, Y. (1995). Waterbird Ecology and the Management of Coastal Wetlands in Ghana. Netherlands Institution for Sea Research. 6 (1) pp. 105.

Prato, E., Parlapiano, I., and Biandolino, F. (2012) Evaluation of a Bioassays Battery for Ecotoxicological Screening of Marine Sediments from Ionian Sea (Mediterranean Sea, Southern Italy). *Environmental Monitoring and Assessment*, 184 (9) pp. 5225-5238.

Ramsar Sites Information Service (2024) *Keta Lagoon Complex Ramsar Site* [Online] Available at: https://rsis.ramsar.org/ris/567 (Accessed 17 May 2024).

Roest, L. (2018) *The Coastal System of the Volta Delta, Ghana: Strategies and Opportunities for Development*. TU Delft: Delta Infrastructures and Mobility Initiative (DIMI).

Rubin, J. and Gordon. C. (1997) *The Mangrove Ecology of the Lower Volta Region*. Lower Volta Mangrove Project Technical Report. DFID / Ghana Wildlife Division / Ghana Environmental Protection Agency.

Ryan. J. and Ntiamoa-Baidu, Y. (1997) Studies on the Terrestrial Fauna of Coastal Ramsar Sites. Ghana. Ghana Coastal Wetland Management Project.

Schipper, C.A., Burgess, R.M., Rietjens, I.M.C.M., and Murk, A.J (2009) Rational Application of Bioassays in Hazard, Risk and Impact Assessments of Dredged Sediments. *Assessment of Effects of Chemical Contaminants in Dredged Material on Marine Ecosystems and Human Health*. 6, pp. 87.

Sellhorn Ingenieurgesellschaft mbH and Inveni Portum Solutions GmbH (SIIPS) (2021) *Feasibility Studies for the Development of the Port of Keta, Ghana: Final Master Plan and Feasibility Study Report*.

Shenker J., Dankwa, H., Junda, L., Ofori-Dason, P. and Ntiamoa-Baidu, Y. (1998) *Fisheries of Keta and Songor Lagoons*. Coastal Wetlands Management Projects.

SWAOCO (2017). Scoping Report for the 2D Seismic Survey Project in the Keta Delta Block of the Voltaian Basin. Prepared by YNYS MON CONSULT, Prepared for Swiss African Oil Company (SWAOCO).

Tahal Consulting Engineers (1986) *An Appraisal of a Flood Control Outfall for Keta Lagoon*. Report prepared for Diamond Shamrock Africa Petroleum. Accra.

Taylor, C. (1960) Synecology and Silviculture in Ghana. Nelson Echinburgy, UK Tropical Ram Forest. Forest Vegetation in Ghana. Geobotany D K~W Junk The Hague/Boston London 383pp.

The Equator Principles Limited (2024) *EPFIS & Reporting.* [Online] Available at: https://equator-principles.com/epfis-reporting/ (Accessed 16 January 2024).

Tufour, K., Timbulto, J., Dankwa, H., Abrahams, R. and Nani, F. (1999) *Coastal Wetlands Management Project (CWMP): Keta Lagoon Complex Ramsar Site Management Plan.* Ghana Wildlife Division (Forestry Commission) Available at: https://rsis.ramsar.org/RISapp/files/21565097/documents/GH567_mgt1508.pdf (Accessed 10 November 2023).

Tumbulto. J.W. (1997) *Hydrology of the Lower Volta Mangrove Project Area*. Technical Report No.7. Series Editor: Gordon C. DFID / Ghana Wildlife Department / EPA. p56.

UK Hydrographic Office (2017) *Admiralty Chart 1384: Tema to Cotonou: Scale 1:350,000.* UK Hydrographic Office.

UNESCO (1973). *International Classification and Mapping of Vegetation*. UNESCO, Paris.

Water Resources Commission (WRC) / Natural Heritage Institute (NHI) (2014) *Reoptimization and Reoperation Study of Akosombo and Kpong Dams: Project Summary & Key Elements.* [Online] Available at: https://n-h-i.org/wp-content/uploads/2017/02/Akosombo-and-Kpong-Dam-Reop_ProjectSummary_Dec2014.pdf (Accessed 17 January 2024).

Weatherspark, (2024) *Climate and Average Weather Year-Round in Keta* [Online] Available at: https://weatherspark.com/y/42314/Average-Weather-in-Keta-Ghana-Year-Round [Accessed 17 April 2024].

WHO (2021) *WHO Global Air Quality Guidelines: Particulate Matter ($PM_{2.5}$ and PM_{10}), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide.* World Heath Organization. [Online] Available at: https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1 (Accessed 18 April 2024).

Wikipedia (2012) *Districts of the Volta Region.* [Online] Available at: https://en.wikipedia.org/wiki/File:Districts_of_the_Volta_Region_%282012%29.svg (Accessed 31 January 2023).

Wimellebroek, G., Willoughby, N., Danso, F. and Amatekpor J. (1998) *Study of Development Options for Ghana Coastal Wetlands.* Draft Final Report prepared for Environmental Protection Agency.