
# Environmental and Social Management Plan (ESMP) for the Ghana National Gas Limited Company (GNGLC) Second Train Gas Processing Plant (GPP2) Proposed Construction and Operation at Atuabo

GHANA GAS
GHANA NATIONAL GAS LIMITED COMPANY

THE GAS GATHERING LTD

**February 2024**

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|---|---|---|---|
| | **Prepared By:**<br>Odun Environmental Limited | **Issue** | 2.0 |
| | | **Date** | 15.02.2024 |
| **DOCUMENT No:**<br>OEL SDS EIA 401 041 120124.1 | **Prepared for:**<br>Ghana National Gas Limited Company / The Gas Gathering Limited | PAGE<br>2 | 119 |

# Environmental and Social Management Plan (ESMP)

# For

# The Ghana National Gas Limited Company (GNGLC) Second Train Gas Processing Plant (GPP2) Construction and Operation

# At

# Atuabo, Ellembelle District.

**February 2024**

| REV | DATE | DESCRIPTION | BY | CHK | APPROVED | | |
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| | | | | | DISC | PROJ | |
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| | | | | | | | |
| 1 | 15 – 02 - 24 | Environmental and Social Management Plan (Final) | N.A | A.A | | | |
| 0 | 12 – 01 - 24 | Environmental and Social Management Plan | N.A | A.A | | | |

# Document Approval

## ISSUE RECORD

## DOCUMENT NUMBER: OEL SDS EIA 401 041 120124.1

| Issue | Date | Revision History | Prepared by | Reviewed by | Approved by |
|---|---|---|---|---|---|
| 0.1 | 10 – Jan -2024 | Draft for Internal Review | N.A | S.A. | N.N |
| 1.0 | 12 – Jan - 2024 | 1st Issue to Client (Draft) | N.A | A.A | A.A |
| 2.0 | 15 – Feb -2024 | 2nd Issue to Client (Final) | N.A | A.A | A.A |
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## Acronyms and Abbreviations

| | |
|---|---|
| AFC | African Finance Corporation |
| API | American Petroleum Institute |
| BLEVE | Boiling Liquid Expanding Vapor Explosion |
| BVS | Block Valve Station |
| CESMP | Construction Environmental and Social Management Plan |
| CSR | Corporate Social Responsibility |
| E.I. | Executive Instrument |
| ESIA | Environmental and Social Impact Assessment |
| EDA | Ellembelle District Assembly |
| EHS | Environmental Health and Safety |
| EPC | Engineering Procurement Construction |
| EPA | Environmental Protection Agency |
| ESMP | Environmental and Social Management Plan |
| ESMS | Environmental and Social Management System |
| FERA | Fire and Explosion Risk Assessment |
| FPSO | Floating Production Storage and Offloading |
| GIIP | Good International Industry Practice |
| GMMB | Ghana Museum and Monuments Board |
| GM | Grievance Mechanism |
| GNGLC | Ghana National Gas Limited Company |
| GoG | Government of Ghana |
| GPP | Gas Processing Plant |
| GSA | Ghana Standards Authority |
| HSE | Health, Safety and Environment |
| IFC | International Financial Corporation |
| IFI | International Financial Institutions |
| JMI | John Moore International |
| IPCC | Intergovernmental Panel on Climate Change |
| LOC | Loss of Containment |
| LSIR | Location Specific Individual Risk |
| L.I. | Legislative Instrument |

| | |
|---|---|
| MMSCFD | Million Standard Cubic Feet per Day |
| OEL | Odun Environmental Limited |
| PS | Performance Standards |
| PPE | Personal Protection Equipment |
| PPGPL | Phoenix Park Gas Processors Limited |
| QRA | Quantitative Risks Assessment |
| SCADA | Supervisory Control and Data Acquisition |
| TEN | Tweneboa-Enyenra-Ntomme |
| TCFD | Task Force on Climate-related Financial Disclosures |
| TICO | Takoradi International Company |
| UN | United Nations |
| UNESCO | United Nations Educational, Scientific, and Cultural Organisation |
| VRA | Volta River Authority |
| WBG | World Bank Group |

# 1 Introduction

## 1.1 Overview

This document prepared by Odun Environmental Limited (OEL), presents the Environmental and Social Management Plan (ESMP) for the Ghana National Gas Limited Company (GNGLC) proposed Second Gas Processing Plant (GPP2) project, which is designed to meet the rising demand for gas supply in Ghana.

The ESMP provides the management framework needed for planning and implementation of monitoring and management activities associated with environmental and social protection. It covers activities throughout the lifetime of the project, from construction through to decommissioning. The ESMP has been prepared in accordance with environmental and social commitments of GNGLC/ Consortium (the project proponent), and in compliance with the legal and regulatory requirements of Ghana Environmental Protection Agency (EPA) and the International Finance Corporation (IFC) Performance Standards and Environmental, Health and Safety Guidelines.

## 1.2 Project Background

Ghana National Gas Limited Company (GNGLC) has commissioned to construct a new Gas Processing Plant (GPP Train 2) and associated facilities which will process raw gas from off-shore Ghana. The Project Sponsors for the development of the 300MMSCF Gas Processing Facility Project in Atuabo, Ghana also referred to as the 'Consortium' which includes Integrated Logistics Bureau Limited (INTELS), Axxela Ghana Limited (AXXELA), John Moore International (JMI), The Natural Gas company of Trinidad and Tobago Limited (NGC) and Phoenix Park Gas Processors Limited (PPGPL) with the African Finance Corporation (AFC) as Transaction Advisers and Lead arrangers have requested for relevant environmental and social (E&S) studies including Quantitative Risk Assessment, Fire & Explosion Risk Assessment and Flood Risk Assessment and ESIA Gap Assessment and associated studies to achieve Ghana EPA approval while meeting requirements in line with World Bank, IFC requirements and Sustainable financing principles.

GNGLC is Ghana's first mid-stream gas business company and was incorporated in July 2011. The first phase of the Gas Processing Plant (GPP), Train 1, and associated facilities were installed in November 2014 (https://www.ghanagas.com.gh). The GPP Train 1 treats raw feed dense phase gas from the Jubilee and Tweneboa-Enyenra-Ntomme (TEN) Fields -which are Floating Production Storage and Offloading (FPSO) vessels -

into Lean Gas, Liquefied Petroleum Gas (LPG), and Condensate (Natural Gasoline and traces of iso-pentane) (see Figure 1).

With its headquarters in Accra, GNGLC currently operates the following key infrastructure:

- Offshore gas export pipeline, which consists of a 12-inch (30.5 cm) diameter 58 km long subsea pipeline, transporting dense-phase gas from the FPSOs to the Gas Processing Plant, GPP Train 1;
- Gas Processing Plant at Atuabo in the Ellembelle District of the Western Region with a design capacity of 150 MMSCFD and operating capacity of 120 MMSCFD;
- Onshore gas pipelines, which consist of a 20-inch (50.8 cm) diameter 110 km Atuabo-Takoradi pipeline, that supplies gas to power generation companies (VRA, Ameri, TICO, and Karpowership) and manufacturing industries (Wangkang and Twyford);
- A 75 km Esiama-Prestea line, which supplies gas to Genser Energy;
- LPG truck-loading gantry located approximately 2.5 km from the GPP, near Anokyi, and connected to the GPP by an 8-inch (20.3 cm) pipeline.

GNGLC also has various stations, located mainly in the Western and Western North Regions to support, and facilitate its supply operations. The stations can communicate with a Supervisory Control and Data Acquisition (SCADA) system for the purpose of transmitting invoicing information, monitoring the status of the stations, and performing other command functions. They are:

i. The Atuabo Initial Station (AIS), which monitors activities at the GPP and the onshore and offshore gas pipelines. At the AIS, raw gas is received from offshore and measured before processing while the lean gas produced is monitored before leaving the GPP.
ii. Four (4) Block Valve Stations (BVSs), two (2) each located on the Atuabo-Takoradi and Esiama-Prestea gas pipelines. These BVSs are used for pipeline protection, thus enabling isolation of any segment of the pipeline for maintenance work.
iii. Three (3) Distribution Stations located in Esiama, Aboadze, and Eshiem that distribute lean gas through the onshore pipelines to power-generating companies and manufacturing industries.
iv. Two (2) Regulating and Metering Stations at Prestea and Sekondi, which control the characteristics (flow rate, pressure, and temperature) of the lean gas to meet contractual specifications before delivery to customers.

## 1.3 Objectives and Scope of the ESMP

The objectives of the ESMP are to:

- Describe all mitigation measures and actions identified during the ESIA process requiring implementation during the design, construction, and operation (and decommissioning where appropriate) phases of the project, to enhance positive benefits and eliminate or reduce key identified biophysical, socioeconomic and health issues and impacts to acceptable levels.
- Identify key environmental and social reporting requirements, such as audits of performance which the project will need to develop and undertake throughout construction, operation, and decommissioning.
- Identify and describe monitoring required as identified within the ESIA to ensure that the reporting commitments are met.
- Identify actions required to implement the above and the roles and responsibilities of parties involved (e.g., within the client organization, designers, contractors, and operators) in administering the various actions.

The scope of the ESMP is to provide information to meet the above objectives for the construction, operation, and decommissioning phases of the project, including both general environmental and social requirements that are common to most construction projects, and specific environmental and social initiatives unique to the development phases and infrastructure of this project.

The actions within this ESMP will be used as a basis by the EPC contractor(s) / future project owners to develop their own suite of Environmental, Health and Safety Management Manuals and Systems for the commissioning, operation, and decommissioning phases of the project.

The ESMP is a live document that will last the lifetime of the project and will be updated as the project proceeds.

Figure 1 Gas Processing Plant Train 1

# 2 GPP Relevant Policies, Laws and Institutional Framework

## 2.1 Introduction

GNGLC/Consortium is committed to complying with the requirements of the applicable environmental, social, health and safety policies and laws associated with the construction and operation of the GPP2 project. The relevant national and sector policies, national legal framework, national environmental quality guidelines, IFC Performance Standards and Environmental Health and Safety (EHS) guidelines to guide the construction and operation of GPP2 have been thoroughly reviewed in the accompanying ESIA report. These are listed below.

## 2.2 National Policy Framework

The key national policies relevant to the proposed gas processing plant include the following:

- National Environment Policy, 2012
- National Energy Policy, 2010
- Health, Safety, and Environmental Policy for the Energy Sector, 2016
- Local Content Policy in the Oil and Gas Sector, 2010
- National Land Policy, 1999
- National Water Policy, 2007
- Riparian Buffer Zone Policy. 2013
- National Climate Change Policy, 2013

## 2.3 National Legal Regulatory Framework

The relevant national environmental and other statutory laws and regulations as they pertain to resource efficiency and emissions reduction include the following:

- The 1992 Constitution of Ghana
- Environmental Protection Agency (EPA) Act 1994 (Act 490)
- Environmental Assessment Regulations 1999 (LI 1652)
- Environmental Assessment (Amendment) Regulations, 2002 (L.I. 1703)
- New Fees, and Charges (Amendment) 2022 (Act 1080)
- Hazardous and Electronic Waste Control and Management Act 2016 (Act 917)
- Hazardous, Electronic, and other Wastes (Classification), Control and Management Regulations, 2016 (LI 2250)
- The Factories, Offices and Shops Act 1970 (Act 328)
- Energy Commission Act 1997 (Act 541)

- Natural Gas Pipeline Safety (Construction, Operation and Maintenance) Regulations 2012 (LI 2189)
- Natural Gas Distribution and Sales (Technical and Operational) Rules, 2007 (L.I. 1911); (Standard of Performance) Regulations, 2007 (L.I. 1912).
- Natural Gas Transmission Utility (Technical and Operational) Rules, 2007 (L.I. 1913); (Standards of Performance) Regulations, 2008 (L.I. 1936).
- National Petroleum Authority Act 2005 (Act 691)
- Petroleum Commission Act 2011 (Act 821)
- Forest Commission Act 1999 (Act 571)
- Water Resources Commission Act 1996 (Act 522)
- Water Use Regulations, 2001 (LI 1692)
- Ghana Ports and Harbours Authority Law, 1986 (PNDCL 160)
- Ghana Maritime Authority Act, 2002 (Act 630)
- Ghana National Fire Service Act, 1997 (Act 537)
- Fire Precaution (Premises) Regulations, 2003 (L.I. 1724)
- Administration of the Lands Act, 1962 (Act 123)
- State Lands Act, 1962 (Act 125)
- Land Use Spatial Planning Authority Act, 2016 (Act 925)
- Labour Act, 2003 (Act 651)
- Water Resources Commission Act, 1996 (Act 522)
- Water Use Regulations, 2001 (L.I. 1692)
- Lands Commission Act, 2008 (Act 767)
- Local Governance Act, 2016 (Act 936)

## 2.4 National Standards

The EPA in conjunction with the Ghana Standards Authority (GSA) have developed Environmental Quality Standard to regulate and monitor pollutants considered to be harmful to public health and the environment, and in line with pollution prevention. The applicable standards are:

- Ghana Standards for Environmental and Health Protection Requirement for Ambient Noise Control (GS 1222:2018).
- Ghana Standards for Environmental and Health Protection Requirements for Air Quality and Point Source/Stack Emissions (GS 1236:2019).
- Ghana Standards for Environmental Protection-Requirement for Effluent Discharge (GS 1212:2019).

## *2.5* GNGLC Environmental Policy

GNGLC is committed to conducting its business activities of gathering, processing, transporting, and marketing of natural gas resources in a manner that ensures protection of the environment.

In line with this commitment, GNGLC is committed to the following:

- Minimizing impacts of its operations on the environment through the prevention of pollution, sustainable resource use, mitigation of climate change and protection of ecosystems.
- Fulfilling its compliance obligations and environmental requirements.
- Promoting effective waste management strategies by reducing, re-using, recycling, and ensuring safe disposal of waste.
- Operating and maintaining its natural gas infrastructure in a manner that minimizes emissions to air and discharges to water and land.
- Engaging positively with interested parties and conducting business in a socially responsible manner.
- Periodically evaluating the effectiveness and suitability of its environmental management system to enhance its environmental performance and ensure continual improvement.
- Setting goals, objectives and targets which motivate each member of the workforce to contribute to its environmental performance.
- Ensuring that responsibilities and authorities for relevant roles within the environmental management system are assigned and communicated at all levels within the company.

GNGLC ensures that the Environmental Policy is clearly communicated to its workforce and all persons working under the control of the company with the intent that they are made aware of their individual environmental management obligations, and the Policy is also made available to interested parties where necessary.

The Chief Executive Officer (CEO) of GNGLC has the overall authority and responsibility of ensuring that adequate resources are provided to enhance the smooth implementation of the Environmental Policy.

## 2.6 International Conventions and Treaties

Ghana is party to international conventions and agreements relating to environmental and social issue which have been ratified. The ratified conventions relevant to this project are listed in Table 1 with their respective ratification status.

Table 1 Applicable International Convention/Treaties

| Convention | Date Ratified |
|---|---|
| African Convention on the Conservation of Nature and Natural Resources, 1969<br>* *Ghana is yet to ratify the Revised version of this Convention which is yet to come into force.* | 17 May 1969 |
| African Convention on the Conservation of Nature and Natural Resources (Revised Version) adopted in Maputo on 11 July 2003 | 31 October 2003 |
| Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Geneva, 1995 | 9 June 2005 |
| Agreement on the conservation of African-Eurasian migratory waterbirds, adopted at The Hague on 14 August 1996 | 1 October 2005 |
| Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 1991 | 2 July 2004 |
| Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 1989 | 12 March 2003 |
| Basel Protocol on Liability and Compensation for Damage Resulting from the Transboundary Movement of Hazardous Wastes and their Disposal, Basel, 1989 | 9 June 2005 |
| Beijing Amendment to the Montreal Protocol | 8 August 2005 |
| Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003 | 20 January 2016 |
| Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973 | 14 November 1975 |
| Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972 | 04 July 1975 |
| Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment Due to Air pollution, Noise and Vibration, Geneva, 1977 | 27 May 1986 |
| Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979 | 19 January 1988 |
| Convention on Biological Diversity, Rio de Janeiro, 1992 | 29 August 1994 |

| Convention | Date Ratified |
|---|---|
| Copenhagen Amendment to the Montreal Amendment on Substances that Deplete the Ozone Layer, Copenhagen, 1992 | 30 September 2000 |
| United Nations Framework Convention on Climate Change, New York, 1992 | 12 July 1992 |
| International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) | 30 November 1990 |
| International Plant Protection Convention, Rome, 1951 | 22 February 1991 |
| International Labor Organization Declaration on Fundamental Principles and Rights at Work | 1998, amended in 2022 |
| Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997 | 30 May 2003 |
| London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 1990 | 24 July 1992 |
| Minamata Convention on Mercury, Kumamoto, 2013 | 24 September 2014 |
| Montreal Amendment to the Montreal Protocol | 8 August 2005 |
| Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 | 24 July 1992 |
| Montreal Amendment to the Montreal Protocol | 8 August 2005 |
| Protocol Concerning Cooperation in Combating Pollution in Cases of Emergency, Abidjan, 1981 | 20 July 1989 |
| Protocol on Liability and Compensation | 30 May 2003 |
| Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam, 1998 | 11 September 1998 |
| United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, Paris, 1994 | 15 October, 1994 |
| United Nations Framework Convention on Climate Change, New York, 1992 | 6 September 1994 |

| Convention | Date Ratified |
|---|---|
| Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985 | 24 July 1989 |

## 2.7 International Environmental and Social Standards

The GNGLC/Consortium intends to seek financing from International Financing Institutions (IFIs) and therefore will require that the construction and operation of the GPP2 project complies with the requirements of international standards and guidelines. To this end the project will comply with the following:

i. IFC Performance Standards
ii. World Bank Group EHS Guidelines
    - EHS General Guidelines (2012)
    - EHS Guidelines for Onshore Oil and Gas Development (2017)
iii. Equator Principles

With respect to the environmental issues, IFC Guidelines refer to World Health Organization (WHO) standards that include the following:

- WHO Ambient Air Quality Standards
- WHO Guidelines for Community Noise
- WHO Drinking Water Quality
- WHO Guidelines for the Safe Use of Wastewater

# 3 Project Description

## 3.1 Project Location

The GPP Train 2 will be situated on the west side of the existing Train 1 (see Figure 2). Train 1 is located near Atuabo, about 1.5 km to the north of the shores of the Gulf of Guinea. The Atuabo community is located on the shoreline, about 2 km south–west of Train 1. The site for the GPP Train 2 is thus bordered to the east by the existing Train 1. Further to the east, about 2.5 km from Train 1 is located the LPG truck loading gantry, which is connected to Train 1 by two sets of 8-inch pipelines and a 6-inch vapour return line. The Anokyi community is located about 0.43 km to the east of Train 1 while the Asemnda community lies 0.5 km north-west of the proposed site for Train 2 (see Figure 3). The Asemnda and Anokyi communities are under the Atuabo Paramount Chief but have their own chiefs who are subordinates to the Paramount Chief who is therefore the owner of the land. Thus, reference is made to the GPP as located at Atuabo.

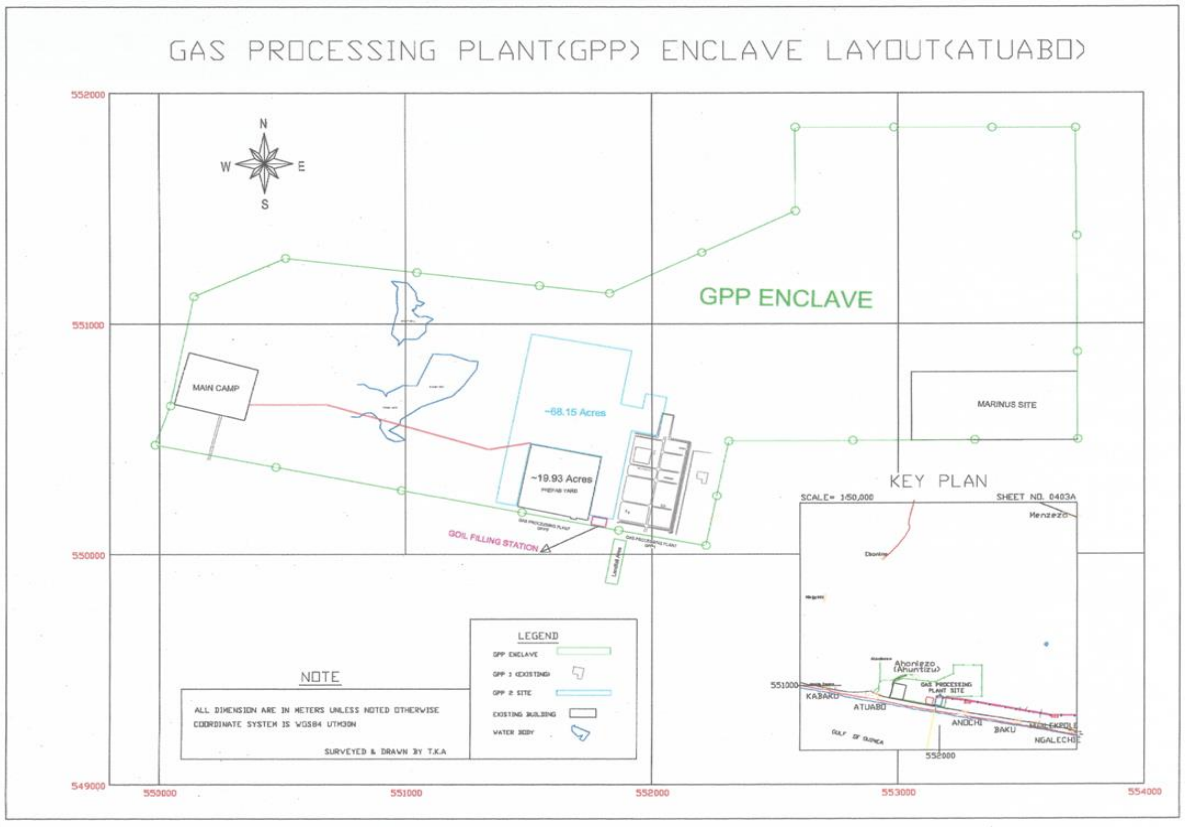


Figure 2 General Layout of GPP Enclave (GPP1 & GPP2)


Figure 3 Aerial Photo of GPP2 Location within GPP Enclave

## 3.2 Key Project Components

The propsoed GPP2 will be composed of the following main process units:

- Unit 10 - Inlet Separation and Fuel Gas System;
- Unit 20 – Chilling, Deethanization & Recompression;
- Unit 30 - Fractionation;
- Unit 40 - Dehydration;
- Unit 42 – Products storage and delivery.

Figure 4 provides a diagrammatic representation of the GPP2 layout.

### 3.2.1 Auxiliary Components

The main auxiliary components of GPP2 are:

- Wastewater and stormwater management and drainage.
- Firewater system.
- Solid waste management.
- Venting and Flaring.

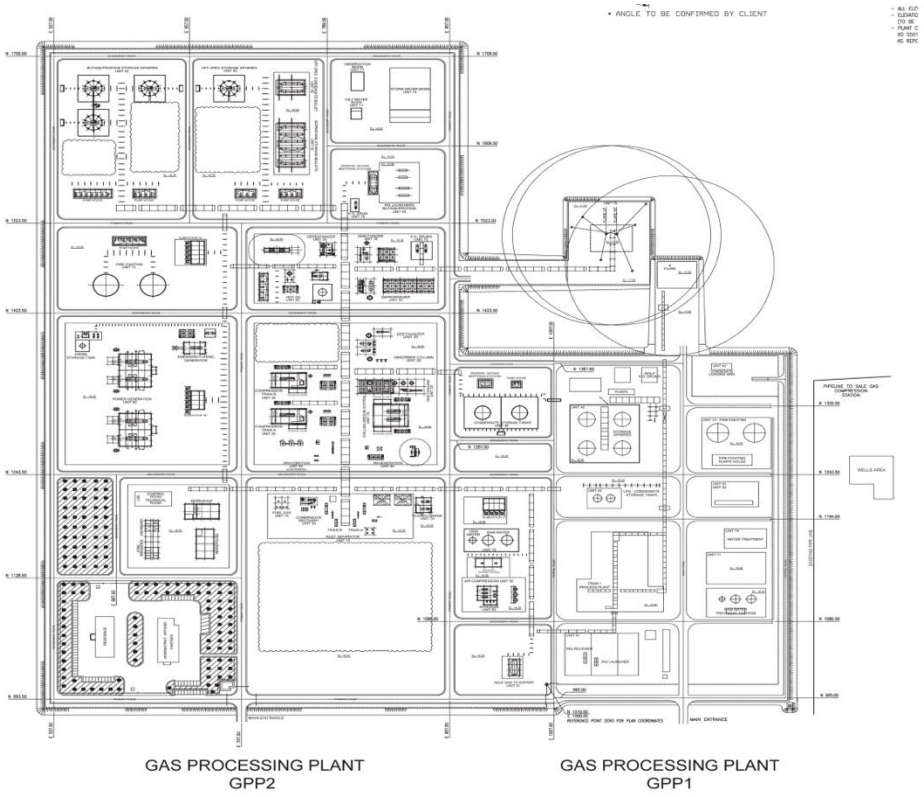


Figure 4 GPP 1 and 2 Layout

## 3.3 Project Utilities

The project utilities for the proposed GPP2 are:

1. Fuel Gas System
   - Medium Pressure Fuel Gas
   - Low-Pressure Fuel Gas
2. Hot Medium
3. Chilling Medium
4. Methanol Injection
5. Instrument and Utility Air System
6. Nitrogen System
7. Service/Utility Water System and Plant Water
8. Power Supply

## 3.4 Project Execution Phases

The GPP2 project will be implemented in the pre-construction, construction, operations, and decommissioning & closure phases.

### 3.4.1 Pre-construction Phase

Pre-construction activities typically include technical surveys for siting the gas plant and its components, feasibility studies, project design, and acquisition of required permits and approvals. The required land area for the project was already acquired during the development of GPP1. Technical surveys including geophysical surveys and feasibility studies, market demand analysis, and project designs have been completed. However, permits and approvals (such as environmental permit, construction permit, and groundwater abstraction licence) are yet to be obtained.

### 3.4.2 Construction Phase

Key activities in this phase include the construction of access roads, site preparations (earthworks and temporary facilities), infrastructure development (e.g., site drainage network, health and safety unit, tank farms for storage of LNG, NLG, LPG, and stabilized condensate, gas processing units and auxiliary units such as wastewater treatment units and installation of gas-powered generators).

### 3.4.3 Operations Phase

Operational activities will consist of processing up to 200 MMSCFD of dense phase gas per year into various quantities of propane (C3), butane (C4), pentane (C5) and stabilized condensate (C5+) fractions. The activities in this phase will also consist of running the plant in an environmentally friendly manner, ensuring good synergy between the plant, neighbouring communities, and the environment. It will also involve gaseous emissions control, and liquid and solid waste management.

### 3.4.4 Decommissioning and Closure Phase

The closure activities of the gas plant at the end of an operational period entail following procedures in the rehabilitation and decommissioning plan developed for the site. During this phase, the plant will cease functioning and all structures, plant units, machinery, and equipment will be dismantled. In addition, all destroyed vegetative areas will be restored with native vegetation.

# 4 Environmental and Social Baseline

## 4.1 Environmental Baseline

**Physical Environment**

Topographically, the GPP2 project area is generally low in altitude. The land rises from the sea level to 137 m to the north in an undulating manner. The soils of the proposed project site belong to the Fredericksburg Association, which predominantly comprises the Krisin series, Fredericksburg Series, Princess Series, Assini Series, Atuabo Series, and Esiama Series. The proposed site lies in the extreme West of the coastline of Ghana and falls within the South–Western Equatorial Climatic Zone in Ghana, which experiences a bimodal rainfall pattern. The major season begins in March and peaks in June while the minor rainfall occurs between September and the middle of December. The general wind direction is predominantly South-West, which means the winds originate from the Gulf of Guinea.

Baseline studies on air quality showed that for Total Suspended Particulates, concentrations higher than or close to the Ghana Standards Authority (GSA) standards were observed at various locations in the project area. Overall, the highest concentrations of particulates occurred at Anokyi, which is located about 0.43 km southwest of GPP Train 1. The concentrations of all the noxious gases were however below their respective GSA standards. The results also indicated that noise levels in most of the communities were slightly above or below the GSA standard for residential areas during the day. Concerning the GPPs, noise levels recorded at both Train 1 and Train 2 sites were below the GSA standards for light industrial areas during the day and at night.

The Ellembelle District is largely drained by the Southwestern Rivers System. The prominent river is the Ankobra with its major tributaries like the Ahama and Nwini Rivers. Indeed, the proposed project site is wholly drained by the Amansuri River in the south-western part and some other minor rivers and streams such as rivers Broma, Nobaya, and Amanzule; other minor rivers that drain the proposed site include the Ebi and Fia Rivers. Just as for GPP Train1, the Amansuri River will be the main surface water body that will potentially be impacted by the operations of the proposed GPP Train 2. This river empties into the Amansuri lagoon which drains to the sea.

The results of physicochemical analyses of selected surface waters, including seawater, did not reveal any clear patterns. While the waters were slightly acidic and turbid, the

presence of faecal coliform and Escherichia coli renders them unfit for direct human consumption and for primary contact activities such as swimming. Bacteriological analyses of groundwaters also showed the presence of faecal coliforms in five of the six locations studied.

**Biological Environment**

In the wet semi-equatorial climate zone where the proposed project is located, the general vegetation comprises wet evergreen – moist evergreen forests in the south and moist semi-deciduous rain forest in the northern sections with a coastline stretching up to about 70 km and comprising patches of savanna vegetation. Thus, the general ecosystem of the project area is comprised of wetlands categorized into swamps with open broadleaved forest cover that are regularly flooded by fresh-brackish waters.

The natural vegetation of the Ellembelle District is comprised of such typical tree species as the African Walnut, *Coula edulis*; *Cynometra ananta*; Akadan *Cola chlamydantha*, Tenanfera *Cola umbratilis*, and Cherry Mahogany *Tieghemelia heckeli*; that form the principal timber species. In areas that are perennially flooded, Raffia Palm *Raphia hookeri*, and the herb *Cyrtosperma senegalense* are common. Further south towards the coast, on lands that are seasonally flooded can be found short grasslands such as *Panicum sp., Setaria anceps; Hyparrhenia mutica,* among others, interspersed with various herbaceous and shrub species including *Tridax procumbens; Centrosema sp.* and *Chlomolaena odorata.* On lands that are permanently flooded where there is a mixing of fresh and saline waters red mangroves – *Rhizophora harisonii*; *Rhizophora mangle*; and *Rhizophora racemose* are observed. Along the length of the beaches of the district, coconut plantations are observed to form the major vegetation cover of the coastline.

The present vegetative cover of the proposed GPP Train 2 site does not reflect the natural vegetation type described above. The site is comprised of a mosaic of grassland and thicket interlocked with swamps of freshwater forests. The main species include Borassius Palm *Borassius aethiopium*; grass species of *Panicum; Setaria; Hyparrhenia and Anadelphia*. Strands of Oil Palm *Elaeis guineesis* and *Calophyllum sp.,* are found included in pockets of forest thickets scattered at the site. Clearly, the site represents a regrowth of previous vegetation following recent clearing.

Several species known to occur in the district are of both national and international conservation concern. These include primates, birds, tortoises and pangolins, reptiles

including snakes, monitor lizards, and crocodiles. These animals enjoy various levels of protection under international and national wildlife laws. However, because of previous anthropogenic activities around the proposed site (construction of Train I, roads to settlements, and clearing of sites), many of the original fauna of the proposed project site have left the area. Thus, the fauna of the area reported include rodents and reptiles such as lizards and snakes and insects including crickets, cockroaches, mosquitoes, bees, and termites.

## 4.2 Social Baseline

The Ellembelle District is one of the 14 administrative Metropolitan, Municipal and District Assemblies in the Western Region of Ghana. It shares boundaries with the Jomoro Municipal to the West, Wassa Amenfi West and Central Municipals to the North, Nzema East Municipal to the East and the Gulf of Guinea to the south. The district capital is Nkroful. The district is richly endowed with human and natural resources including mineral deposits (gold, kaolin, and silica), oil and gas, fertile soils, rivers and streams, and a good climate that supports a tropical rainforest with a variety of timber species, and cash crops. However, the heavy and prolonged rains associated with the semi-equatorial climate adversely affect cocoa harvests, especially the drying of beans, and aggravate the black pod diseases that attack cocoa. In addition, all the un-tarred roads become almost unmotorable during the rainy season. The effects of this on the economy of the district are obvious.

Available data from the Ellembelle District Assembly show that the population of the district for 2021 is projected to be 112,705, comprising 52% female and 48% male. The three communities immediately fringing the GPP Train project site, Anokyi, Asemnda (also known as Asemnda Suazo), and Atuabo, are generally referred to as the A3 Communities. Available data showed that there was a sharp rise in the population of these communities between 2010 and 2018. This sharp rise could be due to the commencement of the operations of the GPP Train 1 in 2014 which saw many workers of the GNGLC coming in from outside the area. Apart from the sharp rise between 2010 and 2018, the population in the A3 Communities has seen a steady rise since 2018. Ethnically, the Nzema constitute the largest group in the area with 80% of the population. The remaining are Fante (9%) Ewe (4%), Mole-Dagbani (4%) and Ga-Adangbe (3%).

Available records show that the major health concern of the Ellembelle District since 2011 has been malaria. Although the incidence of malaria has been decreasing steadily

since 2011, together with skin diseases, the same cannot be said about rheumatism which has seen a steady increase. Upper respiratory tract infections follow malaria, in terms of incidence in the district. It saw a steady increase but has been declining since 2020. The incidence of HIV/AIDS however has been increasing since 2018 to the point where the Ghana Aids Commission identified the EDA as the district with the highest incidence of HIV/AIDS in the Western Region in 2020.

## 4.3 Summary of Environmental and Social Issues

The table below provides the summary of the salient E&S issues as raised by the stakeholders who were consulted within the project area.

Table 2 Summary of E&S Issues Raised by Stakeholders

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| Resettlement and Land Compensation. | The land for both GPP Train 1 and Train 2, covering an approximate area of 398 ha (983 acres), has been acquired by the government's Executive Instrument, E.I. 51, 2014.<br>Compensation has not been paid for the land due to multiple claimants who have emerged for the same piece of land, particularly Atuabo and Anokyi communities. | It was noted during the additional stakeholder engagement that there is an ongoing court case to determine the rightful ownership of the entire GPP land however, the land litigation process has protracted. Management of GNGLC would work together with the traditional authorities of both Atuabo and Anokyi to resolve the land litigation issue and pay the appropriate compensations. |
| | The potential fire and explosion risk of the GPP1 and GPP2 should be the basis for relocation and resettlement of the Asemda Community. | On the basis of economic and physical displacement according to the IFC PS 5, there wouldn't be the need to resettle Asemda Community according to the Resettlement Scoping done for GPP2 to assess whether there is the need for resettlement.<br><br>In addition to the Resettlement Scoping, Quantitative Risk Assessment (QRA) and Fire and |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | Explosion Risk Assessment (FERA) were conducted to quantify and assess the fire and explosion risks of the proposed GPP2. The outcome of both studies indicates that Location Specific Individual Risk (LSIR) depicting the geographical distribution of risk puts Asemda at the least risk level in the event of fire and explosion at GPP2. Specifically, the modelled fire and explosion risk ascertained that there is one chance in 1,000,000 of being killed per year at Asemda if there should be fire and explosion at GPP2 |
| Inadequate Community Relations, Sensitization and Communication. | Despite the pending land compensation payment, it was noted that GNGLC paid compensation for the crops on the land acquired for both the GPP project site and GNGLC's pipeline, but this information seems not to be disseminated adequately. | It is recommended that compensation payment for crops should be put on notices in the communities and if possible, the names of the beneficiaries added to the information. This information should also be given to the Ellembelle District Assembly for them to also publish on their notices. |
| | The communities are unaware of the grievance redress mechanism (GRM) of GNGLC. | It is recommended that GNGLC displays it GRM on notices in all the project affected and interested communities in both English and Nzema. |
| | Although the CSR of GNGLC within the project affected and interested communities in Ellembelle District are reported | GNGLC would displays it CSR projects within the project affected and interested communities in Ellembelle District |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | to be inadequate, the ones carried out in these communities seem not to be notable. | on notices with pictures and adequate project information.<br>▪ For example, information on GNGLC's annual scholarship program would be effectively disseminated in the communities.<br>▪ The application process would be clearly communicated to the people.<br>▪ The number of past and existing beneficiaries from the Scholarship Program in each community would be put on notices in each community. |
| Inadequate Corporate Social Responsibility (CSR) towards the communities, especially the A3 communities (Atuabo, Anokyi and Asemda. | The following were some of the issues raised by the communities regarding the inadequate CSR by GNGLC: | |
| | ▪ GNGLC does not honor the invitation to attend and support the Kundum Festivals in the project affected and interested communities apart from Atuabo and Beyin which have paramountcies. By this GNGLC does not regard the other communities thus their inputs into planning of GPP2 should not be solicited.<br>▪ GNGLC should emulate Eni Ghana in terms of CSR | The current CSR policy of GNGLC allows for the company to support the paramountcies in the district. |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | activities in the Ellembelle District. | |
| | ▪ The local content of GNGLC in terms job opportunities for the people (Nzemas) from the project affected and interested communities is not adequate. | ▪ The EIA Gap Assessment team reckon than GNGLC has employed locals in various capacities at GPP1 thus, GNGLC would display the number of locals employed from the project affected and interested communities on notices in order to appropriately disseminate this information. The local content employment quotas should be properly communicated to the communities.<br><br>▪ The Labor Management Plan for GPP2 construction would include provisions for monitoring third party contractor recruitments so that the adequate number of locals are recruited to work during the construction phase and the appropriate wages paid to them.<br><br>▪ GNGLC would consider granting National Service and Industrial Attachment opportunities to the locals. The Community Relations Department can work with the leaders of the communities to |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | come up quotas for this opportunity. |
| | GNGLC should consider providing basic amenities such as schools, health posts, potable drinking water for the communities around the GPP project site as part of its CSR. | Consideration would be given to these requests by GNGLC. |
| Flood Risk | Occasional flooding at Atuabo and Asemda. | A Flood Risk Assessment (FRA) has been conducted as part of the EIA Gap Assessment to assess the flooding situation.<br><br>According to the FRA studies, the drainage point just north of the existing GPP1 has a minimal discharge capacity with attenuation of 80 to 90% of the incoming flow. The flow difference results to the water stored at the west side of GPP area leaving it inundated and swampy for an extended period.<br><br>The maximum inundation depth ranges from 2.13 to 2.42 meters, reaching an elevation of 5.89 meters amsl for the most extreme flood event. This elevation is lower than the floor elevation of GPP1 with an average elevation of 8.0 meters. This is also lower than the elevation of the town of Asemda at the north-western side, thus, no flooding condition is expected. |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | However, it was observed that some areas in the town of Anokyi are susceptible to flood with minor depths of 0.0 – 0.50 meters for the most extreme flood events. It is important to note that this scenario is not caused or intensified by the GPP facilities.<br><br>Nonetheless, the proposed GPP Train 2 area will impede the natural flow of water which will cause the inundation level at the west side of the GPP2 project site to rise even higher. This will then affect the GPP1 and expand the inundation area without proper drainage. The stored water will seep through soil and embankments which can trigger other problems such as soil consolidation, erosion, piping phenomenon among others.<br><br>To prevent this scenario, a drainage culvert has been proposed across the existing road opposite GPP2. The discharge will be diverted to the coastal side, instead of the town of Anokyi. This will effectively eliminate the flooding specifically at the community area. This will also discharge the storage at the west |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | side to prevent other potential major disasters that can occur. |
| Fire and Explosion Risk Emergency Response | What is the Emergency Response Plan for Fire and Explosion Risk for GPP1 and GPP2?<br><br>GNGLC should communicate its ERP to all stakeholders around GPP1 particularly Maha Beach Resort.<br><br>The outcome of the QRA and FERA for GPP2 should be adequately disseminated to all interested parties around GPP project site.<br><br>GNGLC should replace its faulty fire tender. | GNGLC would collaborate with the communities and business entities around the GPP project site to sensitize them on its ERP for Fire and Explosion Risk. |
| Flare Stack Induced Heat | The flaring of Gas at the Flare Stack at GPP1 is the cause of excessive heat in all the communities engaged, thus construction of GPP2 would only worsen the current heat situation and make the communities unhabitable.<br><br>This was a common concern shared by all the communities engaged. | It is evident that climate change has led to extreme weather events and in the last few years high rainfall and temperatures have occurred. Thus, GNGLC would work on its community relations and engagements to disabuse the perception of the communities on GPP1 being the cause of the high temperatures by doing the following:<br>▪ Conduct continuous ambient temperature monitoring for at least 14days at GPP1 and the communities particularly at |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | the A3 communities (Atuabo, Anokyi and Asemda).<br>▪ Assist the communities to engage third party contractors to also conduct continuous ambient temperature monitoring for at least 14days at the communities particularly at the A3 communities.<br>▪ The temperature results should be compared to ascertain the veracity of the claim that GPP1 flare stack is the cause of the high temperature and heat at the communities.<br>▪ Furthermore, GNGLC could use some communities outside of the catchment of GPP along the coast as controls and conduct the continuous ambient temperature monitoring to compare the monitoring results and ascertain the veracity of the claim that GPP1 flare stack is the cause of the high temperature and heat.<br>▪ Whatever the outcome of the continuous ambient temperature monitoring, GNGLC would increase its community engagement and sensitization. |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | | ▪ GNGLC would adopt nature-based solutions (NBS) and increase carbon reduction initiatives such as tree planting in the communities. This should be done in collaboration the communities. |
| Negative Impact of GPP1 Operations on Community Livelihoods (Fishing and Farming). | All the communities engaged blamed their low fish catch and low crop yield on the GPP1 operations. | GNGLC would consider the following as part of its CSR:<br>▪ Provision of alternative livelihood programs such as aquaculture, pig farming etc.<br>▪ Provision of fertilizers to farmers.<br>▪ Provision of climate resilient seeds to smallholder farmers. |
| Occupational Safety Risk to Staff of GNGLC at the GPP1 site. | Due to the lingering issues and the displeasure of the residents particularly the youth in the project affected and interested communities, the staff of GNGLC at GPP1 could be at risk of being physically assaulted. | ▪ GNGLC would take precautions and ensure the safety of its staff at GPP1.<br>▪ The lingering issues would be resolved promptly.<br>▪ There would be continuous community engagement and sensitization by the Community Relations Department to diffuse all tensions. |
| Dereliction of Duty | In order to make room for the development of GPP1, GNGLC took over the Anokyi community park, promising to provide another park for the locals. But because GNGLC | GNGLC would endeavor to work as soon as possible with the leaders of Anokyi to develop the community park for them before the construction of GPP2 in order |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| | broke this pledge, the local leaders are furious.<br><br>The Chief of Anokyi provided the Plan of the Land earmarked for developing the new community park but there was no action from GNGLC after the land was surveyed. | avert any future community agitation. |
| Cumulative Impacts | The existing impacts from GPP1 operations, if not mitigated adequately could affect GPP2 construction and operation. | GNGLC would endeavor to resolve the lingering issues within the communities in order to ensure the successful implementation of GPP2. |
| Collaboration Opportunity | Inadequate waste management within the Ellembelle District due to the influx of labor to major companies, including GNGLC, in the district. This problem could provide the opportunity for GNGLC and Eni Ghana to engineer and develop a landfill site in the district for appropriate management of waste. | GNGLC may consider this suggestion. |
| | GNGLC is collaborating with Quantum to execute some CSR projects in the communities, but it seems the communities are unaware. | The CSR projects jointly implemented by GNGLC and Quantum would be clearly communicated to the communities and information displayed on notices in the communities. |
| Alignment of Studies to | The findings and recommendations of the QRA, FERA & FRA should be linked | The EIA Gap Assessment team has taken note of this comment and has addressed it. |

| Issue Group | Summary of Issues Raised | Recommended Solution |
|---|---|---|
| produce fit for purpose EIA. | to the impacts and mitigation measures of the final ESIA report to be submitted to the agency. | |

# 5 Identification and Assessment of Potential Impacts

The overall significances of the various impacts were assessed separately for the various phases of the project as presented below. Under the circumstances where GPP Train 1 will be in operation during the construction of GPP2, some of the potential impacts from construction activities may result in cumulative effects that will lead to increases in levels of pollutants, which are currently considered safe, to levels above their respective standard regulations. The same also applies to the post-construction period when both GPPs will be in operation and cumulative impacts will occur concerning air quality, noise, and surface water quality as well as occupational and public health and safety.

## 5.1 Pre-Construction Phase

The potential positive impacts of moderate or high significance are:

- Employment opportunities from recruitment of workers.
- Business opportunities for local experts and contractors.
- Improvement in knowledge and understanding of the impacts of Trains 1 and 2 arising from specialist studies and the possibility of providing effective mitigation measures.
- Improvement in the local economy due to the settlement of compensation issues arising from the acquisition of land for the construction of Train 1.

The potential negative impacts of moderate or high significance are:

- Risk of accidents leading to injury or loss of assets.
- Inability to start Train 2 project without relevant permits and approvals.
- Social conflict and delays in the start of project activities due to the inability to settle compensation issues and inadequate consultation with stakeholders.

## 5.2 Construction Phase

The potential positive impacts of high significance are:

- Employment opportunities resulting in improvement in the local economy and community relations.

The potential negative impacts of moderate or high significance are:

- Gas and dust emissions reducing air quality and causing occupational and public health problems.
- Increased soil erosion.
- Loss of flora and degradation of faunal habitats and ecosystem services.

- Excessive use of water resources.
- Improper disposal of liquid and solid wastes causing water pollution and occupational and public health problems.
- Risk of accidents during construction leading to injury or loss of assets.
- Influx of migrant workers leading to increased demand for services as well as public health and social problems.
- Inability to start construction without relevant permits and approvals.
- Increased vehicular traffic associated with the incidence of accidents and injuries.

## 5.3 Operations Phase

The potential positive impacts of moderate or high significance:

- Employment opportunities resulting in improvement in local and national economies.
- Supply of processed gas for domestic consumption in the country.
- Replacement of light crude oil with natural gas for power production.
- Payment of taxes and other levies leading to improvement in local and national economies.
- Improved community relationships and improvement in local and national economies from Corporate Social Responsibility (CSR) activities.

The potential negative impacts of moderate or high significance are:

- Soil, surface water, and groundwater pollution, and increased occupational and public health risks.
- Increased occupational and public health risks from flaring, air pollution at the ground level and in the atmosphere.
- Increased occupational and public health and safety risks, e.g., from noise and air emissions.
- Increased demand for resources for combined GPP Trains 1 and 2 operations.
- Inability to operate smoothly without relevant permits and approvals.

## 5.4 Decommissioning and Closure Phase

The potential positive impacts of moderate or high significance are:

- Employment opportunities resulting in improvement in the local economy.
- Business opportunities for local administrators and entrepreneurs.
- Restoration of floral and faunal habitats and improved biodiversity.

The potential negative impacts of moderate or high significance are:

- Occupational and public health and safety risks, e.g., from noise and air emissions.
- Soil, surface water, and groundwater pollution.
- Increased erosion of soils.
- Loss of business opportunities dependent on Train 2 operations.
- Loss of jobs by employees of the project.
- Inability to start this phase without relevant permits and approvals.

## 5.5 Flood Risk Assessment

The flood risk assessment was carried out to assess the flood risk to the proposed GPP2 from all sources of flooding, including coastal, groundwater, fluvial and pluvial flooding. Flood risk assessments are essential for ensuring the safety and continuity of operations at gas processing plants to minimize the environmental and safety risks associated with flooding. They are crucial for informed decision-making on plant and facility design, disaster and emergency preparedness and planning, and regulatory compliance. As part of the flood risk assessment, flood inundation simulation was conducted covering the towns of Atuabo, Asemda and Anokyi using HEC-RAS. The current condition shows the drainage point just north of the existing GPP1 has a minimal discharge capacity with attenuation of 80 to 90% of the incoming flow. The flow difference results to the water stored at the west side of GPP area leaving it inundated and swampy for an extended period.

The existing GPP1 was assessed not to be affected by flooding. However, it was observed that some areas in the Anokyi community are susceptible to flood with minor depths of 0.0 – 0.50 meters for the most extreme flood events. It is important to note that this scenario is not caused or intensified by the GPP facilities.

Furthermore, the proposed GPP Train 2 area clearly impedes the natural flow of water which will cause the inundation level at the western section of the proposed GPP2 project site, albeit within the GPP Enclave, to rise even higher. This will then affect GPP1 and expand the inundation area without proper drainage, thus impact assessed as significant without any mitigation measures.

## 5.6 Quantitative Risk Assessment and Fire and Explosion Risk Assessment

As part of the specialist studies to ensure the sustainability of the GPP2 project and safeguard occupational and public health and safety in accordance with the IFC Performance Standard 3 &4, both Quantitative Risk Assessment and Fire and Explosion Risk Assessment were carried out to identify all relevant hazards and potential accident scenarios to be associated with GPP2, calculate and model the risk level in terms of location specific individual risks within the GPP2 and its immediate vicinity.

The outcome of both studies indicates that Location Specific Individual Risk (LSIR) depicting the geographical distribution of risk puts the most severe risks and hazards at only the GPP2 and GPP1 projects sites. The means that in terms of occupational health and safety, the fire and explosion risks at GPP2 is highly significant with one chance in 10 to one chance in 10,000 of being killed per year with jet fire, pool fire and flash fire.

On the other hand, the modelled LSIR puts Asemda at the least risk level in the event of fire and explosion at GPP2. Specifically, the modelled fire and explosion risk ascertained that there is one chance in 1,000,000 to one chance in 10,000,000 of being killed per year at Asemda if there should be fire and explosion at GPP2. This also means that there is no chance of being killed at Anokyi and Atuabo. Thus, in terms of public health and safety, the fire and explosion risks of GPP2 to the A3 communities (Asemda, Atuabo and Anokyi) is low with minor significance.

## 5.7 Climate Change Risk

The Physical and Transition risks identified and the assessment of their impacts on GPP2 operations are summarised in the Climate Risk Table below.

Table 3 GPP2 Climate Risk Table

| Risk | | Risk Driver | Impact on GPP2 Operations | Timeframe | | |
|---|---|---|---|---|---|---|
| **Physical** | **Chronic** | Sea-level rise, drought and variable rainfall patterns. | Direct impact on GPP2 operations could be loss of houses at the adjacent coastal communities, loss of GPP2 & GPP1 infrastructure due to sea level rise induced coastal flooding, loss of farmlands | Short Term | Medium Term | Long Term |

| Risk | | Risk Driver | Impact on GPP2 Operations | Timeframe | | |
|---|---|---|---|---|---|---|
| | | | and productivity due to drought. This could lead to conflicts over land and food security in turn leading to increased militancy and agitation against the GPP operations. | | | |
| | **Acute** | Flooding from heavy rainfall. | Unmotorable roads, storm drain damage, destruction to community livelihoods and accessibility, indirect burden to increase CSR budget allocation and spending to provide relief items. | Short Term | Medium Term | Long Term |
| **Transition** | **Market** | Increased uncertainty and volatility for gas prices. | Significantly lower gas prices could negatively impact revenues, profits & cash flow. Significantly higher prices could also negatively impact the Ghanaian economy and make gas processing business less competitive because prices will be exorbitant for consumers. | Short Term | Medium Term | Long Term |
| | | Reduced demand for gas. | Limiting global warming to 1.5°C or 2°C requires global demand for gas to decline sharply. This could affect the Consortium's ability to sell products thus increasing uncertainty around the strategy for domestic gas business. | Short Term | Medium Term | Long Term |
| | | Increased costs of raw materials. | Climate change is likely to have a growing impact on trade patterns; the energy transition will have a | Short Term | Medium Term | Long Term |

| Risk | | Risk Driver | Impact on GPP2 Operations | Timeframe | | |
|---|---|---|---|---|---|---|
| | | | significant impact on demand for specific metals, other commodities, and products. These impacts may translate into higher prices for steel, chemicals and other materials that will be used in GPP2 business. | | | |
| | | Repricing and stranding of assets. | If stakeholders expect that oil & gas demand will fall in line with global decarbonisation goals, there could be a negative impact on the valuation of GPP2 assets and share price and raise fears of the longer-term gas processing becoming stranded. | Short Term | Medium Term | Long Term |
| | | Cost of capital. | The cost of capital may increase if investors perceive the climate-related financial, reputational or other risks of investing in the GPP business are growing or if GPP2 operations is viewed negatively relative to other peers in the industry. | Short Term | Medium Term | Long Term |
| | **Policy and Legal** | Carbon pricing mechanisms. | Currently there is no regulatory emissions pricing, taxation, or emissions trading schemes in Ghana, and it is expected that it is likely to be some time before global carbon pricing becomes a practical reality. Even if GPP2 will not directly be impacted by carbon pricing | Short Term | Medium Term | Long Term |

| Risk | | Risk Driver | Impact on GPP2 Operations | Timeframe | | |
|---|---|---|---|---|---|---|
| | | | mechanisms, it is noteworthy that such costs could be passed down through the supply chain and result in increased operational costs over time. | | | |
| | | Increased regulation and reporting requirements. | Increasing concern around the impact of climate change and efforts to meet the Paris Agreement could lead to more international agreements and regulatory measures seeking to curb global GHG emissions, which could in turn lead to new mandates on or regulation of GPP2 business potentially increasing costs or affecting demand. | Short Term | Medium Term | Long Term |
| | | Growing numbers of legal cases being brought against fossil fuel companies. | Increased scientific and judicial understanding of the link between GHG emissions and physical climate impacts and a growing body of regulation raises the risks of fossil fuel companies being sued in the courts. For instance, the operations of GPP1 are already being blamed by the local communities as the sole cause of extreme heat and temperature within the local communities. | Short Term | Medium Term | Long Term |

| Risk | | Risk Driver | Impact on GPP2 Operations | Timeframe | | |
|---|---|---|---|---|---|---|
| | Technology | Substitution of gas with low-carbon forms of energy. | Further rapid development of renewable energy technologies, including for batteries and other forms of energy storage, together with falling prices could drive renewables to become an ever-larger share of the global energy mix and impact on demand for gas. | Short Term | Medium Term | Long Term |
| | | Cost of GHG emissions reduction & reporting technology. | Adopting technology to reduce emissions, particularly flaring, will have implications for capital and operating expenditure | Short Term | Medium Term | Long Term |
| | Reputation | Increased stakeholder concern or negative stakeholder feedback | Increasing concerns around the potential impacts of climate change mean that companies that do not address the issue risk being perceived negatively by investors, becoming divestment targets, or suffering increased cost of capital. | Short Term | Medium Term | Long Term |

## 5.8 Habitat Quality and Impact Assessment

Paragraph 20 of the IFC Performance Standard 6 makes specific reference for biodiversity mitigation strategy in protected and international recognized areas, particularly as the GPP enclave is within the Amansuri wetland catchment area, which is noted for the occurrence of international important biodiversity species making it an internationally recognized area.

Guidance Note (GN2) of IFC PS 6 recognizes that sustainable development cannot be achieved if either biodiversity or ecosystem services are lost or degraded by development efforts. IFC PS6 further provides the criteria and requirements for

habitats categorization; natural habitat (Paragraphs 13 and 14), modified habitats (Paragraphs 11 and 12) and critical habitats (Paragraph 16 and 17). Paragraph 9 of the IFC PS 6 defined Habitat as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.

Per the assessment of the biodiversity screening, there is no critical habitat within the GPP2 project site although the unique black peat wetland (regarded as Critical Habitat) is in proximity to the GPP enclave. Thus, the existing habitats within the GPP2 project site and its enclave fall with the category of Natural and Modified habitats per the IFC PS 6 guidelines in paragraphs 13 and 14 and 11 to 12 respectively.

It is evident that any activity or development in a natural area will impact on the surrounding environment in either a positive or negative way. Thus, the purpose of the biodiversity screening amongst others was to determine and assess the major potential impacts associated with the GPP2 construction and operation on the ecological environment and biodiversity, and to determine mitigation requirements post construction.

The significant impacts of the GPP2 construction and operation on habitat and biodiversity (flora and fauna) is provided in Tables 4. Based on the current information, the most pertinent and significant potential impacts (negative) associated with the GPP2 on indigenous fauna and flora would span from medium to low but with the activation of the appropriate mitigation measures in line with the IFC PS6 requirement, most negative impacts are expected to be low to negligible.

Table 4 Biodiversity Impact Significance of GPP2 Development

| **Negative Impact** | **Source of Impact** | **Impact Significance (without mitigation measure)** |
|---|---|---|
| Habitat fragmentation | GPP2 construction could cause fragmentation of habitats or loss of natural habitats | **Medium** |
| Recurring disturbance to | Operational noise from GPP2 | **Medium** |

| Negative Impact | Source of Impact | Impact Significance (without mitigation measure) |
|---|---|---|
| fauna utilizing the area | | |
| Destruction of food sources for fauna | Clearing of vegetation and land preparation activities for construction | **Medium** |
| Swamp[1] wetland destruction | Swamp wetland habitat destruction for construction | **Medium** |

The main impact of the GPP2 project on the vegetation and plant species will occur during the construction phase of the project. Site clearance activities and earthworks during the construction phase will result in fragmentation and the removal of flora species. The loss of vegetation will be permanent within the GPP2 project site thus impact on biodiversity is expected to be medium but with the implementation of the mitigation priority measures, the impact will be low. Again, similar plant species and more are in the wider GPP enclave which will not be impacted; thus, food resources and ecosystem services may not be completely destroyed making the overall adverse impact low. The swamp wetland, which is a natural habitat, with 18ha representing 18.69% of the total swamp land cover within the GPP enclave will be removed but this would be compensated for in accordance with the NNL strategy to be developed by GNGLC as per the requirements of IFC PS6. Consequently, adverse impact will be potentially low.

## 5.9 Human Rights and Fragile Context Risk and Impact Assessment

Human Rights and Fragile Context Risk and Impact Assessment was carried out to provide a comprehensive assessment of human rights considerations and fragile context risks likely to be associated with the construction and operation of the GPP2. The analysis evaluates potential impacts on local communities, workers, and the environment, aiming to mitigate adverse effects and uphold human rights standards throughout the project's lifecycle, in accordance with the United Nations Guiding Principles on Business and Human Rights and ILO Declaration on Fundamental

[1] The total area of the swamp wetland within the GPP enclave is 96.3ha.

Principles and Rights at Work. The human rights and fragile context risks and impacts assessment is provided in Table 5 below.

Table 5 Human Right and Fragile Context Risks and Impact Assessment

| Human Right and Fragile Context Issue | Description | Impact Significance |
|---|---|---|
| The right to an adequate standard of living. | The right to an adequate standard of living is one of the most salient human rights issues for the Consortium/GNGLC to consider. This right includes several components, namely adequate food, clothing, housing, water, and the continuous improvement of living conditions. This right can be impacted by the construction and operation of the GPP2 project. The allure and need to work for an oil and gas company and climate change induced low crop yield and low fish catch could dissuade the residents from engaging in their traditional livelihoods. | **Moderate** |
| The right to work. | The right to work entails the right of everyone to have the opportunity to make a living by work which they freely choose or accept. The influx of migrant workers during construction could threaten the residents by making accommodation within the communities too expensive. From the interaction with the residents and the vulnerable groups, the heightened expectation of the residents to work for GNGLC on the GPP projects and the inability of GNGLC to provide work opportunities for all could impact the right to work of the resident | **Moderate** |

| Human Right and Fragile Context Issue | Description | Impact Significance |
|---|---|---|
| | particularly those who may have the required skill sets. | |
| The right to freedom of association. | The right to freedom of association with others includes the right to form and join all types of associations, including political parties and trade unions. Currently, management of GNGLC allows all its employees to be part of a petroleum workers union where the union can negotiate or mediate on behalf of its members. It is believed that same arrangement will apply to GPP2 operation. | **Negligible** |
| Right to education. | The right to education for everyone aims to guarantee the right of all children to free and compulsory primary education and progressive provision of secondary and higher education. Currently, secondary education is free in Ghana however, the right to basic education in the communities around the project is threatened due to deplorable basic education facilities in communities such as Baku, Ekabaku, Ngalekyi and Ngalekpole. Although GNGLC has provided some basic education facilities in Atuabo, Anokyi and Asemda. | **Moderate** |
| Right to water and sanitation. | The right to water and sanitation includes the right to safe and clean drinking water as well as physical and affordable access to sanitation. GPP2 construction and operation may not have direct impact on the this right | **Moderate** |

| Human Right and Fragile Context Issue | Description | Impact Significance |
|---|---|---|
| | however, the inability of GNGLC to provide adequate and potable drinking water for the communities as part of its CSR constitute indirect negative impact particularly on the vulnerable groups who cannot afford bottle and sachet water.<br><br>For example, GNGLC carried out water quality assessment on the ground water sources in Atuabo and found out that there were high levels of faecal coliform but did not go further to treat the water or provide alternative sources for the people as part of its CSR. | |
| The right to liberty and security of persons. | The right to liberty and security of the person includes the right to be free from unlawful or arbitrary arrest or detention of any kind and the ability to be free from injury to the body and the mind, or bodily and mental integrity. There is a very close connection between potential impacts on the right to liberty and security, and the quality of the GNGLC's community engagement and sensitization process as well as its CSR projects. If people are unsatisfied with the GNGLC's processes regarding community engagement and sensitization process as well as its CSR projects, there is a greater likelihood of unrest and protests, which in turn increase the chances of impacts on their right to liberty and security. Currently, the | **Moderate** |

| Human Right and Fragile Context Issue | Description | Impact Significance |
|---|---|---|
| | people in the A3 communities (Atuabo, Anokyi and Asemda) are not enthused about GNGLC's community engagement and sensitization process as well as its CSR projects. This was the reason the Asemda engagement was truncated, and the peoples threated protest if their concerns are not addressed. | |
| The right to life and the right to health. | The right to life encompasses a right to have one's life protected by law and the right not to be deprived of life arbitrarily or unlawfully and the right to health includes the right to the highest attainable standard of physical and mental health. GNGLC upholds the safety of its staff on site and the safety of the public where it operates. However, it was noted during the additional stakeholder engagement that the Fire Tender at GPP1 was faulty and could not be deployed on time when there was fire incident at Maha Beach Resort is close by. If this situation had happened at GPP1, that would have been disastrous and catastrophic, thus posing threat to human life and health. | **Moderate** |
| Conflict sensitivity and community tensions. | The land dispute over the rightful owners of the GPP enclave by the Atuabo and Anokyi communities could be escalated and turn into full blown conflict which will in turn affect the construction and operation of the GPP2 project. If the land dispute is not | **Moderate** |

| Human Right and Fragile Context Issue | Description | Impact Significance |
|---|---|---|
| | resolved amicably and compensation paid to the rightful owners.<br><br>Secondly, In order to make room for the development of GPP1, GNGLC took over the Anokyi community park, promising to provide another park for the locals. But because GNGLC broke this pledge, the local leaders are furious.<br><br>The Chief of Anokyi provided the Plan of the Land earmarked for developing the new community park but there was no action from GNGLC after the land was surveyed. | |
| Perceived negative environmental impact from GPP1 operations. | The residents in the communities particularly, the A3 communities claim that the flaring of Gas at the Flare Stack at GPP1 is the cause of excessive heat in all the communities engaged, thus construction of GPP2 would only worsen the current heat situation and make the communities unhabitable.<br><br>This was a common concern shared by all the communities engaged. | **Moderate** |

## 5.10 Cultural Resources and Vulnerable Group Impact Assessment

The cultural resources and vulnerable group impact assessment was carried out to assess the potential risk and impacts of the GPP2 project cultural resources and vulnerable groups within the project area in accordance with the IFC PS 7 and 8. It was assessed that the GPP2 project will have both positive and negative impacts on the

project area. Tables 6 and 7 provide the overview of both the positive and negative impact significance of the GPP2 project on the project area.

Table 6 GPP2 Positive Impact Assessment on Cultural Resources

| Impact | Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| Revenue Generation, historical appreciation, boosting local tourism, indirect employment of local tour guides. | Kwame Nkrumah's Birthplace at Nkroful | This is a historical and culturally significant place in the Ellembellle District. It is located at Nkroful, the district capital, which is approximately 32km away from the GPP2 project site. According to the Ellembelle District Assembly, due to the historical significance of Kwame Nkrumah, Ghana's first president, almost all visitors to the district visit this cultural resource. It is envisaged that, migrant workers (both Ghanaians and non-Ghanaians) to be engaged during GPP2 construction and operation would be inclined to visit this cultural resource. | **Moderate** |
| | Fort Apollonia at Beyin | The fort is a UNESCO World Heritage Site which holds significant historical and cultural value due to its colonial and Nzema history. It is envisaged that, migrant workers (both Ghanaians and non-Ghanaians) to be engaged during GPP2 construction and operation | **Moderate** |

| Impact | Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| | | would be inclined to visit this cultural resource. | |
| | Nzulezu | This cultural resource is a historical and culturally significant place, which is also a UNESCO World Heritage Site. It is a spectacular scenery of the 400-year-old stilt propped water settlement of Nzulezu, built on Lake Tadane in the Western Region, stands out as a magnificent interplay between man and his environment. It is envisaged that, migrant workers (both Ghanaians and non-Ghanaians) to be engaged during GPP2 construction and operation would be inclined to visit this cultural resource. | **Moderate** |
| Resource mobilization | Kundum Festival | It was noted during the stakeholder engagement and field visit that GNGLC makes an annual cash donation to Atuabo and Beyin (the two paramount areas within the project's area of influence). This donation enhances the communal resources mobilization of these communities. | **Moderate** |

Table 7 Negative Impact Assessment on Vulnerable Cultural Resources

| Impact | Vulnerable Group/Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| Economic and physical displacement | Women's group, small scale farmers and fisherfolks. | The GPP2 construction will not lead to economic or physical displacement of the vulnerable groups. Crop compensations were paid by GNGLC at the time of the land acquisition. | **Negligible** |
| Health and safety risks | Women's group, small scale farmers and fisherfolks. | Increased exposure to hazardous materials, fire and explosion risk, air pollution, noise, and potential accidents that can threaten the health and safety these groups, especially those living in proximity to the construction site (Atuabo, Anokyi and Asemda) | **Moderate** |
| Disruption to ecosystem services | Women's group, small scale farmers and fisherfolks. | Pollution, habitat destruction, and alterations to ecosystems services that can negatively impact these groups access to clean water, food sources, and local wildlife habitats. Since the acquisition of the GPP enclave (398 ha), which situates the GPP1 and GPP2 project sites, these vulnerable groups are restricted from entering these areas to safeguard the GPP. | **Moderate** |

| Impact | Vulnerable Group/Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| Restricted access to resources and services | Women's group, small scale farmers and fisherfolks. | Limited access to basic services like water, healthcare, education, and infrastructure that could be further compromised during construction, affecting vulnerable groups disproportionately. The GPP2 construction and operation will not limit access to these basic services. | **Negligible** |
| | School children and youth group. | Limited access to basic recreational facility (community park at Anokyi). To make room for the development of GPP1, GNGLC took over the Anokyi community park, promising to provide another park for the locals but the alternative park was never provided. | **Major** |
| Inadequate Corporate Social Responsibility (CSR) | Women's group, small scale farmers and fisherfolks. | It was noted during the stakeholder engagement that GNGLC's CSR towards the communities, especially the A3 communities (Atuabo, Anokyi and Asemda) is inadequate. The social interventions of the CSR projects of GNGLC are not adequate to solve the | **Moderate** |

| Impact | Vulnerable Group/Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| | | issues of the vulnerable groups. | |
| Cumulative Impacts | Women's group, small scale farmers and fisherfolks. | Climate change has exacerbated the climatic conditions of the project communities leading to low crop yield and low fish catch. This impact could worsen if GNGLC does not put together interventions to assist these vulnerable groups. | **Major** |
| Desecration of cultural resources | Cemetery, shrine, sacred stream, and sacred groves | None of these cultural resources were found on the GPP2 project site thus no impact is envisaged however, should there be any chance finds during the construction of GPP2 a Chance Finds Procedure should be followed. | **Negligible** |
| Social and cultural disruption and inadequate resource mobilization | Kundum Festival | It was noted during the stakeholder engagement that GNGLC does not honor the invitation to attend and support the Kundum Festivals in the project affected and interested communities apart from Atuabo and Beyin which have paramountcies. This decision by GNGLC is in line with the company's existing CSR policy. | **Major** |

| Impact | Vulnerable Group/Cultural Resource | Description | Impact Significance |
|---|---|---|---|
| | | The other communities feel disregarded. | |

## 5.11 Cumulative Impacts Assessment

The cumulative effects of the project are considered at two geographical levels: national and local level. At the national level, the project has been assessed in conjunction with other activities that could benefit from the GPP construction and operation or that could have a negative interaction within the project.

The impact at the national level is largely positive and of high significance. Key among the impacts at the national level is the provision of reliable low-cost electricity, provision of enough gas to power thermal plants thereby boosting of the generation capacity of the country. Other impacts include job creation, local expertise development, stimulation of economic growth and direct capital investment.

At the local level the project interaction will be mainly with GPP1. Since GPP2 is proposed to be situated adjacent to GPP1, westward, all forms of interaction will be with the operations of GPP1 particularly during the operation phase. In addition, the project will interact with the LPG loading facility of Quantum Terminals at Anokyi.

No other planned projects which could potentially result in cumulative impacts have been identified at the time of writing.

Potential local level cumulative impacts are likely to be restricted to construction-related air emissions, dust, noise, surface water, waste and traffic which could cause the magnitude of these impacts to be raised above the level defined earlier in the ESIA report. Secondly, operational related impacts could be air emissions, negative public perceptions about GPP 1&2 operations and unmet CSR expectations. However, the mitigation and management actions to be put in place by this project and implemented by GNGLC will render the significance of the local level cumulative impacts Moderate.

## 5.12 Transboundary Effects Assessment

The potential transboundary effects of the GPP2 construction and operation have been assessed under some key environmental and social considerations and they are:

### 5.12.1 Environmental Consideration

For biodiversity, the proposed GPP2 construction, operation and decommissioning is not predicted to result in a significant transboundary effect in relation to biodiversity. The rationale for this conclusion is that given the considerable distance (43km) from the proposed GPP2 site to Ivory Coast there is no potential for any direct or indirect effects on ecological receptors in Ivory Coast as a result of the GPP2 construction and operation. The impact of the project on biodiversity is low and will be localized, only within the project's immediate vicinity.

For air emissions and climate, no transboundary effects are anticipated during construction, operation, and decommissioning of GPP2 with the exception of transportation related Scope 1,2 &3 emissions. Since major components of the GPP2 will be manufactured outside Ghana and transported into the country, some negative transboundary impacts on air quality and climate due to greenhouse gas emissions are anticipated. Also, the transportation of migrant labour particularly foreign expertise during the construction of GPP2 is anticipated to generate some negative transboundary impacts on air quality and climate due to Scope 3 greenhouse gas emissions.

In terms of transboundary effects on land, soil, and geology, the proposed GPP2 construction and operation has no potential effect on the land, soil, and geology environment of Ivory Coast or any of Ghana's neighbours since the proposed construction works will be kept within the proposed development site boundary (GPP Enclave).

With reference to hydrology and hydrogeology, all forms of potential impact on surface and groundwater will be localized no transboundary effects due to the construction, operation, and decommissioning of GPP2 is anticipated.

### 5.12.2 Social Consideration

Transboundary effects on population, public health, land use, cultural resources, labour, economy, and other social factors is expected to be non-existent. All forms of

potential impact on socio-economic and cultural factors will be localized during the construction, operation, and decommissioning of GPP2.

# 6 Environmental and Social Management Plan Actions

## 6.1 Actions Requiring Implementation During all Project Phases

The following section of the ESMP contains three tables which summarizes the key environmental and social mitigation and management actions that are required to be initiated prior to construction, during construction, during operation and decommissioning[2] phases of the GPP2 project. The mitigation and management actions proposed are expected to form the basis of an Environmental and Social Action Plan (ESAP) for the international financial institutions, financing the project to ensure the ongoing project commitment to addressing, managing, and mitigating all identified environmental and social impacts. Furthermore, these actions are specific actions identified through assessment and references modelling undertaken for the ESIA.

Table 8 ESMP for the GNGLC GPP2 Project – Actions Requiring Implementation Prior to Construction

| Pre-Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| Occupational and Public Health and Safety | ▪ Require selected licenced Contractors to submit job risk assessments (JSAs) and method statements, that include general safety and emergency response plans for their staff.<br>▪ Insistence on the observance of all recommended protocols by teams during field inspections and surveys as well as during consultations. For the public, GNGLC will continue to provide support to the local health and administrative authorities as part of its corporate social responsibility activities.<br>▪ Conduct Specialist Studies such QRA, FERA and FRA to assess their respective risks, understand them and incorporate the appropriate mitigation and management measures in the GPP2 project design. | ▪ GNGLC / Consortium<br>o HSE Department/ESMS Team<br>o Project Development Department<br>▪ EPC Contractor<br>▪ Accredited Medical Facility | ▪ IFC Performance Standards 2, 3 & 4<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development | GNCG to monitor and ensure all actions are in place before construction is commenced. | ▪ Monthly prior to construction.<br>▪ One time prior to construction for conducting the specialist studies. | ▪ Medical screening/examination<br>▪ Project preparation and development<br>▪ Project design |
| Regulatory Requirements | ▪ Be guided by all the relevant government policies such as the National Energy Policy | ▪ GNGLC / Consortium | ▪ IFC Policy on Environmental and Social Sustainability | GNCG to monitor and ensure all actions are in place before | Monthly prior to construction. | Inventory of relevant permits and licenses |

[2] Mitigation and management actions for the construction phase will be applicable to the decommissioning phase should the GPP2 project come to its end.

| Pre-Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | and the Local Content Policy of the Oil and Gas Sector.<br>▪ Satisfy all the relevant regulatory frameworks such as for planning and design of the GPP (Environmental Assessment Regulations, 1999 (L.I. 1652) and the National Petroleum Act, 2005 (Act 691).<br>▪ Apply for and obtain all the relevant permits including the Water Use Regulations, 2001 (L.I. 1692).<br>▪ Ensure local content and local participation, concerning the employment of workers and general procurement according to the Petroleum (Exploration and Production) Act, 2016 (Act 919), Petroleum (Local Content and Local Participation) Regulations, 2013 (L. I. 2204), the Labour Act, 2003 (Act 651), and Labour Regulations, 2007 (L.I. 1833) are adhered to. | ○ HSE Department/ESMS Team<br>▪ Ghana EPA | ▪ Good International Industry Practice (GIIP). | construction is commenced. | | |
| Settlement of Compensation Issues | It was noted during the additional stakeholder engagement that there is an ongoing court case to determine the rightful ownership of the entire GPP land however, the land litigation process has protracted. Management of GNGLC would work together with the traditional authorities of both Atuabo and Anokyi to resolve the land litigation issue and pay the appropriate compensations. | GNGLC<br>▪ Community Relations Department<br>▪ ESMS Team | IFC Performance Standard 5 | GNCG to monitor and ensure all actions are in place before construction is commenced. | Monthly prior to construction. | Working with the rightful traditional authority to pay compensations once the land litigation case is settled amicably. |
| Consultation with Relevant Stakeholders | ▪ General awareness creation on the details of the proposed GPP2 project. | GNGLC | IFC Performance Standards 1, 2, 4 & 5 | GNCG to monitor and ensure all actions are in place before | Monthly prior to construction. | Stakeholder List particularly from A3 communities. |

| Pre-Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Assisting to resolve land litigation case between Atuabo and Anokyi and subsequent payment of compensation to the rightful traditional authority.<br>▪ Signing of an agreement with the A3 communities as indicated in their concerns on employment and other local issues.<br>▪ Responding to other concerns raised during the ESIA scoping exercise including employment quotas, provision of emergency assembly points for the A3 communities, restoration of the footpath between Asemnda and Anokyi, and replacement of the football pitch at Anokyi.<br>▪ Prepare Stakeholder Engagement Plan (SEP) | ▪ Community Relations Department<br>▪ ESMS Team | | construction is commenced. | | |

Table 9 ESMP for the GNGLC GPP2 Project – Actions Requiring Implementation During Construction

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| Air Quality and Noise Pollution | ▪ Ensure that site preparation and clearing are conducted in phases to minimise exposed areas.<br>▪ Maintain all work equipment and vehicles at optimal operating conditions, according to the manufacturers' specifications. | ▪ GNGLC / Consortium<br>○ HSE Department/ESMS Team<br>▪ EPC Contractor | ▪ IFC Performance Standards 1, 3 & 4.<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development. | ▪ Observation of air borne particulates (dust) and exhaust fumes.<br>▪ Complaints from the residents on dust and noise pollution. | ▪ Monthly and quarterly during construction and comparing results with | ▪ Monitoring of CO, $SO_2$, $NO_2$ TSP, $PM_{10}$, and $PM_{2.5}$ at the selected monitoring sites.<br>▪ Speed tracking of company and contractor vehicles |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Minimize dust generation by using covers for sand heaps an /or control systems such as dust suppression by dowsing with water.<br>▪ Ensure that all project personnel use approved PPE to minimize effect of inhalation of dust and noxious fumes on worker health.<br>▪ Ensure a strict no burning policy is implemented.<br>▪ Fuel with less Sulphur will be used and scrubbers will be installed on combustion machinery and mufflers on the exhaust pipe of vehicles.<br>▪ Use construction vehicles and equipment with low noise and vibration capacity.<br>▪ Use well-maintained equipment and screen or muffle noisy systems.<br>▪ Ensure that all personnel wear appropriate Personal Protection Equipment (PPE) such as ear plugs in areas of high noise.<br>▪ Air Quality and Noise Management Plan as part of the CESMP to be developed by the EPC Contractor to maintain acceptable levels of emissions. | | ▪ Ghana Standards on air emissions and noise. | ▪ Air quality and noise monitoring records. | baseline results. | |
| Flood Risk (Drainage) | ▪ Ensure that facilities and structures are not sited within any waterway that would cause flooding of the project area and associated communities. | ▪ GNGLC / Consortium<br>○ HSE Department/ESMS Team | IFC Performance Standard 4 | GNCG/Consortium to monitor and ensure flood mitigation measures designs are | Weekly during construction. | ▪ Field inspection at GPP2 construction site.<br>▪ Supervision of construction activities. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Design and construct adequate drainage systems at the project site and associated local communities for evacuation of post-construction stormwater based on the results of the specialised study on flood control and management in the pre-construction phase.<br>▪ Avoid creating or covering exposed surfaces from land clearing and excavations that will generate loose sediment to be carried by surface runoff to cause sedimentation of local drains.<br>▪ According to the FRA studies, the proposed GPP Train 2 area clearly impedes the natural flow of water which will cause the inundation level at the west side of the GPP2 project site to rise even higher. This will then affect GPP1 and expand the inundation area without proper drainage. Furthermore, stored water will seep through soil and embankments which can trigger other problems such as soil consolidation, erosion, piping phenomenon among others. Thus, to prevent this scenario, a drainage culvert will be constructed across the existing road opposite GPP2 (see Plate 28 in ESIA Report). The discharge will be diverted to the coastal side, instead of the town of Anokyi. This will effectively eliminate the flooding | ○ Construction and Engineering Department<br>▪ EPC Contractor | | implemented by the EPC Contractor. | | |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | specifically at the community area. This will also discharge the storage at the west side of the GPP2 project site to prevent other potential major disasters that can occur. The maximum water level reached for 100-yr flood event is computed to be 5.84 meters amsl. The inundation results at the end of 4-day flood simulation with GPP Train 2 and proposed drainage culvert is shown in Plate 30 to 31 of the ESIA Report. The contributed flooding to the town of Anokyi, on the other hand, will be eliminated since no more flow will come from the west of GPP2. Nevertheless, saturation of the area can still be expected with local precipitation and runoff from its own catchment. The discharge on the coastal area, however, imposes no substantial damage and negative effect due to minimal discharge with a peak of only 12.85 cms at a velocity of 0.43 m/s.<br>o The floor level will be elevated to at least 7.0 meters amsl or will be levelled with the existing GPP1 at an elevation of 8.0 meters to make sure a smooth transition of facilities and mobility in between the GPP areas. This will also allow enough freeboard from the maximum water level of the most extreme flood event. | | | | | |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ○ Floor surface will be sloped at a minimum of 1% gradient to allow runoff and avoid accumulation of rainwater that may disrupt operation of the facility, and movement of people and equipment. | | | | | |
| Soils and Erosion | ▪ Using types of heavy-duty trucks and equipment that will not overburden the soils.<br>▪ Ensuring that the heavy-duty trucks and equipment used for the construction are properly maintained on schedule to prevent oil/diesel leakages into the soils.<br>▪ Soil and Erosion Management Plan | ▪ GNGLC / Consortium<br>○ HSE Department/ESMS Team<br>○ Construction and Engineering Department<br>▪ EPC Contractor | Ghana Standards | Observation of change in soil physical and chemical characteristics. | Quarterly during construction. | Sampling and analyses of soil samples for physicochemical parameters. |
| Surface Water and Groundwater Pollution | ▪ Schedule site clearing and road construction activities to avoid heavy rainfall periods to the extent that is practical.<br>▪ Avoid or cover exposed surfaces from land clearing and excavations to prevent loose sediment from being transported by surface runoff into surface waters.<br>▪ Use impervious surfaces for refuelling and other fluid transfer areas to prevent their discharge into surface waters or seepage into shallow groundwater.<br>▪ Train workers on the correct transfer, handling of fuels, chemicals, and response to spills. | ▪ GNGLC / Consortium<br>○ HSE Department/ESMS Team<br>○ Construction and Engineering Department<br>▪ EPC Contractor | ▪ IFC Performance Standard 3<br>▪ Ghana Standards on surface water and effluent quality. | ▪ Observable change in turbidity of water resources within the GPP Enclave.<br>▪ Water quality monitoring record | Monthly during construction to compare with Baseline results as well as Ghana Standards/EPA requirements | Sampling and analyses of effluents, groundwater, surface water, seawater, and rainwater for physicochemical and biological quality parameters. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Provide portable spill containment and clean-up equipment on site and training in the use of the equipment.<br>▪ A Water Management Plan as be part of the CESMP to be developed by the EPC Contractor prevent surface water contamination. | | | | | |
| Waste Management | ▪ Develop an efficient Waste Management Plan to, among others:<br>o Provide labelled waste bins with covers at vantage points at the construction site for collection of solid waste.<br>o Contract a certified waste management company, in collaboration with GNGLC's HSE Department, to collect solid waste from the construction site for final disposal.<br>o Provide sanitary facilities at any temporary work camp and around the project site for workers to prevent open defecation.<br>o Prohibit dumping or storage of litter/debris, tools, and equipment on the sides of public or private roads.<br>o Ensure personnel working at the site are trained in the handling and management of wastes. | ▪ GNGLC / Consortium<br>o HSE Department/ESMS Team<br>▪ EPC Contractor<br>▪ Waste Contractor | ▪ IFC Performance Standard 3<br>▪ EPA Requirements | ▪ Availability and use of bins/skips<br>▪ Records on frequency and location of waste disposal site of domestic and construction waste.<br>▪ Records on collection of recyclable materials. | Monthly during construction | Visual inspection of site and waste trail documents. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| Occupational and public health and safety and security | ▪ Provide PPE and training on safety procedures.<br>▪ Provide First Aid posts and display safety / precautionary measures at selected points at the construction site to guide the movement and activities of workers and visitors.<br>▪ Train selected workers as first aid givers and provide adequate first aid kits to treat minor ailments. Major cases shall be referred to the Eikwe St. Martin de Porres Hospital.<br>▪ Provide periodic medical examinations for employees:<br>▪ Train drivers at the site to understand road traffic regulations.<br>▪ Enforce speed limits of 30 km/hr in built-up areas and 10-30 km/hr at the project site.<br>▪ Ensure that movements of heavy-duty trucks and equipment to site or storage areas are carried out in phases and regulated to control the number of trucks and reduce the risk of accidents.<br>▪ Ensure that all equipment to be used are in good condition and undergo scheduled regular maintenance to minimise accidents.<br>▪ Maintain security personnel who are trained to respect the human rights of the public at the construction site. | ▪ GNGLC / Consortium<br>o HSE Department/ESMS Team<br>▪ EPC Contractor | IFC Performance Standards 2 & 4 | ▪ Records on public complaints related to public health issues.<br>▪ Records on worker health during construction.<br>▪ Records of worker toolbox talks/training sessions on health topics.<br>▪ Medical records of trainees (respiratory tract infections, malaria and other related diseases).<br>▪ Security assessment report.<br>▪ Security incident register. | ▪ Monthly<br>▪ Quarterly | ▪ Medical screening/examination<br>▪ Regular Health Safety and Security Assessments. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Provide workers and security personnel with toilet facilities during the construction period.<br>▪ Use indicator linings / reflective warning notices or wire mesh to prevent falls into uncovered trenches or deep excavations.<br>▪ Ensure that all the drivers to be engaged possess the requisite qualifications.<br>▪ Enclose the project site and strictly control the admission of job seekers to discourage idling and irresponsible behaviour.<br>▪ Security risk assessment will be conducted to evaluate the potential risks.<br>▪ A security worker code of conduct will be developed.<br>▪ The appointed security company will be committed to comply with the Voluntary Principles on Security and Human Rights.<br>▪ Security Management Plan to be developed in line with IFC's Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts (2017. | | | | | |
| Local Traffic and Land Use | ▪ Enforce speed limits of 50 km/hr. in built-up areas and 10-30 km/hr. at the project site.<br>▪ Train drivers to observe all road traffic regulations. | ▪ GNGLC / Consortium<br>o HSE Department/ESMS Team<br>▪ EPC Contractor | ▪ IFC Performance Standards 4<br>▪ Ghana Road Safety Procedures | ▪ Records on frequency and type of incident/accidents involving workers and residents. | Weekly during construction | ▪ Site inspections<br>▪ Traffic incidence reporting. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Provide advance information through public announcements on mobilization schedules.<br>▪ Use road signs, sirens, and security escorts to warn people and communities of on-coming heavy-duty vehicles.<br>▪ Avoid night mobilization trips.<br>▪ Engage flagmen to man all major intersections to assist with the passage of trucks conveying materials and equipment to and from the construction site and storage areas.<br>▪ Use bypass road as much as possible instead of the main Krisan to Baku Road. | | | ▪ Availability and use of diversion/road signs or trained persons directing traffic.<br>▪ Records of parking at unauthorized places. | | |
| Regulatory Requirements | ▪ Be guided by all the relevant regulations such as the Environmental Assessment Regulations, 1999 L.I. 1652, National Petroleum Act, 2005 (Act 691), the Labour, 2003 (Act 651), and Labour Regulations, 2007 (L.I. 1833).<br>▪ Apply for and obtain all other relevant permits.<br>▪ Ensure local content and local participation, with respect to the employment of workers and general procurement according to the Petroleum (Exploration and Production) Act, 2016 (Act 919), Petroleum (Local Content and Local Participation) Regulations, 2013 (L.I. 2204), Labour Act, | ▪ GNGLC / Consortium<br>o Legal/Operations Department<br>o HSE Department/ESMS Team<br>▪ EPC Contractor<br>▪ Ghana EPA | ▪ IFC Policy on Environmental and Social Sustainability<br>▪ Good International Industry Practice (GIIP). | Monitoring and ensuring adherence to all regulatory requirements during construction. | Quarterly | Review of permits and approvals required for compliance. |

| Construction Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | 2003 (Act 651), and Labour Regulations, 2007 (L.I. 1833). | | | | | |
| Consultation with Relevant Stakeholders | ▪ Consultations with all relevant local and administrative stakeholders concerning all construction-related activities that may directly or indirectly affect the public, especially, the nearby communities and businesses.<br>▪ Depoly Stakeholder Engagement Plan (SEP)<br>▪ Publish Grievance Mechanism at vantage points within the communities for easy accessibility.<br>▪ Establish protocols for prompt resolving of grievances upon receipt. | ▪ GNGLC<br>o Community Relations Department<br>o ESMS Team<br>▪ EPC Contractor | IFC Performance Standards 1, 2, 4 & 5 | Periodic scheduled stakeholder consultations in accordance with the project's SEP. | Monthly during construction. | Assessment of stakeholder meetings. |

Table 10 ESMP for the GNGLC GPP2 Project – Actions Requiring Implementation During Project Operations

| Operational Phase | | | | | | |
|---|---|---|---|---|---|---|
| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| Air Quality and Noise Pollution | ▪ Widen the area of monitoring of its air emissions beyond the A3 Communities.<br>▪ Expand the scope of monitoring to include periodic night measurements and increase averaging times for monitoring of particulates to allow comparison with GSA standards.<br>▪ Floors/ground will be concrete paved and gravel during operation to prevent dust.<br>▪ Ensure vehicles and machinery are fitted with appropriate exhaust systems and emission control devices and devices are maintained in good working order.<br>▪ Ensure the use of equipment, generators, machines, and vehicles with atmospheric emissions meeting the standards set by EPA/GSA and industry best practice.<br>▪ Ensure all equipment and engines are maintained and operated as original designed.<br>▪ Ensure all equipment are properly operated according to standard operating procedure that will ensure safe operation of equipment/vehicle/generator while meeting best environmental emission targets.<br>▪ Monitoring the presence of gases with portable and fixed flame and gas detectors.<br>▪ Undertaking routine inspections and maintenance works for optimal operating conditions. | ▪ GNGLC / Consortium<br>○ HSE Department/ESMS Team<br>▪ Ghana EPA | ▪ IFC Performance Standards 1, 3 & 4.<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ Ghana Standards on air emissions and noise. | ▪ Complaints from the residents on fugitive emissions and noise pollution.<br>▪ Air quality and noise monitoring records. | Monthly and quarterly during operations and comparing results with baseline results. | ▪ Monitoring of CO, $SO_2$, $NO_2$, TSP, $PM_{10}$, and $PM_{2.5}$ at the selected monitoring sites.<br>▪ Liaise and collaborate with the EPA to install a state-of-the-art continuous air quality monitoring. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Using storage tanks with internationally acceptable standards.<br>▪ Treating waste gas produced with pollution abetment equipment (scrubbers, filters and knockout drums) before being sent to the flare stack.<br>▪ Locating the flare stack away from residential areas.<br>▪ Increasing recovery of iso-pentane from the GPPs.<br>▪ Increasing and maintaining vegetation cover around the GPPs to support carbon capture.<br>▪ Accelerating the process of engaging a new off-taker for iso-pentane, after the withdrawal of t the initial investor (Genser Energy).<br>▪ Using well maintained equipment and screens or muffling noisy systems.<br>▪ Using plant vehicles with low noise and vibration capacity.<br>▪ Ensuring that all personnel wear appropriate PPE such as ear plugs in areas of high noise.<br>▪ Maintaining a vegetative buffer between the Asemnda community and the site for Train 2. | | | | | |
| Climate Change Risk | ▪ Periodic assessment of physical risks to GPP2 assets, operations, and host communities. Positive stakeholder engagement with local communities and | ▪ GNGLC / Consortium<br>o Management/ Company Board | ▪ IFC Performance Standards 1, 4 & 6.<br>▪ Intergovernmental Panel on Climate | ▪ Data from Periodic Climate Scenario Analysis | Annually during operations | ▪ Climate Risk Assessment |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| *Physical: Chronic and Acute*<br><br>*Transition: Market, Policy and Legal, Technology and Reputation* | active CSR initiatives to reduce the risk of agitations against GPP2 operation.<br>▪ Develop physical climate risk management plan.<br>▪ Implement the recommendation of the Flood Risk Assessment (FRA) during construction to construct appropriate storm drain to channel excess water into the sea. Continuous engagement and sensitization of the local communities.<br>▪ Conduct scenario analysis to demonstrate that the gas portfolio of Ghana is resilient to lower prices and lower demand.<br>▪ Diversification into renewable energy should be considered in order to boost revenue.<br>▪ Consider deployment of biofuels from organic waste.<br>▪ Consider other renewable and sustainable raw material for GPP2 operations.<br>▪ Consider factoring these risks into the GPP2 business thereby considering new energy business.<br>▪ GNGLC will strategize to play a leading role in Ghana's energy transition and decarbonization plan. This will bolster the resilience of the GPP business and the Consortium's reputation and ensure that investors maintain a positive view of the Consortium in absolute terms and relative to its peers. | ○ HSE Department/ESMS Team | Change (IPCC) Guidelines<br>▪ TCFD Recommendations | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Institute measures to mitigate exposure to carbon pricing by eliminating or reducing Scope 1&2 emissions from GPP2 operations as far as possible. Investment in nature-based carbon capture solutions to mitigate emissions that cannot eliminated.<br>▪ GNGLC will strive to ensure that they are fully aligned with climate reporting requirements and are enhancing their ESG performance and their wider non-financial reporting by working with ESG ratings agencies and other third parties.<br>▪ GNGLC will work on its community relations and engagements to disabuse the perception of the communities on GPP1 being the cause of the high temperatures by doing the following:<br>o Conduct continuous ambient temperature monitoring.<br>o Assist the communities to engage third party contractors to also conduct continuous ambient temperature monitoring.<br>o The temperature results should be compared to ascertain the veracity of the claim that GPP flare stack is the cause of the high temperature and heat at the communities.<br>o Furthermore, some communities outside of the catchment of GPP along the coast could be used as | | | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | controls and conduct the continuous ambient temperature monitoring to compare the monitoring results and ascertain the veracity of the claim that GPP flare stack is the cause of the high temperature and heat.<br>o Whatever the outcome of the continuous ambient temperature monitoring, Consortium/GNGLC could increase their community engagement and sensitization.<br>▪ GNGLC will plan to play a leading role in Ghana's energy transition through diversification into renewables. Efficient, low-cost, less-carbon intensive operations; Monitoring technological developments and introduction of cost-effective new technologies when applicable.<br>▪ Budgetary allocations will be made to cater for the short to medium term costs for emissions reduction initiatives.<br>▪ GNGLC will communicate its important role in Ghana's energy transition to stakeholders when it does take the lead. Set and achieving ambitious targets to decarbonize GPP business and aligning with best practice in climate-related disclosures. | | | | | |
| Soil Contamination | ▪ Maintaining bunds around the storage tank areas to contain any spills from the tanks. | GNGLC / Consortium<br>o HSE Department/ESMS Team | Ghana Standards on soil quality | Observation of change in soil physical and chemical characteristics. | Semi-annually | Sampling and analyses of soil samples for physicochemical parameters. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Storing obsolete or expired chemicals and waste oil on non-permeable surfaces under the hazardous waste shed.<br>▪ Treating liquid wastes to permissible standards before discharge | | | | | |
| Water and Wastewater Contamination | ▪ Prevention and control of accidental releases of liquids through regular inspections and maintenance of storage and conveyance systems.<br>▪ Provision of sufficient capacity for storing process fluids to enable maximum recovery into the process and, therefore, avoid large discharges of wastewater.<br>▪ Design and construction of wastewater and hazardous materials storage containment areas with suitably impervious surfaces to prevent infiltration of contaminated water into soil and groundwater.<br>▪ Segregation of process wastewater from stormwater and segregation of wastewater and hazardous materials containment basins; and<br>▪ Implementation of general good housekeeping practices.<br>▪ All workers will be trained in the handling, storing, and disposal of hazardous materials. In the event of an accidental release there will be emergency procedures in place so that the spill can be contained immediately. | ▪ GNGLC / Consortium<br>o Plant Manager<br>o HSE Department/ESMS Team<br>▪ Ghana EPA | ▪ IFC Performance Standards 3.<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ Ghana Standards on water and effluent quality | ▪ Observable change in turbidity of water resources within the GPP Enclave.<br>▪ Water and effluent quality monitoring records.<br>▪ Spill incidences records. | ▪ Quarterly<br>▪ At the occurrence of any oil or hazardous chemical spillage. | Sampling and analyses of effluents, groundwater, surface water, seawater, and rainwater for physicochemical and biological quality parameters. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Emergency spill containment material and clean up equipment will be distributed and stored in appropriate places so that any spill can be cleared up as quickly as possible to minimize any adverse effects.<br>▪ Any contaminated waste waters / storm waters following a spill, will be collected as far as possible and retained on site prior to being treated by the wastewater treatment system or appropriate off-site treatment system and discharged. | | | | | |
| Solid Waste Management | GNGLC will recycle, reuse, or dispose permanently of solid non-hazardous waste and hazardous waste including obsolete chemicals offsite in a manner that complies with:<br>• Section 13 (1) of the Hazardous, Electronic, and Other Waste Control and Management Act, 2016 (Act 917), to minimize the potential negative impacts on human health and the environment.<br>• Section 19 (1) of the Hazardous, Electronic, and Other Waste (Classification) Control and Management Regulations, 2016 (L.I. 2250) on the management of hazardous wastes.<br>• Public Procurement Act 2016 (Act 194).<br>• Ghana Gas Environmental Policy.<br><br>The Solid waste generated will be segregated into labelled colour-coded bins as follows: | ▪ GNGLC / Consortium<br>o HSE Department/ESMS Team<br>▪ Waste Contractor | ▪ IFC Performance Standards 3<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ EPA Requirements | ▪ Availability and use of bins/skips<br>▪ Records on frequency and location of waste disposal site of solid waste on site.<br>▪ Records on collection of recyclable materials. | Monthly | Inspection of the solid waste storage sites |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | • General Waste Black Bin with Yellow Lid<br>• Metals Aluminium Skip<br>• Organic Green Bin<br>• Polythene/Plastics Blue Bin<br>• Oily Rags Black Bin | | | | | |
| Occupational Health and Safety (Fire and Explosions) | ▪ Installation of early warning devices such as fire alarm systems and fixed fire and gas detectors supplemented by portable gas detectors.<br>▪ Installation of fixed firefighting equipment and placement of portable fire extinguishers at vantage points in work locations.<br>▪ Periodic inspection by the HSE Department and servicing of the fire alarms, fire and gas detectors, fire extinguishers, and other equipment by a licenced service provider.<br>▪ Maintenance of a permanent mobile GNFS fire tender in the GPP enclave.<br>▪ Provision of a permanent station for the National Ambulance Service at the GPP to provide first aid services and respond to emergencies.<br>▪ Maintenance of continuous links with the St. Martin de Porres Hospital at Eikwe to which major cases shall be referred.<br>▪ Provision of fire safety training to all employees, contractors, and visitors.<br>▪ Undertaking annual drills and simulation exercises to keep staff alert. | GNGLC / Consortium<br>○ HSE Department/ESMS Team<br>○ Plant Manager | ▪ IFC Performance Standards 2 & 4<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development. | ▪ Records of fire and explosion incidences and near misses. | Weekly | Inventory of fire and explosion incidents and accidents in the GPPs. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Ensuring that available groundwater resources can provide sufficient firefighting water in the event of a fire emergency or accident.<br>▪ Using experienced and competent personnel in all departments of the GPPs.<br>▪ Implementing the recommendations of the QRA and FERA studies below:<br><br>1. Since the QRA/FERA study is based on the Philosophy stated at the blowdown philosophy that (In case of confirmed gas leak, involved area depressurization will be automatically initiated by the ESD system.), which have a great contribution for risk reduction measures, The facility will be provided with an effective fire and gas detection system that will take automatic action (Isolation & depressurization), based on confirmed detection of hydrocarbon gas release or fire. A fire and gas mapping study will be performed to ensure appropriate coverage of fire and gas detectors in GPP2.<br>2. Ensuring that ignition prevention is practiced onsite by the classification of hazardous areas, in addition to preventative maintenance on electrical systems and inspection activities. Work activities within hazardous areas will be controlled by the Permit to Work system. | | | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | 3. Equipment, vessel, pumps etc. which are part of top risk contributing scenarios will be given priority in inspection.<br>4. Review the possibility of providing (analysing the pros and cons) water connection at the sphere bottom that can be used in the event of Loss of Containment (LOC) from bottom of the sphere.<br>5. In case of sphere fires, the potential always exists for an Explosion/BLEVE. To reduce this risk, it is recommended to ensure that the emergency response plan includes following:<br>A. Mitigate fire from the maximum distance possible or use portable monitors or fixed fire monitors.<br>B. Cool spheres by flooding (externally) them with large quantities of water.<br>C. Leave the area immediately if you hear a rising sound from venting safety devises or see discoloration of the sphere.<br>D. For massive fires, use unmanned hose holders or monitor nozzles; and<br>E. Be aware that when BLEVE occurs, sections of the sphere can fly in any direction. Just avoiding the ends of sphere should not be considered for a safe operating procedure. | | | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | 6. Ensure that fire responders (Emergency Response Team) to be aware of the hazards associated with tank fires, including BLEVE.<br>7. Ensure spill containment plan is in placed to avoid spread of pool of liquid in case of LOC from large inventory equipment such as spheres and storage tanks.<br>8. Passive fire protection (PFP) will be provided for isolation and depressurization valves ESD/EDP/XV (which are considered in intolerable risk area) which is located inside the exceedance contour, based on the pool and jet fire events at 10 minutes at a thermal radiation level of 37.5 kW/m2 with cumulative fire frequency of 1.0E-04/yr, in accordance with the requirement in API 2218 (see Appendix C of ESIA Report).<br>9. Shifting of the occupational building zone include the (LAB-Control room – Warehouse – Workshop), slightly to the west to be totally inside the low-risk area (The 10-6 risk contour from jet fire &Pool fire reaching the workshop and warehouse – also the 10-6 risk contour from 0.14 barg overpressure reaching the workshop and control room), it is better to keep occupational building in the low-risk area (see Appendix C of ESIA Report).<br>10. Ensure the drainage facilities are designed to sufficiently contain or drain to a safe area | | | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | to limit the extent of pool fires and prevent escalation between process equipment. | | | | | |
| Occupational Health and Safety (Hazardous Chemicals Handling) | ▪ Provide PPEs to workers during the handling and use of these chemicals.<br>▪ Conduct training for the relevant staff on the use of the chemicals in consultation with EPA.<br>▪ Store chemicals according to the manufacturers' recommendations.<br>▪ Store obsolete chemicals in labelled containers for collection and disposal by accredited companies according to the relevant local legislative requirements, such as the Hazardous and Electronic Waste Control and Management Act 2016, (Act 917).<br>▪ Track the quantities of hazardous waste chemicals generated and how they are disposed of by the service providers. | GNGLC / Consortium<br>o HSE Department/ESMS Team<br>o Plant Manager | ▪ IFC Performance Standards 2 & 4<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ EPA/Ghana Standards Guidelines on Handling Hazardous Chemicals. | ▪ Inventory of all hazardous chemicals on site.<br>▪ Monitoring of volumes used, handling and storage. | Monthly | Audits of handling, storage, and spillage of hazardous chemicals used in the processing of natural gas. |
| Public Health and Safety | ▪ Community sensitisation on GNGLC's proposed activities and prevention of bush fires and encroachment on the RoW of pipelines.<br>▪ Involve the nearby communities in emergency drills and mass casualty exercises.<br>▪ Provide support to local health and administrative authorities as part of corporate social responsibility activities in order to strengthen their capacity. | GNGLC / Consortium<br>o HSE Department/ESMS Team<br>o Community Relations Department | IFC Performance Standard 4 | ▪ Record of public health protocols discussed in community sensitizations.<br>▪ Record of observance of public health safety protocols at the GPP2 entry points.<br>▪ Record of CSR programs geared | Monthly | Audit of the implementation of the Community Affairs Policy. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | | | | towards public health safety. | | |
| Regulatory Requirements | ▪ Be guided by all the relevant regulations such as the Environmental Assessment Regulations, 1999 L.I. 1652 and the National Petroleum Act, 2005 (Act 691).<br>▪ Ensure local content and local participation with respect to the employment of workers and general procurement (Petroleum Local Content and Participation Regulations, 2013).<br>▪ Comply with other regulations such as those for employment, (Labour Act 651, 2003) and Labour Regulations, 2007 (L.I. 1833), water use (Water Use Regulations, 2001 (L.I. 1692), and the GSA Environmental Quality Standards for noise, air quality and effluent discharges. | ▪ GNGLC / Consortium<br>o Legal/Operations Department<br>o HSE Department/ESMS Team<br>▪ Ghana EPA | ▪ IFC Policy on Environmental and Social Sustainability<br>▪ Good International Industry Practice (GIIP). | ▪ Monitoring and ensuring adherence to all regulatory requirements during operations. | Quarterly | Review of permits and approvals required for compliance. |
| Relevant Stakeholders | ▪ GNGLC will continue consultations with the relevant stakeholders to maintain a conducive environment for its activities.<br>▪ Strengthen collaboration with Ellembelle District Assembly and its decentralised departments.<br>▪ Ensure effective interaction with the local communities and district assembly.<br>▪ Depoly Stakeholder Engagement Plan (SEP)<br>▪ Publish Grievance Mechanism at vantage points within the communities for easy accessibility. | ▪ GNGLC<br>o Community Relations Department<br>o ESMS Team | IFC Performance Standards 1, 2, 4 & 5 | ▪ Periodic scheduled stakeholder consultations in accordance with the project's SEP. | Monthly during operations. | Assessment of stakeholder meetings. |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | ▪ Establish protocols for prompt resolving of grievances upon receipt. | | | | | |
| Human Rights and Fragile Context Issues:<br><br>*The right to an adequate standard of living.*<br><br>*The right to work.*<br><br>*The right to freedom of association.*<br><br>*Right to education.*<br><br>*Right to water and sanitation.*<br><br>*The right to liberty and security of persons.* | ▪ Although GPP2 construction and operation cannot improve the living standard of all the communities, it could improve the living standard of the local people to be engaged during the construction and operation by ensuring that the Labor Management Plan for GPP2 construction will include provisions for monitoring third party contractor recruitments so that the adequate number of locals are recruited to work during the construction phase and the appropriate wages paid to them.<br>▪ Increase local content and increase the participation of qualified and requisite locals in the recruitment process for GPP2 construction and operation. However, since the GNGLC would not be able to provide work for all the locals in the communities, the community sensitization by GNGLC will educate the communities on this reality. GNGLC could use its CSR projects to offset its inability to provide work opportunities for all.<br>▪ The current arrangement for GPP1 where staff are allowed to join labor unions would be encouraged and extended to GPP2 operations.<br>▪ The GNGLC will use the CSR projects for GPP2 operation to fix the deplorable basic | ▪ GNGLC<br>o Community Relations Department<br>o HSE Department/ESMS Team | ▪ National Human Rights Legal Framework.<br>▪ International Human Right Treaties Ratified by Ghana.<br>▪ United Nations Guiding Principles on Business and Human Rights. | ▪ Records of issues resolved following every community engagement.<br>▪ CSR projects suitability assessment records. | Monthly and quarterly during operations | ▪ Review of all issues raised during community engagements.<br>▪ Assessment of the suitability of CSR projects. |

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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| *The right to life and the right to health.*<br><br>*Conflict sensitivity and community tensions.*<br><br>*Perceived negative environmental impact from GPP1 operations.* | education facilities in the communities thereby enhancing the right to education.<br>▪ GNGLC will use the CSR projects for GPP2 operation to provide potable water and public toilet facilities for communities thereby enhancing the right to water and sanitation.<br>▪ GNGLC will improve its community engagement and sensitization process as well as its CSR projects within the local communities to prevent any likelihood of unrest and protests.<br>▪ GNGLC will tighten its safety protocols by ensuring its fire tender is operational and ready to be deployed at any time.<br>▪ GNGLC will work together with the traditional authorities of both Atuabo and Anokyi to resolve the land litigation issue and pay the appropriate compensations.<br>▪ GNGLC will endeavor to work as soon as possible with the leaders of Anokyi to develop the community park for them before the construction of GPP2 in order avert any future community agitation.<br>▪ It is evident that climate change has led to extreme weather events and in the last few years high rainfall and temperatures have occurred. It is therefore recommended that GNGLC works on its community relations and engagements to disabuse the perception of the communities on GPP1 | | | | | |

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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | being the cause of the high temperatures by doing the following:<br>○ Conduct continuous ambient temperature monitoring for at least 14days at GPP1 and the communities particularly at the A3 communities (Atuabo, Anokyi and Asemda).<br>○ Assist the communities to engage third party contractors to also conduct continuous ambient temperature monitoring for at least 14days at the communities particularly at the A3 communities.<br>○ The temperature results should be compared to ascertain the veracity of the claim that GPP1 flare stack is the cause of the high temperature and heat at the communities.<br>○ Furthermore, GNGLC could use some communities outside of the catchment of GPP along the coast as controls and conduct the continuous ambient temperature monitoring in order to compare the monitoring results and ascertain the veracity of the claim that GPP1 flare stack is the cause of the high temperature and heat.<br>○ Whatever the outcome of the continuous ambient temperature | | | | | |

| Operational Phase | | | | | | |
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| **Environmental and Social Issue** | **Mitigation and Management Measures** | **Responsible Party** | **Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI** | **Monitoring Requirement(s)/ Recommended Monitoring** | **Time Frame /Frequency** | **Method** |
| | monitoring, GNGLC should increase their community engagement and sensitization.<br>○ GNGLC should adopt nature-based solutions (NBS) and increase carbon reduction initiatives such as tree planting in the communities. This should be done in collaboration the communities. | | | | | |

## 6.2 Proposed Sub-Plans to be Developed and Implemented During all Project Phases

Table 11 highlights a series of management sub-plans which will specify measures to be applied to avoid and minimize environmental and social impacts relevant to the construction and operation of the GPP2 project. Some of these sub-plans will be formalized and expatiated in the CESMP to be developed by the EPC Contractor.

Table 11 Management Sub-Plans to be Developed and Implemented During all Project Phases

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| **Air Quality Management Plan**<br>This plan will be developed as part of the CESMP during the construction phase of the project to: maintain acceptable levels of dust emissions (i.e. compliance with WGB/IFC EHS guidelines on ambient air quality and GS 1236:2019), maintain acceptable levels of vehicular and machinery operating emissions, receive zero complaints from residents regarding | EPC Contractor | ▪ IFC Performance Standards 1 & 3,<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ Ghana Standards on Air Emissions | Compliance with Ghana Standards air quality emission standards GS 1236:2019) and IFC/WBG EHS Guidelines | Throughout the construction phase |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
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| air quality and reduce the generation of fugitive emissions produced. | | | | |
| **Noise Management Plan**<br>This plan will be developed as part of the CESMP during the construction phase of the project to: minimize noise level (i.e. compliance with WGB/IFC EHS guidelines on ambient noise and GS 1222:2018), implement noise monitoring and ensure all noise complaints are recorded and addressed and receive zero complaints from residents regarding noise. | EPC Contractor | ▪ IFC Performance Standards 1 & 3,<br>▪ WBG EHS General Guidelines and Guidelines on Onshore Oil and Gas Development.<br>▪ Ghana Standards on Noise Control | Compliance with Ghana Standards On Noise Emissions GS 1222:2018) and IFC/WBG EHS Guidelines | Throughout the construction phase |
| **Water Management Plan**<br>This plan will be developed as part of the CESMP to prevent considerable alteration to hydrological conditions, to protect surface water from contamination by fuel, chemicals, and | EPC Contractor | ▪ IFC Performance Standard 3<br>▪ WBG EHS General Guidelines and Guidelines on | Compliance with Ghana Standards and WHO Guidelines. | Throughout the construction phase |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
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| other hazardous substances, to minimize interruption or modification to surface drainage patterns and to minimize water use during construction. | | Onshore Oil and Gas Development.<br>▪ Ghana Standards on Water and Effluent | | |
| **Waste Management Plan**<br>This plan will be developed as part of the CESMP to ensure impacts associated with waste management are minimized, to ensure there no contaminated soils from construction related activities after the post-construction clean-up and no evidence of refuse generated from construction related activities. | EPC Contractor | Ghana Standards and IFC PS 3 requirements | Compliance with EPA and IFC/WBG EHS Guidelines | Throughout the construction phase |
| **Land, Soil and Erosion Management Plan**<br>This plan will be developed to limit the occurrence and extent of trench | EPC Contractor | Ghana Standards | Visual inspection | Throughout all the phases of the project. |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| subsidence and soil erosion and to prevent soil inversion during the construction and phases of the project | | | | |
| **Community, Occupational Health, and Safety Plan**<br>This plan will be developed to ensure that the various activities under the construction phase will not pose health and safety risks to workers and residents and if risks are identified the appropriate measure are put in place to avoid or mitigate those risks. Eg. Traffic, accidents, air quality and noise. | | IFC PS 2 and 4 requirements | Compliance with EPA and IFC/WBG EHS Guidelines | Throughout the construction phase |
| **Labour Management Plan**<br>This plan will be developed to promote the fair treatment, non-discrimination and equal opportunity of workers, to promote compliance with national employment and labour laws, to | ▪ GNGLC<br>▪ EPC Contractor | IFC PS 2 requirements | Compliance with labour laws of Ghana and IFC/WBG EHS Guidelines | Pre-construction, throughout the construction and operation phases. |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the GNGLC supply chain, to promote safe and healthy working conditions, and the health of workers and to avoid the use of forced labour during the construction and operation phases of the GPP2 project. | | | | |
| **Worker Accommodation Management Plan**<br>This sub-plan to the Labour Management Plan will be developed to guide the provision of housing or accommodation for workers by the EPC Contractor in compliance with the IFC/EBRD guidance on Workers' | EPC Contractor | IFC PS 2 requirements | Compliance with labour laws of Ghana and IFC/EBRD guidance on Workers' Accommodation | Throughout the construction phase |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| Accommodation: Processes and Standards. | | | | |
| **Emergency Response Plan**<br>This plan will be developed as part of the CESMP to ensure Zero Lost Time Injuries (LTI), zero fatalities, zero regulatory notices and full compliance with induction training procedures and corrective actions procedures during the construction of GPP2. Furthermore, GNGLC will update its existing ERP for GPP1 to address emergency response needs of GPP2 during the operation phase of GPP2. | ▪ EPC Contractor<br>▪ GNGLC<br>o HSE Department | IFC PS 1 and 4 requirements | Compliance with IFC/WBG EHS Guidelines | Throughout the construction and operation phases |
| **Security Management Plan**<br>As part of the security management and mitigation measures, including a security risk assessment to be conducted prior to construction, a | ▪ GNGLC<br>▪ EPC Contractor | IFC PS 4 requirements | Compliance with IFC/WBG Guidelines | Pre-construction, throughout the construction and operation phases |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| security management plan will be developed in line with IFC's Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts (2017). This plan will provide a security worker code of conduct and the security company's commitment to comply with the Voluntary Principles on Security and Human Rights. | | | | |
| **Chance Find Procedure**<br>Although the GPP2 project's impact on cultural heritage is assessed as Negligible, however, in the discovery of any physical cultural resource during construction, a Chance Find Procedure will be applied in line with the laws of Ghana and IFC PS 8 and Guidance Note 8. Highlights of the | ▪ GNGLC<br>▪ EPC Contractor | IFC PS 8 requirements | Compliance with IFC/WBG Guidelines | Prior to and throughout the construction phase |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| Chance Find Procedure to be followed is provided in Section 6.5 of this report. | | | | |
| **Traffic Management Plan** This will be developed to guide the implementation of the traffic mitigation measures during construction of GPP2. | EPC Contractor | IFC PS 1 and 4 requirements | Compliance with IFC/WBG Guidelines and Ghana Road Safety Procedures | Throughout the construction phase |
| **Hazardous Materials Management Plan** for handling and transporting hazardous materials to the construction sites and during operations of GPP2. | ▪ EPC Contractor<br>▪ GNGLC<br>o HSE Department | IFC PS 1 and 4 requirements | Compliance with IFC/WBG General EHS Guidelines | Throughout the construction and operation phases |
| **Biodiversity Management Plan** Since 18ha representing 18.69% of the swamp wetland cover within the GPP Enclave will be removed for permanent GPP2 infrastructure (see Plate 27 of ESIA Report), a BMP will be prepared to restore and enhance the | GNGLC | IFC PS 6 requirements | Compliance with IFC PS 6 requirements | Throughout the construction and operation phases. |

| Management Sub-Plan | Responsible Party | Applicable IFC Performance Standard(s)/ Recommended Basis of Assessment/KPI | Monitoring Procedure | Time Frame |
|---|---|---|---|---|
| biodiversity value of the swamp area (natural habitat) to be degraded. | | | | |
| **Stakeholder Engagement Plan** to sets out the methodologies and guidelines for engaging stakeholders and ensuring all key stakeholder issues are addressed throughout the life of the Project. A standard SEP has been prepared for GPP2, which may be revised or maintained for the project (see Appendix A). | GNGLC | IFC PS 1 requirements | Compliance with IFC/WBG Guidelines | Prior to and throughout the construction phase |

## 6.3 Emergency Response Plan/Procedures

GNGLC has an existing emergency response plan titled Crisis and Emergency Response Plan which will be applicable for the GPP2 project. GNGLC will review the plan and update it where necessary. GNGLC's Crisis and Emergency Response Plan defines the emergency scenario, crisis and emergency level classification, guiding principles for emergency response, resources for emergency response, emergency response procedures, roles, and responsibilities (see Appendix B).

## 6.4 Grievance Mechanism

The purpose of the Grievance Mechanism (GM) is to allow GNGLC to receive, evaluate, and address project-related grievances, written and verbal, from project beneficiary communities, stakeholders and local workers, that, at site level are affected by the project in accordance with the IFC Performance Standards 1, 2, 4 & 5. The GM is a management tool but does not restrict stakeholder's access to any other forms of remedy either, judicially or administratively.

The GM is a relationship-building tool designed to build and maintain local confidence and demonstrate company's responsiveness and respect for local concerns. To this end, the Grievance Mechanism will deal only with grievances related to material impacts of project activities and upcoming from communities or stakeholders affected by such projects at the site level.

The GM is a proactive and structured approach to receive, acknowledge, investigate and respond to aggrieved persons or communities in a planned, respectful and timely manner. The GM will aim at avoiding litigation, minimize bad publicity, avoid/minimize delays in the construction of GPP2, ensure public health and safety, and sustainability of the project. The GM will provide all persons and groups affected by the project, including workers on site, avenues through which they can express their grievances and concerns.

### 6.4.1 Grievance Access Points

To receive grievances, the GNGLC will keep phone contact line, grievance boxes and email channels that will be publicized on a large outdoor advertisement board at the GPP2 project site and the A3 Communities in order to reduce transportation cost and risk. Details on anonymous and confidential grievances will principally be received through grievance boxes, letters or phone calls. Grievance boxes will be checked on daily basis by Community Relation Officers/Grievance Focal point to be appointed by

GNGLC. The Community Relation Officers will also visit the project affected and interested communities to inform them about the GNGLC's procedures and policies as well as to disseminate "stakeholders' satisfaction questionnaire" forms. In addition to this, GNGLC will keep grievance registration forms at the project offices where grievances can be lodged.

### 6.4.2 GM Procedure

All grievances and concerns must be treated with the same level of integrity, respect and following the procedure. The main activities for handling the grievances lodged by complainants are illustrated below.

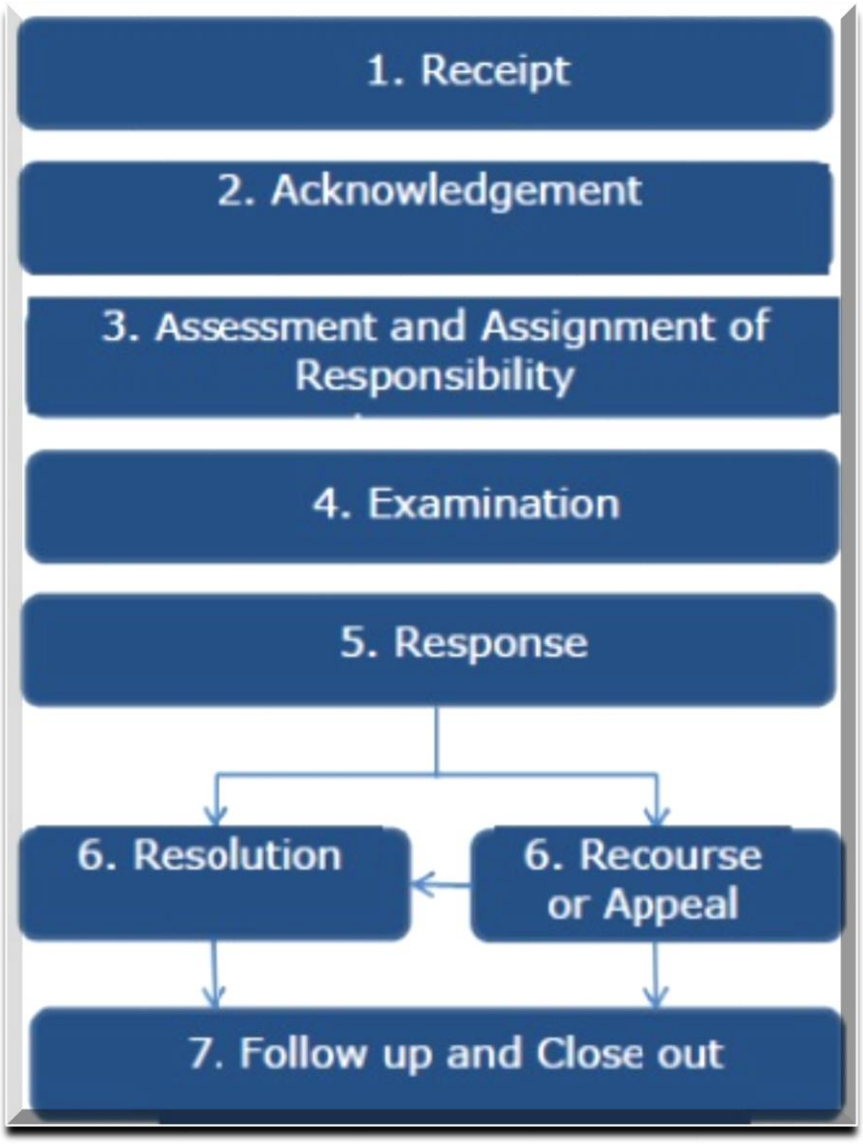


Figure 5 Grievance Mechanism Procedure

The procedure as described above and will comprise the following steps:

- Step 1: Establishing and Publicizing the Grievance Management Procedure.

- Step 2: Receive and Track Grievances on the Grievance Register Form.
- Step 3: Assess and assign responsibility for resolution.
- Step 4: Investigate Grievances.
- Step 5: Respond, Follow up and Close Out.
- Step 6: Monitor Report, and Evaluate the Grievance Mechanism.

The Grievance Mechanism will follow these three orders of Responses:

i. First Order Mechanism - Grievances that can be resolved between GNGLC/EPC Contractor and the complainant.
ii. Second Order Mechanism – Grievances that were not resolved within the first order mechanism and are therefore assigned to agreed third parties or Alternative Dispute Resolution (ADR) for action.
iii. Third Order Mechanism - Grievances that are not resolved within the first or second order mechanisms and which are escalated to the court system.

Acknowledgement of Grievance:

i. Instant acknowledgement with 24 hours
ii. Official Acknowledgement from GNGLC (Community Relations Department) within 1-3 working days.

Assessment and Assignment: Within 3 working days
Examination: 5 working days
Response: 5- 10 Business days
(Applicable for 1st and 2nd order of response)

iii. The third order response timeframe will be bound by the Ghanaian legal system.

### 6.4.3 Monitoring and Reporting Strategy

For the GPP2 project, monitoring and reporting will be the tool for measuring the effectiveness of the grievance mechanism and the efficient use of resources, and for determining broad trends and recurring problems so they can be resolved proactively before they become points of contention. The monthly monitoring and reporting to be done by GNGLC Community Relations Managers/Officers will help identify common or recurrent claims that may require structural solutions or a policy change, and it will enable GNGLC to capture any lessons learned in addressing grievances. The monitoring and reporting will also create a base level of information that can be used by the GNGLC to report back to the communities.

Monthly review of Grievance Management Register by GNGLC, will consider the following KPIs:

- Number of Grievance received within the month.
- Number and percentage of grievance category.
- Number of grievances received and acknowledged.
- Number of grievances resolved with the month.
- Number of grievances closed within the month.
- Number of grievances open.
- Number of grievances under investigation.
- Number and percentages of grievances closed-out in time.
- Number of grievances resolved within the 1st and second order
- The trend in the nature of grievances (for example labor, compensation, health, cultural concerns, etc.).
- Number of 'abandoned' complaints.
- Average resolution time.
- Complaint resolution trend (% of complaints resolved within 30 days for a 12-month rolling window).
- Number of complaints grievances escalated to the 2nd and 3rd order mechanisms.
- Status of second and third order mechanisms.
- Root cause analysis report for significant complaints/grievances.
- Annual review of the Grievance Mechanism involving external stakeholders in evaluation of the grievance. Options for soliciting feedback include:
  - Analyzing the feedback survey on grievance closure form.
  - Presenting Grievance Management updates to Stakeholders during Engagement and audit.

### 6.4.4 Grievance Mechanism Role Responsibility

In order to ensure the viability of the GM for the GPP2 project in accordance with the IFC Performance Standards (PS 1,2,4 &5), the following role responsibilities are proposed.

Table 12 Grievance Mechanism Roles and Responsibilities

| Responsible Party | Role Responsibility |
|---|---|
| GNGLC Project Management Department | ▪ Ensure that all personnel follow the examination and reporting requirements as covered in the GM procedure.<br>▪ Ensure that sufficient focus and importance is placed in thorough examination and corrective action. |

| Responsible Party | Role Responsibility |
|---|---|
| | ▪ Responsible for overall management and integrity of the grievance/complaint system (i.e. receipt, recording, tracking, resolving, reporting and analysis).<br>▪ Provide adequate resources (people, systems, procedures, budget).<br>▪ Effectively manage feedback for the scope of the operation/project.<br>▪ Defines levels of authority for the Community Relation Managers/Officers to resolve complaints before a complaint is escalated.<br>▪ Assigns responsibility for examination to the appropriate department for cases that are beyond the mandate of the Community Relation Managers/Officers.<br>▪ Ensure that the mechanism is transparent, culturally appropriate, and clearly communicated to stakeholders.<br>▪ Chair the internal Grievance Committee and serve as a liaison between committee and GNGLC Executive Management if complaints require additional attention.<br>▪ Accountable for the overall performance in managing community feedback.<br>▪ Ensure sufficient Local Grievance Mechanism awareness training is provided as part of Inductions for all Employees and Contractors. |
| Community Relation Department | ▪ Explain the complaint resolution process to community members.<br>▪ Receive and examine grievances (rapid response).<br>▪ Serve as the liaison between the complainant and GNGLC to coordinate responses to complaints.<br>▪ Register all Community Complaints into the Stakeholder Concerns /Complaints Register.<br>▪ Generate reports from the Community Complaints Tracker. |

| Responsible Party | Role Responsibility |
|---|---|
| | ▪ Ensure that examinations are completed within the designated timeframe.<br>▪ Provide a reliable point of contact for community and individual complaints and grievances, and ensure an outcome in accordance with the established procedure, including:<br>o Preparing documentation of all complaints and grievances that result from the activities of the company, its employees and its contractors.<br>o Conducting first level investigation of claims and pursue resolution to the satisfaction of all parties.<br>o Referring as necessary complaints/grievances to the Resolving Officers of the functional areas associated with the complaint.<br>o Referring complaints/grievances to the Grievance Committee for complaints of a more complex nature.<br>o Maintaining the grievance register on a daily basis.<br>o Ensuring that cordial relations are maintained with the local authorities involved in the grievance investigation process.<br>o Ensuring continuation of the procedure in case of leave or sickness, by training a back-up person.<br>o Conduct Grievance Mechanism training for contractors and Stakeholders. |
| Employees & Contractors | ▪ Report all complaints as per Local Grievance Mechanism awareness training provided during Inductions and other training.<br>▪ Contractors are required to cooperate with the grievance examination process as required. |

## 6.5 Chance Find Procedure

Although no cultural resource will be impacted directly on the GPP2 project site, but if there is a discovery of any physical cultural resource during construction, a Chance Finds Procedure in accordance with IFC PS 8 would have to be applied.

The Chance Finds Procedure outlines actions required if previously unknown heritage sources are encountered during the project construction. As outlined in IFC PS 8 the Chance Find Procedure is a process that prevents chance finds from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements are implemented. The procedure below is applicable to all activities to be undertaken by the Consortium/GNGLC and the EPC Contractor to be appointed for the construction of GPP2, that have the potential to uncover a heritage item/site.

In the event of a physical cultural resource such as archaeological sites, historical sites, remains and objects, individual graves during excavation or construction, the following steps shall be taken:

- All works in the vicinity of the find shall be put on hold until a solution is found for the preservation of these artefacts, or advice from the relevant authorities including Ghana Museum and Monuments Board (GMMB) and Ellembelle District Assembly (EDA) is obtained.
- Immediately notify Consortium/GNGLC's Community Relation Department. An officer from the department will then notify the Construction Manager and the HSE Manager from both GNGLC and EPC Contractor.
- Record details in Incident Report and take photos of the find.
- Demarcate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antique or sensitive remains, a guard shall be arranged until the GMMB and EDA take over.
- Experts including archaeologist from GMMB must make a rapid assessment of the site or find to determine its importance to cultural heritage based on factors such as aesthetic, historic, scientific or research, social and economic values of find. Based on this assessment the appropriate strategy will be implemented.
- Sites of minor significance (such as isolated or unclear features and isolated finds) will be recorded by an expert from GMMB to limit disruption to the work schedule of the Contractor.
- In case of a significant find, GMMB will be informed immediately and put in writing within 7 days from the find.

- GMMB will investigate the fact within 2 weeks from the date of notification and provide response in writing.
- Decisions on how to handle findings will be the sole responsibility of GMMB.
- Construction works can resume only after permission is granted by GMMB. This may include changes in the layout, conservation, preservation, restoration, and salvage and in case of no response received within the 2 weeks period mentioned above, this can be considered an authorization to proceed with suspended construction works.

All records relating to the find shall be maintained by the EPC Contractor and provided to Consortium/GNGLC's Community Relation Department who will maintain duplicate copies. All finds should be registered, photolog, and copies of communication with relevant authorities, decisions and recommendations should be maintained.

# 7 Institutional Arrangement and Capacity Building

## 7.1 Roles and Responsibilities

The table below outlines the roles and responsibilities of the parties to be involved in the implementation of the ESMP.

Table 13 ESMP Implementation Roles and Responsibilities

| Party | Responsibilities |
|---|---|
| GNGLC/Consortium | ▪ Supervision of the use of this document as a guide in the development of subsequent detailed management plans for all project phases of GPP2.<br>▪ Appointment of an ESMS team to develop and implement Environmental, Health and Social Management Plans for the operational phase. |
| EPC Contractor | ▪ Develop a Construction Environmental and Social Management Plan (CESMP) to ensure appropriate environmental protection and impact minimization techniques are implemented during and after construction. The CESMP should comprise a series of management sub-plans which outline the specific measures to be applied to avoid and minimize environmental impacts relevant to the construction of the GPP2 project.<br>▪ The EPC contractor will need to appoint an ESMS team to develop and implement the CESMP. The CESMP will be subject to approval by GNGLC/Consortium. |

| Party | Responsibilities |
|---|---|
| ESMS Team for the Construction Phase | ▪ Drafting of the detailed ESMPs for the construction phase (and Decommissioning Management Plans in the future), which will include all the aspects covered in this ESMP.<br>▪ The implementation and enforcement of actions required by the detailed management plans, including any monitoring requirements and reporting.<br>▪ The training of workers in how to perform tasks required by the detailed management plans.<br>▪ The provision of all required items including safety equipment and emergency response equipment required by the management plans.<br>▪ Management of waste contractors and other external contractors and consultants used in the construction / decommissioning phases of the GPP2 project.<br>▪ Updating the management plans with any required changes as the project progresses. |
| Waste Contractors | Responsible to the collection and disposal of wastes to appropriate disposal facilities. The contractors must abide by the standards specified.<br>within this ESMP and within the detailed management plans. |
| ESMS Team for the Operational Phase | ▪ Drafting of the detailed ESMS or equivalent documents, which will include all the operational aspects covered in this ESMP. |

| Party | Responsibilities |
|---|---|
| | ▪ The implementation and enforcement of actions required by the detailed management plans, including any monitoring requirements and reporting.<br>▪ The training of workers in how to perform tasks required by the detailed management plans.<br>▪ The provision of all required items including safety equipment and emergency response equipment required by the management plans.<br>▪ Management of waste contractors and other external contractors and consultants used in the operational phase of the project.<br>▪ Updating the management plans with any required changes as the project progresses. |
| External Consultants | These may be used to undertake monitoring works and reporting in both the construction and operational phases. The consultants must be required to abide by the standards specified within this ESMP and within the detailed management plans drafted by the relevant ESMS teams. |
| EPA and other Regulating Agencies | ▪ Ensure that monitoring and reporting requirements (as required by the EMSP and detailed management plans in accordance with EPA standards and guidelines).<br>▪ Enforce any actions that may be needed to ensure environmental quality standards are not breached |

| Party | Responsibilities |
|---|---|
| | and permit requirements are maintained. |
| International Financing Institution (IFI) | The IFI that will provide funding for the GPP2 project will develop its own Environmental and Social Action Plan (ESAP) that will include conditions to be met. The ESAP will include the requirement to comply with, among other plans, the ESMP. |

## 7.2 Implementation of the ESMP

### 7.2.1 Overview

This ESMP provides a framework document to be used throughout the lifetime of the GPP2 project. It forms the basis on which more detailed plans will be developed. The action and standards specified within this ESMP will be adopted in the development and implementation of detailed management plans. The IFC Performance Standards and EHS Guidelines as well as the EPA/Ghana Standards and relevant national legislation will be met throughout the life of the GPP2 project. The parties involved in the implementation of the ESMP, and their roles and responsibilities are outlined in Table 1. ESMS teams will be appointed for each project phase, and they will be responsible for ensuring implementation of the ESMP.

### 7.2.2 Training

Training of construction and operational workforce is required to ensure they can safely and effectively carry out the actions required by the ESMP. Procedures for training must be developed and implemented for each project phase. Training procedures will be periodically reviewed and updated. Training records will be kept and maintained.

### 7.2.3 Monitoring

Monitoring is required to ensure the actions specified in the ESMP to mitigate environmental and social impacts are effective. Monitoring and reporting will be

undertaken for each project phase, on a daily, weekly, monthly, quarterly, or annual basis, depending on the action.

### 7.2.4 Audit and Inspection

Internal audits and inspections are required throughout each project phase, on a regular basis, to ensure that the requirements of the ESMP are being undertaken. The audits and inspections will be undertaken to the standards specified within the detailed project ESMS. The frequency of inspections should vary depending on the nature of activities. Inspection records will be maintained and kept up to date.

External audits and inspections by regulating authorities (e.g. the EPA) is also expected to be undertaken throughout the lifetime of the project.

### 7.2.5 Reporting

Reporting of monitoring undertaken will be supplied to the relevant person/organization(s) as specified within management plans developed by the relevant ESMS teams.

During the operational phase quarterly and annual reporting of project emissions to the EPA is mandatory to fulfil the requirements of the Environmental Permit to be obtained for the GPP2 project. Other monitoring works required by this ESMP for all project phases will be reported to the EPA and to the IFI where specified. Detailed reporting requirements and procedures are to be developed by the ESMS teams for each project phase.

### 7.2.6 Change Management

The ESMP is a working document and will be updated in line with any changes to project requirements or because of periodic ESMS reviews. The relevant ESMS teams will be responsible for ensuring that changes are incorporated into the relevant management procedures and implemented.

## 7.3 Adoption of Environmental, Social, Health and Safety Policies and Operational Procedures

The EPC Contractor will also develop environmental, social, health and safety policy to guide the management of environmental, social, health and safety issues during the construction of GPP2. The environmental health and safety policy shall be reviewed and approved by GNGLC/Consortium for implementation. The EPC Contractor will develop standard operational procedures which will guide workers in their daily

activities and also serve as a training manual for in-service training as well as induction of workers for the construction works.

## 7.4 Environmental, Social, Health and Safety Management for Construction Works

As part of the CESMP, GNGLC/Consortium shall make provisions for contractor and supply chain management – including selection criteria, EHS contractual requirements, contractor compliance with ESMP, contractor and supplier audits.

The EPC Contractor will appoint an Environment, Health and Safety (EHS) Manager for the construction of GPP2. The EHS Manager will be responsible for the day-to-day management of the environment, health and safety of the construction works. The EHS Manager will report directly to the EPC Contractor. The responsibilities of the EHS Manager will include the following:

- Lead the implementation of environmental, health and safety policies and programs of the construction works, as well implementation of the ESMP/CESMP and environmental permit conditions.
- Ensure adequate training is provided for all staff, including EHS induction for all workers.
- Organize and coordinate tool box meetings.
- Ensure all required PPE, first aid, waste bins, temporary toilets and other logistics are provided for GPP2 construction.
- Enforce adherence to environmental, health and safety requirements including the use of PPE, waste bins, etc. and taking disciplinary actions against non-compliant workers during daily site walkovers and weekly HSE inspections and audits.
- Liaise with responsible parties to resolve grievances reported at the project site.
- Report on environmental, health and safety issues, including grievance issues during monthly meetings.

## 7.5 Contractor and Supply Chain Management

The EPC Contractor will be required to implement a procedure for selecting sub-contractors and suppliers that are able to fulfil the requirements of the ESMP and lender standards (IFC Performance Standards), through inclusion of appropriate requirements in tender documents and contracts. The procedure will include screening prior to engagement, such as checks on relevant licenses/permits, background

reputational research, any relevant accreditations, risks of non-compliance with lender standards (such as child /forced labour / security).

GNGLC/Consortium will ensure that the EPC Contractor's contract for sub-contractors and suppliers will have clauses that require the appropriate environmental and social (E&S) audits of the sub-contractors and suppliers and penalties for failure to meet the E&S obligations.

## 7.6 Environmental, Social, Health and Safety Reporting

There will be monthly project meetings during the construction phase of the project which will involve the EPC Contractor and GNGLC/Consortium Project Management Teams. The EHS Manager will report on environmental, health and safety issues at the monthly project meetings for deliberation. This will include reporting on non-compliances, trainings, public sensitization/community engagements, grievance issues among others.

Monitoring and reporting requirements will be formalized in a Project Monitoring and Reporting Plan to be developed by the GNGLC/Consortium prior to construction.

## 7.7 Capacity Building for Environmental, Social, Health and Safety Management

The capacity building requirement to ensure successful environmental, social, health and safety management of GPP2 construction and operation is presented in Table 14

Table 14 Capacity Building Plan

| No. | Activity | Target Group/Participant | Timeline/ Duration | Proposed Facilitator |
|---|---|---|---|---|
| 1. | Training Workshop on:<br>▪ ESMP<br>▪ Grievance Mechanism<br>▪ Environmental Permit Schedule | ▪ EPC Contractor-EHS Manager<br>▪ Ellembelle District Assembly (Environmental Health Department, Planning Department & | Preconstruction | GNGLC/ Consortium to coordinate |

| No. | Activity | Target Group/Participant | Timeline/ Duration | Proposed Facilitator |
|---|---|---|---|---|
| | | Information Services Department)<br>▪ GNGLC HSE Department | | |
| 2. | Induction on EHS Policy and Standard Operational Procedures | All construction workers | Prior to commencement of work at GPP2 project site | GNGLC/ Consortium to coordinate |
| 3. | Awareness creation and public sensitization on GM | Project affected persons and communities | Preconstruction and throughout construction phase | GNGLC/ Consortium to coordinate |
| 4. | Public Health Awareness | All construction workers and residents around GPP2 project site | Preconstruction and throughout construction phase | GNGLC/ Consortium to coordinate |
| 5. | Cultural sensitization | Construction workers | Preconstruction and throughout construction phase | GNGLC/ Consortium to coordinate |
| 6. | Tool box meeting | All construction workers | Throughout construction period | GNGLC/ Consortium to coordinate |
| 7. | Training | GPP2 project sstaff | Operational Phase | GNGLC/ Consortium to coordinate |

# 8 Conclusion

The GNGLC/Consortium is committed to ensuring sustainable environmental and social management and safeguarding the health and safety of workers as well as the general public in the construction and operation of the GPP2 project. GNGLC/Consortium is committed to ensuring that the construction of GPP2 comply with good international industry practice in environment and social sustainabilit, the IFC Performance Standards and the Ghanaian national environmental laws and regulations.

The environmental and social management and mitigation action plans outlined in this ESMP will be implemented by both GNGLC and the EPC Contractor and monitored by the Project Management Team of GNGLC/Consortium to ensure effective mitigation and management of the project impacts throughout the project phases.

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# Appendix

The Appendices listed below have been compiled in a separate document because of the size of the Main Report.

Appendix A Stakeholder Engagement Plan
Appendix B GNGLC Crisis and Emergency Response Plan