

Deepwater Tano Cape Three Points (DWT CTP)

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CONTENTS

1	INTRODUCTION	11
1.1	PROJECT BACKGROUND	11
1.2	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)	12
1.3	STRUCTURE OF THIS REPORT	18
1.4	CONTACT DETAILS	18
2	LEGAL AND POLICY FRAMEWORK	19
2.1	INTRODUCTION	19
2.2	THE PETROLEUM AGREEMENT	19
2.3	NATIONAL LAWS AND REGULATIONS	20
2.4	INTERNATIONAL AGREEMENTS AND CONVENTIONS	30
2.5	TRANSBOUNDARY REQUIREMENT	34
2.6	GOOD INTERNATIONAL INDUSTRY PRACTICE (GIIP)	36
2.7	SUSTAINABILITY REPORTING STANDARDS	36
2.8	FINANCIAL INSTITUTION STANDARDS	37
2.9	COMPANY POLICIES AND STANDARDS	38
3	PROJECT DESCRIPTION	41
3.1	PROJECT OVERVIEW	41
3.2	PROJECT ALTERNATIVES	44
3.3	PROJECT LOCATION	46
3.4	PROJECT SCHEDULE	47
3.5	FACILITIES AND EQUIPMENT	47
3.6	PROJECT ACTIVITIES	51
3.7	EMISSIONS, DISCHARGES, AND WASTE	55
3.8	PERSONNEL REQUIREMENTS	57
4	ENVIRONMENTAL AND SOCIAL BASELINE	59
4.1	INTRODUCTION	59
4.2	DATA SOURCES	60
4.3	PHYSICAL ENVIRONMENT	62
4.4	BIOLOGICAL ENVIRONMENT	69
4.5	SOCIAL BASELINE	82
5	SCOPING STAKEHOLDER ENGAGEMENT	107
5.1	OBJECTIVES AND APPROACH	107
5.2	STAKEHOLDER ENGAGEMENT PRINCIPLES AND ACTIVITIES	107
6	THE DWT/CTP SCOPING PROCESS AND OUTCOME	110

6.1	<i>STAKEHOLDER IDENTIFICATION (MAPPING)</i>	110
6.2	<i>NOTIFICATION OF KEY STAKEHOLDERS</i>	110
6.3	<i>CONSULTATION MEETINGS</i>	111
6.4	<i>MANAGING STAKEHOLDER FEEDBACK</i>	112
6.5	<i>SUMMARY OF COMMENTS</i>	113
6.6	<i>GRIEVANCE PROCEDURE</i>	118
6.7	<i>FUTURE STAKEHOLDER ENGAGEMENTS</i>	118
6.8	<i>GENERAL CONCLUSION FROM THE THREE CATEGORIES (BY ESIA SUBJECT MATTER) OF SCOPING COMMENTS.</i>	119
6.9	<i>DISCLOSURE AND CONSULTATION</i>	119
7	<i>TERMS OF REFERENCE FOR ESIA</i>	121
7.1	<i>INTRODUCTION</i>	121
7.2	<i>STEPS TO COMPLETE THE ESIA</i>	121
7.3	<i>PROPOSED BASELINE STUDIES</i>	122
7.4	<i>IMPACT ASSESSMENT METHODOLOGY</i>	130
7.5	<i>STAKEHOLDER ENGAGEMENT</i>	132
7.6	<i>STRUCTURE OF THE ESIA</i>	133
7.7	<i>PROVISIONAL SCHEDULE FOR THE ESIA PROCESS</i>	134
7.8	<i>PROPOSED TABLE OF CONTENT FOR ESIA</i>	135
	<i>REFERENCE LIST</i>	137
	<i>8. APPENDICES</i>	142

LIST OF TABLES

Table 2.1	International Convention and Agreements Signed by Ghana	31
Table 2.2	Relevant MARPOL 1973/1978 Provisions	32
Table 4.1	Climate and Meteorology in the Western Region of Ghana	63
Table 4.2	IUCN Red Listed Species That Could Occur in the Project's AOI	75
Table 4.3	Whales and Dolphins of Ghana, IUCN Conservation Status	77
Table 4.4	Summary of Reported Number of Sea Turtles Nesting in Ghana	78
Table 4.5	Sea Turtles of Conservation Importance Present in the Project Area	78
Table 4.6	Coastal Ramsar Sites in Ghana	80
Table 4.7	Ghana Fisheries Subsectors	85
Table 4.8	Status of Performance against Millennium Development Goals	94
Table 4.9	Coastal Political Administration in the Western Region	95
Table 4.10	Population of Coastal Districts	96
Table 4.11	Education Levels (six years old and older)	97
Table 4.12	Health Facilities in the Western Region by Ownership and Type	98
Table 7.1	Data Gap Assessment	123
Table 7.2	Quantitative Studies	129

LIST OF FIGURES

Figure 1-1	DWT CTP Contract Area Location	12
Figure 1-2	Ghana EIA Process	17
Figure 3-1	Schematic of FPSO – 1 for the Phase 1 Project Development	42
Figure 3-2	Schematic of FPSO – 2 for the Phase 1 Project Development	43
Figure 3-3	Project Alternatives	45
Figure 3-4	DWT CTP Contract Area With Discoveries	46
Figure 3-5	Schematic of Ship-Shaped FPSO	48
Figure 4-1	West Africa Monsoon	63
Figure 4-2	Wind Speed by Direction in the Project Area	65
Figure 4-3	Surface Current Speed in the Guinea Current	67
Figure 4-4	Ghana Local Government Structure	83
Figure 4-5	Shipping Traffic in the Gulf of Guinea	89
Figure 4-6	Health Care System in Ghana	92
Figure 4-7	Main Causes of Mortality in Ghana for Children <5 Years of Age	93
Figure 4-8	Typical School Facility in the coastal community in Western Region	97
Figure 4-9	Typical Secondary Hospital in the Western Region	98
Figure 4-10	Typical Open Waste Dump in the Western Region	101
Figure 4-11	Typical Canoe and Fishing Nets	103
Figure 4-12	Typical Artisanal Fishing Activities	105
Figure 4-13	Tourist Sites in the Coastal Districts of the Western Region	106
Figure 7-1	<i>Evaluation of Significance</i>	131
Figure 7-2	Required Contents of an ESIA	134

ACRONYMS

ALARP	Reasonably Practicable
CALM	Catenary Anchor Leg Mooring
CBD	Convention on Biological Diversity
CC	Convention on the International Regulations for Preventing Collisions at Sea
Cd	Cadmium
DP	Dynamic Positioning
DWT CTP	Deep Water Tano Cape Three Points
EA	Environmental Assessment
EE	Energy Efficiency
EHS	Environmental, Health and Safety
EHS & SR	Environmental, Health and Safety and Social Responsibility
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMPs	Environmental Management Plans
ENVID	Environmental Issues Identification
EP	Environmental Permit
EPA	Environmental Protection Agency
EPLT	Exploration and Production Leadership Team
ERM	Environmental Resources Management South Africa
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EZZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization
FEED	Front End Engineering Design
FPSO	Floating Production, Storage and Offloading
FWS	Full Well Stream
GCLME	Guinea Current Large Marine Ecosystem Project
GHG	Green House Gas
GIIP	Good International Industry Practice
GMA	Ghana Maritime Authority
GNPC	Ghana National Petroleum Corporation
Hg	Mercury
HVAC	Heating, ventilation and air conditioning
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
ILO	International Labour Organisation
ILS	In-Line Sled
IMO	International Maritime Organisation
IPI	International petroleum Industry Environmental Conservation Association
ISPS	International Ship and Port Facility Code
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LLMC	Limitation of Liability for Maritime Claims

LNG	Liquefied Natural Gas
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified in 1978
META	Mahogany East, Teak and Akasa
mg/kg	Milligram per Kilogram
mmscfd	Million standard cubic feet per day
MODUs	Mobile Offshore Drilling Units
NADF	Non-Aqueous Drilling Fluid
NORM	Naturally Occurring Radioactive Material
NPA	National Petroleum Authority
NRWMC	National Radioactive Waste Management Centre
OBF	Oil Based Fluid
OCNS	Offshore Chemical Notification System
OCNS	Offshore Chemical Notification System
OGP	Oil and Gas Producers
OOC	Oil on Cuttings
OPF	Organic Phase Fluid
OPRC	Oil Preparedness, Response and Co-operation
PEAs	Preliminary Environmental Assessments
PFD	Process Flow Diagram
PLET	Pipeline End Terminal
PER	Preliminary Environmental Report
POB	Person on Board
PoD	Plan of Development
ppm	Parts Per Million
PS	Performance Standards
ROC	retained on cuttings
SBM	Synthetic Based Mud
SCR	Steel catenary risers
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
STCW	Standards of Training, Certification, and Watch keeping for Seafarers
SURF	Subsea Umbilicals Risers Flowlines
TBC	To be confirmed
TEN	Tweneboa-Enyenra-Ntomme
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
ToR	Terms of Reference
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VLCC	Very Large Crude Carrier
VSP	Vertical Seismic Profile
WBF	Water Based Fluid
WBM	Water Based Mud

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Aker Energy Ghana Limited (Aker Energy), Lukoil Overseas Ghana Tano Limited (*Lukoil*), Ghana National Petroleum Corporation (*GNPC*) and Fueltrade Limited (*Fueltrade*), the *Contractor Group*, own participating interests in the Deep Water Tano Cape Three Points (DWT CTP) Contract Area (*Contract Area*), with Aker Energy holding 50%, Lukoil 38%, GNPC 10% and Fueltrade 2%. The owners are considering developing the DWT/CTP *Contract Area* with a two Floating Production, Storage and Offloading (FPSO) hubs in the Deepwater Tano Cape Three Point (DWT CTP) *Contract Area* (hereafter the "*Project*").

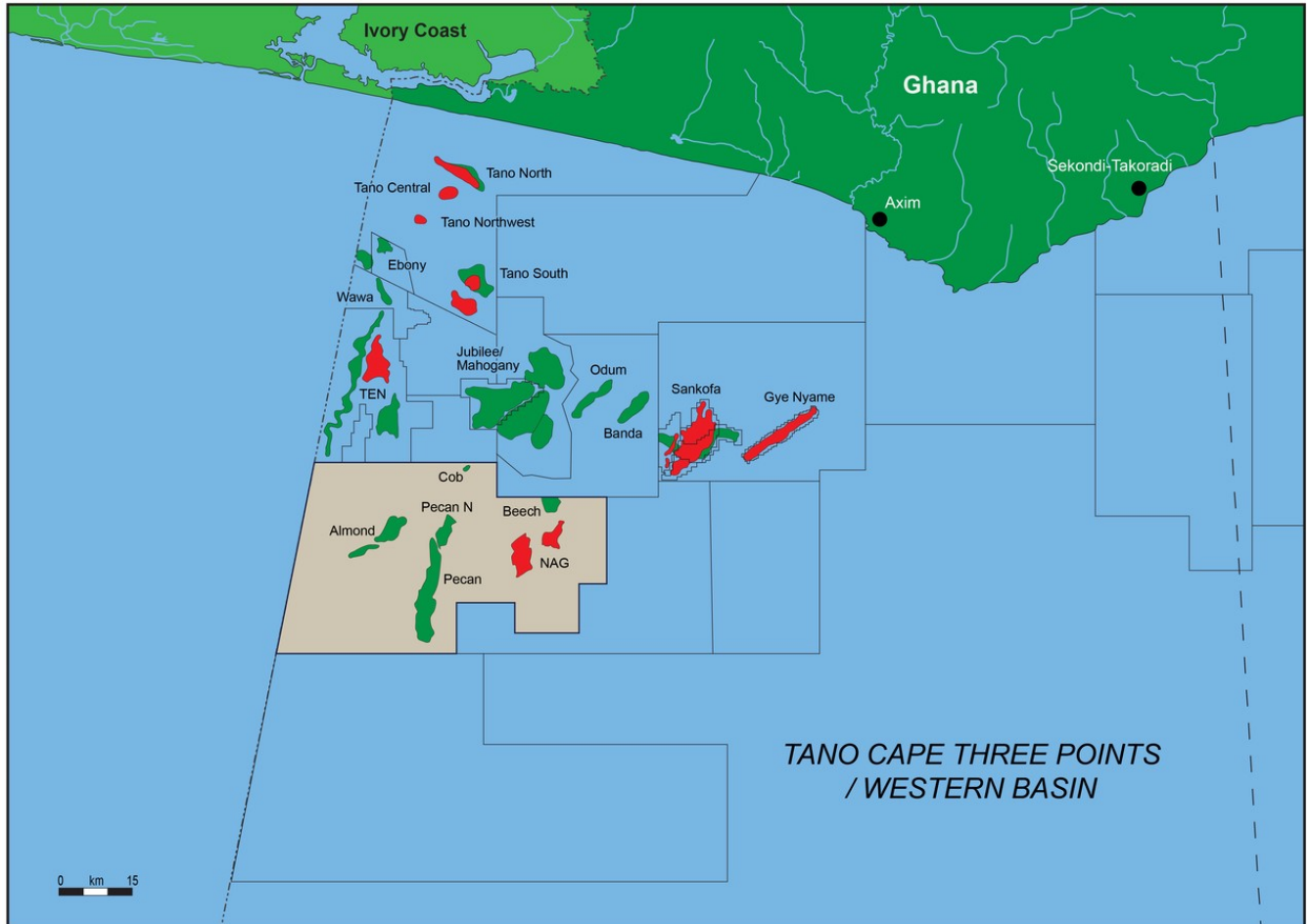
The *Contract Area* is located off the Western Region of Ghana, about 70 km from the coast at the nearest point (*Figure 1-1*). The *Contract Area* is about 60 km across covering about 200,000 ha. Water depths across the *Contract Area* range from 1,600 m to 2,500 m.

A programme of exploration and appraisal has been undertaken over the *Contract Area* involving seismic surveys and well drilling to define oil and gas resources. Aker Energy is now proposing to develop the resources and would be the *Operator*. The *Project* would include:

- Installation of 33 oil and gas production and injection wells;
- Installation of two ship-shaped FPSO's and mooring systems; and
- Installation of subsea infrastructure.

First oil production is planned for in 2020.

Figure 1-1 DWT CTP Contract Area Location



Source Aker Energy 2018

1.2 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)¹

1.2.1 Listed Undertakings

Under the requirements of the Ghana Environmental Assessment Regulations (1999) (EA Regulations), an Environmental Permit issued by the Ghana Environmental Protection Agency is required before the *Project* can commence. Further, because the *Project* would involve an undertaking specified in Schedule 2 of the Regulations (item 12 Petroleum, (a) Oil and Gas Development), an Environmental Impact Assessment (EIA) in accordance with the EA Regulations must be submitted to Ghana EPA as a prerequisite of the Environmental Permit.

¹ The Regulations refer to an Environmental Impact Assessment (EIA) (the assessment process) and Environmental Impact Statement (EIS) (the report on the assessment). This report refers to an Environmental and Social Impact Assessment (ESIA) to acknowledge that environmental and social, including health, issues are considered.

1.2.2 ESIA Process

ESIA is a systematic process to identify and evaluate potential impacts and risks that an activity may have on the physical, biological, chemical, social and human health environment. The ESIA process is used to develop mitigation measures and management actions to avoid, minimise, restore, or offset impacts.

The ESIA will be conducted in accordance with the requirements of the EA Regulations. The regulated process involves a number of steps as depicted in *Figure 1-2*. Broadly the steps include:

- Registration;
- Screening;
- Scoping;
- ESIA; and
- Submission of the ESIA.

This section outlines steps that have been completed as part of the ESIA screening and scoping phases. Activities that are proposed for the next phases of the ESIA are outlined in Terms of Reference in *Chapter 7*.

1.2.3 Registration

Undertakings likely to have significant impacts on the environment (*eg*, those listed in Schedule 2 of the *Environmental Assessment Regulations*) must register with the EPA and obtain an environmental permit before commencement of construction and operations. The proposed *Project* was registered with the EPA on 20 April 2015 with registration number EPA-2378/01/49.

1.2.4 Screening

As per the EA Regulations, following registration, the EPA will make a determination of the level of assessment required. The determination is to be made within 25 days of application.

The EPA has determined that the development falls into the category of undertakings (Regulation 3) for which full EIA is required.

1.2.5 Scoping

A principal objective of the scoping phase is to identify environmental, social, and health sensitivities and *Project* activities with the potential to contribute to, or cause, impacts to environmental or social receptors. At the scoping stage, the key issues are identified and understood to a level that allows the remainder of the impact assessment to be planned.

This enables the resources for the ESIA to be focused on collecting required information and identifying significant impacts and carrying out stakeholder engagement activities in an effective and efficient manner. An overview of the ESIA process is provided in *Figure 1-2*.

The objectives of the scoping phase are to:

- develop an understanding of the legislative, environmental, socio-economic, and health context for the *Project*;
- identify stakeholders and plan or initiate communication with these stakeholders;
- identify potential significant impacts; and
- develop the Terms of Reference (ToR) for the ESIA.

The Scoping Study has involved the following steps.

- Desktop review.
- Initial stakeholder engagement.
- Environmental and social impact identification and scoping.
- Preparation of a Scoping Report.

Desktop Review

This comprised the following steps.

- Identification and preliminary review of relevant laws, regulations, and policies.
- Identify and review primary environmental data collected and social experience during Exploration and Appraisal Campaigns.
- Identification and review of secondary environmental and social data.
- Development of a description of the *Project* and *Project* activities.
- Development of a plan for stakeholder engagement (refer to *Chapter 5*) and consultations on the scope of the ESIA.

Initial Legislative Review

Chapter 2 of this Scoping Report provides a review of legislation and industry guidance relevant to the ESIA for the proposed *Project*.

Identification and Review of Secondary Data

Existing baseline information on the environmental and socio-economic context of the *Project Area* (as defined in *Section 4.1*) has been collected and reviewed and sources of other existing information identified. The ESIA team has undertaken an initial review of existing information sources that contributed to an understanding of the environmental and socio-economic context of the *Project* (refer to *Chapter 4*). Available data sources have been identified for the following subjects.

- Physical environment: oceanography, climate, geology, topography, bathymetry, sediment/water quality.
- Biological environment: benthos, fish, birds, marine mammals, turtles, significant natural sites, terrestrial ecology, fauna and flora and protected areas.
- Socio-economic environment: fisheries, demographics, livelihoods and cultural heritage.

This desktop review also focussed on identifying where gaps in information exist and informed the data gathering requirements and the Terms of Reference for the remainder of the ESIA.

Outline Project Description

The Project Description in *Chapter 3* of this ESIA Scoping Report provides an overview of the various *Project* components and activities to a level that allows those activities with the potential to cause environmental, social and health impacts to be identified (eg, physical presence, noise, emissions, wastes and discharges). Project planning, decision making and refinement of the *Project* description continue throughout the assessment process.

Environmental Issues and Identification Workshop

The main environmental and social issues associated with the *Project* were identified through an Environmental Issues Identification (ENVID) process by the previous license contractor (Hess) in July 2015 in Houston.

The objectives of the ENVID Workshop were as follows.

- To identify and preliminarily assess/rank the potential environmental Impacts /issues associated with the project at a high level and, in so doing, identify ways in which these can be avoided or mitigated.
- To review the current engineering design and ensure that it meets the applicable requirements as well as good industry practice.

- To enable the transfer of all predicted environmental aspects and impacts identified to the Risk Register so that they can be reviewed coincident with the project development.

The ENVID workshop assessed the impacts of both routine and non-routine (*ie*, accidental or emergency events) and identified ways these impacts could be avoided or mitigated. The ENVID will be reviewed and re-assessed as part of the ESIA process.

Stakeholder Engagement

Project stakeholder engagement started during seismic and exploratory drilling (as part of Preliminary Environmental Reports undertaken to support the drilling permit). A round of engagement with statutory consultees was undertaken to inform this Scoping Report. Further consultations with these bodies, potentially affected communities and other stakeholders will be undertaken during the main ESIA phase to ensure that applicable requirements are met, stakeholder concerns are addressed. The proposed process for engaging stakeholders is outlined in *Chapter 5*.

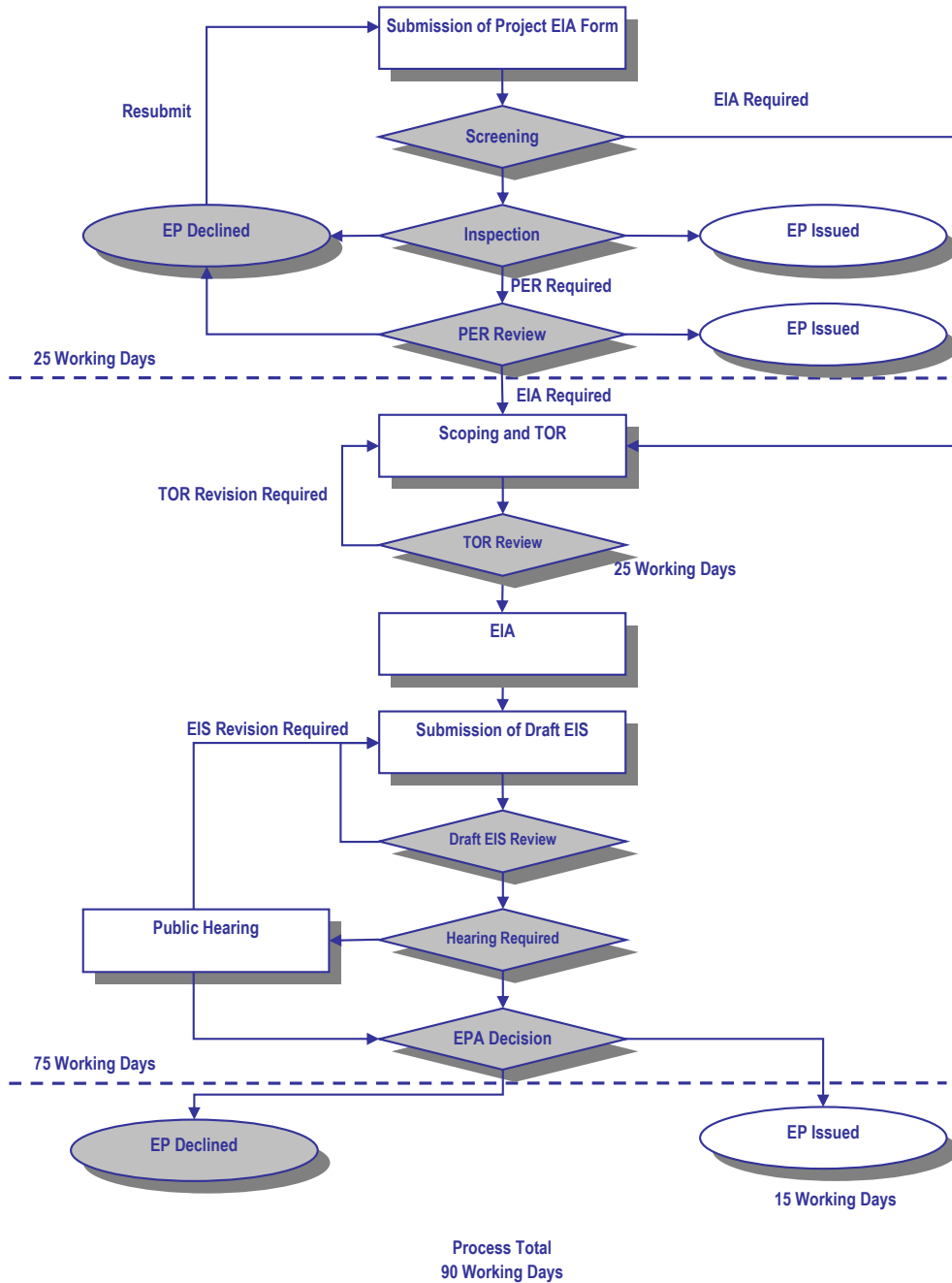
Analysis and Scoping

The information gathered through desktop research and through stakeholder engagement was analysed through a systematic process to identify the key issues. Through this process, a preliminary list of potential impacts and risk was created. This list provides the focus areas for the ESIA.

Scoping Report

The result of the Scoping Study is this Scoping Report and ToR for the ESIA. The Scoping Report has been prepared in accordance with Section Regulation 11 of the EIA Regulations. The Scoping Report is submitted to the EPA for consideration. As per the EIA Regulation, the EPA will determine whether the Scoping Report is acceptable within 25 days.

Figure 1-2 Ghana EIA Process



Source: Based on the Ghana EA Regulations

1.3 STRUCTURE OF THIS REPORT

The structure of the remainder of this report is follows:

Chapter 2 Legal and Policy Framework
Chapter 3 Project Description
Chapter 4 Environmental and Social Baseline
Chapter 5 Stakeholder Engagement
Chapter 6 Scoping Process and Outcome
Chapter 7 Terms of Reference for ESIA
References

The main report is supported by the following appendices:

Appendix A Background Information Document (BID) and Feedback Comment Form
Appendix B Aker Energy Scoping Formal Presentation (Company Profile and Scoping Process)
Appendix C Minutes of Consultation Meetings
Appendix D Attendance Record Sheet
Appendix E Tabulated Extracts of Written Comments
Appendix F Key Comments - Friends of the Nation (FoN), Takoradi and Ghana Maritime Authority (GMA), Accra.
Appendix G Picture Gallery (Photographs taken during and after the meetings)

1.4 CONTACT DETAILS

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LEGAL AND POLICY FRAMEWORK

2.1 INTRODUCTION

This chapter describes relevant Ghana laws and regulations that may be applicable to the *Project*. This includes international treaties to which Ghana is a signatory or otherwise adopted. It also describes the policies, standards, and good international industry practices with which the *Project* would comply.

The legal and policy requirements will be further evaluated in the ESIA and the following provides a summary of an initial review.

2.2 THE PETROLEUM AGREEMENT

The Deepwater Tano/Cape Three Points Petroleum Agreement was ratified by Parliament on 19 July 2006 (*Effective Date*). Under Article 7.1(a), Contractor must, among other things, ‘conduct Petroleum Operations with utmost diligence, efficiency and economy, in accordance with accepted international Petroleum industry practices, observing sound technical and engineering practices using appropriate advanced technology and effective equipment, machinery, materials and methods.’

Contractor also has the right to bring to Ghana any foreign national employees necessary for its operations, and also to engage such subcontractors, whether expatriate or Ghanaian national, and to bring them and their personnel to Ghana as necessary ‘to carry out the Petroleum Operations in a skilful, economic, safe and expeditions manner’ (Arts. 7.2(d); 7.2(h)). Further, under article 20.1, Contractor must ‘give preference to materials, services and products produced in Ghana’ but only if they ‘can be supplied at prices, grades, quantities, delivery dates and on other commercial terms equivalent to or more favourable than those at which such materials, services and products can be supplied from outside Ghana.’

The Petroleum Agreement grants Contractor the right to flare Natural Gas under certain circumstances (Article 14.2).

Under Article 17.2, Contractor must also ‘take all necessary steps, in accordance with accepted international Petroleum industry practice, to perform activities pursuant to the [Petroleum Agreement] in a safe manner’ and in compliance with labour, health, safety, and environmental laws and regulations issued by the Environmental Protection Agency of Ghana.

Under article 26.2, the State (including its departments and agencies) “shall take no action which prevents or impedes the due exercise and performance of rights and obligations of the

Parties [to the Petroleum Agreement] . . . [and] guarantees Contractor the stability . . . of the terms and conditions of the [Petroleum Agreement] . . . on the Effective Date specifically including those terms and conditions and that framework that are based upon or subject to the provisions of the laws and regulations of Ghana (and any interpretations thereof) including, without limitation, the . . . [1984] Petroleum Law”

Accordingly, although this Scoping Report takes into account various legal authorities that came into effect after the Effective Date, to the extent of a conflict between a later-passed law, regulation, or rule and the Petroleum Agreement, the latter prevails.

2.3 NATIONAL LAWS AND REGULATIONS

2.3.1 Environment

Ghana Constitution

The *Constitution of Ghana* (Article 41(k) in Chapter 6) requires that all citizens (employees and employers) protect and safeguard the natural environment of the Republic of Ghana and its territorial waters. The Constitution is the fundamental law of Ghana and provides the framework on which all other laws stand.

Environmental Protection Act (Act 490 of 1994)

The Act establishes impact assessment as a legal requirement and designates the Environmental Protection Agency (EPA) as executive authority. Part I of the Act mandates the EPA with the formulation of environmental policy, issuing of environmental permits and pollution abatement notices and prescribing standards and guidelines. The Act defines the requirement for and responsibilities of the Environmental Protection Inspectors and empowers the EPA to request that an EIA process be undertaken.

Environmental Assessment Regulations (1999)

The EIA process is legislated through the *Environmental Assessment Regulations* (LI1-652, 1999) as amended (2002 and 2006), the principal enactment within the Environmental Protection Act (Act 490 of 1994). The EA Regulations require that all activities likely to have an adverse effect on the environment must be subject to impact assessment and issuance of a permit before commencement of the activity. The EA Regulations set out the requirements for the following:

- Preliminary Environmental Assessment (PEA) and Report (PER);
- Environmental Impact Assessments (EIA);
- Environmental Impact Statement (EIS);
- Environmental Management Plan (EMP);

- Environmental Certificates; and
- Environmental Permit (EP).

EPA Environmental Guidelines

The EPA has developed several documents providing guidance on regulatory requirements for environmental protection and, in particular, the EIA process. In particular, the EPA provides guidance and outlines procedures to be followed by the operator during the EIA process within the document *Environmental Assessment in Ghana, a Guide to Environmental Impact Assessment Procedures* (EPA, 1996).

Other guidelines issued by the EPA and relevant for the *Project* are listed below:

- National Oil Spill Contingency Plan (2010);
- Environmental Quality Guidelines for Ambient Air;
- Guidelines for Environmental Assessment and Management in the Offshore Oil and Gas Development (2011);
- Sector Specific Effluent Quality Guidelines for Discharges into Natural Water Bodies; and
- General Environmental Quality Standards for Industrial or Facility Effluents, Air Quality and Noise Levels.

Water Resources Commission Act (Act 522 of 1996) and Water Use Regulations (LI 1692 of 2001)

The Act establishes a commission to regulate and manage national water resources. The commission is tasked with establishing comprehensive plans for the use, conservation, protection, development, and improvement of Ghana's water resources and is able to grant rights for the exploitation of water resources.

The Water Use Regulations 2001 requires all persons to obtain Water Use Permits from the Water Resources Commission for commercial water use. The Commission is also mandated to request for evidence that an EIA or EMP has been approved by the EPA before issuance of the Water Use Permit, where required.

Wild Animals Preservation Act (Act 43 of 1961) and Wetland Management (Ramsar Sites) Regulations, 1999

The Wild Animals Preservation Act makes provisions for the preservation of birds and fish, as well as other wild animals. The Wetland Management Regulations ratify the 1971 Wetlands Convention and provide for the establishment of Ramsar sites within Ghana. There are five designated Ramsar wetland sites along the coast of Ghana.

Articles 6 and 7 of the Regulations establish the activities that are not permitted or restricted in the designated sites such as pollution of water, removal of vegetation, disposal of waste,

hunting wild animals and grazing livestock, fishing using certain gear and in certain seasons, and other activities that may have an adverse effect on the environment.

The Act requires that potential impacts on coastal wetlands and marine fauna should be fully assessed and appropriate mitigation measures should be put in place to prevent, reduce and remedy any such effects.

Fisheries Act (Act 625 of 2002)

The Fisheries Act (Act 625 of 2002) repeals the Fisheries Commission Act (Act 457 of 1993) to consolidate and amend the law on fisheries. The Act provides for the regulation, management, and development of fisheries and promotes the sustainable exploitation of fishery resources. Section 93 of the Fisheries Act stipulates that, if a proponent plans to undertake an activity that is likely to have a substantial impact on the fisheries resources, the Fisheries Commission should be informed of such an activity prior to commencement. The Commission may require information from the proponent on the likely impact of the activity on the fishery resources and possible means of preventing or minimising adverse impacts. The Act requires that fisheries impact assessment be conducted by the proponent.

The Act establishes penalties for water pollution and adverse effects on aquatic resources (Section 92).

Hazardous and Electronic Waste Control and Management Act 2016 (Act 917).

The Act provides for the control, management and disposal of hazardous waste, electrical and electronic waste. It prohibits the importation, exportation, transportation, selling, purchasing or dealing in or depositing of hazardous waste or other waste on any land in the country or in the territorial waters of Ghana. It aims to ensure that hazardous and other waste products are contained and processed safely to preserve critical ecological components such as the soil, groundwater, flora and fauna. It addresses Ghana's obligations under the Basel Convention on the Control of Transboundary Movement of hazardous Waste and their disposal.

Ghana Atomic Energy Act (Act 204 of 1963, amended as 588 of 2000), Radiation Protection Instrument (LI 1559 of 1993) and Ghana Radioactive Waste Management Regulations (1996)

These regulations provide the legal basis for regulatory control of radioactive waste management in Ghana. The LI 1559 established the Radiation Protection Board as part of the Ghana Atomic Energy Commission. The Board is a sole regulatory authority mandated to establish an inventory of radiation sources in the country and evolve protection and safety strategies for the control of the radiation sources and safe disposal of radioactive waste.

Any operations involving the use of irradiating devices and radioactive materials must be carried out without risk to the public health and safety and the installations and facilities are

designed, installed, calibrated, and operated in accordance with prescribed standards. No person, body or institution may generate or manage waste without a valid license from the Board.

The Radioactive Waste Management Regulations established the National Radioactive Waste Management Centre (NRWMC), which currently serves as a location for collection, segregation, treatment and storage of waste from generators.

If Naturally Occurring Radioactive Material (NORM¹) is found during well drilling or production, it can be disposed through (i) canister disposal during well abandonment; (ii) injection into the annular space of a well; (iii) shipment to shore for disposal in a landfill within sealed containers; or, depending on the type of NORM, (iv) discharge to sea with the drainage effluent.

NORM-containing sludge, scale, or equipment should be treated, processed, isolated and/or disposed of according to guidelines from the International Atomic Energy Agency (IAEA) 2013 "Management of NORM Residues".

2.3.2 Social Legislation

Labour Act (Act 651 2003)

The Labour Act consolidates and updates various pieces of former legislation, and introduces provisions to reflect International Labour Organisation (ILO) Conventions ratified by Ghana.

The Act has 179 articles grouped in 20 parts. Conditions of employments, including hours of work and leave, are described in Part 3. Specific provisions for persons with disabilities, women and young persons are described in Parts 4 to 6.

Occupational health and safety conditions are discussed in Part 15 and include general health and safety conditions, exposure to hazards, employer occupational accidents, and diseases reporting.

The provisions from this Act are applicable to all employers and employees except those in the armed forces, police service, prisons service, or the security intelligence agencies. Article 122 regulates the inspection of work places to guarantee the enforcement of the Act's provisions.

¹ The geologic formations that contain oil and gas deposits may also contain naturally-occurring radionuclides, which are referred to as NORM. Because the extraction process concentrates the naturally occurring radionuclides and exposes them to the surface environment and human contact, these wastes are classified as TENORM.

2.3.3 Maritime

Ghana Maritime Authority (Amendment) Act (Act 825 of 2011)

The Ghana Maritime Authority Act (2002) established the Ghana Maritime Authority (GMA) as responsible for the regulation and coordination of activities in the maritime industry and for the implementation of the provisions of enactments on shipping.

The amendment empowers the Authority to apply standard global practice to impose fees and charges for services and or levies on operators in the maritime industry.

The Act requires clearance for Project vessels (eg, drilling rig, FPSO) travelling into the territorial waters (eg, to and from the onshore base) to be obtained from the Ghana Maritime Authority (GMA). Notification should also be made to the Ghana Navy.

Marine Pollution Act, 2016 (932)

This act addresses the prevention of pollution caused by oil, toxic liquid substances in bulk, harmful substances carried by the sea, sewage, and garbage and air pollution from ships. It ratifies the London Convention (IMO MARPOL) which aims to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter

The Act also gives contracting parties the mandate to inspect ships including tankers and other supply vessels to ensure that their operations are safe and will not pollute the marine environment.

Ghana Shipping (Amendment) Act (Act 826 of 2011)

The Shipping Act (Act 645 of 2003) regulating trade in Ghanaian waters was amended by the Ghana Shipping Amendment Act, 2011 (Act 826). The amendment was intended to inject local content into the oil and gas development by encouraging Ghanaians to participate in the shipping activities relating to offshore business. The Ghana Shipping Act, 2003 (Act 645) imposed restrictions on the trading of foreign registered ships in Ghanaian waters by preserving local trade in Ghanaian waters to Ghanaian ships. However, the current definition of Ghanaian waters is limited to the 12 nautical mile territorial sea.

This amendment extends the definition of Ghanaian waters to include the waters within the 500 m safety zone generated automatically under the United Nations Convention on the Law of the Sea (UNCLOS) around installations in the exclusive economic zone beyond the territorial sea. Specifically, it extends the scope of 'trade' to include waters within the 500 metre safety zone of offshore installations, regardless of whether they are inside or outside the 12 nautical mile territorial sea boundary.

The amendment also makes provision for the grant of permit to foreign vessels to trade in Ghanaian waters in instances where there are no Ghanaian vessels available or capable of providing those services so as not to create operational bottlenecks.

This Act requires the registration of vessels, seaworthiness certifications, assurance of appropriate communication and signalling devices, and welfare of seafarers, in particular with respect to crew agreements, wages and occupational safety and health.

Ghana Maritime Security (Amendment) Act (Act 824 of 2011)

The Maritime Security Act, 2011 (Act 824), amendment of the previous Act 675 of 2004 gives effect to Chapter XI-2 of the International Convention for the Safety of Life at Sea (SOLAS, 1974). The amendment intends to extend the previous application of the Ghana Maritime Security Act to offshore installations. The Act aims to enhance maritime safety and security; to create a legal framework for effective compliance with the International Ship and Port Facility Code (ISPS), defined under the International Convention; and to provide for related matters.

In addition to the legislation mentioned above, other potentially relevant maritime legal instruments include:

- Ghana Shipping (Protection of Offshore Operations and Assets) Regulations 2011.
- Ghana Maritime Authority (Maritime Safety Fees and Charges) Regulations 2012 (L.I 2009).

Requirements specified in these regulations include the development of a Ship Security Plan, a security alert system, vessel inspections and competency checks of personnel on board in terms of their abilities for shipboard security procedures.

Ghana Shipping (Protection of Offshore Operations and Assets) Regulations (LI 2010 of 2012)

Offshore platforms and pipelines can present a risk to the safety of vessels navigating in the vicinity of structures and installations, especially when such structures are located in close proximity with major shipping lanes and productive fishing grounds. The 2011 Shipping Regulations, under the Ghana Shipping Act, have the following main provisions.

- They provide for the creation and enforcement by the Ghana Maritime Authority and patrol by the Ghana Navy of temporary exclusion zones around pipelines and subsea cables of not more than 100 and 50 m respectively on either side of a pipeline or cable, and an exclusion zone not exceeding 500 m from each point of the outer edge of offshore installations.

- They prohibit vessels entering the exclusion zones without prior authorisation, unless the vessel is engaged in repair or maintenance activities of pipelines and subsea cables (Art. 2).
- They prohibit anchoring and fishing activities in the pipelines and subsea cables exclusion zones (Art. 7).
- They specify the circumstances under which vessels may enter these zones (eg, to lay, maintain, renew, or remove a cable or pipeline or provide logistical support to the installation) under the authorization from the Ghana Maritime Authority.
- They include specific provisions (Articles 8 and 9) for the use of Mobile Offshore Drilling Units (MODUs).

The Maritime Zones (Delimitation) Law (PNDCL 159 of 1986)

The extent of the territorial sea and Exclusive Economic Zone (EEZ) in Ghana is defined by the Maritime Zones (delimitation) Law (PNDCL 159), of 1986. According to the PNDCL 159, the territorial sea corresponds to the 12 nautical miles (approximately 24 km) of the low waterline of the sea, whereas the EEZ is defined by the area beyond and adjacent to the territorial sea, less than 200 nautical miles (approximately 396 km) from the low waterline of the sea.

The Act also grants the rights, to the extent permitted by international law, to the government of Ghana for the purposes of:

'exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters adjacent to the sea-bed and of the sea-bed and its subsoil, and with regard to any other activities for the economic exploration and exploitation of the zone, such as the production of energy from the water, currents and winds...' (Section 5, Issue I, V-3752).

2.3.4 Petroleum Sector

The Ghana National Petroleum Corporation Law (Act 64 of 1983)

The Ghana National Petroleum Corporation Law (Act 64 of 1983) established the Ghana National Petroleum Corporation (GNPC) as mandated, to promote exploration and planned development of the petroleum resources of the Republic of Ghana. Apart from allowing the GNPC to engage in petroleum operations and associated research, the law empowers the GNPC to advise the (now) Minister of Petroleum on matters related to petroleum operations.

The Petroleum Commission was established in 2011 by an Act of Parliament, Act 821, which is discussed further below, to regulate and manage the exploitation of petroleum resources and to co-ordinate the policies. The Commission took over regulation of the sector from the Minister of Energy, who until then regulated the sector with the assistance of GNPC. Act 821

specifically requires GNPC to cease to exercise any advisory function in relation to the regulation and management of the utilisation of petroleum resources and the coordination of policies in relation to them six months after the passage of Act 821. This took effect on 16 January 2012.

Regulation of downstream operations is a shared responsibility between the Energy Commission, the National Petroleum Authority, and the Petroleum Commission. The Energy Commission and the National Petroleum Authority have been designed to play parallel roles in the allocation of licences for the transportation of crude oil and crude oil products. Consequently, an individual or corporate entity that wishes to engage in a business or commercial activity in the downstream industry is required to obtain the required licences from both bodies.

Petroleum (Exploration and Production) Law (Act 84 of 1984)

The Petroleum (Exploration and Production) Law establishes the legal and fiscal framework for petroleum exploration and production activities in Ghana. The Act sets out the rights, duties, and responsibilities of contractors; details for petroleum contracts, and compensation payable to those affected by activities in the petroleum sector. According to the Act all petroleum operations are required to be conducted in such a manner as to prevent adverse effects on the environment, resources, and population.

Petroleum (exploration and production) Act, 2016

Scope of the Act

1. This Act applies to petroleum activities within the jurisdiction of the Republic of Ghana, including activities in, under and upon its territorial land, inland waters, territorial sea, exclusive economic zone and its continental shelf.

Object of the Act

2. The object of the Act is to provide for and ensure safe, secure, sustainable and efficient petroleum activities in order to achieve optimal long-term petroleum resource exploitation and utilisation for the benefit and welfare of the people of Ghana.

National Petroleum Authority Act, 2005 (Act 691 of 2005)

The National Petroleum Authority (NPA) is established by the National Petroleum Authority Act. It is a statutory body whose objective is to regulate, oversee and monitor the Ghanaian petroleum industry.

Petroleum Commission Act (Act 821 of 2011)

The Petroleum Commission Act established the Petroleum Commission with the aim to manage Ghana's petroleum resources. The Act establishes the Commission's responsibilities,

functioning and governance, as well as the interaction of the Commission with other government bodies in relation to petroleum resources.

The Petroleum Commission seeks to implement Local Content and Local Participation through the following.

- Promote local content and local participation programmes as stipulated in the Local Content Regulation.
- Liaise with external stakeholders on local content development. The Commission in this regard has participated in several conferences and seminars to discuss the opportunities in the sector for local companies and the way forward in the sector.
- Ensure that as much as practicable, the use of Ghanaian Human Resources, materials, services, and businesses for the systematic development of national capacity.
- Coordinate the flow of information amongst all relevant agencies with regard to local content and local capacity administration.
- Ensure compliance with local content targets set in the Local Content Regulations.
- Promote effective coordination, management and supervision of corporate, governmental and community interactions to support positive social development outcomes and enhance revenue generation in the sector.

Petroleum (Local Content and Local Participation) Regulations, Legislative Instrument (LI) 2204 (2013)

The stated purpose of these regulations are to promote the maximisation of value-addition and job creation through the use of local expertise, goods and services, businesses and financing in the petroleum industry value chain and their retention in the country.

Local Content refers to the quantum/percentage of locally produced materials, personnel, financing, goods and services rendered to the oil industry and which can be measured in monetary terms.

Local Participation on the other hand refers to the level of Ghanaian Equity Ownership in the oil and gas industry. To qualify as a Ghanaian / indigenous company, the company must have at least 51% of its equity owned by a Ghanaian with 80% management and senior positions occupied by Ghanaians.

The minimum Local Content for any petroleum activity in Ghana is specified under Schedule 1. Provisions are made regarding goods and services, technical capabilities, materials and procurement, well drilling services, among others.

Petroleum (Exploration and Production) Act, 2016 Act 919

This Act covers all petroleum exploration and production activities onshore and offshore on territorial land, inland waters, territorial sea, exclusive economic zone and its continental shelf. It aims to ensure safe, secure, sustainable and efficient petroleum activities to achieve long-term benefit for the people of Ghana.

The Act provides for the defining and opening of licence blocks for exploration and production activities through Production Sharing Agreements.

The Act also requires the Minister to undertake a strategic assessment of the impact of the petroleum activities on local communities; the impact of petroleum activities on the environment, trade, agriculture, fisheries, shipping, maritime and other industries and risk of pollution; and the potential economic and social impact of the petroleum activities.

Petroleum (Exploration and Production) (Health, Safety and Environment) Regulations, 2017

The Petroleum (Exploration and Production) (Health, Safety and Environment) Regulations, 2017 (L.I. 2258) are intended to prevent adverse effects on, and promote high standards for, health, safety and the environment from petroleum activities. The regulations require that operators and contractors in the petroleum sector have in place a HSE management system, a health and safety plan and facility Safety Case which are required to be submitted to the Petroleum Commission. The regulations cover a wide range of HSE issues including the design of production facilities in a manner that chemical and energy consumption is reduced and there is minimal pollution of the external environment. The regulations also contain various requirements relating to emissions and discharges, including reporting of flaring events, oil in water measurement, formation testing and well clean up, and use and discharge of chemicals.

2.3.5 New and Revised Laws and Regulations

It is recognised that in view of the developing oil and gas sector, new or revised environmental, social and marine regulations and guidelines have been produced.

2.4 INTERNATIONAL AGREEMENTS AND CONVENTIONS

2.4.1 Overview

The Republic of Ghana is signatory to a number of international conventions and agreements relating to industry, development, and environmental management. In certain cases, conventions and agreements have influenced policy, guidelines and regulations and therefore are worth considering in connection with the *Project*.

Table 2.1 lists relevant international conventions and protocols to which Ghana is signatory. Those potentially pertinent to the *Project* are summarised in the following.

Table 2.1 International Convention and Agreements Signed by Ghana

Date	Name of the Convention / Agreement
2003	The Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)
2001	The International Labour Organisation (ILO) Fundamental Convention related to forced labour, freedom of association, discrimination and child labour
2000	International Covenant on Economic, Social and Cultural Rights
2000	International Covenant on Civil and Political Rights
1999	Guinea Current Large Marine Ecosystem Project (GCLME)
1999	Memorandum of Understanding Concerning Conservation Measure for Marine Turtles of the Atlantic Coast of Africa
1992	United Nations Framework Convention on Climate Change (UNFCCC)
1992	Convention on Biological Diversity (CBD)
1991	Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa – Bamako Convention
1991	Convention on Fisheries Cooperation among African States Bordering the Atlantic Ocean
1989	African Charter on Human and People’s Rights
1989	Montreal Protocol on Substances that deplete the Ozone Layer
1988	Convention on the Conservation of Migratory Species of Wild Animals
1987	Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration (ILO No 148)
1985	Vienna Convention for the Protection of the Ozone Layer
1982	United Nation Convention on the Law of the Sea (UNCLOS), Montego Bay, Jamaica
1981	Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention)
1975	Convention Concerning the Protection of the World Cultural and Natural Heritage(World Heritage Convention), Paris
1973/1978	International Convention for the Prevention of Pollution from Ships (MARPOL 73/78);
1971	Ramsar Convention on Wetlands of International Importance, especially Waterfowl Habitats (Ramsar, Iran)
1971	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)
1969	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION)
1969	International Convention on Civil Liability for Oil Pollution Damage (CLC)
1968	African Convention on Conservation of Nature and Natural Resources
1944	Convention on International Civil Aviation (Chicago Convention)

MARPOL Convention

The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) contains a number of the provisions relevant to the *Project*. These include general requirements regarding the control of waste oil, engine oil discharges and grey and black wastewater discharges. *Table 2.2* provides a list of MARPOL provisions relevant to oil and gas development. To date, Annexes I to VI have been ratified by Ghana.

Table 2.2 Relevant MARPOL 1973/1978 Provisions

Environmental Aspect	Provisions of MARPOL 1973/1978	Annex
Drainage water	Ship must be proceeding en route, not within a 'special area' and oil must not exceed 15 parts per million (ppm) (without dilution). Vessel must be equipped with an oil filtering system, automatic cut-off and an oil retention system.	I
Accidental oil discharge	Shipboard Oil Pollution Emergency Plan (SOPEP) is required.	I
Bulked chemicals	Prohibits the discharge of noxious liquid substances, pollution hazard substances, and associated tank washings. Vessels require periodic inspections to ensure compliance. All vessels must carry a Procedures and Arrangements Manual and Cargo Record Book.	II
Harmful Substances carried at Sea in Packaged Form	It contains general requirements for the standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions, and notifications for preventing pollution by noxious substances.	III
Sewage discharge	Discharge of sewage is permitted only if the ship has approved sewage treatment facilities, the test result of the facilities are documented, and the effluent will not produce visible floating solids or cause discoloration of the surrounding water.	IV
Garbage	Disposal of garbage from ships or from fixed or floating platforms is prohibited. Ships must carry a garbage management plan and be provided with a Garbage Record Book.	V
Food waste	Discharge of food waste ground to pass through a 25 mm mesh is permitted for facilities more than 12 nm from land.	V
Air pollutant emissions	Sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone-depleting substances including halons and chlorofluorocarbons. Sets limits on emissions of nitrogen oxides from diesel engines. Prohibits the incineration of certain products on board such as contaminated packaging materials and polychlorinated biphenyls.	VI

2.4.2 United Nation Convention on the Law of the Sea (UNCLOS)

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) sets out the general framework for all marine and maritime activities, including jurisdiction over maritime areas and specific provisions regarding pollution from offshore activities and transboundary pollution (Article 194[c]).

With respect to pollution from offshore activities, Article 194 provides that '*States shall take all measures necessary to prevent, reduce and control pollution of the marine environment from any source*', including measures '*designed to minimise to the fullest possible extent*' pollution from installations and devices used in exploration or exploitation of the natural resources of the seabed and subsoil, in particular '*measures for preventing accidents and dealing with emergencies*'.

Although UNCLOS highlights the importance of preparedness (or preventative measures) and contingency planning in the context of offshore installations and devices used in exploration it does not detail the specific steps that States must take in this context. This responsibility falls to States to 'adopt laws and regulations to prevent, reduce and control pollution of the marine environment' in connection with marine activities subject to their jurisdiction. It also provides that States 'shall establish global and regional rules, standards and recommended practices and procedures to that effect ⁽¹⁾. However, international attempts to negotiate a global instrument have been unsuccessful.

Ghanaian implementation of this Convention requires vessels travelling into Ghanaian territorial waters to obtain clearance from the Ghana Maritime Authority (GMA) and to notify the Ghana Navy.

2.4.3 Convention on Oil Pollution Preparedness, Response and Cooperation (1990)

On a global level, the 1990 Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC) identifies the legal duties necessary to ensure adequate preparedness, contingency planning and response to a spill. In this context, OPRC provides for the following specific obligations on the parties.

- Undertaking (individually or jointly) all appropriate measures to prepare for and respond to an oil pollution incident.
- Requiring that operators of offshore installations have oil pollution emergency plans in place (co-ordinated with the national system in place and approved by the Ghana Maritime Authority).

(1) *Ibid*, Article 208(5)

- Establishing a national system for responding promptly and effectively to oil pollution incidents, including a national contingency plan for preparedness and response.
- Establishing (either unilaterally or through bilateral or multilateral co-operation) a minimum level of pre-positioned oil spill combating equipment, commensurate with the risk involved, programmes for its use, programmes of exercises and training, detailed plans and communication capabilities and coordinated arrangements.

Implementation of this Convention in Ghana requires the establishment of a contingency plan to combat accidental pollution to be coordinated with the National Oil Spill Contingency Plan. It also requires approval by the EPA.

2.5 *TRANSBOUNDARY REQUIREMENT*

The *Project Area* is located in the same gulf as several other West African nations. Given the location, there is the possibility that *Project* activities could affect resources and receptors across national borders.

A comprehensive review of the legal and policy requirements related to transboundary issues will occur during the ESIA following consultation with stakeholders during scoping.

2.5.1 *National Requirements*

Part 12(o) of the EA Regulations requires that the ESIA ToR include an indication of whether any area outside Ghana is likely to be affected by the activities of the undertaking.

2.5.2 *International Requirements*

Requirements related to transboundary issues are contained in

UNCLOS

Provisions in UNCLOS that are applicable in the context of transboundary pollution, irrespective of whether it occurred from offshore activities, include the following.

- Notification of imminent or actual damage (Article 198).
- Co-operating on activities that may cause transboundary pollution and jointly developing and promoting contingency plans for responding to pollution incidents (Article 199).
- Monitoring of the risks or effects of pollution (Article 205).
- Publication of the reports presenting the results of the monitoring studies (Article 205).

- Assessing potential effects of activities (Article 206).

Oil Preparedness, Response and Co-operation (OPRC)

OPRC provides for the specific obligations on the parties relative to transboundary issues. With respect to contingency plans, OPRC acknowledges the importance of mutual assistance and international cooperation, including exchange of information, respecting the capabilities of States to respond to oil incidents and the preparation of oil pollution contingency plans. OPRC also expresses the need to promote international cooperation to enhance existing national, regional and global capabilities concerning oil pollution preparedness and response, taking into account the special needs of developing countries.

2.6 GOOD INTERNATIONAL INDUSTRY PRACTICE (GIIP)

The following guidelines and best practices standards provided by the International Association of Oil and Gas Producers (IOGP), IPIECA and others are relevant to the *Project*.

- Environmental, Social Health Risk and Impact Management Process, 2007.
- Environmental Management in Oil and Gas Exploration and Production, 1997.
- HSE Management Guidelines for Working Together in a Contact Environment, 2010.
- Waste Management Guidelines, 1993.
- Guidelines for waste management with special focus on areas with limited infrastructure Report No. 413, rev1.1 IOGP 2009.
- Alien invasive species and the oil and gas industry, 2010.
- Guidance on Improving Social and Environmental performance: Good Practice Guidelines for the Oil and Gas Industry, 2011.
- Good Practice Guidelines Series on Oil Spill Preparedness and Response, by IPIECA and IOGP (<http://www.oilspillresponseproject.org/>).
- IPIECA's Biodiversity and ecosystem services fundamentals. Guidance document for the oil and gas sector, 2016.
- IPIECA & IOGP. Preparing effective flare management plans: Guidance document for the oil and gas industry 2011.
- IPIECA-IOGP online guideline for energy and GHG efficient technologies and practices (<http://www.ipieca.org/resources/energy-efficiency-solutions/>).

2.7 SUSTAINABILITY REPORTING STANDARDS

A sustainability report is a report about the economic, environmental and social impacts caused by the *Projects* everyday activities and demonstrates the link between the *Projects* strategy and its commitment to a sustainable global economy.

The *Project* will evaluate whether to follow The Global Reporting Initiative for Sustainability Reporting Standard or the IPIECA guideline on voluntary sustainability reporting.

The Oil and gas industry guidance on voluntary sustainability reporting is IPIECA's key tool to help companies shape the structure and content of their sustainability reporting. Published in conjunction with the American Petroleum Institute (API) and the International Association of Oil & Gas Producers (IOGP).

2.8 FINANCIAL INSTITUTION STANDARDS

The standards of financial institution are generally applied in the case where a Project is financed and in such an event, the environmental and social requirements of the particular financial institution are applied. Where the specific financial institutions that may fund the project are not known at an early stage in the project, the standards provided in the IFC Performance Standards for Environmental and Social Sustainability (IFC Performance Standards) and the Equator Principles, as well as UN's Guiding Principles on Business and Human Rights are commonly applied. These standards are used by Development Finance Institutions (DFI) and Equator Principal Finance Institutions (EPFI) globally.

2.8.1 IFC Performance Standards

Seven of the eight IFC Performance Standards may be relevant to the *Project*:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety and Security;
- Performance Standard 5: Land Acquisition and Involuntary, in case of acquiring of new land area for development of land base facilities;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; and
- Performance Standard 8: Cultural Heritage, might be relevant if evidence of marine archaeology were to be identified in the *Project Area of Influence*, or in case of acquiring of new land area for development of land base facilities. This would be further investigated in the ESIA.

- Performance Standard 7: Indigenous People, as defined in the Performance Standard, there are no indigenous people in the *Project Area of Influence*.

2.8.2 Environmental, Health, and Safety (EHS) Guidelines

The EHS Guidelines are designed to provide relevant industry background and technical information that would help avoid, minimise, and control EHS impacts during construction, operation, and decommissioning of an offshore oil and gas project.

The EHS Guidelines serve as a technical reference source to support the implementation of the IFC Performance Standards, particularly in those aspects related to Performance Standard 3: Resource Efficiency and Pollution Prevention, as well as certain aspects of occupational and community health and safety.

During the ESIA, the legal review would determine where the Ghana regulations differ from the levels and measures presented in the EHS Guidelines. The Project is expected to achieve whichever is more stringent. However, if less stringent levels or measures are appropriate in view of specific project circumstances, a full justification for proposed alternatives would be provided.

The general EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors and would be used together with the relevant IFC industry sector guidelines. For the *Project*, the relevant EHS Guidelines that would be applied:

- EHS General Guidelines (2007); and
- EHS Guidelines for Offshore Oil and Gas Development (2015).

2.9 COMPANY POLICIES AND STANDARDS

The *Project* would comply with the environmental and social policies and standards of the *Operator* or as otherwise approved by the *Contacto* Group.

All *Project* activities would be conducted in compliance with applicable laws, act and regulations, Aker Energy requirements and procedures and recognized industry standards, design codes and practices.

The Aker Energy's HSE Policy Statement and the Corporate Social Responsibility Policy including Human Rights Principles will be implemented through the FPSO sub-contractors Management System. The Management system comprises, but is not limited to, a Health, Safety and Environment (HSE) Management System and a Corporate Social Responsibility

(CSR) Management System. The Policies set out the top-level goals and commitments and the framework under which the proposed *Project* would be designed and operated. These commitments will be fully aligned with Ghana requirements and good international industry practice.

Corporate responsibility shall be reflected in Aker Energy's core values and in the entire range of activities. Aker Energy commits to undertaking the following.

- Operate its business with integrity and respect laws, different cultures and human dignity and human rights.
- Operate its business in accordance with fundamental human rights as enshrined in the UN Human Rights Declaration and follow the standards of the International Labour Organization.
- Show consideration for the local community and emphasize spin-off effects of the company's activities.
- In its role as partner contribute to learning and distribution of knowledge.
- Establish long-term working relationships and utilize the supplier industry's expertise for the further development of the industry.

Safeguarding Health, Safety and Environment in all activities is an important goal for Aker Energy and to provide this Aker Energy commits to the following:

- In planning of activities and operations, Aker Energy shall strive to reduce risk as much as reasonably practicable.
- Aker Energy shall be a safe workplace, where the goal is to prevent any kind of harm. All who work for us – our employees, hired personnel and contractors – shall be able to perform their work in an environment where the emphasis is on the safety of all individuals in the workplace. Our facilities shall be in good condition, and they shall be planned, designed and maintained in a manner ensuring their technical integrity.
- Aker Energy shall avoid harm to the environment by reducing the risk of any adverse effects on the environment as much as possible.
- Aker Energy shall achieve this goal by means of good risk management and by ensuring that health, safety and environment (HSE) is an integrated part of all our activities.

The structure of Aker Energy Management System Framework is modelled on a continual improvement cycle of five phases: commit, plan, perform, measure, review and improve.

These are the fundamental management system phases behind the elements of the HSE and CSR Management System Framework and represent the key steps towards improving corporate performance.

Project sub-contractors are required to have their own HSE management systems in place, which, at a minimum, meet Ghana laws and regulations. A Project Management System Interface Document would be prepared that describes the bridging of control between the Aker Energy and the contractor for key activities and/or HSE and CSR sensitivities.

Such documents outline the systems and procedures developed to ensure that the proposed operations carried out by the sub-contractor on behalf of the *Contractor Group* are managed safely and to high standards with due regard for the environment and people.

3 PROJECT DESCRIPTION

3.1 PROJECT OVERVIEW

The current Phase 1 field scenario *Project* concept would involve the following activities:

- Installation of 18 oil and gas production wells;
- Installation of 15 Water Alternating Gas (WAG) injection wells;
- Installation of 5 drill centres;
- Installation of two (2) ship-shaped FPSO's and mooring system's; and
- Installation of subsea infrastructure, including multi-phase lifting pumps.

Phase 1 is selected developed with two stand-alone FPSO's because of the distance between the various reservoir discoveries that potentially will be developed in later phases. Schematic overviews of the two FPSO developments are shown in Figure 3-1 and Figure 3-2.

Figure 3-4 shows the DWT CTP *Contract area* with the present discoveries. More exploration in the block is expected and plans for extent of later phase field development are still being reviewed.

This chapter provides a description of the *Project* facilities and equipment, main project activities, and associated emissions and discharges. Information on project personnel is also provided.

The *Project* engineering FEED studies are under evaluation and the design details are expected to be refined concurrently with the ESIA development and approval process. An ESIA would present the detailed design concept assessed in the ESIA.

Figure 3-1 Schematic of FPSO - 1 for the Phase 1 Project Development

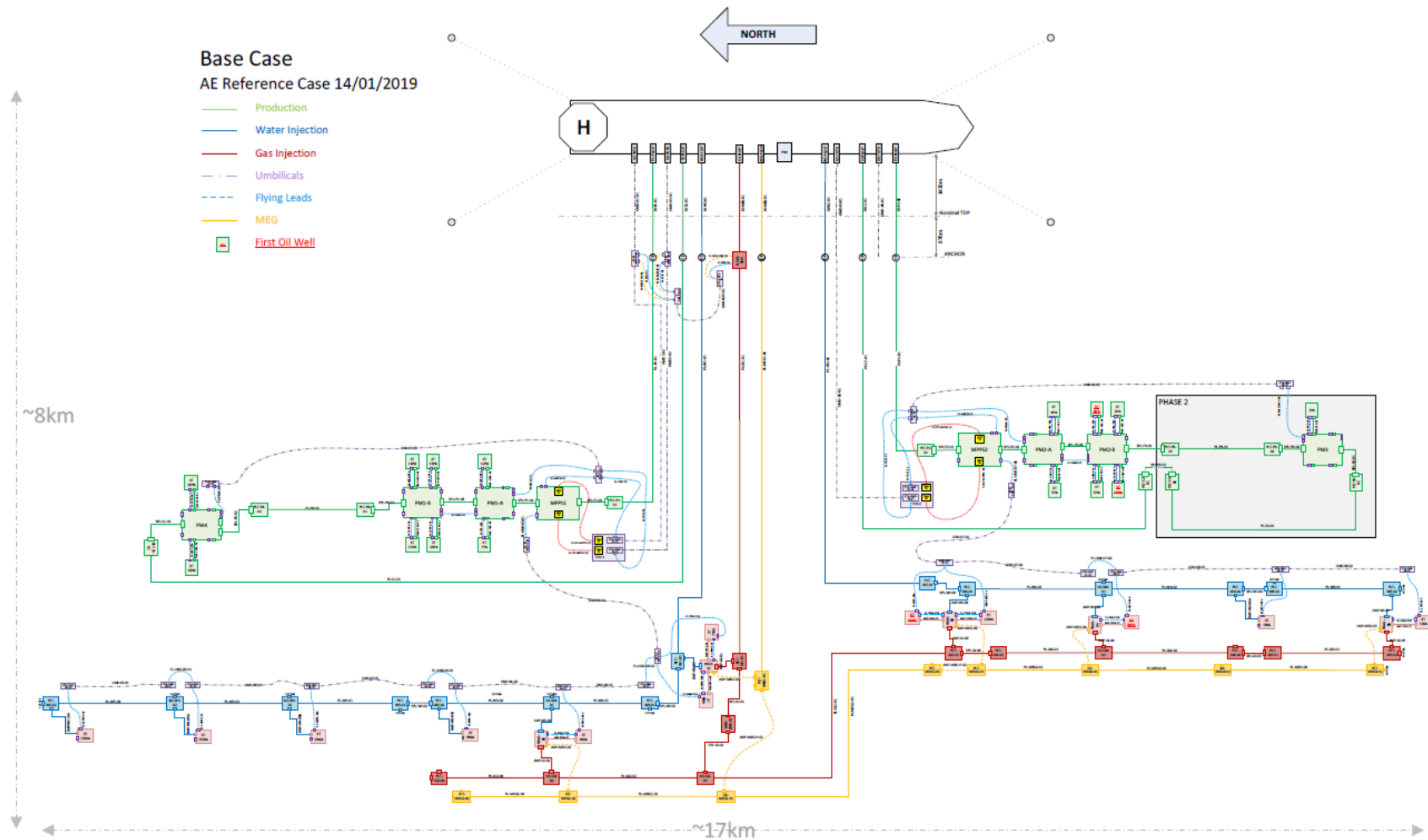
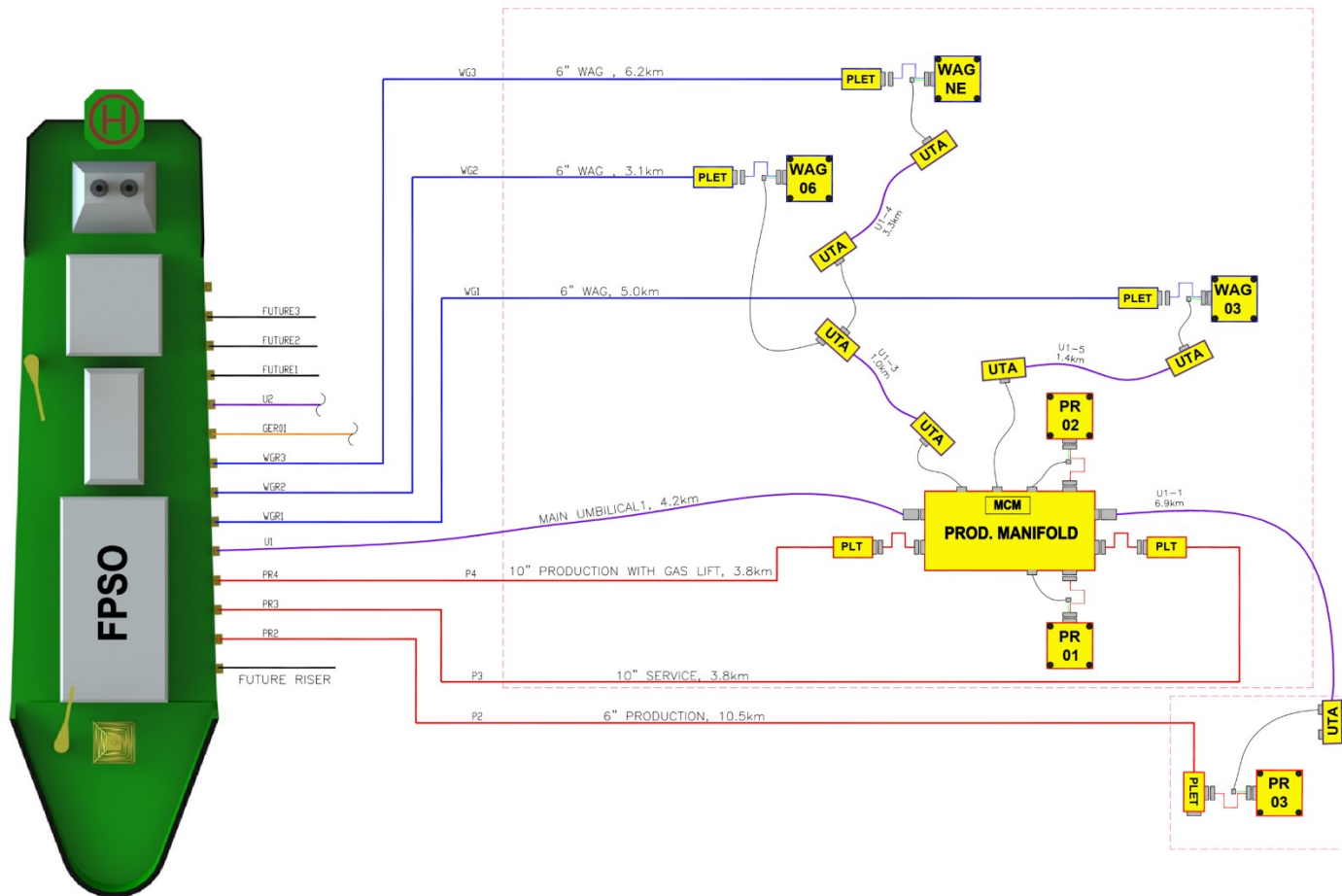


Figure 3-2 Schematic of FPSO - 2 for the Phase 1 Project Development



3.2 PROJECT ALTERNATIVES

This section describes the work undertaken for selecting the design concept and the process that will be followed for refining the *Project* design.

3.2.1 Base Design

The *Project* development location was defined based on the geophysical data and subsequent exploration and appraisal well drilling. Results of well testing indicated accumulations of oil and gas within the DWT CTP *Contract Area*.

The potential development and production concept is based on the results of the exploratory and appraisal drilling and is designed to optimise the extraction of hydrocarbons in the most efficient and cost effective manner. The location of the two FPSO's also considered the location of the proposed oil and gas production wells with the design intended to minimise the distance between wells and the production facilities, and to optimize potential for later phase developments with tie-back to the two FPSO's.

The technical, operational, and economic factors associated with various development approaches were evaluated. Oil industry experiences in similar fields, including developments offshore Ghana, were used to define the approach. Based on an evaluation of production operational risks, project cost, environmental and social factors, and schedule risks associated with installation and risks arising from major accidental hazards, the option involving two ship-shaped FPSO's was determined to have the lowest risk for both project installation and operational phases.

Similar to decision making for the option with two FPSO's, several factors were considered to determine the best approach for subsea infrastructure design, including location, water depth, reservoir depth, and aerial extent of the fields.

The *Project* base design goal would be to use proven subsea production and control systems tied back to the FPSO's, utilizing proven processing equipment. The proposed approach has been used successfully at the Jubilee Field, TEN Field, Sankofa Field and elsewhere in West Africa and other deep-water locations around the world.

3.2.2 Engineering Design Alternatives

Aker Energy will continue to evaluate multiple design alternatives, based on safety, engineering, technical, financial, environmental, and social considerations, in order to determine the optimum field development concept. The development concept includes a number of alternatives which are expected to be further revised and refined during subsequent engineering studies. Figure 3-3 shows the multiple design alternatives that have been considered through the ongoing design optimization.

Figure 3-3 Project Alternatives

Development Phasing	Pre-investment	Pecan Drill Centers	Pecan Flowline Type	Pecan Flowline Heat	Hull Form	Parcel Size	Mooring Type	Artificial Lift	Riser Type	Pecan Riser Heat	Oil Cargo Offloading	Seawater Injection	Associated Gas	Gas Re-injection	Non-associated Gas	Lease vs. Purchase	FPSO Operations
Pecan initially (2 rigs)	Oil + NAG	2x DC (P50) 3x DC (P10)	Dual	Wet Insulation	Ship Shape FPSO	1.0 MMBO (VLCC)	Spread Moored	Subsea Pumps (MPP)	SCR*	Wet Insulation	Tandem	Nitrate Injection	Sales Gas (via ENI**)	None	Keep as Option	Lease with Option to Purchase	FPSO Contractor (Potential future Contractor)
Pecan initially (1 rigs)	Oil Only	3x DC (P50) 4x DC (P10)	Single	PIP	FDPSO	<1.0 MMBO (Suez Max)	External Turret	Riser Gas Lift	SLWR	PIP	CALM	Low Salinity	Rich Gas (via Tullow)	Re-injection Pecan	Relinquish	Lease	FPSO Supplier
All at once (Pecan, Beech, NAG)	NAG Only		Flexible	Electric	Semi-Submersible		Internal Turret	Downhole Gas Lift	FSHR	Electric		Sulfate Removal	Rich Gas (pipeline to GNGC)	Re-injection Other		Purchase	Contractor
EPS	None		Bundle		Spar			In-riser ESP's & Gas Lift	Flexible	Hot Water		Raw Seawater	Gas Re-injection	Flaring			3rd Party
					Round FPSO			Subsea Pumps & Gas Lift		Integrated Bundle		None	Flaring				
								Subsea Caissons with ESP's				Include Prod. Water	New PL & Onshore Gas Plant				
								None				SWIT					

- SCREEN stage selection
- Concept not selected
- FRAME stage basis

* Export gas riser may require SLWR for ENI export route, but SCR for export via Tullow pipeline.

** Pending commercial/marketing outcome. Therefore gas export via Tullow pipeline to GNGC gas plant remains another alternative.

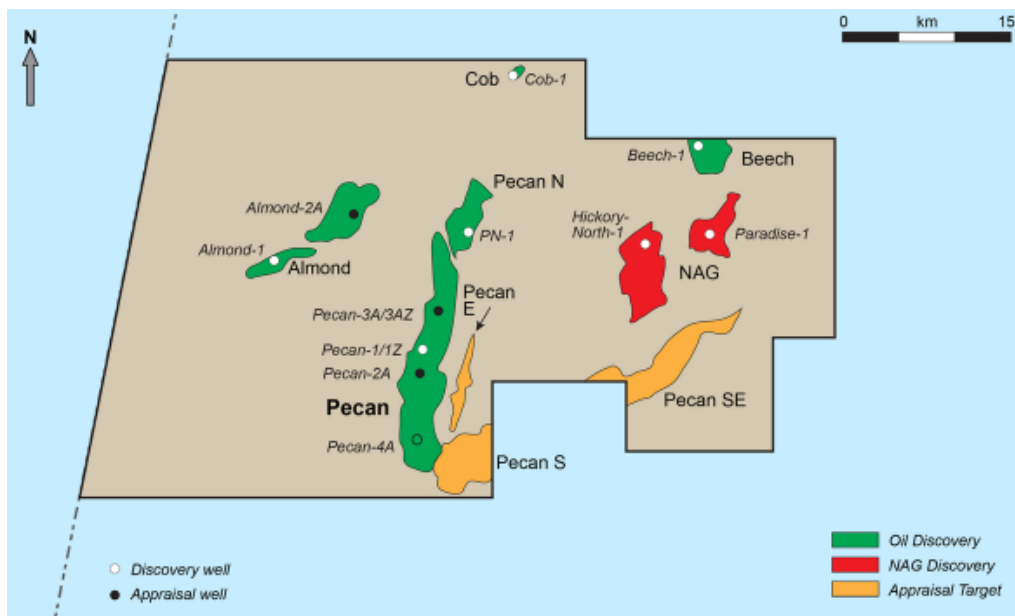
The ESIA would provide a detailed description of the consideration of alternatives, including an outline of design or criteria for selecting preferred alternatives.

3.3 PROJECT LOCATION

The Project would be developed in the Deep Water Tano Cape Three Points (DWT CTP) Contract Area, offshore Ghana (Figure 3-4). The Contract Area is approximately 60 km across consisting of 200,000 ha. The Contract Area is located around 70 km off the coast of the Western Region of Ghana (Refer to Figure 1-1). Water depths in the Contract Area range from 1,600 m to 2,500 m.

The Project may potentially involve production of oil and gas from one or several prospects located within the Contract Area. FPSO-1 will be located at the Pecan discovery while FPSO-2 will be located to optimize production from other discoveries.

Figure 3-4 DWT CTP Contract Area With Discoveries



Water Depth 5,500 feet to 8,500 feet
Reservoir Depths 12,500 feet to 15,000 feet below the seabed surface
Formation Upper Cretaceous sands

Source: Aker Energy

3.4 PROJECT SCHEDULE

The *Project* would be developed in phases allowing the collection of data in early drilling and production periods to inform continued project optimisation.

Subsea equipment installation for the Reference Case would occur approximately 6-12 months before commissioning of the FPSO and start of production. FPSO installations is planned for end of 2020 and mid-2021, with the target for first oil production by the end of 2020.

3.5 FACILITIES AND EQUIPMENT

The main facilities and equipment consist of:

- Two FPSO's with topsides processing systems, storage tanks, offloading systems and mooring systems;
- Oil and gas production wells, gas and water injections wells; and
- Subsea infrastructure as multiphase subsea pumps etc.

The following provides further description of the main components.

3.5.1 FPSO, Topsides Processing Systems, and Mooring Systems

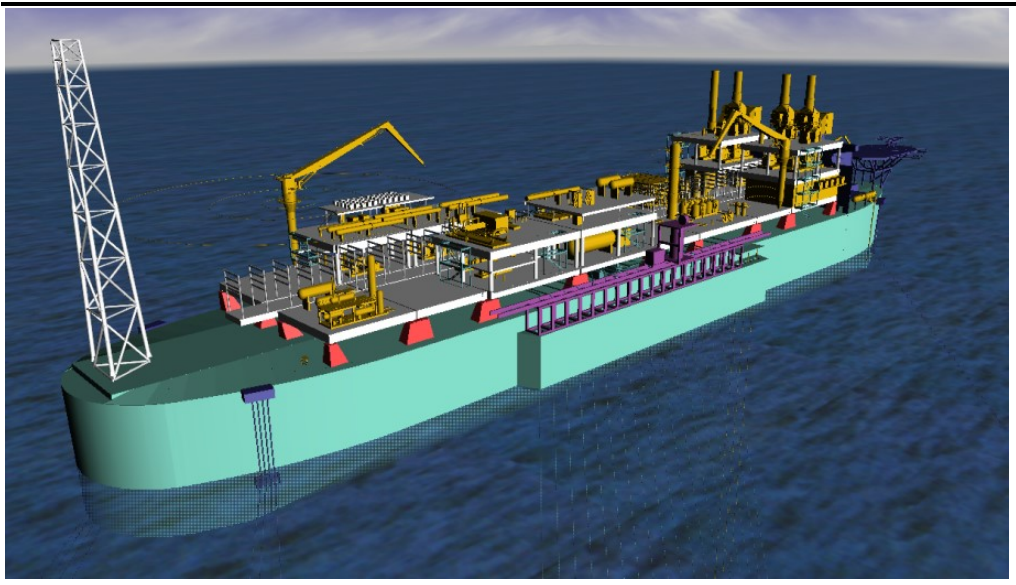
FPSO

As described in the *Project* concept there will be two ship shaped FPSO's. The FPSO-1 would be a converted Very Large Crude Carrier (VLCC) designed for a compliment of 120 persons with provision made for up to an additional 30 persons during installation and commissioning. The FPSO-2 would be a converted Suezmax tanker with a capacity of 104 persons.

The FPSO-1 would allow for the storage of up to approximately 1.3 to 1.6 million barrels of oil. The processing design capacities would be 110,000 barrels of oil per day (bopd), 200,000 barrels of produced water per day (bwpd), and 100 million standard cubic feet per day (MMscfd) of gas. The FPSO would also be designed to provide 200,000 barrels of water per day (bwpd) for water injection.

The FPSO-2 would allow for the storage of up to approximately 1.3 million barrels of oil. The processing design capacities would be 60,000 barrels of oil per day (bopd), 60,000 barrels of produced water per day (bwpd). The FPSO would also be designed to provide 50,000 barrels of water per day (bwpd) for water injection.

Figure 3-5 Schematic of Ship-Shaped FPSO



The FPSO's would likely have the following utilities and systems onboard:

Crude and water processing system	Air and nitrogen systems
Gas processing system	Lighting system
Cooling and heating system	Oily water treatment (slope, bilge and ballast)
Fuel gas system	Power generation (main, essential and emergency)
ICSS (including fire and gas, ESD)	Water Injection system
Diesel system	Fire-fighting systems
Drain system	Material handling
Seawater intake system	Accommodation
Inert gas system	Sewage treatment system
Fresh and Potable water system	Helideck with fuelling
Heating, ventilation and air conditioning (HVAC) systems	Flare and vent system
Produced water treatment system	Evacuation system
Seawater injection system	Gas injection system

Mooring System

The FPSO would be anchored in place with a spread mooring system with sufficient capacity to allow for up to two mooring lines to fail without impact on safety or operation. The

mooring lines would consist of polyester rope with chain segments at both ends. The chains would be attached as low as possible to the keel level of the FPSO to enhance stability and to avoid impact of supply boats and offloading tankers.

3.5.2 Oil and Gas Production and Injections Wells

The *Project* base case calls for tentatively 18 production wells to be drilled from four off drill centres at the Pecan field. Each drill centre would have a multi-well production manifold. Tentatively 15 injection wells for alternating water and gas injection (WAG) would also be drilled. Further oil and gas production wells, water injection wells, and gas injection wells may be developed in subsequent phases.

The exact number and locations of the wells would be confirmed in connection with the preparation of a development plan.

3.5.3 Subsea Infrastructure

This section describes the present layout of the subsea infrastructure connected to the FPSO-1 at the Pecan area. The layout for the subsea infrastructure connected to FPSO-2 is under development and will be described in the ESIA. The FPSO-1 related subsea system will consist of 2 off individual production flow systems, the northern loop (DC1 and DC4) and the southern loop (DC2 and DC3), ref figure 3.1 above. Each production flow system consists of 2 off drill centres, a thermal insulated production pipeline and connected to a service line forming a loop and allowing for roundtrip pigging from the FPSO. All production lines (2 off) and service lines (2 off) are tied back and connected to the FPSO by steel catenary risers (SCR). Water injector system consist of two flow systems (northern and southern loop). The water injection trees are lined up and connected as satellite wells to the flowline system by In-Line Structures. In parallel with the water injection system there is a dedicated gas injection flow system which will provide dedicated wells the required gas amount to allow water and gas alternating (WAG) injection for increased oil recovery. In addition the WAG system request a dedicated monoethylene glycol (MEG) supply line to WAG wells to safeguard operations. Separate dynamic umbilical's (total 4 off) will provide the required controls to subsea wells.

At the production drill centres subsea production system will include manifolds, vertical X-mas Tree (VXT) systems, electrical/hydraulic distribution unit, jumpers and associated tie-in connections. Subsea boosting will be provided using multiphase pumping stations located downstream DC1 and DC2. Hydro-electric subsea umbilical's with fibre optics will deliver chemical, hydraulic power, electrical power and communications to all four drill centres and 2x2 multiphase pumps. A subsea distributed, chemical system will be used with measurement and flow control at each subsea injection point.

The pre-drilled production wells will be cleaned up to the drilling vessel/ship before started up later to the FPSO. The remaining production wells will be cleaned up to the FPSO prior to

start-up of the wells. Well tests shall be conducted using multiphase flow meters located on each production tree

The production pipeline system includes use of rigid jumpers while water injection system comprises both flexible and rigid jumpers tied into pipeline structures to reach the injection trees.

The production would be transported via 12 inch flowlines, and Subsea Multiphase pumps (MPP) would be located downstream DC1 and DC2 to provide additional lift for the production fluid to the host. The 10-inch water injection flowline terminate from the PLETs, manifold to the trees with either rigid or flexible jumpers. The subsea controls would be provided using an electro-hydraulic umbilical.

During normal operating conditions, production data from the wells and the subsea structures would be transmitted through the umbilical to the FPSO and the control/operating room. All information, data, and monitoring would be managed and supervised in the control room.

Box 3.1 Subsea Infrastructure Terms

Flowlines

Flowlines are dual-insulated pipes that will carry production fluids from production manifolds to riser bases or injection water/gas from riser bases to injection manifolds.

Manifolds

Manifolds comprise valves and pipes that act as a gathering point for the fluids from individual wells. Manifolds are installed on the seafloor.

Steel Catenary Risers

A steel catenary riser (SCR) connects a subsea flowline to a floating or fixed oil production platform.

Risers

Risers are used to transport injection water/gas from the FPSO to riser bases.

Spools/ Jumpers

Spools/Jumpers are generally rigid insulated pipes that connect wellheads to manifolds.

Umbilicals

Umbilicals are used to convey chemicals, data (control system information, pressure and temperature) electrical power and high/low pressure hydraulic fluid supply to allow manipulation of infrastructure valves and tree safety valves and flow chokes.

Wet trees

Wet trees consist of a set of control valves that are installed on subsea wellheads to control production fluids.

3.6 PROJECT ACTIVITIES

3.6.1 Well Drilling and Completion

One or two deep water Mobile Offshore Drilling Units (MODU), either a semi-submersible drilling unit or Drillship, will be utilised to drill and complete the Pecan wells. Four (4) wells may be drilled prior to commissioning of the FPSO to ensure first oil is delivered as early as possible. The MODU will continue with the drilling and completion programme to deliver the required number of wells in line with the Project Depletion Strategy. On average the MODU is anticipated to deliver 4-6 wells per year, depending on the type of well (Producer or Injector) and challenges encountered during execution. Producer wells will be deviated, step out wells drilled in a cluster around an optimally positioned Drill Centres (DC). Currently four (4) DCs are planned in a phased approach. The injector wells are currently envisaged as vertical/ slightly inclined wells drilled in standalone location.

The drilling campaign may commence in Q3-2020 to Q1 2021 and be completed by Q4 2024 to Q1 2025 pending operational success and campaign requirements.

For each well the MODU will be positioned at the well location using Dynamic Positioning (DP) and have an exclusion zone of 500 m.

Drilling fluids (also called muds) are pumped down the drill string during drilling to maintain a positive pressure in the well, cool and lubricate the drill bit, protect and support the exposed formations in the well and lift the cuttings from the bottom of the hole to the surface. Drilling fluids are slurries of various solids and additives (used to control the fluids functional properties such as density).

There are two broad categories of drilling fluid: Water Based Fluids (WBFs) and Non-Aqueous Drilling Fluids (NADFs)¹. For both types of drilling fluid a variety of chemicals are added to the water or non-aqueous liquid to modify the properties of the fluids.

Additives include clays and barite to control density and viscosity and polymers such as starch and cellulose to control filtration. The type of drilling fluid used for a particular well or drilling program depends largely on the technical requirements of the well, local availability of the products, and the contracted drilling fluid supplier. Often, both WBFs and NADFs are used in drilling the same well. WBFs are used to drill some sections (particularly the top sections) of the well and then NADFs are substituted for the deeper sections to the bottom of

¹ The Ghana Oil and Gas Regulations also refer to Organic-Phase Fluid (OPF) and Oil-Based Fluid (OBF). OPF is defined as: 'an organic-phase drilling fluid, which is an emulsion of water and other additives in which the continuous phase is a water-immiscible organic fluid of animal, vegetable or mineral origin.' OBF is defined as: 'low aromatic and paraffinic oils and those mineral oil-based fluids that are neither synthetic fluids nor fluids of a class whose use is otherwise prohibited.' EPA, 2015 :Offshore Environmental Regulations. Proposed by the Petroleum Department.

the well. Prior to release, cuttings would be passed through the solids control equipment to remove the majority of drilling fluids prior to being discharged.

The drilling rig would be equipped with solids control equipment called shale shakers. Shale shakers remove drilled solids from mud by passing material through a wire-cloth screen that vibrates while drilling fluid flows on top of it. Larger solids are retained on the screen, passed through the cuttings dryer and discharged. The liquid phase of mud and solids smaller than the wire mesh pass through the screen and are sent to a centrifuge. Solids from the centrifuges would be discharged and clean drilling fluid reused.

In addition to assessing the environmental impact from drill cuttings discharges, the *Project* would conduct an assessment of the best technique with regards to environment, safety and feasibility, for drilling fluids and cuttings handling. The drilling operations will use as environmental friendly drilling fluids as possible, while protecting well and project deliverability.

Further information on the composition and treatment of drilling fluid would be provided in the ESIA, upon completion of the Drilling & Completions Basis of Design.

After the wells have been drilled a process known as 'well completion' is undertaken to prepare the well for its operational function (*ie*, producing well or injector well) and to install a number of safety and operational controls.

Completion fluids such as weighted brines or acids, methanol, glycols and proppants are circulated/ injected in to the well to clean the wellbore, stimulate the flow of hydrocarbons, or to maintain downhole pressure.

Prior to bringing the well on full production the completion fluids are back flowed to surface to clean and protect the well and the reservoir interface. Prior to commission the FPSO, this backflow operation will be completed to the MODU. Once the FPSO is onstream, clean-up will be conducted to the FPSO.

3.6.2 Infrastructure Installation

Installation of the FPSO mooring suction piles will be performed prior to FPSO arrival. The mooring clusters position and final FPSO location depend upon the field layout determined during the *Project* detailed design phase. The FPSO would sail under its own power from the conversion yard to the installation site.

Subsea Production Systems and flowlines, umbilicals and risers will be installed as a part of the subsea infrastructure. The methods of installation will be described in the ESIA as this has not yet been concluded. The SCRs and flowlines can either be installed with reel lay, S-lay or

J-lay method. The umbilicals will be installed with a tiltable lay system (TLS) and an underdeck basket carousel for laying flexible products. Large structures, jumpers and other hardware are installed with lifts using construction vessel cranes.

The flowlines and subsea equipment will be hydrotested and flushed with potable or treated seawater prior to commissioning. Environmentally safe chemicals would be used for the treated seawater. The chemical lines and hydraulic lines in the umbilicals would arrive with storage fluid and the lines flushed and cleaned using a subsea kit and all fluids routed into the flowlines and to the host facility to discharge. The specific chemicals and additives that would be used would be in line with the United Kingdom Continental Shelf (UKCS) Offshore Notification Scheme.

3.6.3 *Pre-Commissioning and Commissioning*

Pre-commissioning includes the activities undertaken prior to the introduction of hydrocarbons; *i.e.* up to the ready for start-up (RFSU) point. Pre-commissioning would commence at the FPSO shipyard to minimise the amount of pre-commissioning required once the FPSO arrives on site. Commissioning of all FPSO and subsea systems would be undertaken to ensure mechanical completion, testing, and commissioning of all systems including fire and gas, safety and process control systems. There would be flaring and venting during commissioning. Commissioning offshore and start-up take approximately 4 to 6 months.

3.6.4 *Operation*

Crude oil would be treated and stored on the FPSO prior to being exported to an offloading tanker. Produced gas would be treated on the FPSO to maximise offtake and re-injected. A portion of the produced gas would be used as fuel for the FPSO.

Processing

Fluids from production wells would be processed and treated on the FPSO. Crude oil would be separated, treated, stored, and periodically offloaded to an offloading tanker. Produced gas would be treated on the FPSO and re-injected.

Options for transport of the gas to shore are being evaluated and evaluated as a fallback option. A portion of the produced gas would be used as fuel for the FPSO. Produced water from the well fluids would be treated on the FPSO and disposed at sea. Seawater would be pumped from under the FPSO, treated and injected into the reservoir for pressure maintenance with treatment reject seawater disposed overboard.

Gas Processing

Gas would be separated from production fluids before being treated and compressed prior to leaving the FPSO as follows:

- Alternating reinjection of associated gas and water for increased oil recovery
- Export to pipeline to Atuabo (pending decisions)

Some of the gas would be routed to the fuel gas module to be superheated and used as fuel gas for the gas turbine power generators.

Water Injection

The water injection system would use treated seawater injection pumped at high pressure into the water injection wells to maintain reservoir pressure. The seawater is likely to include calcium nitrate to reduce the possibility of souring in the wells.

Offloading Operations

Crude oil stored on the FPSO would be offloaded in tandem through a floating hose to an offloading tanker. All crude oil transfers and associated vessel movements in the DWT CTP development would be controlled via marine terminal rules and regulations being developed by the project.

Power Generation

The power generation system on board the FPSO would consist of dual fuel turbines. Diesel would be used as fuel during start up and shutdown events. Precise specifications will be determined later during detailed engineering design phase. Emergency diesel power generation systems would also be provided. The turbines exhaust system would have a heat recovery unit to maximise the energy efficiency from the power generation. During detailed engineering of the *Project* there would be conducted an energy budget to optimise power generation solution with the energy need.

3.6.5 Support Operations

Marine Vessel and Helicopter Support

Support vessels, including crew and supply boats, would be required to support the drilling, completion, installation and production operations. Helicopter support would also be necessary during installation and production operations.

Onshore Support Locations

The location for primary logistics support for the *Project* has not yet been determined. Options being considered in the Western Region are the Port of Takoradi and the Navy Base. The *Project* may require the development of additional onshore facilities, but this has not yet been determined.

The ESIA will provide details of the onshore logistics operations for the *Project* as they are developed.

3.6.6 Decommissioning

The *Project* equipment and facilities would be decommissioned at the end of its economic life. Field life is projected to be 18 years (from first oil production). Decommissioning would involve dismantling production and transportation facilities and restoration of the area in accordance with license and regulatory requirements.

Further information on decommissioning will be provided in the ESIA.

3.7 EMISSIONS, DISCHARGES, AND WASTE

3.7.1 Emissions

Air Emissions

The *Project's* activities, including well drilling and completion, construction of facilities and equipment, the FPSO facility installation and operation (including offloading), flowline and umbilical installation and support vessel and helicopter operations would emit Greenhouse Gases and varying amounts of other pollutants such as carbon monoxide (CO), oxides of nitrogen (NO_x) and sulphur (SO_x), volatile organic compounds (VOCs) and particulate matter. Estimated emissions volumes would be detailed and assessed in the ESIA.

The *Project* would focus on energy efficient design solutions to minimise Greenhouse Gases emission. Further, the *Project* would apply principles of good international industry practice to design for minimal flaring and cold venting.

3.7.2 Discharges

The drilling vessel, FPSO and associated support vessels plus offloading tankers would produce various discharges. FPSO discharges would continue for the life of the development. *Project* discharges would result from the following activities.

Vessel

Drilling, completion, installation and support vessel operations would result in routine discharges to sea (*ie*, sewage, grey water, food waste, bilge water, ballast water and deck drainage). Discharge streams would be treated to required standards prior to discharge.

Drilling

Routine discharges would include drill cuttings and drilling fluid. Water based drilling fluid and cuttings from the tophole sections of the well would be discharged to the seabed. All other drilling fluid and cuttings would be routed to the drilling deck and recycled and / or treated prior to discharge. The selection of drilling fluids and additives will be based on technical requirements and the available fluids with the lowest hazard ratings.

The ESIA for the *Project* would assess the environmental impact from drill cuttings discharges and, the *Project* would conduct an assessment of the best technique with regards to environment, safety and feasibility, for drilling fluids and cuttings handling.

Completions

Routine discharges would include returned completion fluids. Completion fluids can typically include weighted brines, surfactants, acids, methanol and glycols and other chemicals. Completion fluids would be treated and / or discharged in accordance with Ghanaian regulations and permits.

Installation and Commissioning

Intermittent discharges may include commissioning fluids including dye, oxygen scavenger, corrosion inhibitor and biocide. When flowlines and risers are dewatered (*ie*, water is pumped out) after pressure testing and treatment, these fluids will be pumped through the pipelines to the FPSO for processing. In some cases, discharge to sea will be required. Nitrogen would be purged to the atmosphere.

Operations

Routine *Project* discharges would include the following: produced water, sewage, grey water, food waste, deck drainage, bilge water, ballast water, brine, cooling water and hydraulic fluid.

Non-routine discharges, for example during g commissioning, would include the following: oxygen scavenger, corrosion inhibitor and biocide, workover fluid, Naturally Occurring Radioactive Material (NORM) (potentially).

Anticipated discharge volumes and treatment methods will be assessed in the ESIA.

3.7.3 Noise

The FPSO, drilling rig, completion vessels, installation vessels, offloading tankers and support vessels would introduce sound into the marine environment during operation. Vessel noise is primarily attributed to propeller cavitation and propulsion engines (*ie*, noise transmitted through the vessel hull). Noise would also be produced from equipment such as flowlines and valves.

Once the specification of the vessels and equipment to be used is known in detail an assessment of the noise sources can be made as part of the ESIA.

3.7.4 Waste

Operations would generate solid non-hazardous wastes including paper, plastic, wood, glass and metal. In addition, there will be hazardous wastes such as used oils and chemicals. The solid waste generated on board the drilling vessels, FPSO or support vessels would be shipped back to the shore base where it will be reused or recycled, where possible, or disposed of using Ghana EPA-approved contractors. All waste storage, transport, treatment and disposal will be undertaken in accordance with a project Waste Management Plan.

3.8 PERSONNEL REQUIREMENTS

Qualified personnel would be required to support both onshore and offshore activities including but not limited to:

- Aker Energy Ghana offices;
- Logistics shorebase (*eg*, warehouse, pipeyard, *etc*);
- Logistics operations (*eg*, land transportation, aviation, marine/quayside operations, material handling, loading and transport);
- FPSO operations;
- Drill rig or drillship operations; and
- Support vessels

Personnel requirements would be met via a combination of direct staff employment, third party contractors and consultants as well as third party service providers.

Estimated employment numbers would be confirmed and evaluated as part of the ESIA.

Where qualified Ghanaian personnel are available for employment to support operations, whether staffed directly or via third party, Aker Energy will develop procedures to provide opportunities for employment/services as far as reasonably possible.

Direct (Aker Energy employees) and indirect (contracted services) employment requirements would change with each phase of the project through to production operations. Attracting, developing and retaining qualified, high-performing professionals is a key objective.

4 ENVIRONMENTAL AND SOCIAL BASELINE

4.1 INTRODUCTION

This chapter provides a description of the current environmental and socio-economic baseline against which the potential impacts of the *Project* will be assessed. The description covers the area in which the *Project* will take place as well as areas that may be directly or indirectly affected.

In this section, reference is made to the following:

- *Project* refers to the installation and operation of the wells and the FPSO.
- *Project Area* refers to the area immediately surrounding the *Project* components; *i.e.*, the *Project* footprint.
- *Contract Area* refers to the broader area to which Aker Energy Ghana Limited and partners hold exploration rights. The *Project Area* is a small portion of the larger licence *Contract Area*. The term is sometimes used when describing baseline conditions at a regional level.
- *Area of Influence* refers to the area likely to be affected by the *Project* directly or indirectly. The Area of Influence will vary depending on the particular resource or receptor and may be as small as the direct footprint (*ie*, the *Project Area*) or extend regionally, nationally and even globally. The predicted Area of Influence is used to establish the Study Area.
- *Study Area* refers to the area that would be covered by a particular baseline study in the detailed ESIA phase.

The *Project Area* and the context in terms of the regional setting are shown in *Section 1.1*.

The *Project's Area of Influence* includes: the footprint of the *Project* facilities and activities (FPSO location, FPSO exclusion zone and subsea infrastructure); transportation routes between the FPSO and supply base; areas surrounding the site that may be impacted by project activities; indirect impacts on biodiversity and livelihoods; as well as the Ghana marine and socio-economic environment at a wider scale. The Area of Influence will be further defined in the ESIA, when the onshore port location are confirmed.

4.2 DATA SOURCES

4.2.1 Overview

A part of the scoping process, existing sources of information and data were identified and reviewed with the objective to determine coverage and quality with respect to the project setting and impact assessment. The search focussed on information and data related to the offshore location where the project would be located and the marine environment of the specific location and the wider region. The search also identified social and economic information related to the specific location as well as the Western Region of Ghana where shore-based project activities may occur.

The baseline conditions are, in many instances described at a regional or national level since the basis of the information is largely secondary data collected during scoping. The data are derived from published sources, secondary data sourced from publically available ESIA reports as well as published journal articles and online sources. Where further information is required to inform the impact assessment, further baseline data will be collected as part of specific studies in the ESIA. A gap assessment of the data with regards to the requirements for the ESIA has also been conducted and is presented in *Section 7.3.1*.

4.2.2 Secondary Data

The baseline description draws on a number of publically available secondary sources including the following.

- Published scientific studies, academic texts and reference books.
- Publically available environmental reports, in particular ESIA reports for other developments near the *Project*.
- Reports covering sensitive or protected species and habitats (eg, UNEP and IUCN publications).
- Subscription based geospatial data (topographic data, aerial photographs, satellite imagery; IBAT database).
- Information on protected areas from the Ghanaian government.
- Information from international organisation including Food and Agriculture Organization (FAO), International Union for Conservation of Nature (IUCN), Fishbase, and Birdlife International.

The main information sources used are as follows:

Environmental and Social Impact Assessment of the Offshore Cape Three Points (OCTP) Phase 1 Development [offshore oil production and export], Ghana (prepared by ERM and ESL), eni Ghana, 2015.

Environmental and Social Impact Assessment of the Offshore Cape Three Points (OCTP) Phase 2 Development [offshore gas production and transport to shore], Ghana (prepared by ERM and ESL), eni Ghana, 2015.

Environmental and Social Scoping Study of a 450 MW Power Plant in Aboadze, Western Region, Ghana (prepared by ERM and ESL), Globeleq Advisors Limited and Volta River Authority, 2015

Environmental and Social Impact Assessment of an Oil Services Terminal (OST), Atuabo, Western Region, Ghana (prepared by ERM, ESL, and SRC), 2013

Environmental and Social Scoping Study of the Tweneboa, Enyenra, Ntomme (TEN) Development, Ghana (prepared by ERM, ESL, and SRC), Tullow Ghana, 2012

Environmental and Social Impact Assessment of the Jubilee Field Phase 1 Development, Ghana (prepared by ERM, ESL, and SRC), Tullow Ghana, 2009

Fisheries Management Plan of Ghana 2015 to 2019, Ghana Fisheries Commission, 2014.

Independent Study of Marine Environmental Conditions in Ghana (prepared by Acorn International), Kosmos Energy, 2015.

4.2.3 Primary Data

The environmental baseline description also draws on primary data collected through studies and surveys commissioned for the *Project*. The following are the main sources used for this report:

Environmental Baseline Survey Report, Deep Water Tano Cape Three Points, Survey Date December 2013 to January 2014, Gardline, 2014.

Current Data Report, Ghana Deepwater Current Measurements Phase 4, Survey Date 24 August to 27 December 2014, Fugro, 2014.

Metocean Modelling Data Report, Metocean Criteria for the Pecan Field, Fugro, 2014.

3D Seismic Survey Report. Cetacean and Sea Turtle Report. Hess Corporation. Deepwater Tano/ Cape Three Points, Ghana, EPI Group, 2014.

The information in the reports covers the following related to the offshore biophysical environment:

- Metocean conditions including temperature, wind, waves and currents;
- Marine water quality;
- Planktonic and zooplanktonic;
- Seabed sediment type and quality;
- Benthic macrofauna;
- Marine habitats; and
- Marine fauna.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Climate and Meteorology

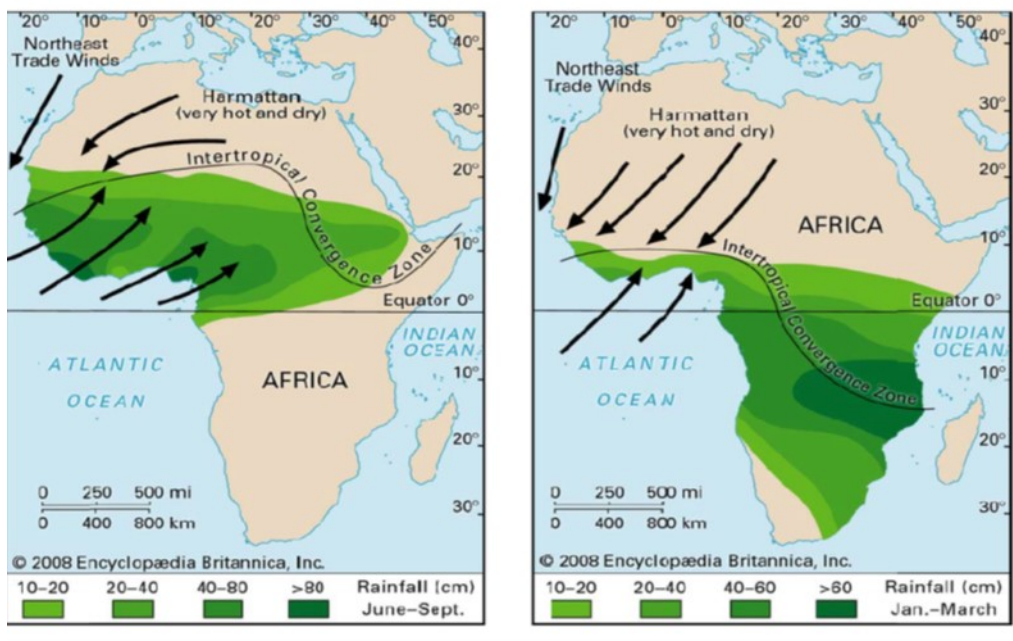
Overview

Regional climactic conditions are influenced by two air masses: one over the Sahara Desert (tropical continental); and the other over the Atlantic Ocean (maritime). These two air masses meet at the Intertropical Convergence Zone (ITCZ) and the characteristics of weather and climate in the region are influenced by the seasonal movement of the ITCZ.

In general, two seasons are characteristic of the climate in the region, namely the dry and wet seasons. The occurrence of these seasons corresponds with periods when the tropical continental and maritime air masses, and their associated winds, influence the region (Refer to *Figure 4-1*).

The climate of West Africa is subject to considerable spatial and temporal variability. This variability is linked to variations in the movement and intensity of the ITCZ as well as variations in the timing and intensity of the West African Monsoon. The most documented cause of these variations on an inter-annual timescale is the El Niño Southern Oscillation (ENSO). The West African Monsoon is influenced either during the developing phase of ENSO or during the decay of some long-lasting La Niña events. In general, El Niño is connected to below normal rainfall in West Africa (USAID, 2011).

Figure 4-1 West Africa Monsoon



Source: Encyclopaedia Britannica Online, April 2011.

Table 4.1 Climate and Meteorology in the Western Region of Ghana

Variable	Details
Wet Season	From May to July and again between September and November
Dry Season	From July to August
Annual rainfall	From 730 mm to 3,500 mm
Annual percentage rainy days	60%
Diurnal Temperature Range	26°C and 33°C
Annual variation in temperature ranges	2°C and 4°C
Prevailing Wind Direction	South-West
Swell Direction	Predominately South West

Source: ERM, 2015a

Long Term Climate Trends

Analysis of available temperature data by USAID (2011) indicated a warming climate in Ghana with the drier northern area warming more rapidly than southern Ghana. Since 1960, mean annual temperature rose by 1.0°C for Ghana as a whole. The rate of increase was generally quicker in the northern than southern regions. Annual rainfall in Ghana is highly variable making identification of long-term trends difficult. In the 1960s, rainfall in Ghana was particularly high and decreased to particularly low levels in the late 1970s and early 1980s.

The USAID study found no evidence that extreme rain events have either increased or decreased in Ghana since 1960.

The USAID study modelled and forecast the future changes in temperature and precipitation in Ghana until 2080. They found that the forecast changes in Temperature in Accra (Coastal Savanna Zone) for the wet season is $1.68 \pm 0.38^{\circ}\text{C}$ by 2050 and $2.54 \pm 0.75^{\circ}\text{C}$ by 2080 and for the dry season, $1.74 \pm 0.60^{\circ}\text{C}$ by 2050 and $2.71 \pm 0.91^{\circ}\text{C}$ by 2080. The forecasted changes in precipitation in Accra ranged from 52 percent decreases to 44 percent increases in wet season rainfall by 2080. The variability among the models' precipitation changes is not very different from the inter-annual variability currently experienced in the region.

The USAID study also indicates that sea-surface temperatures in Ghana will increase with potential negative implications for the dynamic and critical link between timing and intensity of the coastal upwelling and fishery productivity. Associated in part with sea temperature increases is sea-level rise which is also projected to rise from 0.13 to 0.60 m by the late 21st century, depending on development scenarios modelled.

Countries in Africa are vulnerable to the effects of climate change because of the dependence of the majority of the population on agriculture, particularly rain-fed agriculture and widespread poverty that reduces the population's ability to withstand climate stress. Additionally, climate variability and change threaten other resources, including water, forests, and fisheries. Some countries, including Ghana, already experience coastal erosion and flooding (Boko et al., 2007).

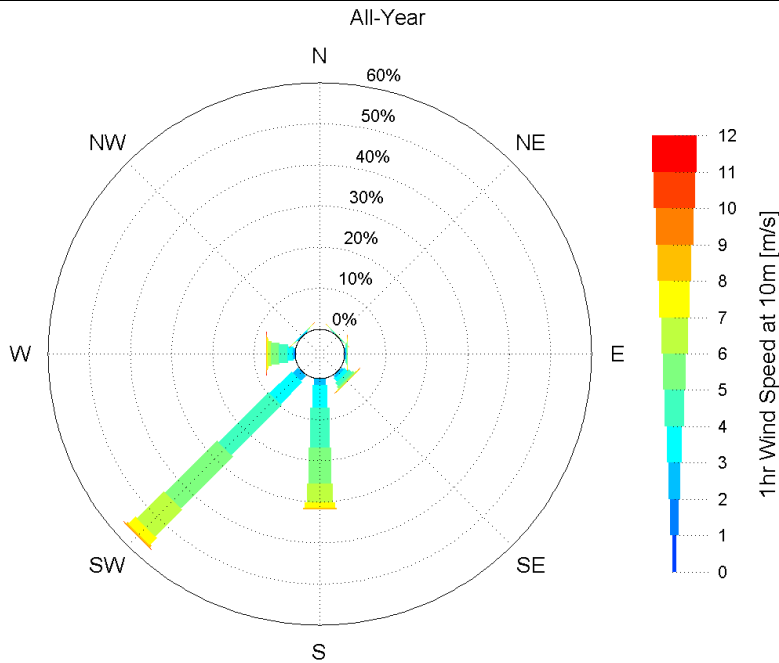
4.3.2 Offshore Winds

Surface atmospheric circulation in the region is influenced by north and south trade winds and the position of the ITCZ. The dry season is generally defined as a period with warm, dry winds from the Sahara which are commonly referred to as the harmattan. Trade winds tend to be stronger during the wet season. Extreme winds are caused by squalls (storms), associated with the leading edge of multi-cell thunderstorms. Squall activity tends to reach a minimum in August and a maximum around March.¹

The prominent wind direction in the *Project Area* (near Pecan Field) is from the south-southwest (refer to *Figure 4-2*). Average wind speeds are between 5 ms^{-1} and 6 ms^{-1} and maximum wind speeds are approximately 12 ms^{-1} (*Figure 4-2*).

(1) ¹ Whilst thunderstorms and squalls are responsible for the strongest winds, they generate only weak currents and low wave heights due to the limited fetch and duration

Figure 4-2 Wind Speed by Direction in the Project Area



Source: Fugro (2014)

4.3.3 Air Quality

The *Project* would be located offshore and away from any industries, urban areas or other onshore sources of air pollution. The only offshore source of air pollution would be vessels travelling along shipping lanes in the proximity as well as vessels involved in oil and gas operations in the area including process emissions from the Jubilee Field FPSO and combustion emissions from exploration and appraisal well drilling in the vicinity.

In general, the airshed in the *Project Area* is considered un-degraded.

4.3.4 Noise, Vibration, Light

Noise, vibration and light levels in the *Project region* are minimal due to the lack of industrial and other activities. Ambient levels of noise, vibration, and light are due to natural sources (water movement, weather events, and natural light cycles).

4.3.5 Hydrology and Oceanography

Tides, Currents, and Waves

The oceanography of the Gulf of Guinea comprises the principal water types of the South Atlantic, but is largely influenced by the meteorological and oceanographic processes of the South and North Atlantic Oceans, principally oceanic gyral currents (Fontaine *et al* 1999, Merle and Arnault 1985).

Surface water temperatures are warm (24°C to 31°C) with the daily sea surface temperature cycle showing annual variability (Fugro 2014). Hydrographic data collected in the Gulf of Guinea indicate that a thermal cycle occurs only in the upper two elements of the water column which together comprise the tropical surface water mass.

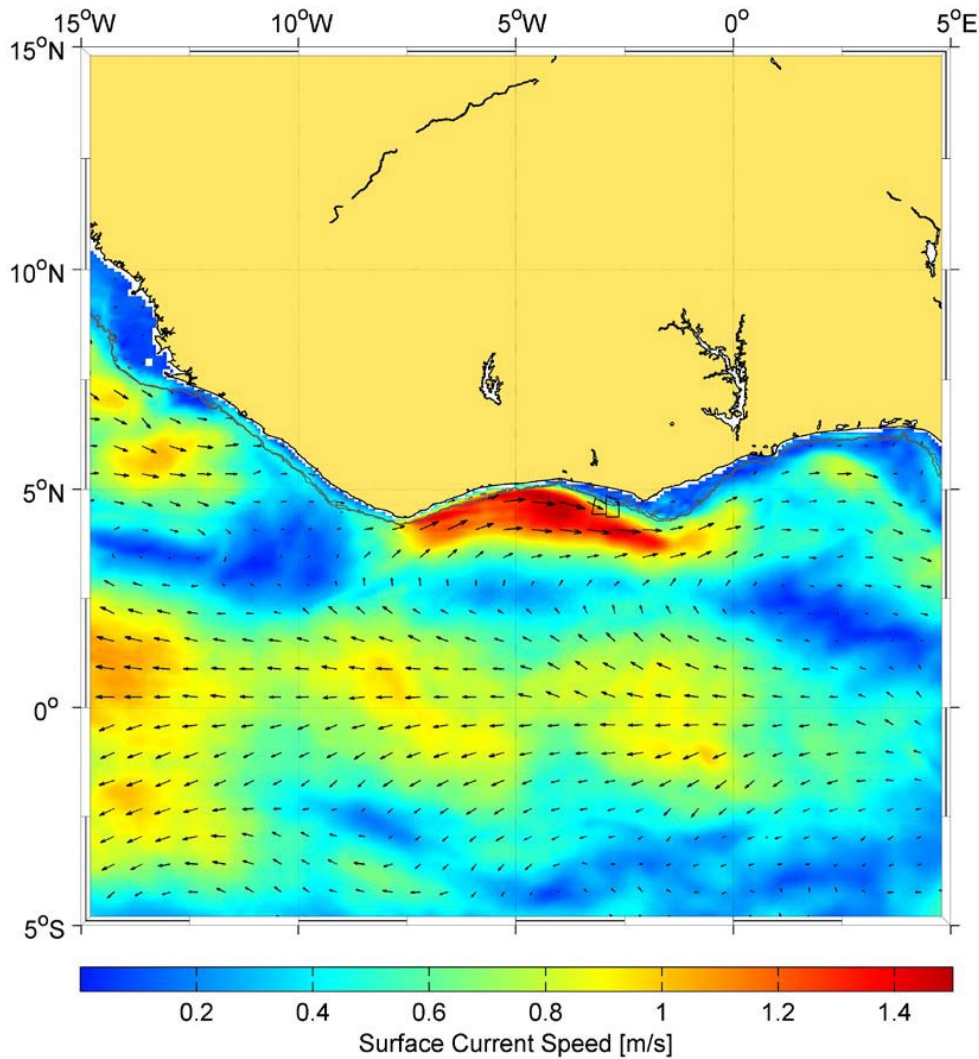
The oceanic gyral currents of the North and South Atlantic Oceans produce a counter current, the Equatorial Counter Current that flows in an eastward direction. This becomes known as the Guinea Current as it runs from Senegal to Nigeria.

The offshore waters of Ghana are dominated by the Guinea Current, which is an offshoot of the Equatorial Counter Current and is typically confined to the upper 40 to 50 m of the water column (refer to *Figure 4-3*) (Fugro 2014). Currents are typically aligned along the continental slope likely due to topographic steering. However reversal of the current does occur, predominantly during the less severe winter months. The Guinea Current, like other eastern ocean boundary currents, is characterised by areas of upwelling, and cooler surface waters during the boreal summer are typically associated with the intensification of the current (Jubilee EIA 2009).

The tides in the Gulf of Guinea and specifically in the coasts of Ghana are regular and semi-diurnal of two almost equal high tides and two low tides each day (Noble-Denton 2008). Waves reaching the shores of Ghana consist of swells originating from the oceanic area around the Antarctica Continent and seas generated by locally occurring winds (Noble-Denton 2008). Wave heights are generally between 0.9 m and 1.4 m and rarely greater than 2.5 m. Occasionally, during swells, the wave amplitude may increase to five or six metres, though the periodicity of such events is about 10 to 20 years. The swell wave direction is usually from the south or south-west.

Seabed current speeds are weak (0.15 ms⁻¹). Maximum currents speeds at 4 m below mean sea level were 0.90 ms⁻¹. The maximum recorded significant wave height measured during field surveys was 5.0 m and the minimum recorded significant wave height was 0.9 m (Fugro 2014).

Figure 4-3 Surface Current Speed in the Guinea Current



Source: Fugro (2014)

Upwelling

There are two seasonal coastal upwellings each year offshore Ghana, one major and one minor, with differing durations and intensities (Mensah & Koranteng, 1988). The major upwelling event normally occurs between June and September and the minor upwelling event normally occurs anytime between December and March. The upwelling is known to have considerable influence on local and sub-regional fisheries.

The upwelling influences the migratory patterns of pelagic fishes and is linked with the marine fish catch in Ghana (Armah and Amlalo 1998). The rest of the year the sea is characterized by a strong stratification and the presence of a thermocline.

Turbidity is higher from June to October (average Secchi disk value 9 m) and lower from November to May (Secchi disk value 18 m). Generally, during the period of increased turbidity, corresponding with the major upwelling event, nutrient enrichment (nitrates and phosphates) occurs.

Water Quality

Water column samples were tested in a survey conducted in December 2013 to January 2014 (Gardline 2015). Temperature of the surface waters ranged from 28 to 29°C and salinity ranged from 34.4 PSU and 34.8 PSU. A prominent thermocline was present at approximately 40 m water depth with another zone of cooling around 300 m depth.

Temperature above the seabed was 3°C. Turbidity decreased with depth from 6.9 FTU at surface and 5.9 FTU near seabed. Dissolved oxygen decreased from a maximum 120% at surface to 23% at 250 m below the thermocline. Water conditions across the *Contract Area* was generally similar.

Gardline's water column profiles indicated an oligotrophic environment, absent of notable upwelling. The chlorophyll-a, suspended solids, nitrates and phosphate were below the level of detection for the majority of the samples. There was no indication of hydrocarbon contamination in the water column.

There was little variation in dissolved metal concentrations within the water column. Cadmium, mercury and lead were below the limit of detection, with little or no variation in chromium, copper, nickel and between samples. Zinc and arsenic recorded the highest concentrations of all metals within the survey areas, but remained below $<0.020 \mu\text{gL}^{-1}$ in almost all samples with the majority recording comparable values across depths within each site.

4.3.6 Bathymetry, Seabed Topography and Sediments

Bathymetry

The continental shelf at about 200 m water depth off the coast of the Western Region of Ghana is at its narrowest off Cape St Paul in the east (20 km wide) and at its widest between Takoradi and Cape Coast in the west (90 km). The continental slope is steep and the depths increase sharply from approximately 100 m on the shelf and drop to approximately 1,600 m at the deepest part of the slope.

The *Project Area* would be located on the deeper portion of the continental slope in water depths ranging between 1,600 to 2,500 m.

Seabed Topography

Seabed features observed in the near the *Project Area of Influence* submarine canyons and sediment ridges and furrows (Gardline 2015, ERM 2012).

Sediments

Sediment samples were analysed in a survey conducted in 2014 (Gardline 2015). Sediments across the *Project Area* were found to be generally similar. These sediments were determined to be poor to very poorly sorted and either fine or medium silt. Total Organic Matter ranged between 9.5% and 14.2% and Total Organic Carbon ranged between 1.48% and 2.36%. The Total Petroleum Hydrocarbons concentrations ranged from 5.9 $\mu\text{g g}^{-1}$ to 18.4 $\mu\text{g g}^{-1}$.

4.4 BIOLOGICAL ENVIRONMENT

4.4.1 Plankton

Phytoplankton

The plankton, including phytoplankton and zooplankton, constitutes the basis of trophic chains in marine ecosystems. Phytoplankton organisms are microscopic and range between 30 μm and 60 μm in size, and their abundance increases with increased nutrient availability because of an upwelling event.

The composition and abundance of plankton is variable throughout the year and depends mainly of water circulation patterns, light, temperature, salinity, and nutrients (Nybakken, 1992 & Odum, 1971). However, the main limiting factor influencing the development of phytoplankton is the presence of nutrients, especially nitrate and phosphate (Nybakken, 1992). In the coasts off Ghana it is known that phytoplankton abundance increases during upwelling events when nutrient availability increases.

Green algae blooms of non-toxic marine green algae (*Enteromorpha flexuosa*) occur seasonally and are expected to be a result of over fertilisation of soils alongside rivers draining into the sea, as well as the outflow of untreated sewage into rivers and the sea (CRC-URI, 2010). These blooms usually appear between August and October and may remain in the inshore region during several months or even a year, with impacts on local fishing activities.

In recent years, Ghana has experienced an unprecedented increase in the presence of seaweed known as *Sargassum* (a genus of free-floating algae). The *Sargassum* has been particularly present in the Western Region where it has affected livelihoods of fishers and other

community members (Ghana EPA, 2014b). The increase in *Sargassum* along Ghana's shores is part of a regional and global trend. The reason for the migration of *Sargassum* from the Gulf of Mexico may be related to climate change, changes in Atlantic current patterns and changes in the productivity of marine habitat on a regional scale (Acorn, 2015). There are reports that the *Sargassum* actually originates in the Caribbean as large blooms in that region are followed by high incidents of *Sargassum* on the West African coast.

The Gardline (2015) survey than was conducted in December 2013 to January 2014 found the abundance of phytoplankton in the *Project Area* to be low during the survey period which means that there was limited evidence of any upwelling event during the survey (Gardline 2015). However, upwelling events have been previously documented to sometimes occur during January to December in Ghanaian waters (Ateweberhan et al 2012).

Zooplankton

Zooplankton organisms are heterotrophic and rely on phytoplankton as a food source, becoming the first consumer in the food chain. Zooplankton includes a range of organism sizes including small protozoans and large metazoans. It includes holoplanktonic organisms, whose complete life cycle lies within the plankton, as well as meroplanktonic organisms that spend only part of their lives in the plankton (eg, fish eggs).

Offshore Ghana zooplankton assemblages are generally dominated by copepods, followed by Ostracods ⁽¹⁾, Appendicularians ⁽²⁾ and Chaetognaths ⁽³⁾.

Maximum zooplankton abundance usually takes place during the major upwelling event (June to October) and to a minor extent during the minor upwelling event (December to February) following the increase in primary productivity by phytoplankton. A survey conducted in the *Contract Area* between December and January 2014 found high numbers of zooplankton in the top 200 m of the water column. The zooplankton community in the *Contract Area* was dominated by copepods with the predominant species the cyclopoid copepod *Oncaea* (Gardline 2015).

4.4.2 Benthic Invertebrates

Benthic fauna forms an important part of the marine ecosystem, providing a food source for other invertebrates and fish as well as cycling nutrients and materials between the water column and underlying sediments. Benthic fauna are relatively long-lived and sedentary and they exhibit different tolerances to stress, making them useful indicators of environmental

(1) Ostracoda is a class of the Crustacea, sometimes known as the seed shrimp because of their appearance.

(2) Larvaceans (Class Appendicularia) are solitary, free-swimming underwater saclike filter feeders found throughout the world's oceans.

(3) Chaetognatha is a phylum of predatory marine worms that are a major component of plankton worldwide.

conditions. The macrobenthos of offshore Ghana has not been extensively studied, particularly in deeper waters.

A survey of the *Project Area* showed that the macrofaunal community in the *Project Area* has a low abundance but proportionally high diversity. Polychaetes, arthropod, crustaceans and molluscs dominated species composition and abundance, with relatively few echinoderms or other taxa present in the samples. The results indicate an absence of contamination, under which circumstances only a few tolerant and highly abundant taxa might be expected to be present. No potentially sensitive or threatened species were observed during the survey (Gardline 2015).

4.4.3 Corals

Corals have very restricted ranges due to their requirements for specific thermal regimes, salinities, water depths, sedimentation and other physical and chemical characteristics. True coral reefs do not occur along the West African coast or in the vicinity of the Gulf of Guinea archipelagos, although mature coral communities are found at some discrete locations such as the oceanic islands and rocky mainland coasts; Cape Verde Islands, Gulf of Guinea Islands, Ghana, Gabon and Cameroon (Wells and Bleakley 2003).

Deep water corals, dominated by the cold-water coral *Lophelia pertusa*, but also potentially including other cold-water corals (*Madrepora oculata*, *Desmophyllum cristagalli*, *Dendrophyllia cornigera*, *Enallopsammia rostata* and *Solenasmilia variabilis*) have been recorded on raised offshore seabed features across the North East Atlantic Ocean (Tyler-Walters 2003).

Eight species of sea anemone and corals present in the Gulf of Guinea are listed on the IUCN Red List of Threatened Species (IUCN 2015). None of the eight species are listed as Endangered or Vulnerable.

During a survey of the DWT Block, north-west of the TEN Project area, a deepwater area offshore Ghana, a zone of coral was identified. The corals are deep water corals commonly found within the offshore waters of the Gulf of Guinea.

4.4.4 Fish

Pelagic Fish

The pelagic fish are those that live in the water column, and consist of species exploited commercially. The distribution and quantity of each population largely depend on

hydrological conditions, with each species distributed according to the optimum temperature and salinity required for growth and reproduction.

Most of the fish species discussed below have spawning grounds offshore Ghana and spawning of different species takes place throughout the year, typically with a peak from April to November.

The commercially important small pelagic fish in the coastal and offshore waters of Ghana include round sardinella (*Sardinella aurita*); flat sardinella (*S. maderensis*); European anchovy (*Engraulis encrasicolus*); and chub mackerel (*Scomber japonicus*). These species are important commercially as they represent approximately 80 percent of the total catch landed in the country (approximately 200,000 tonnes per annum). In terms of biomass, acoustic surveys have shown that the two sardinella species and the European anchovy represent almost 60 percent of the total biomass in Ghanaian waters (FAO 2010).

The large pelagic fish species include the tuna, billfish and some sharks. Key tuna species are skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*) (FAO 2010). These species are highly migratory and occupy the surface waters of the entire tropical and sub-tropical Atlantic Ocean. They are important species in the ecosystem as predators and prey, as well as providing an important commercial resource for industrial fisheries.

Billfish species are also commercially exploited in much lower but notable numbers and include swordfish (*Xiphias gladius*), Atlantic blue marlin (*Makaira nigricans*) and Atlantic sailfish (*Istiophorus albicans*). In addition, there is a smaller but significant shark fishery in Ghana, with the main species caught being blue shark (*Prionace glauca*) and hammerhead shark (*Sphyrna spp*) (FAO 2010).

Demersal Fish

Demersal fish species are those that live on or near the seabed. They are usually found over the continental shelf and the continental slope. Their distribution and composition is influenced by oceanographic conditions and specifically by the upwelling that results in changes of the bathymetric extension suitable for different species.

This can also be observed by the differences recorded between the communities found above the thermocline, above 40 m depth and dominated by sciaenid species, and those living below (Koranteng, 1998). The density of demersal species is higher on shallower waters up to 50 m depth.

Trawl surveys conducted between 1956 and 1992 have shown that demersal fish are widespread on the continental shelf along the entire length of the Ghanaian coastline

(Koranteng 2001). Species composition is a typical tropical assemblage including the following families.

- Porgies or Seabreams (Sparidae) (eg bluespotted seabream *Pagrus caeruleostictus*, Angola dentex *Dentex angolensis*, Congo dentex *Dentex congoensis*, canary dentex *Dentex canariensis* and pink dentex *Dentex gibbosus*).
- Grunts (Haemulidae) (eg, bigeye grunt *Brachydeuterus auritus* and to a lesser degree sompat grunt *Pomadasys jubelini* and bastard grunt *Pomadasys incisus*).
- Croakers or drums (Sciaenidae) (eg, red pandora *Pellagus bellottii*, Cassava croaker *Pseudotolithus senegalensis*).
- Goatfishes (Mullidae) (eg, West African goatfish/red mullet *Pseudupeneus prayensis*).
- Snappers (Lutjanidae) (golden African snapper *Lutjanus fulgens*, Goreean Snapper *Lutjanus goreensis*).
- Groupers (Serranidae) (eg, white grouper *Epinephelus aeneus*).
- Threadfins (Polynemidae) (eg, lesser African threadfin *Galeoides decadactylus*).
- Emperors (Lethrinidae) (eg, Atlantic emperor *Lethrinus atlanticus*).
- Triggerfish (eg, grey triggerfish *Balistes capriscus*).

The demersal species that are most important commercially (in terms of catch volumes) are cassava croaker (*Pseudotolithus senegalensis*), bigeye grunt (*Brachydeuterus auritus*), red pandora (*Pellagus bellottii*), Angola dentex (*Dentex angolensis*), Congo dentex (*Dentex congoensis*) and West African Goatfish (*Pseudupeneus prayensis*) (Koranteng, 1998).

Deep Sea Species

Information on the distribution of specific deep water species in Ghanaian waters is limited however Froese and Pauly (2009) identified 89 deep-sea fish species from 28 families including Alepocephalidae, Gonostomatidae, Myctophodae and Stomiidae that are likely to be found in Ghanaian waters over at depths over 1,000 m.

Protected or Endangered Species

The sensitive fish species in offshore Ghana according to the IUCN Red List (IUCN 2015) and in the *Project's Area of Influence* according to the IBAT database are presented in *Table 4.2*. Main

species of concern include two species of sawfish (*Pristis pectinata* and *P. perotteti*), two species of angle sharks (*Squatina aculeata* and *S. Oculata*) and a grouper (*Epinephelus itajara*) all considered as critically endangered.

Other species are subject to commercial fishing and to international regulations and monitoring, as is the case of all tuna species by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Sharks are one of the groups most represented within the list.

Local enforcement of protection programmes for fish is through the Fisheries Commission who monitors and inspects fish catch. Tuna fishing is monitored through on-board fishing inspectors that monitor activities in accordance with The International Commission for the Conservation of Atlantic Tunas programme requirements.

Migratory patterns of the fish of high conservation importance will be investigated during the ESIA and it will be confirmed if any species migrate through the *Project Area*.

4.4.5 Marine Mammals

The water of the Gulf of Guinea and offshore Ghana are considered favourable to the presence of marine mammals, especially due to the seasonal upwelling, which boosts productivity and therefore ensures food availability for these species. However, there is a lack of knowledge on the distribution, population estimated and ecology of cetaceans in the region. The majority of data are based on opportunistic sighting, incidental catches and strandings and species abundance in the Gulf of Guinea (Van Waerebeek et al 2009; Weir 2010; and ERM, 2012). Marine mammal species observed in the waters surrounding Ghana and potentially to occur within the *Project Area*, are listed in *Table 4.3*.

Table 4.2 IUCN Red Listed Species That Could Occur in the Project's AOI

Scientific Name	Common Name	Red List Category	Range
<i>Epinephelus itajara</i>	Goliath Grouper	Critically Endangered	Found in tropical and subtropical waters of the Atlantic Ocean. In the western Atlantic, the species ranges from North Carolina (USA) to southeast Brazil and is caught widely in the Gulf of Mexico and throughout most of the Caribbean.
<i>Epinephelus marginatus</i>	Dusky Grouper	Endangered	Found in the eastern Atlantic and western Indian Ocean: Mediterranean Sea and round the southern tip of Africa, except for Namibia to southern Mozambique. Western Atlantic: southern Brazil, and from Uruguay and Argentina.
<i>Thunnus obesus</i>	Bigeye Tuna	Vulnerable	Distributed globally in tropical and temperate seas, except the Mediterranean.
<i>Epinephelus aeneus</i>	White Grouper	Near Threatened	Found throughout the southern Mediterranean (up to 44°N in the Adriatic Sea) and along the west coast of Africa to southern Angola, including islands of the Gulf of Guinea.
<i>Thunnus albacares</i>	Yellowfin tuna	Lower Risk	Found worldwide in tropical and subtropical seas.
<i>Alopias superciliosus</i>	Bigeye Thresher Shark	Vulnerable	A highly migratory, oceanic and coastal species found circumglobally in tropical and temperate seas.
<i>Alopias vulpinus</i>	Common Thresher Shark	Vulnerable	Found circumglobally, with a noted tolerance for cold waters.
<i>Carcharhinus falciformis</i>	Silky Shark	Near Threatened	Found circumglobally in tropical waters.
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	Vulnerable	One of the most widespread of shark species, ranging across entire oceans in tropical and subtropical waters, usually found far offshore between about 30°N and 35°S in all oceans.
<i>Carcharodon carcharias</i>	Great White Shark	Vulnerable	Found in most seas and oceans with concentrations in temperate coastal seas. It is principally known as a pelagic dweller of temperate continental shelf waters, but also ranges into the open ocean far from land and near oceanic islands, the cold boreal and austral (sub-Antarctic) seas and the coastal tropics. It is found from the surfline and the intertidal zone to far offshore, and from the surface down to depths over 250 m.
<i>Centrophorus granulosus</i>	Gulper Shark	Vulnerable	Found in deep in waters ranging between 100 to 1,490 m in depth, all around the world.
<i>Dalatias licha</i>	Kitefin Shark	Near Threatened	Found on continental and insular shelves and slopes in warm-temperate and tropical areas. This species is found in the western and eastern Atlantic, western Indian Ocean, western Pacific and around the Hawaiian islands.
<i>Isurus oxyrinchus</i>	Shortfin Mako	Vulnerable	A coastal, oceanic species occurring from the surface to at least 500 m depth and is widespread in temperate and tropical waters of all oceans from about 50°N (up to 60°N in the northeast Atlantic) to 50°S.

Scientific Name	Common Name	Red List Category	Range
<i>Isurus paucus</i>	Longfin Mako	Vulnerable	Found worldwide in tropical and warm temperate waters.
<i>Kajikia albida</i>	White Marlin	Vulnerable	Found throughout warm waters of the Atlantic from 45°N to 45°S including the Gulf of Mexico, Caribbean Sea, and Mediterranean.
<i>Manta birostris</i>	Giant Manta Ray	Vulnerable	Circumglobal in tropical and temperate waters, this species has a widespread distribution.
<i>Prionace glauca</i>	Blue Shark	Near Threatened	One of the widest ranging of all sharks, being found throughout tropical and temperate seas from latitudes of about 60°N/50°S.
<i>Pseudocarcharias kamoharai</i>	Crocodile Shark	Near Threatened	An oceanic and circumtropical species that occurs at the surface to at least 590 m depth, usually found offshore and far from land but sometimes occurring inshore and near the bottom.
<i>Rhincodon typus</i>	Whale Shark	Vulnerable	Found in all tropical and warm temperate seas except the Mediterranean.
<i>Thunnus albacares</i>	Yellowfin Tuna	Near Threatened	Found worldwide in tropical and subtropical seas.

Source: IUCN 2015; IBAT 2015

Table 4.3 Whales and Dolphins of Ghana, IUCN Conservation Status

#	Species	IUCN Status
Delphinidae		
1	Common bottlenose dolphin (<i>Tursiops truncatus</i>)	LC
2	Clymene dolphin (<i>Stenella clymene</i>)	DD
3	Spinner dolphin (<i>Stenella longirostris</i>)	DD
4	Pantropical spotted dolphin (<i>Stenella attenuate</i>)	LC
5	Atlantic spotted dolphin (<i>Stenella frontalis</i>) (G. Cuvier, 1829)	DD
6	Long-beaked common dolphin (<i>Delphinus capensis</i>)	DD
7	Fraser's dolphin (<i>Lagenodelphis hosei</i>)	LC
8	Rough-toothed dolphin (<i>Steno bredanensis</i>)	LC
9	Risso's dolphin (<i>Grampus griseus</i>)	LC
10	Melon-headed whale (<i>Peponocephala electra</i>)	LC
11	Pygmy killer whale (<i>Feresa attenuata</i>)	DD
12	Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	DD
13	Killer whale (<i>Orcinus orca</i>)	DD
14	False killer whale (<i>Pseudorca crassidens</i>)	DD
Ziphiidae (beaked whales)		
15	Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	LC
Kogiidae (pygmy sperm whales)		
16	Dwarf sperm whale (<i>Kogia sima</i>)	DD
Physeteridae (sperm whales)		
17	Sperm whale (<i>Physeter macrocephalus</i> or <i>Physeter catodon</i>)	VU
Balaenopteridae (rorquals)		
18	Humpback whale (<i>Megaptera novaeangliae</i>)	LC
19	Sei whale <i>Balaenoptera borealis</i>	E
20	Bryde's Whale (<i>Balaenoptera edeni</i>),	DD

E: Endangered; VU Vulnerable; LC = Least Concern; DD = Data Deficient

4.4.6 Marine Turtles

Offshore Ghanaian waters and the coast provide an important nesting and feeding habitat for five species of marine turtles, namely green turtle (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), olive ridley (*Lepidochelys olivacea*) and loggerhead (*Caretta caretta*).

Green, leatherback, hawksbill and loggerhead turtles are all included in the Memorandum of Understanding on measures for the conservation of the sea turtles of the Atlantic Coast of Africa. The IUCN Red List classifies hawksbill turtles as Critically Endangered, green and loggerhead turtles as Endangered and olive ridley and leatherback turtle as Vulnerable

(IUCN, 2018). These species are also listed as protected species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Migratory Species (CMS).

Despite the importance of the Gulf of Guinea as a habitat for marine turtles, there is little scientific data of abundance, distribution and habitat utilisation. In Ghana, coastal habitat is favourable and turtle nesting may occur all along the sandy coast of the country, including the beaches in the Western Region at Kengen, Metika Lagoon, Elonyi, Anochi, Atuabo and Benyin (Baker et al. 2012). Though the olive ridley is documented to nest throughout the year, the nesting period occurs primarily from September to March, with a peak in October to November (Armah et al 1997; Amiteye, 2002; Agyekumhene, 2009).

Table 4.4 Summary of Reported Number of Sea Turtles Nesting in Ghana

Author, year	Leatherback	Olive Ridley	Green	Loggerhead
Amiteye, 2002	46	412	32	-
Agyemang, 2005	30	190	10	-
Allman, 2007	418	134	0	-
Agyekumhene, 2009	74	103	0	-
Allman, Babour and Agyekumhene, 2015	-	-	-	1
Average	142	210	21	

* Nesting of loggerhead recorded by Allman, Barbour & Agyekumhene was a onetime survey conducted.

Table 4.5 Sea Turtles of Conservation Importance Present in the Project Area

Species	Common name	IUCN Red List Category
<i>Chelonia mydas</i>	Green Turtle	Endangered
<i>Dermochelys coriacea</i>	Leatherback	Vulnerable

Source: IBAT

4.4.7 Observations of Marine Mammals and Sea Turtles

During a seismic survey of areas in the *Contract Area* carried out from November 2013 to April 2014, marine mammals and sea turtle observations were recorded by Marine Mammal Observers (MMO) accompanying the survey vessels.

The MMO observed the following species: sperm whale (*Physeter macrocephalus*), Bryde's Whale (*Balaenoptera edeni*), short-finned pilot whale (*Globicephala macrorhynchus*), Clymene Dolphin (*Stenella clymene*), bottlenose dolphin (*Tursiops truncatus*), Melon-headed whale (*Peponocephala electra*), Fraser's Dolphin (*Lagenodelphis hosei*), spinner dolphin (*Stenella longirostris*), pantropical spotted dolphin (*Stenella attenuata*), leatherback turtle (*Dermochelys coriacea*), olive ridley turtle (*Lepidochelys olivacea*) and hawksbill turtle (*Eretmochelys imbricata*).

As the data only represent individual observations, it is only conclusive as verification that the observed species do occur in the *Contract Area*.

4.4.8 Seabirds

The west coast of Africa forms an important section of the East Atlantic Flyway, an internationally important migration route for a range of bird species, especially shore birds and seabirds (Boere *et al* 2006; Flegg 2004).

A number of species that breed in higher northern latitudes winter along the West African coast and many fly along the coast on migration. Seabirds known to follow this migration route include a number of tern species (*Sterna* sp), skuas (*Stercorarius* and *Catharacta* spp) and petrels (Hydrobatidae).

The distance of the migration routes of these species from the shore depends on prey distribution and availability (*eg* the abundance and distribution of shoals of anchovies or sardines) (Flegg 2004). The highest concentrations of seabirds are experienced during the spring and autumn migrations, around March and April, and September and October.

The marine birds of Ghana include storm petrels (*Oceanodroma castro*) and Ascension frigate birds (*Fregata aquila*). Records dating back to the 1960s reveal only limited sightings of a few species (Elgood *et al* 1994). The rarity of oceanic birds may be attributable to the absence of suitable breeding sites (*eg* remote islands and rocky cliffs) off the Ghana coast and in the Gulf of Guinea. Waders are present during the winter months between October and March. Species of waders known to migrate along the flyway include sanderling (*Calidris alba*) and knott (*Calidris canuta*).

4.4.9 Protected Areas

Coastal Protected Areas

Several coastal habitats are important for their biodiversity as well as for rare and endangered species. However, only five coastal areas are currently protected within the country. These areas are all located onshore and are protected under the Ramsar Convention. They are the Muni-Pomadze, Densu Delta, Sakumo Lagoon, Songor Lagoon and the Anglo-Keta Lagoon complex Ramsar sites (Table 4.6).None of these protected areas are located along the coast of the Western Region.

Table 4.6 Coastal Ramsar Sites in Ghana

Name and Site Number	Location and distance from Project area	Area (km ²)	Comments
Muni-Pomadze (563)	5°23'N, 0°40'E 250 km	94.6	Sand dunes, open lagoon, degraded forest and scrubland. Lagoon opens into the sea during the rainy season.
Densu Delta (564)	5°30'N, 0°15'E 300 km	58.9	Sand dunes, lagoons, salt pans, marsh, and scrub. Scattered stands of mangrove with extensive areas of open water.
Sakumo (565)	5°30'N, 0°08'E 375 km	13.6	Brackish lagoon with narrow connection to the sea. Main habitats are the open lagoon, surrounding flood plains, freshwater marsh, and coastal savannah grasslands.
Songor (566)	5°45'N– 6°00'N, 0°20'E–0°35'E 450 km	511.33	Closed lagoon with high salinity, and a large mudflat with scattered mangroves.
Keta Lagoon Complex (567)	5°55'N, 0°50'E 550 km	1,010.22	Open lagoon with brackish water influx from Volta River. Coastal savannah grasses with patches of trees and shrubs. Largest seabird populations of all coastal wetlands of Ghana.

Ghana has not established any marine protected areas. There are five coastal Ramsar sites designated as protected areas for their ecological importance. Several coastal lagoons with their associated mangrove stands serve as breeding and nursery areas for a wide variety of marine species. However, none of these lagoons are under any protection by national legislation, with the exception of those found in the Ramsar sites.

Traditional methods of conservation exist for a number of lagoons and wetlands within the country. These lagoons are considered as deities and this affords the lagoons and their resources protection. The traditional protection methods include days, periods and seasons of closed fishing, and restrictions on fishing methods, gear and fishers.

Important Bird Areas

Six Important Bird Areas (IBAs) are located along the coastline of Ghana, from the West to the East coast, namely (Birdlife International, 2015):

- Amansuri Wetland;
- Muni-Pomadze Ramsar Site;
- Densu Delta Ramsar Site;
- Sakumo Ramsar Site; and
- Songor Ramsar Site.
- Keta Lagoon Complex Ramsar Site;

Five of these are designated Ramsar sites, however, only one, the Amansule Wetland, is located in the Western Region. The Amansule Wetland is the largest stand of intact swamp-forest in Ghana, with large portions of the wetland still in a relatively pristine condition. The wetland is classified as a blackwater area, and as such, the fauna on the site is species-poor, but distinctive.

4.4.10 Coastal Zone

The Ghanaian coast can be divided into three areas with definitive characteristics (COWI 2004).

- West of Cape Three Points the coastline comprises sheltered, gently sloping, wide beaches, backed by coastal lagoons. The wave heights are generally low.
- Between Cape Three Points and Tema the coast consists of rock headlands and sandbars (or spits) enclosing coastal lagoons, embayed coast, subject to medium to high wave energy. The wave heights often exceed 1 m. The south-westerly prevailing winds cause oblique wave approach to the shoreline, which generates an eastward littoral sediment transport.
- East of Tema, the shoreline is sandy and characterized by the eroding Volta delta. Wave and sediment dynamics are similar to those between Cape Three Points and Tema.

Rocky shores are restricted to the area between Axim and Tema, supporting a wide range of organisms in the intertidal zone.

Estuaries

Estuaries are present along the eastern part of the Ghanaian coastline where large rivers enter the sea. Most studies on the estuaries of Ghana have concentrated on the estuary of the largest and longest river, the Volta River. The Densu, Ayensu, Nakwa, and Amisa Rivers flow into the Gulf of Guinea through lagoons. Generally, the estuaries are 15 to 50 km long and

orientated perpendicular to the coast. Behind the coast, the estuaries branch into numerous tidal creeks surrounded by mangrove swamps (Allersma & Tilmans, 1993).

Coastal Lagoons

There are approximately fifty lagoons along the coastline of Ghana. Very little is known about the majority of these lagoons. The amount of annual rainfall has an important effect on the nature of the coastal lagoons. Westwards from Takoradi, where the rainfall is approximately 1,250 mm annually, all the coastal lagoons have a permanent opening to the sea. East of Takoradi, only four rivers the Pra, Kakum, Densu, and the Volta, have a sufficient volume of water at all seasons to maintain a permanent outflow from the coastal lagoons at their mouths.

Closed lagoons mainly occur in the eastern coastal region where rainfall is low and normally seasonal. Closed lagoons may be in contact with the sea for the greater part of year due to the inlets being kept open artificially: the sandbars being deliberately breached by local people who fish in the lagoons. Mullet fish (*Mugilidae*) are common in the coastal waters of tropical and subtropical countries.

4.5 SOCIAL BASELINE

This section of the report provides a description of the social baseline of the *Project Area of Influence* at various geographic levels. This information will be used to identify risks and impacts from *Project* activities and to develop the scope for the ESIA.

4.5.1 Governance and Administration

Administrative Structure

This section of the baseline presents aspects of Ghana's institutional structures that are of relevance to the *Project*. The levels of government outlined will have varying jurisdiction over the *Project* and the presence of the *Project* will necessitate interaction with a number of these structures.

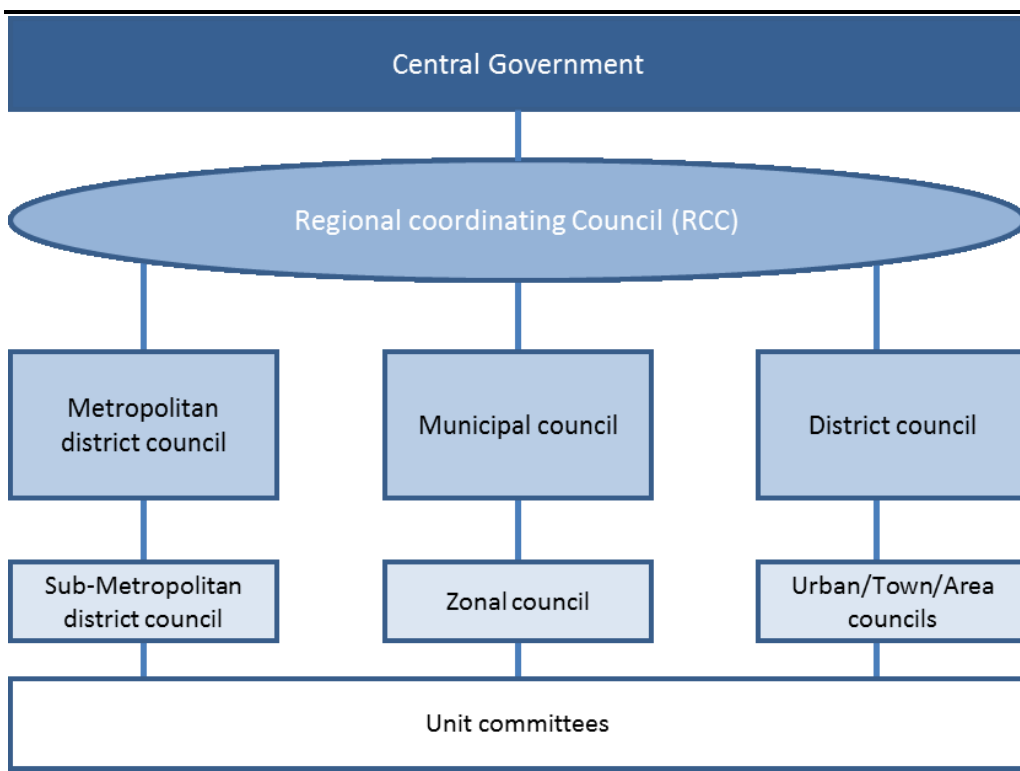
There is a dual system of governance in Ghana made up of formal government structures and traditional leadership structures. These systems of authority are recognised as complementary structures that have different responsibilities. There is a decentralised government in Ghana with three levels of administrative authority, namely national, regional and district.

The *Project* is located off the coast of the Western Region of Ghana. The local government system, as defined under the Local Government Act 462 of 1993, is made up of the Regional

Coordinating Council (RCC), four-tier Metropolitan and three-tier Municipal/District Assemblies. Under these fall the Sub-Metropolitan District Council, Zonal Council and Urban/Town/Area/ Councils, as well as Unit Committees (see *Figure 4-4* and further discussion contained in *Section 4.5.5*).

The RCC is the head of the local government system and is the highest decision-making body. The RCC is responsible for monitoring, coordinating and evaluating the performance of the District Assemblies and any Agency of central government.

Figure 4-4 Ghana Local Government Structure



Adapted from http://www.ghanadistricts.com/home/?_=13&sa=3627

In addition, groups of villages or communities are governed by Traditional Authorities that are the custodians of local tradition, morals, and traditional practices. The traditional system of authority is managed at a national level through the Ministry of Chieftaincy and Culture. The role of the Ministry is to preserve, sustain and integrate the regal, traditional and cultural values and practices.

At the local level, the Paramount Chiefs are the traditional heads of the people and custodians of the land, and they carry great local influence. Each Chief will have a Traditional Council,

which is composed of the elders who carry out the instructions of the chief and safeguard traditional customs and knowledge about an area for future generations.

4.5.2 Economy and Livelihoods

Macroeconomy

Ghana is West Africa's second largest economy (current GDP \$38 trillion) behind Nigeria (current GDP \$568 trillion). The largest contributor to GDP is the service sector (50 percent of GDP), followed by industry (30 percent) and then agriculture (21 percent). The mining and quarrying subsector's contribution to GDP was 9.8 percent in 2013 (Ghana chamber of mines 2013; World Bank 2015). Ghana's economic growth has developed in response to the discovery and production of oil in commercial quantities in 2011.

Ghana experienced real GDP growth of 6 percent from 8 percent in 2010 to 14 percent in 2011 (AFDB 2012). This has slumped to 4 percent in 2014 on the back of a drop in gold and oil production. Oil production had been affected by various periods of constrained production and down time at the Jubilee Field (for example arising from technical issues with FPSO gas compression systems), depressed global oil prices, and constraints at the Tema refinery (refer to *Section 4.5.3*)⁽¹⁾.

The official unemployment rate in Ghana is estimated at 3 percent. However, only approximately 8.5 percent of the working population is employed in the formal sector. This indicates that the definition of unemployment disguises the high level of underemployment and unemployment in the formal sector (AFDB 2012).

There is a diverse set of economic activity in Ghana including, fishing, farming, forestry, the informal sector (those self-employed in small unregistered businesses or involved in unregulated wage employment), oil and gas, mining and quarrying, formal employment, tourism, and manufacturing and industry. These activities are described below.

Fishing

This section provides a brief overview of Ghana's fisheries sector from a perspective of its socio-economic and livelihoods contribution to the Ghana economy, based on information obtained from previous baseline descriptions and secondary literature review. The fisheries component of the environmental baseline will provide more specific data pertaining to biological and ecological characteristics of Ghana's fisheries.

(1) <http://databank.worldbank.org/data//reports.aspx?source=2&country=GHA&series=&period=>

The fisheries sector plays a key role in the national economy and contributes 3 percent of the total Gross Domestic Product. Approximately 10 percent of the population is involved in the fishing industry. In addition, marine fisheries account for approximately 80 percent of the fish consumed in Ghana (Ghana Investment and Promotion Centre 2014).

The fishing industry in Ghana is based on resources from both marine and inland (freshwater) waters and from coastal lagoons and aquaculture (Quatey, 1997; NAFAG 2007). There is a long tradition of both artisanal and distant-water fishing. Fishing in Ghana is practiced all along the coast throughout the whole year, though it shows two main peaks in the catches related to the seasonal upwelling when biological productivity is enhanced. The marine fishing industry in Ghana has four key sub sectors, the descriptions of which are contained in the table below.

Table 4.7 Ghana Fisheries Subsectors

Sector	Description
Artisanal	Artisanal fisheries operate by means of canoes from open beaches where landing facilities are usually not well developed. There are approximately 300 landing centres for marine canoes dotted along Ghana's coastline. Each landing site is under the control of a Chief Fisherman (Sarpong et al 2005).
Nearshore and inshore fishery vessels	The nearshore and inshore fleet is formed by approximately 300 semi-industrial vessels that operate from seven different ports or landing centres. Most of these vessels use both trawling and purse seine gears, depending on the specific season (Antwi, Asare & Abbey 2011).
Offshore/distant water vessels	The offshore/distant water fleet is composed of trawlers, shrimpers and tuna boats that may remain at sea for periods that last up to one month. According to FAO (2014) the fleet in Ghana includes approximately 60 trawlers (FAO 2014).
Tuna fleets	The Gulf of Guinea hosts a very productive tuna fishery. As a result a tuna fleet has developed in the area that catches between 50,000 and 90,000 tonnes annually. Tuna fleets operate out of the ports of Sekondi-Takoradi and Tema (ICCAT 2008).

Maximum fish production in Ghana took place in 1997 and since then it has progressively declined (Antwi, Asare & Abbey 2011). Artisanal fisheries in the coastal areas are nearing their estimated maximum sustained yield (Ghana Investment and Promotion Centre 2014), placing increasing pressure on coastal livelihoods (further detail on Ghana's coastal fishers is provided in *Section 4.5.5*). A study of marine environmental conditions in Ghana published by Acorn International in January 2015 noted that the primary causes of the decline in Ghana's fish catch appear to be unrelated to oil and gas industry activities. The decline has been linked instead to unsustainable fishing practices, specifically overfishing and illegal, unregulated and unreported fishing (Acorn, 2015).

Oil and Gas Activities

In 2004, Ghana sold licences for offshore oil exploration and production to various oil and gas development companies. In July 2007, Tullow Oil and their joint venture partners discovered commercial quantities of oil in the Jubilee Field off the Western Region of Ghana (Casting 2011). Commercial production came online in December 2010.

Since the discovery, oil rents ⁽¹⁾ grew from 0.5 percent of GDP in 2010 to 6.2 percent in 2013, and in 2013 the export of crude oil brought in revenues of \$ 3.2 billion (Ghana chamber of mines 2013; World Bank, 2015). However the global devaluation of Brent Crude prices have forced Ghana's revenues down.

Since production began at the Jubilee field, it increased to 99,000 bopd in 2013. Tullow expects 2018 gross production from the Jubilee field to average 75,800 bopd, which takes into account the planned shut-downs associated with planned FPSO turret remediation work following bearing issues. The Government of Ghana approved the Greater Jubilee Full Field Development Plan in October 2017, allowing Tullow and its Joint Venture Partners to prepare for a multi-year incremental drilling programme to maximise and sustain oil production and gas export.

The offshore Tweneboa, Enyenra, and Ntomm (TEN) project has also been developed by Tullow with first oil to the FPSO Prof. John Evans Atta Mills in August 2016. Production in 2017 averaged 56,000 bopd and 2018 gross oil production is expected to average 64,000 bopd. In the last quarter of 2017, Tullow signed the TEN Associated Gas (TAG) Gas Sales Agreement with the Ghana National Petroleum Corporation and Tullow anticipates the start of gas sales from TEN in the third quarter of 2018. Gross gas sales equivalent to around 2,300 boepd (net: 1,100 boepd) have been forecast for the year (<https://www.tulloil.com>).

In addition, Eni (Operator), Vitol and GNPC have developed an oil and gas production project in the Offshore Cape Three Point (OCTP) fields. The OCTP integrated oil & gas development is made up of the Sankofa Main, Sankofa East and Gye-Nyame fields, which are located about 60 km off Ghana's Western Region coast. Production is via the FPSO John Agyekum Kufuor which can produce up to 85,000 barrels of oil equivalent per day (boepd) through 18 underwater wells. A 63-kilometer submarine pipeline transports gas to Sanzule's Onshore Receiving Facilities (ORF), where it will be processed and transmitted to Ghana's national grid, supplying approximately 180 million standard cubic feet per day (mmscfd).

(1) Oil rents are the difference between the value of crude oil production at world prices and total costs of production

Currently there are approximately 15 petroleum agreements between the Government of Ghana, GNPC and petroleum operators, signifying significant interest in Ghana's oil sector. Oil and gas exploration is ongoing and more discoveries are anticipated in the future.

The country also has an active midstream and downstream oil and gas sector including a refinery at Tema and numerous storage and distribution systems for refined product. The Ghana National Gas Company operate a gas processing plant at Atuabo in the Western Region which receives gas from the Tullow developments.

Informal Economy

The Ghana Statistical Service estimates that approximately 86 percent of all employment in Ghana is in the informal sector (Osei-Boateng and Ampratwum 2011). More specifically, almost 91 percent of women and 81 percent of men are working informally.

The informal sector in Ghana consists of various small-scale businesses, for example producers, wholesalers, retailers, and consumers. Informal sector workers are largely self-employed persons such as farmers, traders, food processors, artisans and craft-workers

The rural informal economy centres on the following.

- Agricultural activities focused on family farming units or community owned assets. Farming is generally on a low technology basis dependent on family labour.
- Artisanal fishing is predominantly undertaken by males (between 18-40 years old) along Ghana's coastline. Women generally undertake processing activities, including the smoking and marketing of fish, and this takes place in coastal villages.
- Rural agro-based processing activities of local crops. These include processing cassava, palm kernel, groundnut and copra oils, brewing distilling, and traditional soap-making. These activities are generally undertaken by women (Osei-Boateng and Ampratwum 2011).

The urban informal economy centres on the following.

- Services sector, for example urban food traders, domestic workers and repair men and women.
- Construction sector, for example masons, carpenters, and small-scale plumbers (mainly men between 18 and 40 that have dropped out of school).

- Manufacturing sector which includes, food processing, textiles and garments, wood processing and metal works⁽¹⁾.

4.5.3 Marine Infrastructure

Ports and Harbours

The nearest operational commercial port to the *Project Area* is the Port of Takoradi. Sekondi-Takoradi possesses the majority of the basic infrastructure required to support the offshore oil and gas industry as it is the city closest city to the Jubilee Field. Most oil and gas operational support bases are located in Sekondi-Takoradi, with administrative offices in Accra to deal with administrative and government relations. Takoradi Airbase is used to run flights between offshore oil rigs in the region and Accra (Quayson 2012).

The Port of Takoradi was built as the first commercial port of Ghana in 1928 to handle imports and exports to and from the country respectively.

The initial capacity of the port was 1 million tones of cargo. With the first expansion in 1956 the port was able to handle 1,153 vessels carrying 2.3 million tons of cargo in 1964. The port in 2015 handled 27% of national seaborne traffic, 15% of national seaborne imports, 68% of national seaborne exports, 6% of National seaborne container traffic and 7% of transit traffic to the Sahelian countries of Burkina Faso, Niger and Mali. Over the years vessel calls to the port have increased from 485 in 2003 to 1,525 calls in the 2015. The increase is attributed to the calls from Oil Supply vessels servicing the Jubilee Oil Fields at Cape Three Points. Since the discovery of oil in 2007, supply vessel calls have increased from 11% to 61% in 2015 of total vessel calls (www.ghanaports.gov.gh).

The capacity of the slipway is 250 tones with dimensions of 11 metres wide and 38 metres in length. The port currently has a storage area of 140,000 m² and has an open storage area of 250,000 m² and is accessible by road and by rail. The Port of Takoradi is located on the Western Rail Line that runs from Takoradi to Kumasi and includes branches to Awaso and Prestea.

The Port has three tug boats for berthing, sailing and shifting. The tugs are fitted with monitors for firefighting. Two (2) tug boats are always in attendance for berthing.

The Port receives high traffic volumes and handles approximately a third of national sea borne traffic. Moreover, the port handles approximately 18 percent of National seaborne imports annually and 70 percent of National seaborne exports annually (Ghana Ports and Harbour

(1) Industry, according to International Standard Industrial Classification (ISIC), comprises value added in mining, manufacturing (reported as a separate subgroup), construction, electricity, water, and gas.

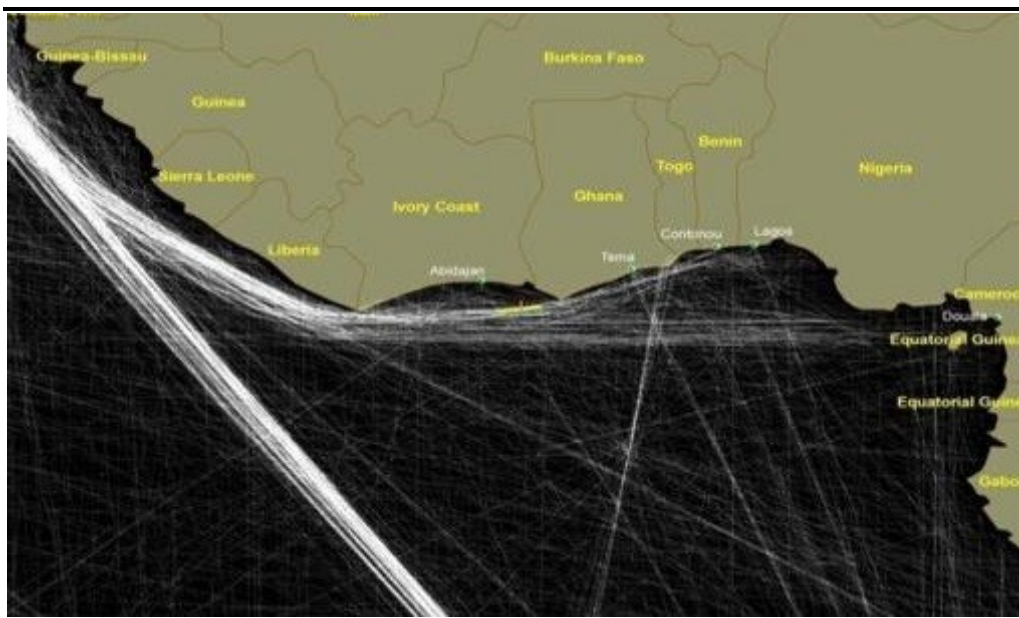
Authority 2015). Major import commodities include clinker, wheat and quicklime and major exports are cocoa, bauxite, and manganese.

Given the presence of oil and gas operators in the region some of the dry docks at the port are being utilised as an assemblage and receiving point for industrial goods such as heavy materials and oil pipes that are then transported to offshore locations. The port was modernised in 1986 but the development of oil and gas in the region necessitated further expansion and as such, a dedicated oil and gas hub is currently in the process of being constructed. In addition, Viking/Halliburton Company modified existing port infrastructure to create the 'Viking Berth', to facilitate storage and the delivery of services to oil supply vessels (Quayson 2012; GPHA 2015) ⁽¹⁾.

Shipping and Navigation

The Gulf of Guinea experiences high maritime traffic. *Figure 4-5* below provides a general illustration of shipping lanes across the Gulf of Guinea. A study of shipping routes will be carried out as part of the *Project's* further design. This will be further evaluated in the ESIA.

Figure 4-5 Shipping Traffic in the Gulf of Guinea



Source: NCEAS Online (n.d)

Incidents of piracy have occurred in Ghanaian waters, for example in June 2014 a Liberian oil tanker was attacked and the contents of the ship stolen. As the oil and gas industry around

(1) Takoradi military base also serves as a storage area for oil companies operating at the Jubilee Oil field.

Takoradi expands, there is a risk that pirates operating out of the Niger Delta could increase their activity in Ghanaian waters and on ships in the wider region travelling to and from Ghana's national waters. Nonetheless, the level of risk is significantly lower in Ghana than in Nigeria, Benin and Togo (Maplecroft 2014).

Oil and Gas Downstream

Ghana has one oil refinery, the Tema refinery, with a design capacity of 45,000 bbl/d. Tema predominantly processes crude oil and the refinery's installed capacity includes a Crude Distillation Unit (CDU), a Residue Fluid Catalytic Cracker (RFCC) and a Premium Reforming Unit (PRF). Refined products include (UNEP, 2012):

- Fuel gas,
- LPG,
- Gasoline,
- Kerosene,
- Aviation turbine kerosene,
- Gas oil,
- Atmospheric residue,
- Light cycle oil,
- Heavy cycle oil, and
- Clarified oil.

Total crude storage capacity is about 2 million barrels, including liquid product storage and five LPG spheres of a total capacity of 6,400 metric tonnes (UNEP, 2012).

Operations at the Tema refinery have been plagued by inefficiencies such as old equipment and the lack of funds to purchase crude oil for processing has hampered its operations. In 2014, the refinery processed only 18 percent of Ghana's 3.7 million metric tonnes of fuel imports (Reuters 2015). The Government is currently looking for strategic partners to manage the refinery with a view to expanding the current capacity of 45,000 bbl/d to 145,000 bbl/d (Ministry of Energy, n.d).

Power generation is the main consumer of gas in Ghana and power demand is expected to grow at an annual rate of 7.5 percent for the period 2012-2021 and 6.3 percent from 2022 onwards.

In 2017, total gas flow to the thermal power plants rose to about 43 million mmBTU (43,360 mmscf), almost 60% more the supply of 2016; only about 17% coming from Nigeria (18% in 2016) via the WAGP and the remaining 73% (82% in 2016) coming from Ghana Gas, i.e. the Atuabo gas processing plant. The average daily flow were about 30 mmscf WAGP and almost 81 mmscf from Ghana Gas. For **2018**, total gas required for power generation would be almost **67 million mmBTU** largely coming from the local fields. The expected average WAGP gas flow

would be **60 mmscfd** throughout the year, whilst an average of **150 mmscfd** could come from Ghana Gas during the first half of the year. Additional gas is expected from the Sankofa-Gye Nyame fields during the second half of the year and that could boost average supply range to **200-300 mmscfd** during the second half of the year.... (2018 Energy (Supply and Demand) Outlook for Ghana – Energy Commission – www.energycom.gov.gh)

The Ministry of Energy expects gas demand for power generation to start at 150 mmscfd in 2013 and grow to reach about 300 mmscfd in 2020 and about 600mmscfd in 2030.

Ghana's total gas supplies include local sources (1,150 mmscfd) and imports (150 mmscfd). Excluding Liquefied Natural Gas (LNG) imports, the Ministry of Energy expects Jubilee, Tweneboa-Enyenra-Ntomme (TEN) and the Sankofa and Gye Nyame fields to yield supplies of around 550 to 850 mmscfd between 2018 to 2020 (Ministry of Energy 2012).

Current known existing and potential gas supplies include:

- Imported gas from Nigeria via the West Africa Gas Pipeline (WAGP);
- Associated gas from the Jubilee Field;
- Associated and non-associated gas production from TEN and Mahogany East, Teak and Akasa (META) discoveries; and
- Non-associated gas from the eni Sankofa gas fields (Ministry of Energy 2012).

There are proposals for LNG import projects to supply gas on a temporary basis for power plants. These projects are in early stages of development.

Pipelines and Cables

Ghana is experiencing a significant amount of offshore oil and gas development, and as a result there is subsea infrastructure currently in place and planned for the future. This includes submarine cables and pipelines such as the existing subsea pipeline from the Jubilee Field to the Ghana Gas Plant at Atuabo. There is also an onshore national gas supply pipeline from the central gas processing facility in Atuabo (currently processing gas from the Jubilee field) to Aboadze just north of Takoradi.

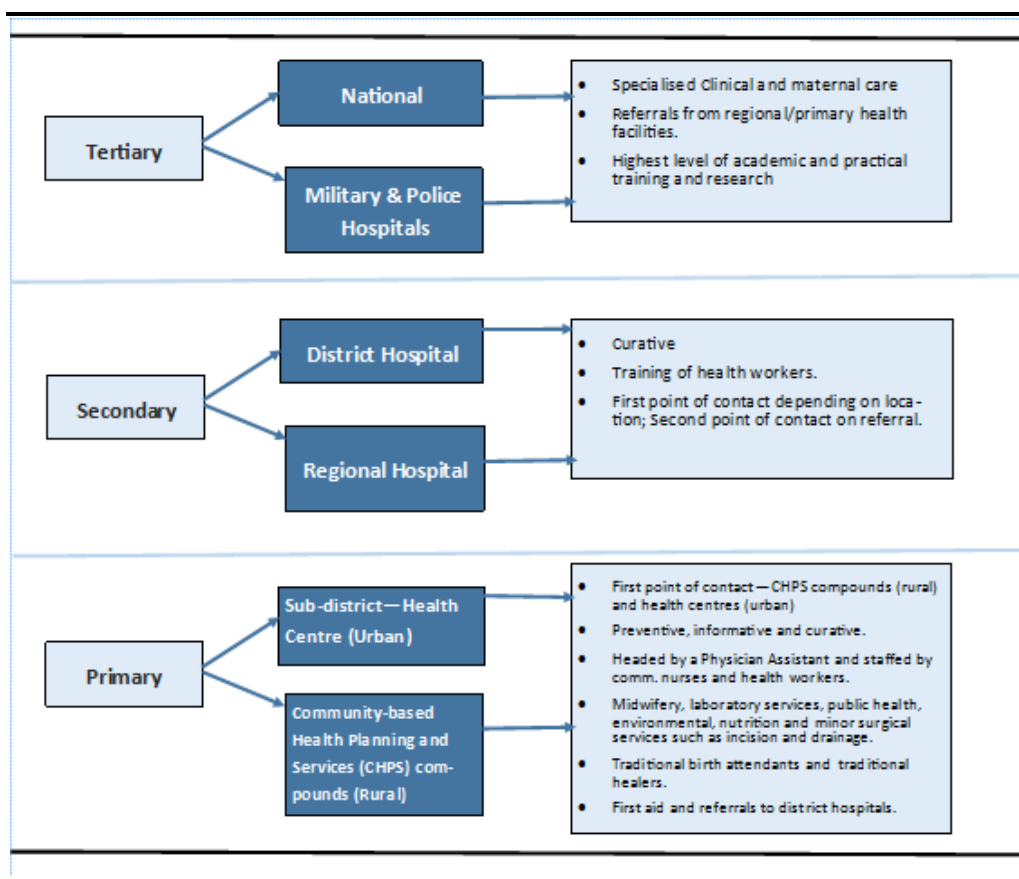
4.5.4 National Health Care

Health Care Facilities

Public health services are delivered through a hierarchy of hospitals, health centres, maternity homes and clinics, including Community-based Health Planning and Services (CHPS) compounds. There are primary, secondary and tertiary facilities organised at community, sub-district, district, regional and national levels (Arhinful 2009). Community and sub-district levels provide primary care, with district and regional hospitals providing secondary health

care (Figure 4-6). Ghana has a universal health care system, National Health Insurance Scheme (NHIS). The system of health which operated prior to the establishment of the NHIS was the “Cash and Carry” system, under which the health need of an individual was only attended to after initial payment for the services was made. It was quite difficult for a large number of the public to access public health. However, the NHIS is an equitable insurance scheme that is to ensure treatment is provided first before payment. Since its inception, the country’s health facilities have seen constant rise in patient numbers and a considerable reduction in patient numbers (Health in Ghana – Wikipedia: <https://en.m.wikipedia.org>)

Figure 4-6 Health Care System in Ghana



Traditional Healers and Practitioners

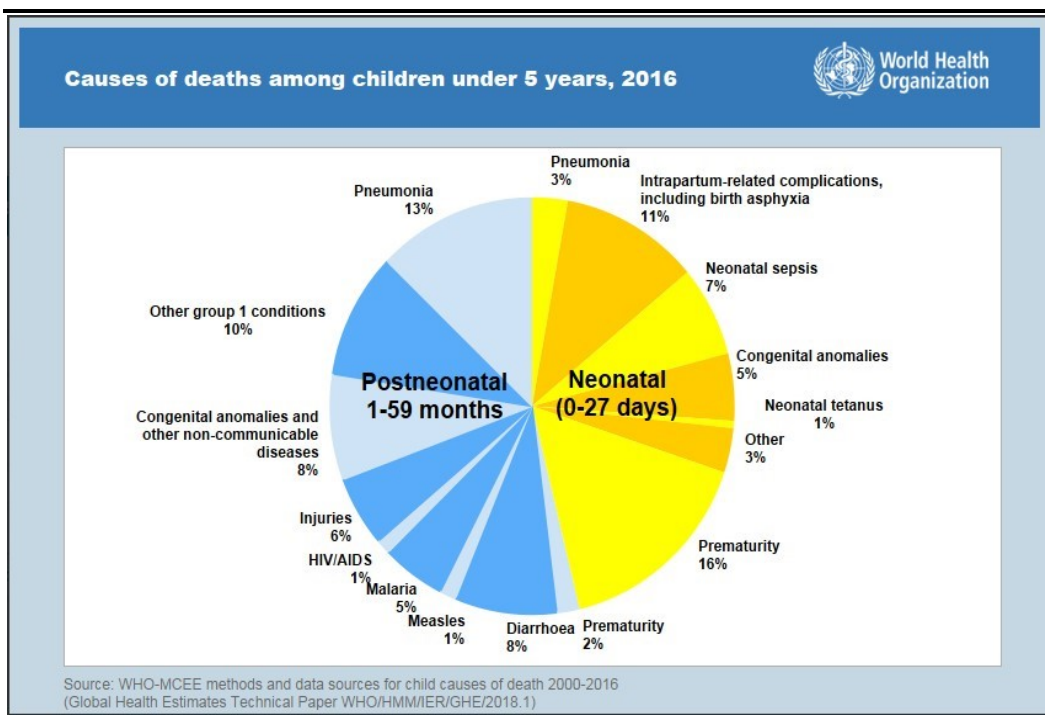
The use of traditional healers is common in Ghana and is recognised by the Ghana health service (GHS). Many villages have a traditional healer and/or a traditional midwife. It is reported that the Department of Health offers basic training to interested traditional healers such as first aid, safe delivery of babies, identifying signs of anaemia and good hygiene for the mother and midwife.

Common Illnesses and Associated Issues

The leading causes of death among children under five in 2016 were preterm birth complications, acute respiratory infections, intrapartum-related complications, congenital anomalies and diarrhoea. Neonatal deaths accounted for 46% of under-five deaths in 2016 (see Figure 4-7).

Ending preventable child deaths can be achieved by providing immediate and exclusive breastfeeding, improving access to skilled health professionals for antenatal, birth, and postnatal care, improving access to nutrition and micronutrients, promoting knowledge of danger signs among family members, improving access to water, sanitation, and hygiene and providing immunizations. Many of these lifesaving interventions are beyond the reach of the world’s poorest communities

Figure 4-7 Main Causes of Mortality in Ghana for Children <5 Years of Age



In 2004 the government developed three initiatives to tackle HIV/AIDS, namely, the National HIV/AIDS and other Sexually Transmitted Infection (STI) Policy and National HIV/AIDS Strategic Framework (2006 – 2010) and a five-year Strategic Plan of Work (2006 to 2010). In 2010, Ghana’s HIV/AIDS infection rate was recorded as 1.7 percent, the lowest rate in West

Africa. The prevalence rate was reported to have dropped from three percent in 2004 to 2.7 percent in 2005 and to 1.7 percent in 2010 (Ghana Aids Commission 2014).

Table 4.8 below provides a comparative overview of Ghana's current status based on the latest World Health Organisation (WHO) data (2012), against a number of indicators established under the Millennium Development Goals. As the table indicates, Ghana compares favourably to both Nigeria and the Ivory Coast across the range of indicators.

Table 4.8 Status of Performance against Millennium Development Goals

Indicator	Statistics*2012 and 2013		
	Ghana	Nigeria	Côte d'Ivoire
Under-five mortality rate (per 1000 live births)	78	117	100
Maternal mortality ratio (per 100 000 live births)	380	560	720
Deaths due to HIV/AIDS (per 100 000 population)	40.8	128.7	162.3
Deaths due to malaria (per 100 000 population)	68.7	106.9	71.7
Deaths due to tuberculosis among HIV-negative people (per 100 000 population)	4.4	94	20

Source: WHO Global Health Observatory (GHO) data

*2012 for deaths due to HIV/AIDS and malaria; 2013 for other indicators

<http://www.who.int/gho/countries/en/>

4.5.5 Socio-Economic Characteristics of Western Region Coastal Districts

The increasing prospecting activities for oil and gas by oil and gas companies in the region will likely lead to increasing cumulative impacts, which means that stakeholders are likely to be interested in and or concerned with the associated real and/or perceived cumulative effects of this growing industry. Consequently, there is an increasing focus on the role of the oil and gas sector in regional development.

Administrative Structure

The Western Region's RCC oversees the administration of the Western Region. The council is chaired by the Regional Minister and the operations of the RCC are replicated by the various District Assemblies.

The Western Region currently comprises 14 districts, two municipalities, and one metropolis run by the Sekondi-Takoradi Metropolitan Assembly (STMA) (Ghana Statistical Service 2013). Table 4.9 illustrates the political and administrative structures in the coastal districts of the Western Region.

Table 4.9 Coastal Political Administration in the Western Region

District	Status	Capital
Jomoro	District	Half Assini
Ellembelle	District	Nkroful
Nzema East	Municipal	Axim
Ahanta West	District	Agona Nkwanta
Sekondo Takoradi	Metropolitan	Sekondi
Shama	District	Shama

Source: Ghana Statistical Service (2013)

Western Region Demographics

The Western Region comprises nine percent of Ghana's total population (2.37 million people) and is the fifth most densely populated region in the country (Ghana Statistical Service 2012). Furthermore, the region has a large rural population, with 57.6 percent of the population living in rural areas (Ghana Statistical Service 2012).

The breakdown of the population is as follows:

- 1,187,774 males;
- 1,188,247 females;
- Population under 15 constitute 39.6 percent of the population;
- Population between 15 and 64 constitute 57 percent of the population; and
- The population above 65 make up the remaining 3.4 percent.

The population growth rate in the Western Region mirrors the national growth rate at two percent (Ghana Statistical Service 2012). However, it is important to note that the populations of key regions with high economic activity grew substantially between 2000 and 2010, most likely due to a combination of natural growth and in-migration. For example, the Central Region recorded the highest percentage increase in the population (38.1 percent) over this 10-year period.

Similarly, although growth rates were low, population density in the Western Region increased from 80.5 people per square kilometre to 99.3 people per square kilometre between 2000 and 2010 (Ghana Statistical Service 2013). Again, it is likely that migration played a role in these changes in population. Moreover, it is estimated that one in four people in the region are 'migrants' born outside the Western Region. Despite this, there is no indication of conflict arising between the various ethnic groups or nationalities in the area. Finally, the region is expected to experience population growth in the future, as people migrate to the area in search of employment opportunities.

Sekondi-Takoradi Metropolitan Assembly (STMA) has the highest share of the population with 23.5 percent and Nzema East Municipality has the least with 2.6 percent (Ghana Statistical Service 2013). Sekondi-Takoradi is the capital of the Western Region and has experienced growth as the port in Takoradi is a hub for offshore oil and gas activities. Table 4.10 illustrates the population size and regional district share of the coastal districts in the Western Region.

Table 4.10 Population of Coastal Districts

District	Population	Regional District Share %
Jomoro	150,107	6.3
Ellembelle	87,501	3.7
Nzema East Municipality	60,828	2.6
Ahanta West	106,215	4.5
Sekondi-Takoradi Metropolitan Assembly	559,548	23.5
Shama	81,968	3.4

Source: Ghana Statistical Service (2013)

Ethnicity and Religion

The population in the Western Region consists predominantly of people from the Akan decent, with five major sub groups, namely Ahantas, Nzemas, Sefwis, Aowins and Wassas. Akans in the region have a high degree of cultural homogeneity and have similar cultural practices. For example, the matrilineal descent system for succession and inheritance is widely practiced including chieftaincy (Ghana Statistical Service 2013). Fanti is the dominant language and is spoken alongside local dialects. English is not widely spoken amongst rural coastal communities, however English has a presence in larger towns.

Nationally, Christianity is the religion practiced by the majority of the population, and this trend is reflected in the Western Region where 81 percent of people are Christian, followed by Islam (8.5 percent).

Education

Education has progressed significantly in the Western Region since 2000. However, the region is faced with infrastructure and skills issues that have restricted progress and development. In the Western Region, basic education is comprised of primary school (six years) and Junior High School (JHS) (three years). Secondary education in the Western Region, aligned with the rest of Ghana, comprises a junior phase and a senior phase, each lasting three years. The junior secondary phase concludes the compulsory school-age years. Children are usually 15 years old at this time (Nuffic, 2015). Prior to attending basic education institutions, children are encouraged to attend two years of kindergarten, this is not however mandatory. Schools

are predominantly run by the state, however private and faith-based organisations run schools also exist. *Figure 4-8* depicts a typical school in the Western Region.

Figure 4-8 Typical School Facility in the coastal community in Western Region



There are currently 1,320 primary schools in the Western Region and these are evenly distributed across ten of the region's districts. As noted above the region suffers a lack of available teachers and a lack of infrastructure 27 percent all schools in need of major repairs. *Table 4.11* illustrates the population 6 years and older by level of education for each of the coastal districts in the Western Region.

Table 4.11 Education Levels (six years old and older)

District	Level of Education								
	Total	Never Attended (%)	Pre Primary (%)	Primary (%)	JHS (%)	SHS (%)	Voc. (%)	Post-Sec. (%)	Degree or higher (%)
Jomoro	124,242	27.0	3.1	28.9	27.7	9.9	0.9	1.9	0.5
Ellembelle	73,213	22.6	3.2	28.3	31.3	9.6	1.3	3.1	0.7
Nzema	50,138	26.6	3.9	29.7	30.1	6.6	1.0	1.8	0.5
East									
Ahanta	87,051	23.2	4.1	29.0	32.4	6.7	1.5	2.4	0.7
West									
STMA	483,199	9.6	1.3	21.3	35.1	16.4	4.3	9.1	2.9
Shama	68,039	23.6	3.8	27.9	32.2	6.9	2.0	2.7	0.9

Source: Ghana Statistical Service (2010)

*Voc.- Vocational School

*Post Sec. Post-secondary

Western Region Health

Access to health care in the Western Region is difficult due the rural nature of many of the population centres. In the region, the health system is dominated by primary care and secondary care facilities (tiers one and two). The highest referral system in the region is Effia Nkwanta Regional Hospital (in Takoradi) which provides secondary health care. There is no tertiary health facility in the Western Region (see *Figure 4-6* above). *Table 4.12* illustrates a breakdown of healthcare facilities in the region and *Figure 4-9* depicts a secondary hospital in the Region.

Table 4.12 Health Facilities in the Western Region by Ownership and Type

Ownership	Hospital	Health Center	Clinic	CHPS	Maternity Home	Total
Govt.	15	56	42	181	0	294
Mission	4	2	18	0	1	25
Quasi-govt.	3	0	2	0	0	5
Private	7	1	47	0	40	95
Industrial	2	0	0	0	0	2
Total	31	59	109	181	41	421

Source: Ghana Health Service 2013

Figure 4-9 Typical Secondary Hospital in the Western Region



Various illnesses are prevalent throughout the Western Region. In data recorded in hospitals in the region malaria, diarrhoeal diseases, and anaemia were the top three reasons for admission.

The average number of hospital admissions per 1,000 population in the Western Region in 2009 was 45.10, as compared to 43.79 at the national level. Malaria is by far the most prevalent accounting for 39.3 percent of admissions in 2013. Moreover, anaemia and malaria were the top two causes of hospital recorded deaths, 8.21 and 7.7 percent respectively (Ghana Health Sector: facts and figures, 2010; Ghana Health Service 2013).

The Ghanaian government is tackling malaria through the National Malaria Control Program, including a number of initiatives in the Western Region such as treated bed-nets for vulnerable groups, intermittent preventive treatment (IPT) given to pregnant women, and pesticide spraying on households and community infrastructure. Malaria as a cause of hospital admissions in the Western Region dropped from 43.7 percent in 2012 to 39.30 percent in 2013 (Ghana Health Service, Western Region, 2013). However, poor sanitation in the Western Region results in high incidence of related infections including diarrhoea, typhoid, cholera, dysentery and gastritis.

HIV/AIDS accounted for 2.53 percent of hospital recorded deaths in 2013 (Ghana Health Service 2013). HIV/AIDS cases and issues are poorly reported in general in Ghana, however, health professionals in the Western Region reported that HIV infection rates in women are higher than in men. The causes are generally attributed to people having multiple sexual partners and trading sex for livelihoods, as well as an influx of infected persons entering the Western Region to live and work, (Ghana Health Service, Western Region, 2013).

Water and Sanitation

There are three major sources of drinking water in the region namely, piped (inside, outside, tanker supply), well (well, borehole) and natural (spring, river, stream, lakes, rainwater, dugout). In the Western Region, 32 percent of houses have access to treated piped water with 8.5 percent having this available within their dwellings. The highly urbanised districts have almost 100 percent availability of, or accessibility to, piped water. This is in contrast to rural districts where over 60 percent of households use rivers, streams, wells, spring or rainwater as their main source of water.

Proper sanitation remains an issue in the region where disposal of waste is often uncontrolled; the following sanitation facilities are common in rural areas (Ghana Statistical Service 2013):

- Public toilet (37.4 percent);
- Pit latrine (30.1 percent);
- Toilet in dwelling (13.4 percent); and
- Bush/beach/field (11.9 percent).

Energy

The Electricity Company of Ghana is responsible for the distribution of power across southern regions of Ghana, including the Western Region. In the Western Region, electricity and kerosene lamps are used as the main sources of lighting with electricity dominating in the urban areas and kerosene lamps in rural areas.

However, rural households are also gradually gaining access to electricity through a rural electrification programme. Charcoal and fuel wood are the main sources of cooking fuel in the region (including urban dwellers), however liquid petroleum gas (LPG) and coconut husks are also used as a source of cooking fuel.

There have been frequent power shortages in Ghana in some years past and this was linked to increased demand and limited power infrastructure. In some areas residential customers experienced up to 24 hours of power outage for every 12 hours of power and thus are forced to use back-up power, kerosene lamps or forgo power. Ghana's businesses typically do rely on diesel generators that are easily purchased in country (Paradi-Guilford, 2015). Though the situation has seen significant improvement since 2017, there are still a few areas and occasions of power shortage over the country.

Waste Disposal

Typical waste management in Western Region is basic. Usually, there are central collection points in each of the districts in which people are able to deposit their non-hazardous waste. A government sub-contractor (for example Zoomlion) then collects the waste from these points and deposits in landfills.

The majority of landfills are open, unlined, and largely unmanaged, giving rise to scavenging activities on the dumping sites and associated risks of disease, infection and personal injury.

Waste is burned at the site periodically to reduce waste levels. *Figure 4-10* below illustrates and open waste dump in the Western Region.

Waste disposal is a challenge in Ghana, particularly in the rural areas. Solid waste is collected in only 8.2 percent of households. The rest is either burned or buried. In urban areas, most households dump their rubbish in a public container while in rural areas most do so in the open space.

Figure 4-10 Typical Open Waste Dump in the Western Region



The majority of liquid waste is disposed of in the street or gutter, with a small percentage of people of households disposing of liquid waste through a formal drainage system. The current waste management practices present public health risks. For example, with diarrheal diseases presenting a serious challenge to the region, insufficient sanitation infrastructure exacerbates this problem (Ghana News, 2014, Friends of the Nation, 2014).

Roads

The road network in the Western Region is limited and the conditions of the roads can be very poor, particularly in the rainy season. The primary road between Takoradi and the coastal districts is the National 1 Road. This dissects all of the coastal Districts and is completely tarred.

The majority of road traffic fatalities (61.2 percent) and injuries (52.3percent) were recorded on roads in rural areas. In 2003, 4 percent of the total accidents in Ghana occurred in the Western Region (Afukaar et al., 2003; Anderson et al., 2014).

The Ghana Private Road Transport Union (GPRTU) and other transport organisations provide transport services within the districts in the Region.

In small communities, motor-bikes, private taxis and small buses owned by private individuals are also operational.

4.5.6 Western Region Economy and Livelihoods

Overview

The Western Region has a wealth of natural resources including cocoa, timber, gold, rubber, bauxite, manganese and offshore oil. For example, the region is the highest producer of cocoa and timber in the Ghana, as well as the sole producer of rubber, bauxite and manganese (Ghana Statistical Service 2013).

However, agriculture (including subsistence fishing, as well as the cultivation of cocoa, coffee, oil palm, cashew, rubber, plantain, banana and citrus crops) remains the dominant activity within the region economically (Ghana Investment and Promotion Centre, 2014).

Tourism has been identified as sector with economic potential. Tourism potential centres on wildlife reserves, cultural heritage (forts), and the vast beaches and coastline in the region.

Fisheries

The marine fisheries and consequently the fishing fleet can be classified into four main groups, artisanal fishing fleet, nearshore and inshore fishery vessels, the offshore/ distant water vessels, and the tuna fleet. Artisanal and nearshore fishery is the fishing practice undertaken by the largest number of people, with fishing serving as an important aspect of coastal communities livelihoods. For example, the fisheries sector in total accounts for around 60 percent of the national protein supply, and fish and seafood account for 16 percent of total household spend on food (Koranteng, 1998; Antwi-Asare and Abbey 2011).

Fishing Fleets

Artisanal fishery is mainly operated from beaches by means of wooden canoes (refer to *Figure 4-11*). There are three types of canoe in Ghana ranging from 3 to 5 m small dugout canoes mainly propelled by paddle, through medium 6 to 11 m wooden canoes propelled by paddle, sail and outboard engine, to large 12 to 18 m wooden canoes mainly motorized by outboard engine (Doyi, 1984). Approximately 50 to 60 percent of the canoes are powered by outboard motors with engine power of less than 40 hp (FAO 2010; Kwadjosse 2009).

Some artisanal vessels that are better equipped may operate at ranges of up to 120 miles from harbour (de Lesteng, 2007). Crews for the larger canoes range between 4 and 30 people, depending on the canoe size and fishing gear.

This fleet operates different fishing gears as hook and line and beach seines used to exploit demersal fishes. They also use drift gill or beach seines nets. The main species they target are sardinella species, seabreams, snappers and groupers, among others.

The inshore/nearshore fishing fleet consists of locally built wooden vessels fitted with inboard engines of up to 400 hp ranging between 8 m and 37 m in length. Vessels with lengths less than 12 m are referred to as small-sized while those between 12 and 22 m are referred to as medium-sized vessels (FAO 2010).

Figure 4-11 Typical Canoe and Fishing Nets



There are about 300 inshore vessels, operating from seven landing centres, the larger centres being Takoradi, Tema, Elmina and Sekondi and the smaller centres being Apam, Axim, Mumford (TFS 2011). Currently this sector is estimated to land about 2% of the total marine fish production (Kwadjosse 2009). The inshore fleets are mainly multi-purpose and operate as purse-seiners during the upwelling periods and switching to bottom trawling for the rest of the year. Most purse-seine nets measure 400 to 800 m long, are 40 to 70 m deep and have a mesh size of approximately 25 to 40 mm. Bottom trawl gear has a mesh of 40 mm at the end of the net (cod end), 45 m head rope and 40 m foot rope. The fishermen in this category can stay offshore for three to five days depending on the availability of catch and as such carry ice for preserving fish, and they have a range of up to 200 nautical miles (de Lesteng, 2007).

The industrial fishing fleet is composed of trawlers, shrimpers and tuna boats that may remain at sea for periods that last up to one month. According to FAO (2014) the fleet in Ghana includes approximately 60 trawlers and about 29 tuna boats.

As deep-sea vessels, they are required by the Fisheries Act of 2002 (Act 625) to operate outside the Inshore Exclusion Zone (IEZ), that is in waters greater than 30 m depth (or 12 nautical miles), but as they generally cannot trawl in depths greater than 75 m, due to the state of disrepair of vessels and engines, their operational area is limited to areas between these two depths.

The tuna fleet operates throughout the Gulf of Guinea. The geographic range for Tuna fishery is between 20 nautical miles (nm) and 200 nm (exclusive economic zone) EEZ.

The *Project* FPSO is located about 70 km from the shore and thus there is a possibility that over the course of the *Project* lifecycle many of the fishing vessels described above could interact variously with the offshore *Project* infrastructure.

Fish Landings

Artisanal fishermen operate by means of canoes from open beaches where landing facilities are usually not well developed. There are numerous landing sites along the coastline in the Western Region and each will be under control of a Chief fisherman. The Port of Takoradi has the capacity to service larger industrial and Tuna fleets.

Fishing Livelihood

During the major fishing season there is often an influx of people to coastal districts and economic activities are high. However, during the off season unemployment rises and the local economy suffers as a result of an exodus of non-residents. The main fishing season occurs from July to September, with a secondary season occurring between December and February (TGL 2011). Artisanal fishers (predominantly men) sell most of their catch to fishmongers (predominantly women) for processing and selling.

In *Figure 4-12* men are practising dragnet fishing, where they cast nets from their canoes off the coast and return to shore where they drag the net back to the beach manually. Once they have hauled the net ashore the catch is sorted on the beach and sold to fishmongers. Fishmongers will travel to nearby towns and markets to sell their catch. However, due to declines in catches, fishing activities are not as lucrative as they have been in the past. For instance, fish production in Ghana in 1997 was around 450,000 tonnes, whilst the average fish catch in the period 2000-2010 was 326,000 tonnes (Antwi-Asare & Abbey, 2011; EDP 2012)⁽¹⁾.

(1) Note, no specific data exists on the numbers of people directly or indirectly benefiting from the fisheries sector and it is a challenge to separate post-harvest livelihoods from fisheries livelihoods in general. The same individuals are often involved in both sectors, with profits split between household members so that benefits from harvesting and from post-harvest activities are pooled (Bank of Ghana, 2008).

Figure 4-12 Typical Artisanal Fishing Activities



a) Fisherman drag netting

b) Fishmongers sorting the catch on the beach

Commercially Important Shellfish

In addition to fish, a variety of invertebrate species are targeted from coastal areas. These include squid, octopus, cuttle-fish, deep-sea rose prawn, lobster and several shrimp species.

Cuttlefish and squid species are common along all Ghanaian waters and can be found both in coastal and offshore waters over the continental shelf, while octopus is found mainly in shallow and rocky bottoms. The deep-sea rose prawn is found on the continental shelf and upper slope, between 50 and 400 m depth over sandy sea beds, while shrimp species, southern pink shrimp, Caramote prawn and Guinea shrimp are generally associated to sandy and muddy bottoms at depths up to 100 m that vary according to the species.

Interactions between fisheries and oil and gas vessels and infrastructure

There have been anecdotal reports of negative interactions between fishing crews and offshore oil and gas infrastructure and vessels. These interactions include vessel strikes, encounters with spills and the destruction or confiscation of fishing equipment.

4.5.7 Western Region Tourism

The primary tourist sites in the Western region pertain to national parks or reserves, forts and cultural heritage, and beaches. Eco tourism sites include the Bia National Park Egambra Crocodile Sanctuary, Wassadomama Rock Shrine, Nzulezu Settlement (village on stilts over lake Tadane) and Boako Waterfalls. There are numerous forts in the region, for example, Fort Appolonian at Beyin, Fort Cross at Dixcove, Fort Batensteyn at Butre, Fort Fredericksburg at

Prince Town, Fort Anthonio at Axim, Fort Dorothea (ruins) at Akwidaa, and Fort Sebastian. Figure 4-13 below illustrates key tourist sites in the coastal districts of the Western Region.

As the figure indicates, there is currently little development in terms of coastal tourist resorts, which are often associated with marine based recreational activities such as diving and deep sea fishing.

Figure 4-13 Tourist Sites in the Coastal Districts of the Western Region



Source: Ghana Statistical Service 2010

5 SCOPING STAKEHOLDER ENGAGEMENT

5.1 OBJECTIVES AND APPROACH

The initial phase of work to develop the scope for the Deep Water Tano/Cape Three Point (DWT/CTP) ESIA involved identifying the components of the Project and the activities involved in construction, operation and closure, and considering how these could be expected to interact with known environmental and social conditions in the vicinity of the *Project*.

This process will be guided by reference to the EPA Guidance on ESIA Scoping and the IFC Performance Standards (International Finance Corporation Sustainability Framework - available at <http://www.ifc.org/ifcext/policyreview.nsf>).

The DWT/CTP ESIA Terms of Reference is included in section seven (7) and will be submitted to the EPA. The purpose of the Terms of Reference is to define the Project and its potential impacts on the environment and communities, set out the proposed approach and methods for the impact assessment, identify the expertise that is needed to prepare the study, and present the schedule for its completion. The Terms of Reference will be reviewed and approved by the EPA.

5.2 STAKEHOLDER ENGAGEMENT PRINCIPLES AND ACTIVITIES

To inform the scope of the assessment, the ESIA Team will also undertake a programme of consultations on the Project and the ESIA Terms of Reference. Details will be set out in a Stakeholder Engagement Plan to be published, covering stakeholder engagement activities during the ESIA study. The Plan will include an analysis and identification of potential stakeholders which will be used to inform the development of the programme.

Engagement Principles

International best practice recommends the active engagement of stakeholders throughout a Project lifecycle, commencing with scoping. Stakeholder engagement is an important part of the environmental and social impact studies leading up to ESIA report, but it is the intention that this will continue as a crucial aspect of the way environmental and social impacts and risks are managed in the future. This will be undertaken in accordance with IFC guidance and Aker Energy's policy with regard to engagement.

In line with current international best practice, the Project will ensure that engagement:

- is free from manipulation, interference, coercion and intimidation;
- is free of charges for participation;
- takes place prior to decisions being made so that views expressed can be considered;
- is conducted based on timely, relevant, understandable and accessible information;
- is undertaken in a culturally appropriate manner;
- includes all those interested in or affected by the Project, and in particular, vulnerable groups;
- achieves a two-way dialogue; and
- is responsive, and includes explicit mechanisms for receiving, documenting and addressing comments received.

Aker Energy standards require that consultation and engagement are carried out in good faith with mutual obligation. Approaches and procedures must be transparent, inclusive and culturally appropriate, and must ensure that:

- people and organisations who may be affected by or interested in the Project are as fully informed as practically possible about the *Project* and its possible effects before they occur and have access to reliable independent advice;
- two-way discussions cover stakeholder issues and priorities as well as the concerns and needs of the company;
- discussions occur in a language and format that is understandable to local stakeholders;
- stakeholders participate to the greatest extent possible in social and environmental impact assessments;
- a record is kept of all formal and informal meetings that involve commitments, including how views of both the company and stakeholders may have changed and where agreements have been reached, and of action items with dates for completion; and
- discussions and community decision-making reflect established local conventions and protocols, including gender considerations, supplemented if necessary by additional processes for inadequately represented and marginalized groups.

The programme of engagement activities that was undertaken during scoping, was designed to accord with the above principles and the DWT/CTP *Project* is committed to continuing this through the lifetime of the *Project*. The Stakeholder Engagement Plan for the *Project* will be updated to describe the next steps in this process.

The remainder of this section outlines the activities that was undertaken for the scoping exercise. The section also focuses on the plan for disclosure of this report and consultation on its findings with *Project* stakeholders. The processes for enabling and responding to feedback from stakeholders and for managing any grievances that may arise are also described.

6 THE DWT/CTP SCOPING PROCESS AND OUTCOME

6.1 STAKEHOLDER IDENTIFICATION (MAPPING)

The IFC's Handbook on Stakeholder Engagement (2007) defines stakeholders as "persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively."

As part of scoping, a stakeholder identification exercise was undertaken to select key stakeholder groups and organisations, based on ESL's experience in similar ESIA's in Ghana. These stakeholders were selected based on the above definition, and that they would have an interest in the *Project* and would also have knowledge through which to provide insight into possible issues and concerns related to the *Project*. In addition, further stakeholder groups were identified through the consultation process.

The composition of stakeholders is likely to expand/change as the *Project* moves to feasibility, construction, operations and closure.

6.2 NOTIFICATION OF KEY STAKEHOLDERS

The stakeholders selected during the identification process were either contacted via telephone to arrange a stakeholder consultation meeting or by hand-delivery of an invitation letter with a Background Information Document (BID) attached. A copy of the BID and a covering letter requesting a meeting were hand-delivered to these stakeholders and meetings confirmed through subsequent telephone and email communication. The BID provided an overview of the *Project* and also outlined ways through which additional issues and comments could be raised with Aker Energy and the ESIA team. Additional stakeholders that may be identified later will be engaged with written communication that may include the BID, and an invitation to submit written comment. A copy of the invitation letter and the BID is provided in Appendix 6-A. Below is a list of all fifteen (15) stakeholders contacted through an invitation letter and a BID:

Environmental Protection Agency (EPA)
Fisheries Commission

Ghana Marine Police
Ghana Ports and Harbours Authority (GPHA)
Petroleum Commission
National Canoe Fishermen Association
Ghana Maritime Authority (GMA)
Ghana Navy
Ministry of Energy (MoEn)
Western Regional Coordination Council (WRCC)
Western Regional House of Chiefs (WRHC)
Western Regional EPA
Western Regional GPHA
Western Regional Fisheries Commission

6.3 CONSULTATION MEETINGS

Fourteen (14) public scoping meetings were conducted in June and July 2018, with the dates and locations detailed in Table 6-1. Eight (8) of the meetings were held in Takoradi and 6 in Accra. The scoping meeting format and the information presented was the same at each public meeting. During the open house sessions, attendees had the opportunity to view presentation boards and maps that displayed *Project* information and could ask questions about the *Project* team. A *Project* overview, including an introduction to the ESIA process, was also presented.

The question and comment period was followed with the completion of comment forms, some of which were submitted immediately while others were received days after. Comment forms were made available at meetings so attendees could submit written comments during the meeting whenever possible. Supporting information for public scoping meetings and formal presentation is included in Appendix 6-B.

6.4 MANAGING STAKEHOLDER FEEDBACK

Throughout the period of consultation, a formal comment and feedback system would operate. Comments and questions were requested to be submitted to the *Project Team* by various routes:

- by email to: akarmah@esl-ghana.com, akarmah@yahoo.com ;
- by writing to:

The Chief Executive Officer
ESL Consulting Ltd.
P. O. Box LG 239
Legon-Accra, Ghana.
Tel: +233-244771707

or

- by email to: aemmanuel@akerenergy.com,
- by writing to:

Mr. Emmanuel Appiah
7th Floor Marina Mall
Airport City
Accra
Tel: +233-544338699

- by raising a point or asking a question at a stakeholder event;
- by leaving a written comment at a stakeholder event or
- by raising an issue with the relevant authorities or regulators (the EPA and the Petroleum Commission).

Comments could be submitted by any means (in person, in writing, by email) including on the pre-printed feedback form which was made widely available. A copy of the feedback form is included in Appendix 6-C: Aker Energy Deep Water Tano Cape Three Points (DWT/CTP) Development ESIA Scoping Study Background Information Document (BID), and is available on the website (www.akerenergy.com).

All comments made by stakeholders, whether in person, by mail or email, was recorded. Where questions were raised that required an individual response, this was provided and if any parties raised a grievance or complaint this would be managed through the Aker Energy Grievance Procedure (see Section 6.2.7). This document is the report on the

outcome of the stakeholders engagement at the scoping stage of the preparation of the Environmental and Social Impacts Assessment (ESIA).

6.5 SUMMARY OF COMMENTS

AKER ENERGY scoping comments document interested parties' concerns about the scope of the proposed course of action as well as identify significant issues, resources and suggested alternatives. The scoping comments will be considered during the study process and in preparation of the draft ESIA.

Summary of Aker Energy Scoping Comments

A total of a hundred and eighty-seven (187) people signed the attendance records for the fifteen (15) Aker Energy scoping engagements. These included, but not limited to, private citizens, industry stakeholders, non-governmental organizations (NGOs) and political representatives. A copy of the sign-in attendance record sheets for the public Aker Energy scoping meetings is provided in Appendix 6-D.

A total of a hundred and fifty-two (152) comments were received during the Aker Energy scoping engagement period. Of these, fifty-five (55) verbal comments were articulated during the fifteen Aker Energy scoping meetings (Table 6-1; see Appendix 6-C). Ninety-seven (97) written comments (see extracts of comments tabulated in Appendix 6-E) were received, submitted either in person or electronically via email.

Aker Energy stakeholder scoping engagement often contained several multi-part comments directed at multiple areas of concern. Hence, a single comment could potentially be addressed in multiple sections of the ESIA. A total of two hundred and thirty-nine (239) specific comments (written categorised by subject matter) were expressed during the Aker Energy scoping engagement period (Table 6-2). For accurate representation, spoken scoping engagement comments were recorded and transcribed, and public comments may have grammatical or spelling errors.

Table 6-1: Number of Scoping Meeting Participants and Scoping Meeting Comments.

Date	Scoping Meeting Location	*Number of Participants	Number of Comments
TAKORADI			
June 18, 2018	The Fishermen Association, Conference Room, Centre for Sustainable Livelihood and Environmental Development.	21	10
June 18, 2018	Ghana Ports and Harbours Authority (GPHA), Conference Room.	13	5
June 19, 2018	Fisheries Commission, Regional Director's Office.	4	4
June 20, 2018	Western Regional Coordinating Council (WRCC), Regional Office, Residency Conference Room	43	40
June 20, 2018	Ghana Maritime Authority, Maritime Office	4	
June 21, 2018	NGOs, Friends of The Nation Premises, Conference Room.	19	15
June 22, 2018	Environmental Protection Agency (EPA), Conference Room.	11	Verbal
June 25, 2018	Western Regional House of Chiefs (WRHC), Conference Room.	35	23
ACCRA			
June 27, 2018	Forestry Commission, Director's Office	1	
June 27, 2018/ July 9, 2018	Petroleum Commission, Accra, Conference Room/HSE Head Office.	- 4	1
June 28, 2018/ July 11, 2018	Environmental Protection Agency (EPA), Conference Room/ Director of Petroleum Sector's Office.	4 1	Verbal
June 28, 2018	Ministry of Energy, Conference Room.	9	
June 29, 2018	Fisheries Commission, Conference Room	8	5
July 5, 2018	Ghana Maritime Authority, Deputy Director's Office.	1	1
July 18, 2018	Ghana Navy, Burma-Camp, Faisal Hall.	9	2

*Excluding attendance by Aker Energy and ESL Team representatives.

Table 6-2: Categorization of Scoping Comments by ESIA Subject Matter.

Source of Scoping Comment	CB	PI	RI	Totals
Scoping Meeting Verbal Comments	40	11	4	55
Scoping Written Comment	97	90	52	239
Totals	137	101	56	294

* CB = Concern and Benefits, PI = Project Impacts (Environmental & Social), RI = Relevant Information on Environment, Community and Health Status.

NOTE: A single scoping comment may be categorized under multiple ESIA subject matter headings.

AKER ENERGY scoping comments were categorized according to the chapter of the ESIA where the subject matter of the comment would likely be addressed. Table 6-2 displays the categorization and number of specific comments by ESIA subject matter. The standard ESIA format includes the following in their chapters:

- Concerns and Benefits
- Project Impacts
- Relevant Information on Environment, Community and Health Status

Concerns and Benefits

A total of a hundred and thirty-seven (137) comments were received regarding Concerns and Benefits. Comments received in this category included the need to provide alternative livelihood for likely affected fishermen in the communities within the *Project* influenced areas. Mr. Joe Appiah, the Metro Youth Director (National Youth Authority) commented at the June 20, 2018 Western Regional Coordinating Council, Residency Conference Room, Takoradi, Aker Energy scoping meeting: *“on the issue of Corporate Social Responsibility, the project has the potential of affecting the activities and incomes of the fisher-folks within the project area of influence leading to local unrest; and the use of the FPSO would lead to setting exclusion safety zones that limit their fishing area. I want to know if Aker Energy will compensate or provide some sort of alternative livelihood for the fisher-folks.”*

Several comments stressed consideration of alternative livelihood for the affected fishermen. By written submission dated July 11, 2018, Nimonius N. Pengyir (Deputy Director – Fisheries Commission) commented: *“...More sea area (fishing grounds) will be lost by the fishermen...there will be the need to initiate social interventions that will compensate for this; i.e. for the local content in workforce, offer specialized training to children of the fishers to take up job opportunities in the oil and gas industry in accredited oil and gas training institutes abroad...”*.

On the other hand, all comments stated that the project would be beneficial to the region in terms of development, and in general bring income and other resources to the country. Captain Inusah (Deputy Director, Environment & Safety Standard of the Ghana

Maritime Authority), in a written comment submitted on July 29, 2018, noted: *“The project will bring a lot of economic benefits to Ghana. Secured offshore energy production is fundamental to sustainable economic growth, prosperity and employment.”*

Project Impacts (Environmental & Social)

A total of a hundred and one (101) comments were received concerning Environmental Impacts. Concerns related to disruption of fishing activities and job creation dominated the comments received in this category. Joyce Obiri Yeboah, Department of Development Head, reiterated at the June 20, 2018 Western Regional Coordinating Council, Residency Conference Room Aker Energy Scoping meeting: *“Aker Energy’s activities will distort their fishing activities of the fisher folks and these won’t be able to make a living and so there must be some help that must be given to them. Does Aker have any alternative economic activities for the fishermen?”*. Mr Baba Nyina of the Trade and Industries also commented: *“.....cumulatively, the exclusive zones that have been set by Tullow, Tein, Sankofa etc., and will be set by Aker Energy are going to increase, and will potentially reduce the fisher-folk’s effective area of fishing activity thereby limiting the fish stock.”*

In addition, the leader of the Canoe Council commented at the June 18, 2018 Fishermen Association, Friends of the Nation Conference Room Aker Energy scoping meeting: *“how will Aker Energy manage the effect of constructing an FPSO as it will affect our fishing activities....., and how will the company manage the effect of vessel traffic.”*

By written submission received July 2018, Nana Kusi Nsiah (Town Planning Officer – Physical Planning Department) listed points regarding negative impacts: *“...The fish folks will be deprived of their activities.....depletion of fish stocks.....traffic management in urban areas.....housing stock depletion....”*

Regarding positive impacts, all comments invariably mentioned job creation and regional and national development.

Relevant Information on Environment, Community and Health Status

A total of fifty-six (56) comments were received concerning Relevant Information on Environment, Community and Health Status. Comments received in this category concerned periodic or annual health screening for the coastal community members within the project area of influence, proper health facilities in the communities and gas flaring. At the June 18, 2018, Fishermen Association, Friends of The Nation Conference Room, Sekondi, Aker Energy scoping meeting, Mrs. Emelia Abaka-Adu (National Vice President – National Fish Processors and Traders Association) commented: *“Some of our*

members suffer from diseases from time to time resulting from the oil and gas operations. I suggest that health screening should be arranged for the communities regularly."

By written submission dated July 2018, Nana Kofi Bentil (Chief Fisherman – Fishermen Association) listed: "...health screening for the fishing communities on yearly basis....". J. F. Esumbey (Fisheries Commission) also commented: "Communities around the catchment area experience severe heat and other health hazards, hence the need for health screening for the coastal communities."

Other Key Comments

Additional Key Comments on the scoping exercise of activities by Aker Energy in the Deep Water Tano Cape Three Points Block submitted by the Friends of the Nation (FoN) and the Ghana Maritime Authority (GMA-Accra) can be found in Appendix 6-F.

List of Key Comments

A semi-quantitative method together with professional judgement were used to identify and extract the key issues raised by stakeholders during the scoping phase. A list of some of the key comments raised during the scoping consultations is as follows:

- Job creation in the districts with emphasis on employment of local community members.
- Improvement of social infrastructure including hospital, roads, sanitation and other facilities.
- Educational scholarships, training opportunities for locals.
- Disposal of offshore waste, oil spill and discharge of ballast water at sea.
- Livelihood of fishermen being affected negatively with the decline of fish catch due to the presence of the FPSO limiting fishing grounds and light attracting fish into the safety zone.
- Complaint from the fishermen about some men of the Ghana Navy on patrol who disregard the ban on fishing within the 500 m safety exclusion zone.
- Fishermen from Elmina in the Central Region regularly fish near the FPSO calling for their inclusion in subsequent stakeholder engagements.
- Alternative Livelihood Programmes for local community members especially fishermen.
- Enhanced cooperation between District Assemblies and Oil Companies to facilitate development.

- Rising cost of living with escalating rental charges for land, accommodation and cargo storage (warehousing).
- Security, maritime safety of oil operations including fire prevention and containment.
- Safety of marine mammals especially whales in the Western Region
- The Fisheries Commission and other stakeholders demanded a Fisheries Impact Assessment.
- Cumulative Impacts of the oil activities on the marine environment, atmosphere and the communities especially fishermen need to be addressed.
- The Ghana Maritime Authority was concerned with maritime security and would like negative activities including possible terrorist attack, narcotic smuggling, illegal oil bunkering, piracy and armed robbery to be addressed in the report.

6.6 GRIEVANCE PROCEDURE

A Grievance Procedure is under development to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The Grievance Procedure can be made available on request. It has been designed to resolve concerns promptly, using an understandable and transparent process that is culturally appropriate and readily accessible. Grievances will be addressed with no cost to the party that raised the concern and without retribution. The mechanism will also not impede access to other judicial or administrative remedies available to affected parties.

6.7 FUTURE STAKEHOLDER ENGAGEMENTS

On completion of the ESIA regulatory procedure, the Project will move into the Construction and Operation Phases. A full programme of stakeholder engagement will continue during Constructional and Operational Phases, and then throughout the lifetime of the Project. Details of this will be provided in an update of the Stakeholder Engagement Plan, which will be published at the time of Project approval. This will be regularly updated thereafter. The long-term programme of engagement will include:

- on-going liaison with regulatory authorities concerned with environmental and social issues;
- establishment of local community liaison groups which will be used to keep people informed of Project activities and seek their participation in decisions affecting their communities;

- publication of regular reports on Project progress, implementation of mitigation measures, compliance with the Environmental Management Plan (EMP) and the overall performance; and
- the sharing of monitoring results and consultation on responses to unforeseen impacts that may occur.

6.8 GENERAL CONCLUSION FROM THE THREE CATEGORIES (BY ESIA SUBJECT MATTER) OF SCOPING COMMENTS.

The stakeholders have raised several concerns, highlighting both positive and negative impacts. Analysis of the responses from the scoping consultations comments using content analysis and reflecting on key considerations that emerged, gives the general opinion and an overall impression that, despite stakeholder concerns raised, the stakeholders are of the view that the DWT/CTP development has more potential positive than negative impacts as all the comments invariably indicated preference in favour of the development. Consequently, details of the wide range of potential impacts and concerns identified during the scoping study and stakeholder engagement are presented in the Terms of Reference (TOR) under section 7, and will be addressed in the ESIA.

6.9 DISCLOSURE AND CONSULTATION

A programme of disclosure and further stakeholder engagement is planned to run for 21 days after acceptance of this report and subsequent advertising of this report by the EPA. The aim of this is to provide directly affected communities and other project stakeholders with the opportunity to understand and comment on the results of the assessment and the proposed mitigation measures. This will include the following activities:

- The ESIA Report and accompanying leaflets and summary material will be published in the newspapers and also on the Aker Energy Project website at <http://www.akerenergy.com> and will be available to download at no cost (a soft copy may also be requested).
- Hard copies of the report will be available for inspection at the following locations in Ghana:
 - ✓ EPA Head Office in Accra
 - ✓ District Assemblies of the Western Region
 - ✓ Regional Offices of the EPA in the Western and Central Regions
 - ✓ Petroleum Commission
 - ✓ Fisheries Commission

- ✓ Ghana Maritime Authority
- ✓ Ghana Navy
- ✓ Ghana Ports and Harbours Authority
- Notice of the report will be announced in newspaper advertisements.
- A national and /or regional stakeholder conference, if so determined by the EPA will be held. These will be widely publicised in local media and invitations will be sent to the regional, prefectural, sub-prefectural and local administrative authorities, to community leaders, and to community-based and non-governmental organisations.

In addition to these activities, a programme of community visits will be undertaken, visiting settlements throughout the Project area during the full scale consultations for the assessment of impacts. These visits will provide the opportunity for communities affected by the Project to be consulted on the ESIA and allow local people to comment on the Project and its impacts prior to final decisions on the project. Meetings will be held in relevant villages directly affected by the Project. Local leaders, affected households and businesses, and special sectors within the community including women and other potentially vulnerable groups will be invited

7 TERMS OF REFERENCE FOR ESIA

7.1 INTRODUCTION

Based on the scoping activities undertaken, this *Chapter* provides the proposed Terms of Reference for the ESIA. This includes establishing the basis for Baseline studies, additional stakeholder engagement, and the structure of the ESIA Report. This *Chapter* is structured as follows.

- Steps to complete the ESIA;
- Baseline studies;
- Quantitative studies;
- Impact assessment methodology;
- Stakeholder engagement;
- Structure for the ESIA; and
- Schedule for the ESIA.

7.2 STEPS TO COMPLETE THE ESIA

Following approval of the Scoping Report by EPA, the ESIA Consultant will undertake the following activities to complete the ESIA.

- The project description will be updated and finalised as further technical details become available from the *Project*. The ESIA Consultant will work with the *Project's* technical team and confirm parameters for quantitative studies and impact assessment.
- Baseline studies will be conducted to document the environmental and social setting with focus on addressing gaps on the existing information. Baseline studies will involve further desk-top based research as well as primary data collection through surveys and interviews.
- Quantitative studies, including computer modelling, will be conducted to assist in the prediction of environmental effects.
- Impacts identified in the scoping process, as well as other impacts identified in the ESIA process, will be characterised. The impact will be evaluated to determine significance. The proposed impact assessment methodology is provided in *Annex F*. Mitigation measures and management actions will be developed and a provisional Environmental and Social Management Plan (ESMP) will be prepared.

- The findings of the impact assessment will be summarised and reported in an ESIA report. The ESIA report will be submitted to the Ghana EPA for approval and disclosed for public comments under EPA's direction.
- Stakeholder engagement will continue throughout the process. This will include the establishment of a grievance mechanism to allow issues and concerns from stakeholders to be raised with the *Project*. To facilitate this, the project will set up drop in centres to allow grievances to be made in person and logged by the *Project*.

7.3 PROPOSED BASELINE STUDIES

7.3.1 Gap Assessment

During scoping, the quality of the existing information and data was reviewed in terms of:

- Relevance - does it apply to the *Project*?
- Coverage - does it comprise the *Project Area of Influence*?
- Completeness - does it cover all elements of a particular topic area?
- Accuracy - does it reflect the current status?

The results of the gap assessment are summarised in *Table 7.1*.

The information gaps identified during scoping will be addressed through baseline studies as part of the ESIA.

Table 7.1 Data Gap Assessment

Topic Area	Main Sources of Information	Gaps Physical	ESIA Baseline Study Approach
Meteorology	Regional meteorological conditions are covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>) and Fugro metocean studies.	No significant gap.	Confirm that data is current through further desktop research.
Air Quality	Information on existing air quality is provided in previous ESIA documents previous ESIA documents (Refer to <i>Section 4.2.2</i>).	No significant gap.	Confirm that data is current through further desktop research.
Climate and Climate Change	Basic information on climate patterns and climate data is available in previous ESIA documents (Refer to <i>Section 4.2.2</i>) and in public sources. Regional climate change trends are covered in USAID (2011) climate change report.	No significant gap	Confirm that climate and climate change data is current through further desktop research.
Marine Water Quality	Information on existing marine water quality is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>). Primary data collected on environmental survey by Gardline. Parameters measured: temperature, salinity, turbidity, nutrients, chlorophyll-a, THC, suspended solids, PAH, PCB, dissolved metals.	No significant gap.	Confirm that data is current through further desktop research.
Oceanography	Information on existing metocean conditions is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>). Primary metocean and current data were collected by Fugro in 2014 in the Pecan Field.	No significant gap.	Confirm that data is current through further desktop research.

Topic Area	Main Sources of Information	Gaps	ESIA Baseline Study Approach
Sediment Quality	Information on existing sediment quality (Total Organic Matter, Total Organic Carbon and Total Petroleum Hydrocarbons) is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>). Primary sediment quality data were collected in the Pecan and Almond Fields by Gardline.	No significant gap.	Confirm that data is current through further desktop research.
Biological			
Marine Flora and Fauna	Information on existing marine fauna and flora in the area is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>). Primary data were collected in the study area by Gardline for planktonic, zooplanktonic and macrobenthos organisms. MMO observations were conducted in the study area during a seismic survey that was carried out from November 2013 to April 2014. There is also publically available data from the Jubilee and TEN projects on marine mammal and turtle sightings.	No significant gap.	Confirm that data is current through further desktop research. Engage with EPA (or other applicable entities) on sensitive species locations, temporal sensitivities, and stakeholder values/priorities
Corals	Information on existing corals in the area is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>).	No significant gap.	Information on the seabed conditions within the Project Area will be reviewed to assess the presence of deepwater corals.
Fish and Fisheries	The existing FIA and ESIA documents have extensive information on the fish species that occur in the <i>Project Area</i> .	There is limited information on deepwater fish that occur in the <i>Project Area</i> .	Additional information on fish and fishing will be collected through interviews with the Fisheries Commission and local fishers and current data provided by the Fisheries Commission.
Protected Areas	Information on coastal and marine protected areas is provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>) and publically available information sources (eg, IBAT).	Government plans for designation of protected areas is not readily available.	Consult with EPA (or other applicable entities) to document plans for protected areas. Establish through oil spill modelling the sensitive areas (eg, Ramsar, IBA) and sensitive receptors (eg: marine mammals, seabirds and sea turtles) that may be impacted during an oil spill.

Topic Area	Main Sources of Information	Gaps	ESIA Baseline Study Approach
Ecosystems and Habitats	Information on ecosystems and habitats contained in previous ESIA documents (Refer to <i>Section 4.2.2</i>).	No significant gap.	Confirm that data is current through further desktop research.
Social			
Governance and Administration	Government administrative structure and legal and regulatory requirements are covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>) and the legal review (AECOM, 2014) that was commissioned for this <i>Project</i> .	No significant gap.	Confirm that data is current through further desktop research.
Economy and Livelihoods	General economic status covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>). Per previous study findings, the primary livelihood issues will be related to fishing activities.	Fishing activities and fish catch data may not be the most recent available. Need information on current concerns of the fishing sector (eg, recent grievances).	Additional information on fishing will be collected through interviews with the Fisheries Commission and local fishers and data provided by the Fisheries Commission.
Existing Marine Infrastructure	Marine infrastructure is covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Confirm subsea pipeline options and Status of other marine infrastructure projects.	Supplement with further research of publically available information. Consult with Ghana Ports and Harbours Authority as well as EPA to confirm the development status of the ports.
Marine Traffic	Marine traffic is covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Further detail on the marine traffic present in the <i>Project Area</i> and collision risks are needed.	Area specific marine traffic and collision risk data will be collected during a collision risk assessment of the study area.
Community Health	Community and public health information covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Information may not be current.	Confirm that data is current through further desktop research and consultation with Ghana Health Services.
Demographics	Population demographics provided in previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Information may not be current.	Conduct further research of recently published government data.
Education	Education system and resources covered in the various in the previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Information may not be current	Gather primary data in consultations with government or directly with institutions identified through further research.

Topic Area	Main Sources of Information	Gaps	ESIA Baseline Study Approach
Tourism	Tourism facilities and development plans covered in the previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Quantitative data on tourism sector is limited. Need current performance figures for tourism, especially as related to the Western Region.	Gather primary data through consultations with government bodies, in particular departments responsible for tourism.
Transboundary Issues	General information on the environmental and social setting in the areas bordering the <i>Project Area</i> is readily found in public sources including ESIA for existing projects in the oil and gas sector previous ESIA documents (Refer to <i>Section 4.2.2</i>).	Transboundary issues of concern would be related largely to surrounding nations' fishing, marine traffic, and effects from an accidental release (which could impact the coastline). Detailed information and data for these issues of concern may not be readily available.	Gather detail on the specific Areas of Influence through further desktop research and an oil spill modelling study. Incorporate information from the Ship Collision Risk Assessment. Consider consultation with Cote d'Ivoire and other potentially affected nations/stakeholders through government spill response entities and directly with potentially affected communities.
Labour and Working Conditions	Requirements for worker rights are contained in applicable Ghana laws and regulation. International requirements are contained in the IFC Performance Standards and in various conventions of the International Labor Organization (ILO).	Details on the <i>Project's</i> approach for addressing worker rights are still being developed.	Identify <i>Project</i> commitments concerning worker rights including human resources and health and safety policies, plans and procedures (where available).
Community Health, Safety, and Security	Community health, safety and security impacts and risks are identified in the previous ESIA documents (Refer to <i>Section 4.2.2</i>). The main issues of concern are associated with non-routine events such as accidents related to vehicle and vessel operations, fires and explosions, accidental release of oil or hazardous materials, as well as	Details on the <i>Project's</i> approach for community health, safety and security are still being developed.	Identify <i>Project</i> commitments concerning community health, safety and security. Engage with the EPA (or other applicable entities) on available oil spill response equipment in the area and the capability of oil spill response in the <i>Project Area</i> .

Topic Area	Main Sources of Information	Gaps	ESIA Baseline Study Approach
Waste Management	Waste management for an offshore oil and gas development are identified in the previous ESIA documents (Refer to <i>Section 4.2.2</i>) and HGEL Appraisal Campaign experience and Waste Management Plan.	Details of the <i>Project's</i> approach to waste management are still being developed.	Identify <i>Project</i> commitments concerning waste management. Evaluate availability and capacity of public resources to manage non-hazardous, hazardous wastes and NORM.
Ecosystem Services	Information on ecosystems services is contained in previous ESIA documents (Refer to <i>Section 4.2.2</i>). For this <i>Project</i> ecosystem services of concern are as covered by other topic areas as follows: <ul style="list-style-type: none"> • Provision services relate to fishing and other marine based livelihoods and marine water quality. • Regulating services relate to climate change. • Cultural services are related to recreation (tourism). • Supporting services are related to marine water quality and nutrient levels (related to upwelling and productivity). 	Gaps are as identified for the various topic areas above.	Approach is as identified for the various topic areas.

7.3.2 Environmental Baseline Studies

Environmental baseline studies for the ESIA will consist of further desktop-based research and collection of information from public sources through direct engagement with individuals and organisations that may have information and data. The requirements for further baseline studies are detailed in the gap assessment.

Given the availability of relevant and recent environmental data provided in studies and surveys conducted for the *Project*, no further primary environmental sampling and analysis is required for the ESIA.

The results of any available swath, geophysical and geotechnical surveys of the seabed in the *Project Area* commissioned by the *Project* as part of the technical studies will be reviewed for the ESIA to provide further information on bathymetry and seabed conditions.

7.3.3 Socio-Economic Baseline

Social baseline studies for the ESIA will consist of further desktop-based research and collection of information from public sources through direct engagement with individuals and organisations that may have information and data. The requirements for further baseline studies are detailed in the gap assessment. Given the availability of relevant and recent social data, no further primary sampling is likely to be required for the ESIA.

5.2.1 Quantitative Studies of Environmental Impact

To support the impact assessment, quantitative studies will be conducted as part of the ESIA to predict potential effects. *Table 7.2* gives an overview of the quantitative studies that will be part of the *Project* ESIA. These studies will include the following.

- Modelling of accidental oil spill scenarios to predict the fate of oil in the environment.
- Aquatic dispersion modelling of operational discharges, including drill cuttings discharges, cooling water and produced water discharges.
- Quantification of all sources of GHG emissions from *Project* activities.

Table 7.2 *Quantitative Studies*

Resource	Potential Area of Influence	Approach	Parameters
Environmental Resources and Receptors	Understanding the impacts of the proposed activities and accidental events on resources and receptors in the Area of Influence	A specialist will model the trajectory and dispersion of the worst-case scenarios of an accidental oil spill (ie collisions, ruptures, blowout, etc) to establish the extent and dispersion of the oil spill.	An advanced hydrodynamic model will be used to assess the impact of a major accidental oil spill on the marine water quality and sensitive areas and receptors near the study area.
Water Quality	Understanding the impacts of the proposed activities on water quality	A specialist will model the operational discharges, including drill cuttings discharges, cooling water and produced water discharges. Other modelling may need to be conducted depending on the operational design at the time the ESIA is conducted.	An advanced hydrodynamic model will be used to assess the impact of the operational discharges including drill cuttings, cooling water and produced water on the marine water quality and sensitive areas and receptors near the study area.
Air Quality	Air quality near the FPSO and climate change	An inventory to quantify the amount of GHG emissions that will be emitted by the proposed activities offshore and to predict whether air emissions from the project activities will meet the EPA air quality standards.	Based on desktop study informed by engineering and technical data. The following parameters will be described: <ul style="list-style-type: none"> • Suspended particulate matter (SPM); • Carbon monoxide (CO); • Sulphur dioxide (SO₂); • Nitrogen dioxide (NO₂); and • Hydrocarbons (volatile organics).

7.3.4 Fisheries Impact Assessment

Section 93 of the Fisheries Act stipulates that if a proponent plans to undertake an activity that is likely to have a substantial impact on the fisheries resources, the Fisheries Commission should be informed of such an activity prior to commencement. The Commission may require information from the proponent on the likely impact of the activity on the fishery resources and possible means of preventing or minimising adverse impacts. As such, the Fisheries Commission will be consulted as a key stakeholder in the ESIA.

The baseline conditions and potential impacts on fisheries will be assessed and a Fisheries Impact Study will be conducted and submitted to the Fisheries Commission.

7.4 IMPACT ASSESSMENT METHODOLOGY

7.4.1 Introduction

An impact, as defined by the international standard ISO14001:2004 is:

“Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects”.

Where *“environmental aspect”* is defined as: *“Element of an organisation’s activities or products or services that can interact with the environment”.*

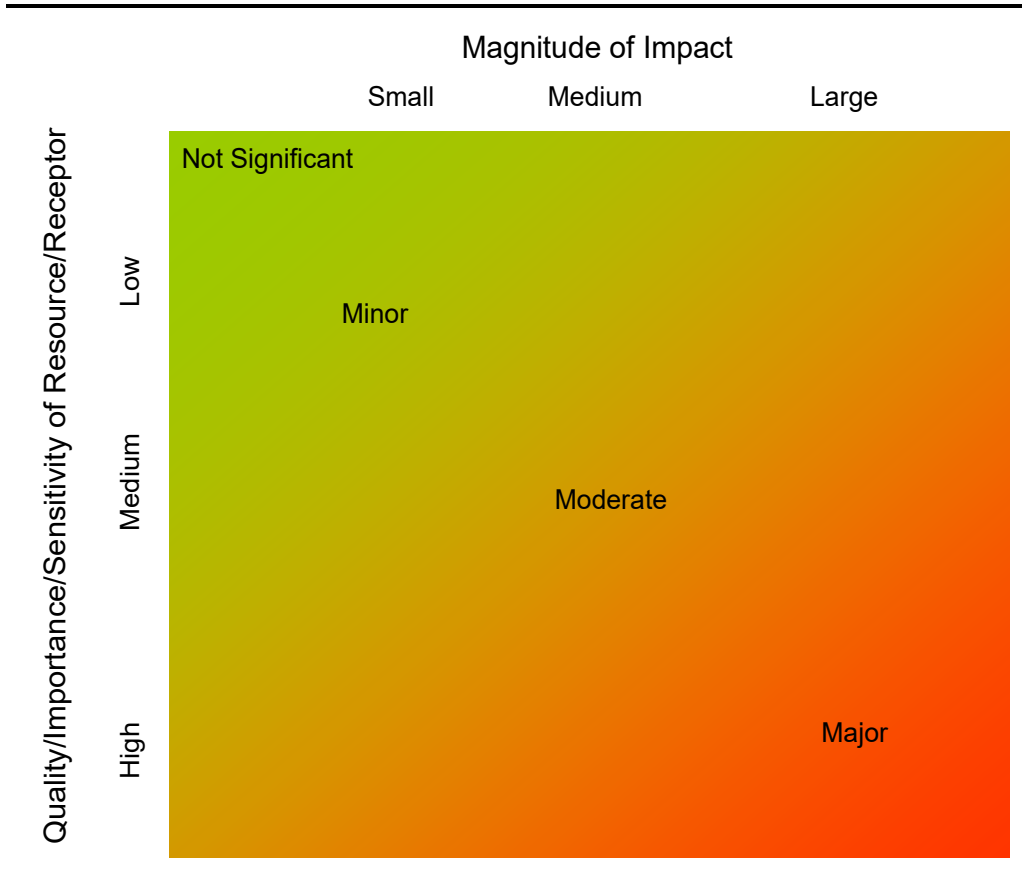
An *“impact”* is defined where an interaction occurs between a project activity and an environmental receptor.

The ESIA process ranks impacts according to their *“significance”* determined by considering project activity *“event magnitude”* and *“receptor sensitivity”*.

Determining event magnitude requires the identification and quantification (as far as practical) of the sources of potential environmental and socio-economic effects from routine and non-routine project activities. Determining receptor environmental sensitivity requires an understanding of the biophysical environment.

Magnitude and receptor quality/importance/sensitivity will be looked at in combination to evaluate whether an impact is, or is not, significant and if so its degree of significance (defined in terms of *Minor, Moderate* or *Major*). Impacts classed as *not significant* include those that are slight or transitory, and those that are within the range of natural environmental and social change. This principle is illustrated schematically in Figure 7.1.

Figure 7-1 Evaluation of Significance



The assessment of unplanned events, such as potential oil spills, will also take into account the probability of occurrence via a risk assessment process.

Risk is defined ‘the likelihood that a hazard will actually cause its adverse effects, together with a measure of the effect’, where a hazard is ‘something (e.g. an object, a property of a substance, a phenomenon or an activity) that can cause adverse effects’¹. An example of a hazard is the rupture of an oil transfer hose during transfer operations.

¹ UK Health and Safety Executive (<http://www.hse.gov.uk/risk/theory/alarplance.htm>)

This approach includes reference to qualitative risk evaluation that assigns severity and likelihood categories to the consequences for the hazards identified using a risk assessment matrix.

7.5 STAKEHOLDER ENGAGEMENT

Following the completion of scoping and the Scoping Report, further consultation will be undertaken as follows:

- Disclosure of Scoping Report;
- Baseline Studies; and
- ESIA.

Disclosure of Scoping Report

The Scoping Report will be submitted to the EPA for review.

Following approval, the EPA will issue authorisation to the *Project* to proceed with the ESIA phase. The letter will also include comments on the Scoping Report and the TOR.

Following approval, the Scoping Report will be disclosed to government stakeholders and the public under EPA's direction. The EPA will decide the process for disclosure. Typically, disclosure is announced via public notice (in newspaper). The Scoping Report is made available at public locations (subject to EPA advice). For this *Project*, locations may include:

- PA library in Accra;
- Public Library in Sekondi;
- District Assembly Offices in Elembelle, Western Region; and
- Paramount Chief Palace in Atuabo.

The Scoping Report will also be hosted on a website and the address provided to consultees during consultations.

Consultations during ESIA Studies

Further, local level engagement activities will be undertaken for the various impact studies. This will involve meetings and interviews. While the aim of the engagements is data collection, stakeholder views and concerns will continue to be gathered during these engagements.

Consultation during ESIA Disclosure

Disclosure of the ESIA will provide detailed information about the proposed *Project* activities, an assessment of the potential impacts and the planned mitigation measures and management actions.

The disclosure of the ESIA is led by Ghana EPA. Typically, the ESIA is submitted to the EPA and advertised. Copies of the ESIA are made available at a number of locations for public review and comment. The *Project* supports the disclosure process as required and directed by the EPA.

Given the nature and scale of the *Project*, a public hearing will likely be required by EPA. The public hearing is organised by EPA and attended by representatives of the *Project*.

Following the public hearing and EPA review, the EPA may grant provisional approval for the *Project*. The EPA will require that comments received on the ESIA be addressed and a final ESIA submitted to EPA for approval.

The Scoping Report will also be hosted on a website and the address provided to consultees during consultations. The drop-in centres established for the purposes of receiving grievances will also be used to disseminate information on the project, including copies of the ESIA Non-Technical Summary.

7.6 STRUCTURE OF THE ESIA

The EA regulations specify the requirements for the content of the ESIA (Figure 7-2).

Figure 7-2 Required Contents of an ESIA

- Description of the undertaking
- Analysis of the need for the undertaking
- Alternatives to the undertaking including alternative situations where the undertaking is not proceeded with
- Matters on site selection including a statement of the reasons for the choice of the proposed site and whether any other alternative site was considered
- Identification of existing environmental conditions including social, economic and other aspects of major environmental concern
- Information on potential, positive and negative impacts of the proposed undertaking from the environmental, social, economic and cultural aspect in relation to the different phases of development of the undertaking
- Potential impact on the health of people
- Proposals to mitigate any potential negative socio-economic, cultural and public health impacts on the environment
- Proposals to be developed to monitor predictable environmental impact and proposed mitigating measures
- Contingency plans existing or to be evolved to address any unpredicted negative environmental impact and proposed mitigating measures
- Consultation with members of the public likely to be affected by the operations of the undertaking
- Maps, plans, tables, graphs, diagrams and other illustrative material that will assist with comprehension of the contents of the environmental impact statement
- Provisional environmental management plan
- Proposals for payment of compensation for possible damage to land or property arising from the operation of the undertaking
- Indication whether any area outside Ghana is likely to be affected by the activities of the undertaking

Source: Ghana EA Regulations

An outline of the proposed contents of the main volume of the ESIA Report is provided in *section 7.8*. The proposed contents fulfil the requirements of the Ghana EA Regulations and are consistent with previous ESIA's approved by Ghana EPA.

The content may be altered slightly during the evolution of the *Project* or based on the findings of on-going consultation, however it is anticipated that the contents of the ESIA will align broadly within the suggested framework.

7.7 PROVISIONAL SCHEDULE FOR THE ESIA PROCESS

The *Project* development schedule is being developed in consultation with the government of Ghana and the *Project* partners. The commencement of the ESIA process will follow completion of certain planning actions and advancement of *Project's* design. Once initiated, the detailed ESIA process is expected to take between eight and twelve months.

7.8 PROPOSED TABLE OF CONTENT FOR ESIA

The table below gives an overview of the proposed outline of the ESIA report, called the Environmental Impact Statement (EIS).

1	Introduction
1.1	The purpose of the report
1.2	Overview of the project
1.3	The purpose of the EIA
2	Legal and Policy Framework
2.1	Introduction
2.2	Government administration
2.3	National legislation
2.4	State, conventions and classification requirements
2.5	Relevant international agreements and conventions
2.6	Good practice standards and guidelines
2.7	Project EHS policies and standards
3	Project Description
3.1	Project overview
3.2	Project alternatives
3.3	Project location
3.4	Project schedule
3.5	Offshore facilities and equipment
3.6	Onshore support operations and onshore base
3.7	Main project activities
3.8	Personnel requirements
3.9	Emissions, discharges and wastes
3.10	Personnel health and safety
4	Stakeholder Engagement
4.1	Stakeholder identification
4.2	Public consultation and disclosure plan
5	Environmental Baseline
5.1	Data sources
5.2	Climate and meteorology
5.3	Air quality
5.4	Oceanography and hydrography
5.5	Bathymetry and seabed topography
5.6	Water and sediment quality
5.7	Marine habitats and species
5.8	Protected areas for nature conservation
6	Fish and Fisheries Baseline
6.1	Data sources
6.2	Fisheries consultations
6.3	Fish species in Ghanaian marine waters
6.4	Fishing fleets
6.5	Supporting infrastructure
6.6	Fish landings

Socio-economic Baseline

- 7.1 Data sources
- 7.2 Administrative structures
- 7.3 Demographic profile
- 7.4 Land tenure, spatial planning and land use
- 7.5 Economy and livelihoods
- 7.6 Education
- 7.7 Health care
- 7.8 Utilities, infrastructure and services
- 7.9 Marine infrastructure

8 Impact Identification and Assessment

- 8.1 Assessment methodology
- 8.3 Project footprint
- 8.4 Operational discharges
- 8.5 Emissions to atmosphere
- 8.6 Greenhouse gas emissions
- 8.7 Waste management
- 8.8 Fisheries impacts
- 8.9 Socio-economic and community health impacts
- 8.10 Accidental events/ emergencies
- 8.11 Cumulative and transboundary impacts

9 Mitigation and Management Measures

- 9.1 Summary of mitigation and management measures

10 Monitoring Plan

- 10.1 Monitoring approach
- 10.2 Monitoring plan for specific mitigation measures

11 Decommissioning

- 11.1 Regulations and authority
- 11.2 International conventions and guidelines
- 11.3 Decommissioning methods

12 Environmental Management Plan

- 12.1 Overview and scope
- 12.2 General requirements
- 12.3 Planning
- 12.4 Implementation
- 12.5 Checking and corrective action
- 12.6 Cost estimates and schedules
- 12.7 On-going stakeholder engagement
- 12.8 Grievance procedure

13 Summary and Conclusions

- 13.1 EIA process
- 13.2 Summary of impacts and mitigation
- 13.3 Overall conclusion

REFERENCE LIST

ACORN, 2015. Independent study of marine environmental conditions in Ghana. January 2015.

Adamec D and O'Brien J J, 1978. The seasonal upwelling in the Gulf of Guinea due to remote forcing. *J Phys Oceanog* 8: 1050-1060.

AECOM Environment, 2014. Preliminary Environmental Report (PER). Appraisal Drilling, Deepwater Tano/ Cape Three Points Block Offshore Ghana.

AFDB, 2012. Republic of Ghana Country Strategy Paper 2012-2016, AFDB, Tunis

Aggrey-Fynn, 2007. The fishery of *Balistes capricus* (Balistidae) in Ghana and possible reasons for its collapse. PhD Thesis. Centre for Tropical Marine Ecology, University of Bremen.

Afukaar et al., 2003. Pattern of road traffic injuries in Ghana: Implications for control. *Injury Control and Safety Promotion*. 2003, Vol. 10, No. 1-2, pp. 69-76. Accessed: http://www.researchgate.net/publication/10737164_Pattern_of_Road_Traffic_Injuries_in_Ghana_Implications_for_Control (15/09/15)

Allersma E. and Tilman M. K.W., 1993. Coastal Conditions in West Africa. Review in *Ocean and Coastal Management* Vol., pp. 199- 240.

Anderson et al., 2014. Statistical Analysis of Vehicle Accident Cases in the Western Region, Ghana. *Mathematical Theory and Modeling*. Vol.4, No.13, 2014. Accessed: <http://www.iiste.org/Journals/index.php/MTM/article/viewFile/17298/17596> (15/09/15)

Amiteye B. T., 2002. Distribution and ecology of nesting sea turtles in Ghana. Unpublished Thesis University of Ghana.

Arhinful, D. K., 2009. Health Facilities Survey in Ghana.

Armah A K, Darpaah G A, Wiafe G, Adomako J K, Quartey S Q, Abotchie C, Ansah F and Fiagbedzi S 1997 . Traditional and modern perspectives of marine turtle conservation in Ghana *Biodiversity Conservation: traditional knowledge and modern concepts* (eds. Amlalo DS, Atsiatorme LD and Fiati C), p. 80-87: EPA/MAB/UNESCO.

Armah A K and Amlalo D S 1998. Gulf of Guinea Large Marine Ecosystem Project: Coastal zone profile of Ghana Ministry of Environment Science and Technology, Accra Ghana.

Ateweberhan, M., Gough, C., Fenelly, L. and Frejaville, Y. 2012. The nearshore rocky reefs of Western Ghana, West Africa: baseline ecological research surveys. Blue Ventures Conservation Report, 1-100

Birdlife International, 2015. Birdlife Data Zone – Important Bird Areas. Accessed at <http://www.birdlife.org/datazone/site/search>

Boere G C & Stroud D A 2006. The flyway concept: what it is and what it isn't. Waterbirds around the world. Eds. Boere G C, Galbraith C A & Stroud D A. The Stationery Office, Edinburgh, UK. pp. 40-47.

Boko, M. et al., 2007. Chapter 9: Africa. Fourth Assessment Report of the IPCC: 441.

Commonwealth Network Ghana 2014, Tourism and Travel. Accessed at: http://www.commonwealthofnations.org/sectors-ghana/business/tourism_and_travel/ (14/02/2015)

CRC-URI, 2010. Our Coast, Our Future. Western Region of Ghana, Building capacity for adapting to a rapidly changing coastal zone. H&N Mpoano. Prepared by Coastal resources centre – University of Rhode Island (CRC-URI) and SustainaMetrix. pp. 66.

Elgood J H, Heigham J B, Moore A M, Nason A M, Sharland R E and Skinner NJ, 1994. The birds of Nigeria (2nd edition) British Ornithologists' Union Check-list No. 4. British Ornithologists' Union Tring.

Ellembelle District Profile, 2012. Ellembelle District Information, Ellembelle District. Accessed at: <http://ghanadistricts.com>

EPA, 2010 Guidelines for Environmental Assessment and Management in the Offshore Oil and Gas Development. Available from: www.epa.gov.gh

EPI Group 2014. 3D Seismic Survey Report. Cetacean and Sea Turtle Report. Hess Corporation. Deepwater Tano/ Cape Three Points, Ghana. EPI REPORT No. 1530-MMO.

ERM, 2009. Ghana Jubilee Field Phase I Development. Environmental Impact Statement. Prepared for Tullow Ghana Limited in November 2009.

ERM, 2012. Environmental and Social Scoping Study of the Tweneboa, Enyenra, Ntomme (TEN) Development, Ghana (prepared by ERM, ESL, and SRC), Tullow Ghana, 2012

ERM 2013. Environmental and Social Impact Assessment of an Oil Services Terminal (OST), Atuabo, Western Region, Ghana (prepared by ERM, ESL, and SRC) (2013).

ERM, 2015a. Environmental and Social Impact Assessment of the Offshore Cape Three Points (OCTP) Phase 2 Development [offshore gas production and transport to shore], Ghana (prepared by ERM and ESL), eni Ghana, 2015

ERM, 2015b. Fisheries Impact Assessment of the Offshore Cape Three Points (OCTP) Phase 1 and Phase 2 Development, Ghana (prepared by ESL for ERM), Eni Ghana, 2015

ERM, 2015c. Environmental and Social Scoping Study of a 450 MW Power Plant in Aboadze, Western Region, Ghana (prepared by ERM and ESL), Globeleq Advisors Limited and Volta River Authority, 2015

Evans P G H and Nice H 1996. Review of the effects of underwater sound generated by seismic surveys on cetaceans. SeaWatch Foundation, Oxford. (Report commissioned by UKOOA.)

FAO, 2010. Country reports presented at the FAO FishCode-STF/CECAF/FCWC Subregional Workshop on the Improvement of Fishery Information and Data Collection Systems in the West Central Gulf of Guinea Region. Accra, Ghana, 26-28 June 2007. FAO Fisheries and Aquaculture Report. No. 921, Suppl. 113p.

FAO, 2014. FAO FishFinder [online]. FAO Fisheries and Aquaculture Department [online]. Rome. Available at <http://www.fao.org/fishery/fishfinder/about/en> [Accessed July 2014].

Flegg J 2004). Time to Fly. Exploring Bird Migration. BTO, Thetford.

Fontaine B, Janicot S and Roucou P, 1999. Coupled ocean-atmosphere surface variability and its climate in the tropical Atlantic region. *Climate Dynamics* 15: 451-473.

Froese R and Pauly D, Editors, 2010. FishBase version 09/2010 [online] Available at www.fishbase.org [Accessed July 2011].

Fugro, 2014. Current Data Report, Ghana Deepwater Current Measurements Phase 4, Survey Date 24 August to 27 December 2014.

Fugro, 2014. Metocean Modelling Data Report, Metocean Criteria for the Pecan Field.

Gardline 2015. Environmental Baseline Survey Report, Deep Water Tano Cape Three Points, Survey Date December 2013 to January 2014.

Ghana Aids Commission, 2014. Country Aids Response Progress Report - Ghana, Ghana Aids Commission, Accra

Ghana Health Service 2014. Ellembelle District Profile, Ghana Health Service, Accra

Ghana Investment and Promotion Centre 2014. Investing in Ghana's Fishing Sector. Office of the President (Ghana). Accessed at: <http://gipcghana.com/21-investment-projects/agriculture-and-agribusiness/fishing-and-aquaculture/300-investing-in-ghana-s-fishing-industry.html> (18/12/14)

Ghana Investment and Promotion Centre 2014, Investing in Ghana's Agricultural & Agro-Processing Industry, Office of the President (Ghana). Accessed at: <http://gipcghana.com/invest-in-ghana/sectors/agriculture-agro-processing/investing-in-this-sector.html> (18/12/14)

Ghana Ports and Harbour Authority n.d, Port of Takoradi. Accessed at:
<http://ghanaports.gov.gh/tr/page/39/Navigational-Information-Takoradi> (18/12/14)

Ghana Statistical Service 2013. Population and Housing Census- Regional Analytical Report- Western Region, Ghana Statistical Service, Accra.

Ghana Statistical Service, 2012. 2010 Population and Housing Census: Provisional National and Regional Statistics. Republic of Ghana.

Hess Offshore Operations, 2011. Fish and Fisheries Study, Hess, Accra

IUCN 2015. <http://www.iucnredlist.org/> [Accessed July 2014].

Kastning, T 2011. Basic Overview of Ghana's Emerging Oil Industry, Friedrich Ebert Stiftung, Accra

Koranteng K.A. 1998. The impacts of environmental forcing on the dynamics of demersal fishery resources of Ghana. PhD Thesis, University of Warwick, pp. 377

Mensah, M.A. and Koranteng, K.A. 1988. A review of the oceanography and fisheries resources in the coastal waters of Ghana. Marine Fisheries Research Report No. 8, Fisheries Research & Utilization Branch, Tema, Ghana, pp. 35.

Ministry of Energy, 2012. Natural Gas Pricing Policy, May 2012.

NCEAS 2014, Data Impacts. Accessed at: <https://www.nceas.ucsb.edu/GlobalMarine/impacts>.

Noble Denton, 2008. Offshore Ghana MetOcean data report Report No: L22898/NDC/IGA 45pp.

Osei-Boateng, C. and Ampratwum E, 2011. The Informal Sector in Ghana, Friedrich Ebert Stiftung, Accra

Paradi-Guilford, 2015. How Ghana is tackling energy shortages, May 2015. Accessed:
<https://agenda.weforum.org/2015/03/how-ghana-is-tackling-energy-shortages/> (15/09/15)

Soper, J. 2015. Ghana: Fishing in Oil's Ocean. September 11, 2015. Accessed.
<http://pulitzercenter.org/reporting/ghana-fishing-oils-ocean-soper> (15/09/15)

TGL Offshore Operations, 2011. Fish and Fisheries Study, TGL, Accra

Tyler-Walters, H. 2003. Lophelia reefs. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [Available at: <http://www.marlin.ac.uk>]

US Energy Information Administration 2014, Ghana- Country Analysis Note. Accessed at:
<http://www.eia.gov/countries/country-data.cfm?fips=gh> (13/02/15)

United States Agency for International Development (USAID), 2011. Ghana Climate Change Vulnerability and Adaptation Assessment.

US Energy Information Administration 2014. Ghana- Country Analysis Note. Accessed at:
<http://www.eia.gov/countries/country-data.cfm?fips=gh> (13/02/15)

Van Waerebeek K, Ofori-Danson P K and Debrah J (2009). *The Cetaceans of Ghana: a Validated Faunal Checklist*. West African Journal of Applied Ecology Vol 15.

Weir, C.R. 2010. A review of the cetacean occurrence in West African waters from the Gulf of Guinea to Angola. Mammal Rev. 40 (1): 2-39

WHO Global Health Observatory (GHO) data, 2015.
(10/09/15)<http://www.who.int/gho/countries/en/> (10/09/15)

World bank 2015. Accessed:
<http://databank.worldbank.org/data//reports.aspx?source=2&country=GHA&series=&period=>
(10/09/15)

8. APPENDICES

8. APPENDICES

APPENDIX 8-A: Background Information Document (BID) and Feedback Comment Form

Purpose

The purpose of the Background Information Document (BID) is to provide information about the proposed Aker Energy (Ghana) Deep Water Tano Cape Three Points (DWT CTP) Development and to introduce the scoping study that is being conducted as part of the Environmental and Social Impact Assessment (ESIA).

Background

Aker Energy Ghana (formerly known as Hess Ghana Exploration Ltd (HGEL), Lukoil Overseas Ghana Tano Limited (*Lukoil*), Ghana National Petroleum Corporation (GNPC) and Fueltrade Limited (*Fueltrade*), own participating interests in the Deep Water Tano Cape Three Points (DWT CTP) Contract Area (*Contract Area*), with Aker Energy holding 50%, Lukoil 38%, GNPC 10% and Fueltrade 2%. The owners are considering developing the DWT/CTP *Contract Area* with a Floating Production, Storage and Offloading (FPSO) (hereafter the "*Project*").

The *Contract Area* is located off the Western Region of Ghana, about 70 km from the coast at the nearest point (The *Contract Area* is about 60 km across covering about 200,000 ha. Water depths across the *Contract Area* range from 1,600 m to 2,500 m.

Overview of Proposed Development

The proposed development is an offshore oil and gas production system consisting of:

- Installation of 40 - 45 oil and gas production and injection wells;
- Installation of a ship-shaped FPSO and mooring system; and
- Installation of subsea infrastructure.
- Subsea connections from the wells to the FPSO.

All of the above will be in very deep water where there is no trawling activity.

Construction of the development will involve drilling, completion and connection of the wells; installing and testing of the subsea facilities and pipeline; and anchoring of the FPSO unit.

Once the system is operational, well fluids comprising oil, gas and water will be received and treated on the FPSO. Treated crude oil will be stored on the FPSO and periodically offloaded to a shuttle tanker and sold to international markets. Natural gas will be treated on the FPSO and transported to shore used in Ghana.

Start of production is planned for 2021. Production is projected to last until 2036 or longer.

At the end of production, the FPSO and associated infrastructure will be decommissioned i.e. removed. This will involve the removal of the subsea infrastructure, the connecting lines, the FPSO mooring lines and the FPSO itself. All hazardous wastes will be disposed of according to international good practice.

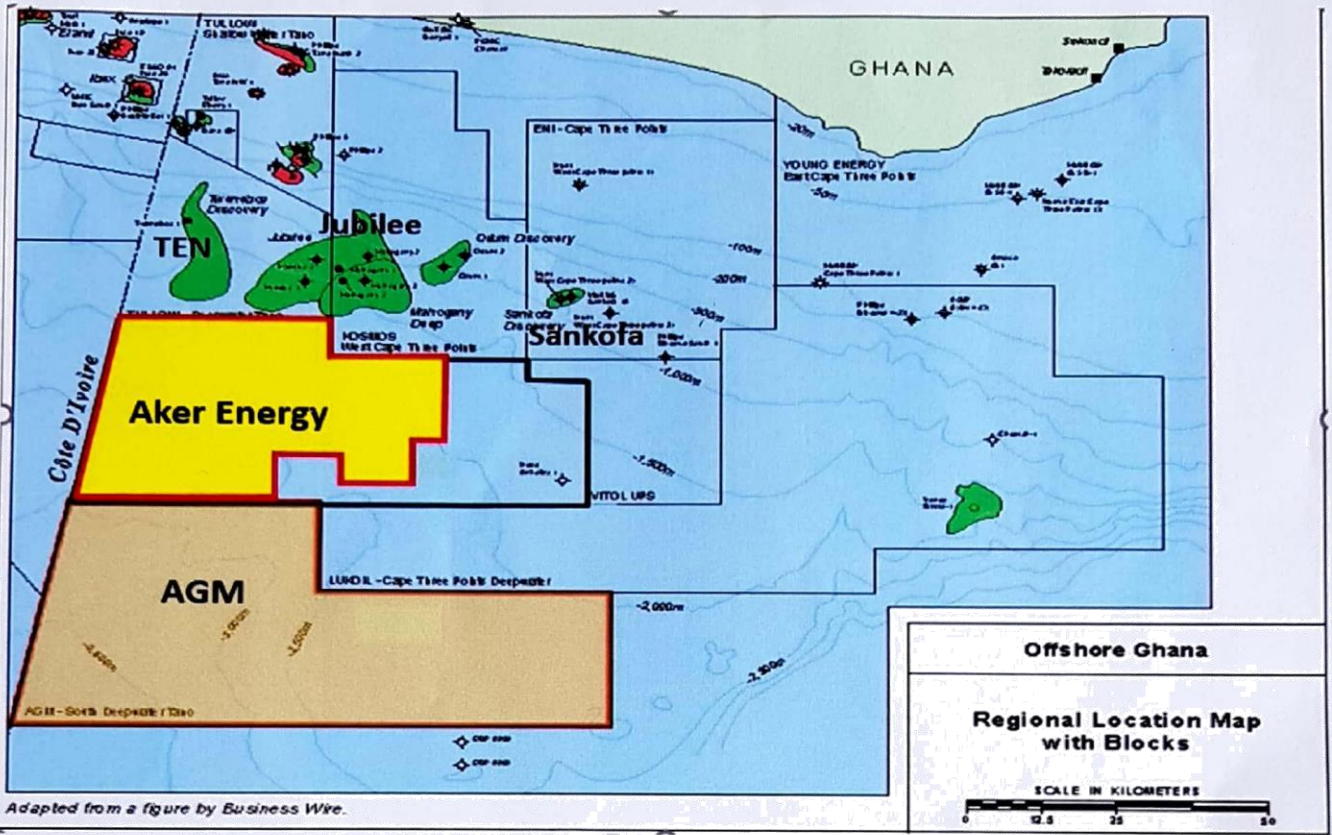
Scoping Study

In conformity with the Ghana Environmental Assessment Regulations of 1999 (LI 16:52), the proposed activities require an Environmental and Social Impact Assessment (ESIA) and an environmental licence from the Ghana Environmental Protection Agency (EPA).

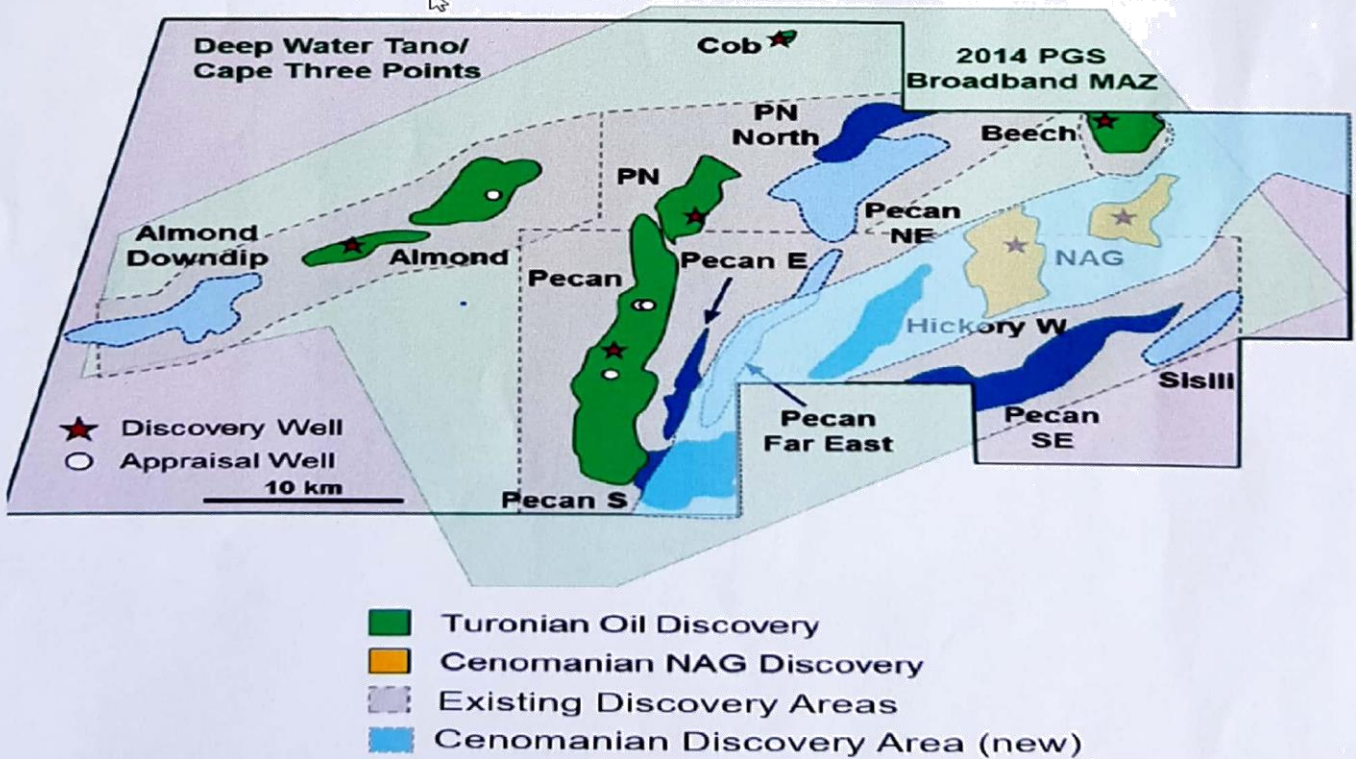
Aker Energy has appointed ESL Consulting (ESL) to undertake the ESIA scoping study.

The scoping study will identify the likely potential positive and negative environmental, social, and health impacts of the project and further provide the terms of reference for the full ESIA studies. A Scoping Report will be prepared which will describe the plans to be put in place to mitigate and manage impacts. The scoping study will include engagement with the government, community and civil society stakeholders to obtain their views. The Scoping Report, along with stakeholder comments will be submitted to the Ghana EPA for approval and made available for public comment.

Figure 1: Project Locality Map



Adapted from a figure by Business Wire.



Source Aker Energy 2018

Figure 2. Example of subsea structures array

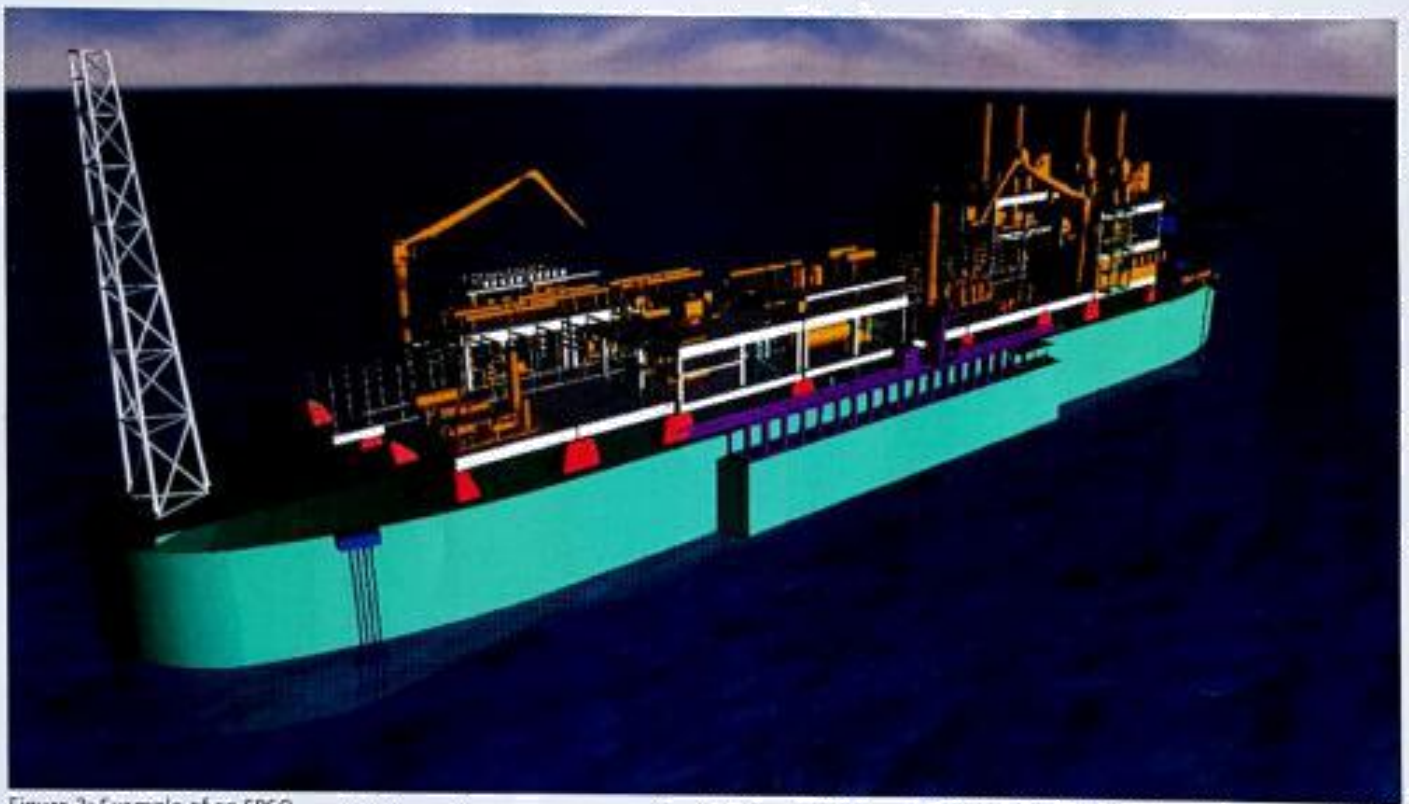


Figure 3: Example of an FPSO



Deep Water Tano Cape Three Points (DWT CTP) Development ESIA Scoping Study

Background Information Document
June 2018

Potential Impacts & Mitigating Measures

The development will be located in deep water approximately 70 km off the coast of the Western Region of Ghana. The activities

planned for construction, operations and decommissioning have the potential for impacts to the environment. Based on a preliminary assessment of the proposed activities, potential impacts and risks include the following:

Physical and Biological

- Emissions to air from power generation, flaring and venting on the drilling rig and FPSO have the potential to effect air quality and contribute to global climate change. The FPSO design and operation will have focus on energy efficiency to reduce the CO2 emission. The design will allow flaring and venting to be at minimum.
- Discharges to sea of produced water and chemicals have potential to impact the marine environment. The produced water and other oily spill water will be treated to meet or be below required discharge limits. Best Available Technique (BAT) principles will be applied for the treatment technology. The drilling and production process will use as environmental friendly chemicals as possible. Risk assessments will be conducted to estimate potential impact and to find best chemical option.
- Noise generated by the drilling rig, FPSO, and other operations could result in localised disturbance to marine mammals.
- Drilling activities and the placement of subsea infrastructure and FPSO moorings have the potential to impact biological communities that live on or in the seabed sediments. The drilling ship will not be moored to reduce anchoring impact.

There will be collection and containment systems offshore as well as at the shore, and oil dispersion systems offshore.

All potential impacts and mitigating measures will be identified and assessed through the course of the ESIA Study.

Social

- Direct and indirect employment and procurement related to the development has the potential for positive economic impacts on the country and local communities.
- The movement of vessels during construction, production and decommissioning has the potential to interrupt fishing activities.
- The safety exclusion zone around the FPSO has the potential to impact fishing activities and marine traffic.

Cumulative

- Other oil and gas activities are already occurring in the offshore area near where the development will be located. Takoradi, where supply and maintenance activities will occur, is already experiencing social and economic impacts from the multiple oil and gas developments.

Accidents

- There are risks associated with oil and gas operations. Accidents and unplanned events can occur, like vessel collisions, pipeline leaks or well blowouts. Such events and accidents are very unlikely and best industry practices will be applied to lower the likelihood for an event. The events could lead to accidental oil spill that potentially have a significant impact on the biophysical and social environment, on a local and regional scale. Oil spill response plans and equipment will be in place to mitigate such and oil spill.

Invitation to Comment

You are invited to participate in the scoping process and to share issues and concerns you may have about the proposed development. Your comments are important to informing the scoping process and it is important that your support or concerns are noted so that they can be assessed in the ESIA.

To be kept informed through the scoping and ESIA process, please provide your contact details.

Name: _____

Organisation: _____

Position: _____

Address: _____

Telephone: _____

Mobile: _____

Email: _____

To register your comments, please use the form attached or send an email to the following:

ESL Consulting Limited

~~ESL~~

~~Ghana~~

~~Exploration~~

~~ESL~~

Contact: Mr. AK Armah

Tel: +233-302-683206

Email: akarmah@esl-ghana.com//akarmah@yahoo.com

Address: ESL Consulting Ltd, PO Box LG 239 Legon, Ghana

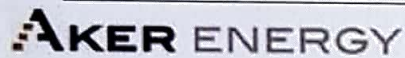
Aker Energy Ghana Limited

Contact: Emmanuel Appiah

Tel: + 233-544338699

Email: aemmanuel@aker.com

Address: 7th Floor Marina Mall, Airport City, Accra.



Deep Water Tano Cape Three Points (DWT CTP) Development ESIA Scoping Study

Background Information Document
June 2018

Stakeholder Comments

Please answer the questions below. Feel free to provide any comments you would like to raise. Please use additional sheets if required.

1. What are the primary concerns and or benefits faced by you/your community/your organization with regards to this development?

2. In your opinion, what are the positive and negative aspects of the proposed Project?

3. Do you have information regarding the environment, community or health status which you think is relevant? (If so, please include here)

Thank you for your participation!

APPENDIX 8-B: Aker Energy Scoping Formal Presentation (Company Profile and Scoping Process)

PRIVATE & CONFIDENTIAL



AKER ENERGY

COMPANY PRESENTATION

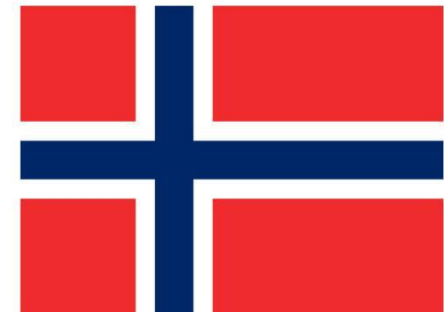
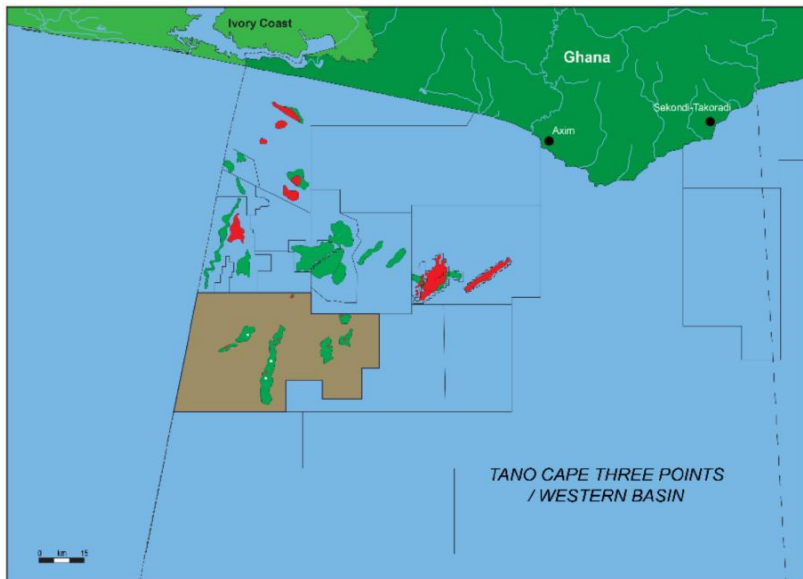


Aker Energy: Brief introduction

International Oil & Gas Company with head office in Norway, operations in Ghana

Acquired Hess Ghana Ltd including the Deepwater Tano Cape Three Points Block

Pecan Field development with FPSO – First oil December 2021



Ambition: Become the oil and gas operator of choice

maturing resources to producing reserves in an efficient, safe and reliable manner

act responsibly towards all stakeholders in our operations

have focus on safety, environment, risk management

Ambition: Become the oil and gas operator of choice

sharing knowledge and experiences through secondments and transfer of learnings

have a long-term ambition to ensure direct and indirect jobs and development of local services

contribute to sustainable growth, create jobs and invest in people.

Aker: Significant oil and gas holdings and experience

EXPLORATION & PRODUCTION

OILFIELD SERVICES

- Fully integrated E&P company
- Operate 5 production hubs
- Largest independent producer on NCS
- 1.2bn resource base – 97 licenses
- Production on current portfolio to increase >300k boepd after 2020
- Significant growth ambitions: organic & M&A

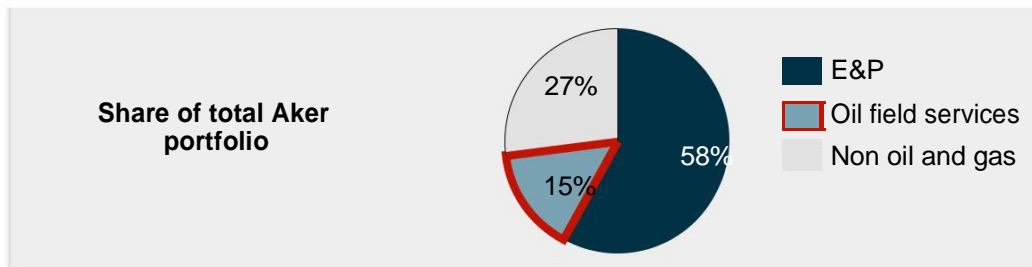
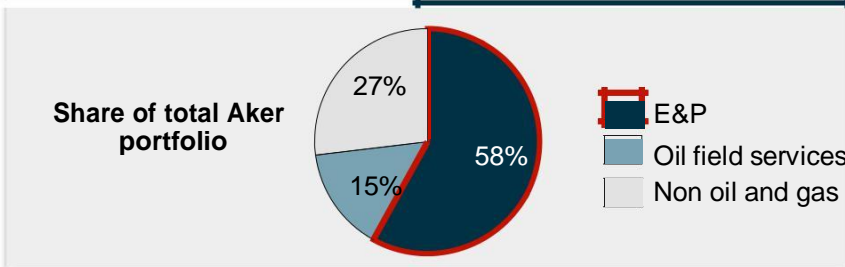
- E&P company with the aim of replicating the Aker BP success in Ghana
- Secured access to attractive acreage in Ghana - SPA signed with Hess on the DWT-CTP block
- Contribute to building local Ghanaian industry

Two key businesses:

- Subsea
- Field Design

- Rig equipment (MHWirth)
- Subsea construction / well intervention vessels

- EPC specialist
- NCS focus



Aker Energy: Executive Management

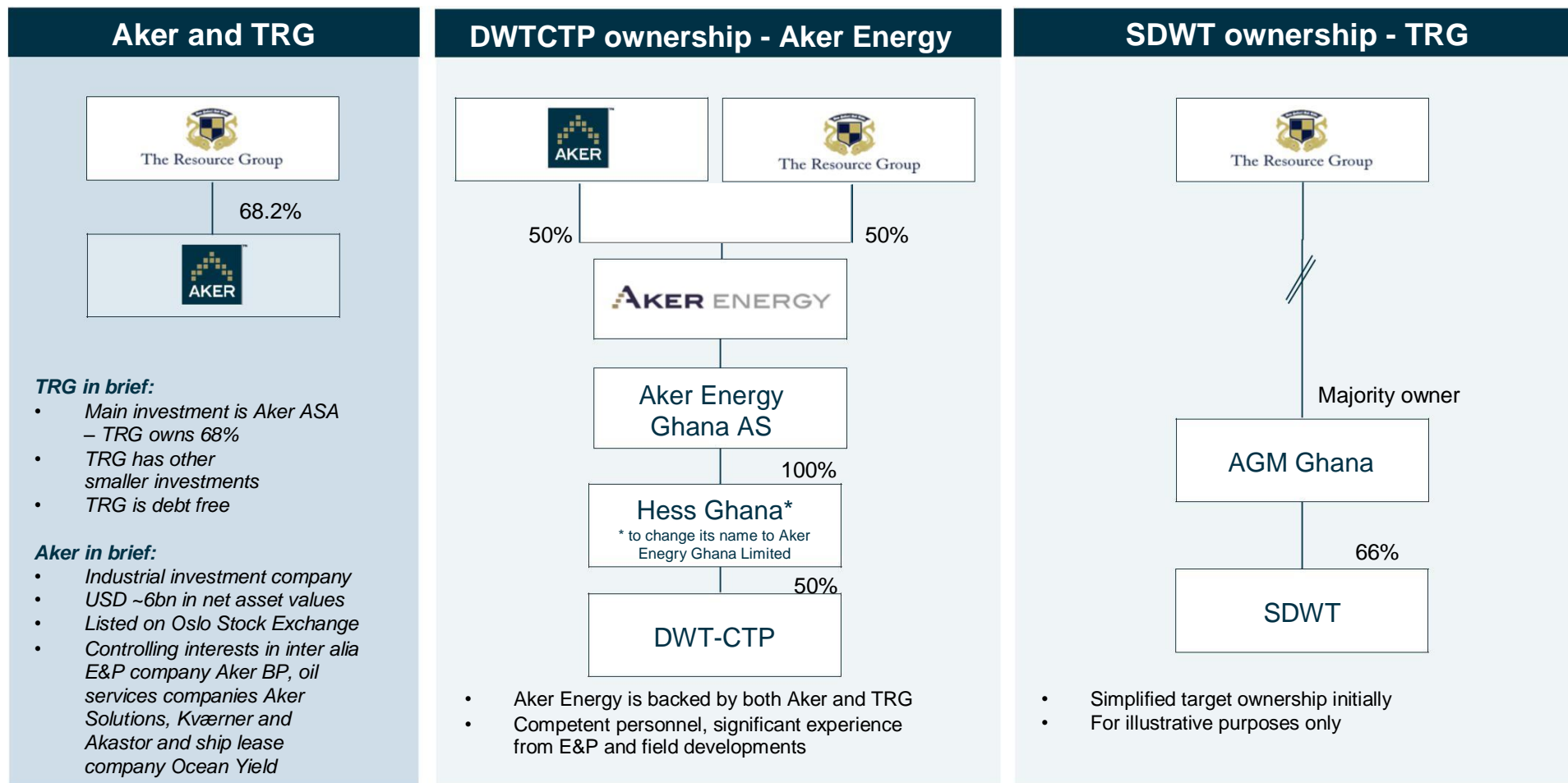
**Chief Executive Officer
Jan Arve Haugan**



**Country Manager Ghana
Jan Helge Skogen**



Ownership: Extensive industry experience



Aker Energy envisages significant synergies between the DWT-CTP and SDWT blocks and will target a regional development



Thank you for your attention

Ole Aspholm

AKER ENERGY

DEEP WATER TANO CAPE THREE POINTS
(DWT/CTP) DEVELOPMENT
ESIA SCOPING STUDY

BACKGROUND INFORMATION

PURPOSE

- To provide information about the proposed AKER Energy (Ghana) (Ghana) DWT CTP Development.
- To introduce, as part of the ESIA, the on-going scoping study.

Background to the DWT CTP project.

Participating Entities:

- Aker Energy (formerly Hess Ghana Exploration Ltd – HGEL): - 50%
- Lukoil Overseas Ghana Tano Ltd (*Lukoil*): - 38%
- Ghana National Petroleum Corporation (*GNPC*): - 10%
- Fueltrade Limited (*Fueltrade*): - 2%

Contract Area to be developed:

70 km from the coast at the nearest point and 60 km across;

across; Coverage = 200,000 ha

Water depth range = 1600 to 2500 m

PROPOSED DEVELOPMENT OVERVIEW

- It is an Offshore Oil and Gas Production System consisting:
 - ✓ Installation of 40-45 oil and gas production and injection wells
 - ✓ Installation of a ship-shaped FPSO and mooring system
 - ✓ Installation of subsea infrastructure
 - ✓ Subsea connections from the wells to the FPSO
- Construction activities of the development will involve:
 - ✓ Drilling, completion and connection of the wells
 - ✓ Installation and testing of the subsea facilities and pipelines
 - ✓ Anchoring of the FPSO unit.

Proposed development overview – cont'd

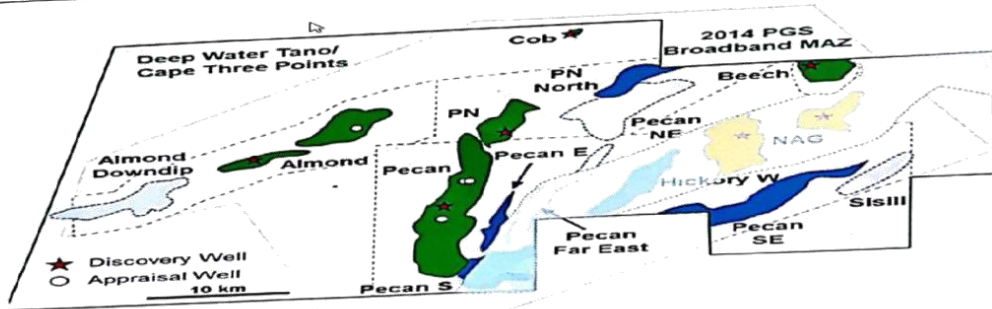
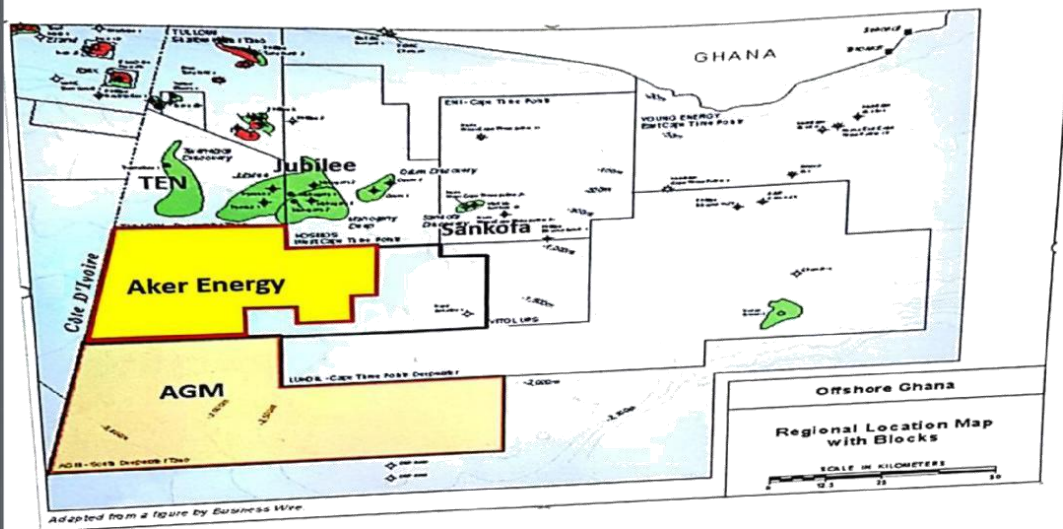
- Operation of the system will involve:
 - ✓ Well fluids (oil, gas and water) to be received and treated on the FPSO
 - ✓ Treated crude oil to be stored on the FPSO and periodically offloaded to shuttle tanker and sold to international markets
 - ✓ Natural gas to be treated on the FPSO and transported to shore and used in Ghana.

Note: Production planned for **2021** and projected to last until **2036** or longer.

- Decommissioning (removal of FPSO and allied infrastructure) at end of production will involve the removal of:
 - ✓ The subsea infrastructure, the connecting lines, the FPSO mooring lines and the FPSO itself.
 - ✓ All hazardous waters, and will be disposed of according to international good practice.

Proposed development overview – cont'd

Figure 1: Project Locality Map



- Turonian Oil Discovery
- Cenomanian NAG Discovery
- Existing Discovery Areas
- Cenomanian Discovery Area (new)

Source Aker Energy 2018

Figure 2. Example of subsea structures array

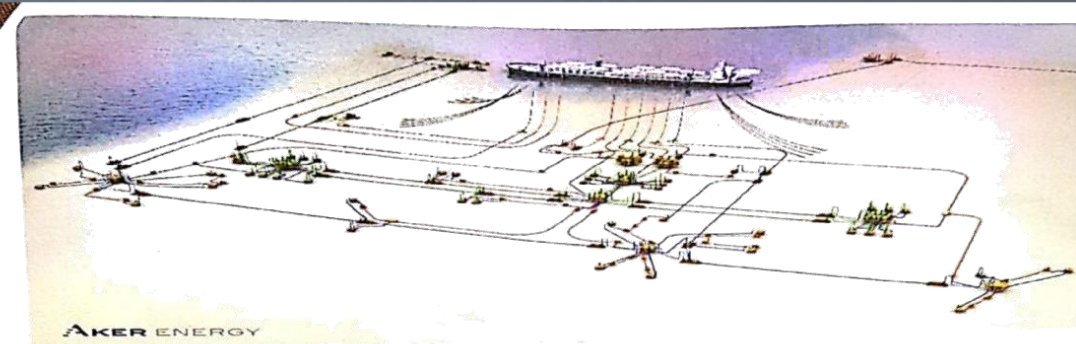


Figure 3: Example of an FPSO

AKER ENERGY

Deep Water Tano Cape Three Points (DWT CTP) Development
 ESIA Scoping Study

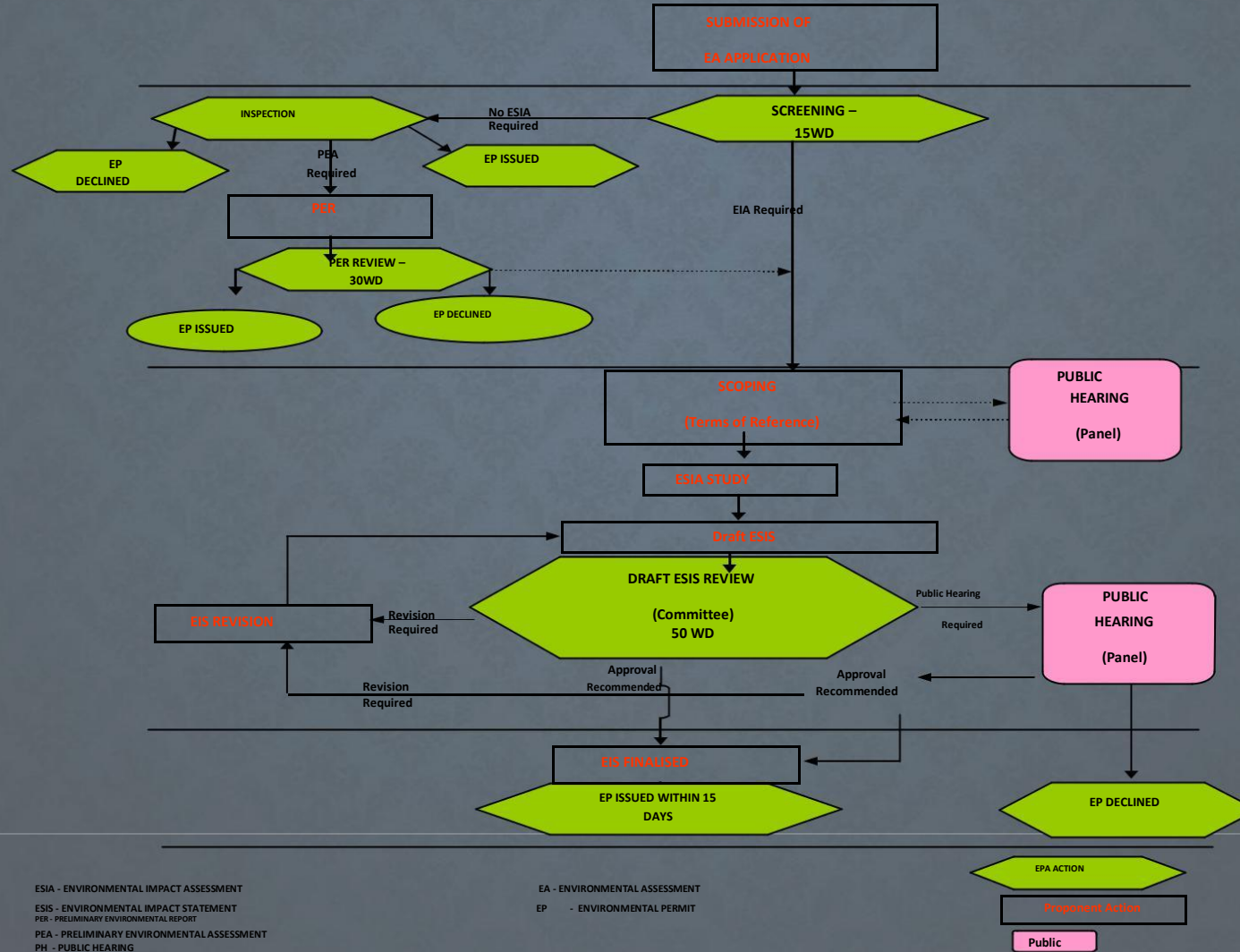
Background Information Document
 June 2018

Potential Impacts & Mitigating Measures

The development will be located in deep water approximately 70 km off the coast of the Western Region of Ghana. The activities

planned for construction, operations and decommissioning have the potential for impacts to the environment. Based on a preliminary assessment of the proposed activities, potential impacts and risks include the following:

GHANA ESIA PROCESS FLOW CHART



ESIA - ENVIRONMENTAL IMPACT ASSESSMENT
 ESIS - ENVIRONMENTAL IMPACT STATEMENT
 PER - PRELIMINARY ENVIRONMENTAL REPORT
 PEA - PRELIMINARY ENVIRONMENTAL ASSESSMENT
 PH - PUBLIC HEARING
 WD - WORKING DAYS REQUIRED FOR REVIEW

EA - ENVIRONMENTAL ASSESSMENT
 EP - ENVIRONMENTAL PERMIT

EPA ACTION
 Program Action
 Public

SCOPING STUDY

- Scoping is a critical step in the preparation of an ESIA.

OBJECTIVES

- Inform the public.
- Identify the main stakeholders, their concerns and values.
- Identify issues of most importance for the ESIA and eliminate those of little concern.
- Establish the Terms of Reference for the ESIA study.

SCOPING STUDY

Why Scoping Study

- Ghana Environmental Assessment Regulations of 1999 (LI 1652) determined the proposed activity as requiring an ESIA and an environmental license from the Ghana EPA.
- The scoping study will identify:
 - ✓ the likely potential positive and negative impacts – environmental, social, health.
 - ✓ provide the terms of reference for the full ESIA studies.

Outcome of Scoping Study

- Report will describe plans to mitigate and manage impacts.
- Study will include engagement with the government, community and civil society stakeholders to obtain their views.
- Scoping report with stakeholder comments will be submitted to the Ghana EPA for approval, and made available for public comment.

POTENTIAL IMPACTS & MITIGATING MEASURES

Based on preliminary assessment

➤ Physical and Biological

- ✓ Emissions to air from power generation, flaring and venting on the drilling rig and FPSO.

(FPSO design and operation will focus on energy efficiency to reduce CO₂ and will allow for flaring and venting to be at minimum)

- ✓ Produce water and chemicals discharges to sea.

(The produce water and other oily spill water will be treated to meet or be below required discharge limits using BAT principles; drilling and production process will use environmental friendly chemicals; risk assessments will be conducted to estimate potential impacts and to find best chemical option)

- ✓ Disturbance to marine mammals from noise generated by the drilling rig, FPSO and other operations.

- ✓ Drilling activities, placement of subsea infrastructure and FPSO mooring could impact biological communities living on or in the seabed sediments.

(The drilling ship will not be moored to reduce anchoring impact)

POTENTIAL IMPACTS & MITIGATING MEASURES Based on Preliminary Assessment

➤ Social

- ✓ Positive economic impacts on country and local communities from direct and indirect employment and procurement related to the development.
- ✓ Interruption of fishing activities from the movement of vessels during project life cycle.
- ✓ The safety exclusion zone around the FPSO could impact fishing activities and marine traffic.

➤ Cumulative

- ✓ Collective social and economic impacts from other adjacent oil and gas activities already occurring in the offshore area. Takoradi, where supply and maintenance activities will occur, is already experiencing social and economic impacts from multiple oil and gas developments.

Note: All potential impacts and mitigating measures will be identified and assessed during the course of the ESIA study.

POTENTIAL IMPACTS & MITIGATING MEASURES

Based on preliminary assessment

➤ Accidents

- ✓ Unplanned events can occur: vessel collision, pipeline leaks, well blowouts and accidental oil spill. (these are very unlikely, and the application best industry practice will reduce likelihood for event. Oil spill response plans and equipment, collection and containment systems offshore and shore, oil dispersion systems offshore, will be available to mitigate oil spill.

Note: All potential impacts and mitigating measures will be identified and assessed during the course of the ESIA study.

INVITATION TO COMMENT

- ❖ Issues and concerns you may have about the proposed development
- ❖ Your comments are important to informing the scoping process
- ❖ Your support or concerns will be noted so they can be assessed in the ESIA.

THANK YOU !!!

APPENDIX 8-C: Minutes of Consultation Meetings

(TAKORADI MEETINGS)

**1. AKER ENERGY STAKEHOLDERS' ENGAGEMENT MEETING WITH THE
FISHERMEN ASSOCIATION**

MINUTES OF MEETING

**DATE: MONDAY, 18TH JUNE 2018 TIME: 9: 32AM VENUE: CONFERENCE
ROOM,
FRIENDS OF THE NATIONS, SEKONDI**

ATTENDANCE: 29

OPENING

The meeting started at 9:32am with a prayer by Mrs. Annan (Fishmonger).

DISCUSSIONS

Introduction

Mr Emmanuel Appiah (CSR Manager, Aker Energy) led discussions and asked attendees to introduce themselves, he started by introducing himself and others followed suit.

Presentations

The Environmental Manager for Aker Energy, Ole did a presentation on Aker Energy. He Started by giving a brief background in his experience as an Environmental Manager for 25years. He mentioned that Aker is headquartered in Norway and that they have recently acquired Hess Ghana Exploration Limited. According to him, Aker is an oil and gas company that desires to long its experience in the industry to Ghana. It has a team of 150 skilled employees.

Ole pointed out that, Aker Energy aims at being one of the best oil and gas operators in Ghana, by working in the common interest of society and the country at large. He posited that Aker plans to produce oil in compliance with the country's regulations and laws. He further added that Aker B.P is one of its partners and they aim at having efficient operations in Ghana.

Ole explained that an FPSO (Floating Production Storage and offloading Vessel will be built in the sea and 45 wells will be created. They will produce gas too. Aker will take over HESS' wells and produce oil by 2021. His company promises to engage its stakeholders.

Nana Kondua explained the presentation in fante to the attendees (the fishermen) and convinced them that Aker has their interest at heart. He also requested that Aker should engage them and work closely with them. He explained that they already have a good relationship with Mr Appiah so Aker can count on them for their support. Nana assured Aker that they would carry the message

to the grassroots. He assured Aker that they are the opinion leaders in the association so in case of any conflict, they are the right people to consult to resolve the issues. He indicated that certain issues can be resolved with them rather than going to the court. At the end of the day, if there is an accident, they will also be affected.

Mr Appiah assured the attendees that Aker is more than ready to work with them and to also consider their requests and grievances.

A.K Armah also did a presentation on the scoping study. He emphasized that at this stage, they intend to know the things that are very important in the Environmental Social and Impact Assessment, and that after the meeting they would be consulted again for a proper impact assessment. A copy of the scoping study report will be given to the attendees and to the Environmental Protection Agency (EPA). The fishermen will make inputs which will be used to revise it and then a revised copy will be submitted to the EPA before a license will be issued.

Prof Armah pointed out that Aker now has three (3) main partners; namely Lukoil, GNPC and Fueltrade limited and that the oilfield is about 70km away from the coast but will be very deep into the sea.(deep water drilling) thus a robust technology which is uncommon will be used.

A.K Armah gave an overview of the development which involves injection of water and gas into the land and a building of an FPSO and structures under the sea. He explained that all the structures will be tested and the FPSO will be anchored and the natural gas will be transported to the shore. The gas pipeline will be joined with that of ENI(an oil and gas producing company in Ghana). He mentioned that the lifespan of the oil is 25years (from 2021 to 2036) and that oil producing countries look up to Norway because they are a good example of an oil producing country which has managed their oil revenue properly to benefit their country thus Aker will safely drill oil with less damage.

Prof. Armah added that Aker will use deep sea oil exploration technology since their block is deeper into the sea and their field is different from the jubilee field .He explained what an FPSO is (a ship like factory on the sea without an engine of its own).

Mr Armah mentioned that EPA requires them to do a marine impact assessment and that Aker is committed to doing so.

After scoping, he explained, a report is put together and shared in the newspapers and a copy is sent to stakeholders (fishermen) for their input and approval. A.K Armah added that Aker will put measures in place to mitigate the impact of the oil production. He mentioned some mitigation measures as follows:

1.Physical and Biological;

Air-Generators, machines, flaring, etc could pollute the air. A filter will be used to take out the harmful chemicals

Water-Oil comes with water and gas so they are separated. The water will be treated before it is discharged into the sea.

Sub soil-Marine mammals will be disturbed because of movement of machines

2. Social Impact; Employment, both direct and indirect will be created. Another stream of revenue will be coming into the economy of Ghana. This revenue would influence the country's policies (eg. Free SHS Policy)

Fishing activities will be interrupted because of the movement of vessels.

Cumulative Impact-There will be more NO-GO AREAS on the ocean.

Accidents such as oil spills, vessel collision and pipeline leaks are bound to happen.

A.K Armah quickly added that there are many benefits of oil exploration but it comes at a cost and those who are mostly affected are the fishermen

A.K opened the floor for issues that bothered on scoping so that important issues could be identified.

Sheets were distributed to the fishermen and fishmongers, they were asked to put down their inputs and suggestions regarding the scoping. Their contact information were taken and they were given ample time (up to Friday) to complete and submit the forms.

Mr Appiah said that the fishermen will be consulted from time to time (every 6 months)

SUGGESTIONS

1. There was a suggestion that health screening should be arranged for the communities regularly as some suffer from diseases from time to time (Mrs Abaka Adu)
2. Caution letters should not be given to the children often as it makes them apprehensive.
3. Focus should be shifted from SHS to vocational and technical training .Mr Appiah added that the children are unwilling to attend vocational and technical schools

Deliberations (Questions and answers)

Mr Abeka Adu asked about how the shores will be protected and what compensation the affected fishermen will receive. Ole responded that they would address it after their environmental impact assessment.

Emeila Abaka Edu enquired if Aker would continue with the programs and activities of HESS such as the scholars' program. Mr Appiah responded that they will continue with the program and even make it better.

Mr Abeka Adu asked about how Aker would protect the marine environment. Ole replied that they will follow the guidelines to protect it. A.K added that they would even conduct a marine assessment as it is now a requirement of the EPA.

The leader of the canoe council asked how Aker would manage the effect of constructing an FPSO, as it will affect fishing. Mr Appiah replied that the FPSO will be constructed onshore and transported to the sea so it would not have much impact.

The leader again asked how the company will manage the effect or vessel traffic. Mr Armah answered that the vessel traffic is normal on the sea but this will not be a problem on the Aker Block. Ole added that Aker will look into it and will see how best they can reduce its effect.

Mr Appiah added that Norway has best practices when it comes to oil production so they will produce oil in an environmental friendly manner.

Mr Appiah emphasized that they should put down their ideas and suggestions regarding the scoping.

Mr Abaka Adu asked how the drilling water will be treated and where it will be discharged?

Ole answered that the water is properly treated on the vessel and it is discharged into the sea. He added that their waste will be managed and properly discharged and that they would use environmentally friendly products to produce the oil.

Nana Kojo Konduah enquired about how the local community will benefit from the employment that the industry will create. Mr Appiah replied that the industry creates spin offs. For example Tullow engaged local contractors from the Half Assini area when it was building an assembly hall in Half Assini senior high school.

Emelia Abaka Adu asked about how the sea weeds will be managed in Ghana even as it is used as medicine and for other purposes in other countries such as Tanzania. Mr Armah replied that there is no market for sea weeds in Ghana so little can be done with it.

CLOSING

The meeting ended at 12pm with a closing prayer from Mrs Annan.

Mr Appiah thanked all the attendees.

2. CONSULTATIONS

Minutes of meeting with Ghana Ports and Harbours Authority (GPHA) - Takoradi

Venue: GHPA Conference Room, Takoradi

Date: 18th June 2018

Attendance: 13 people attended the meeting.

Distribution: To attendees via email

Opening

The meeting started at 3.05 p.m. with an opening prayer by David Halm (Estate & Environment Manager).

DISCUSSIONS

Introduction

Captain Ebenezer Afedzi (Director of Port) opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself and his team. In response, Mr. Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Mr. Ole Aspholm (AKER Energy Environment Manager) and Mr. A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Presentation

Presentation on AKER Energy company profile, outlining its ambitions, aims and objectives, and introducing the proposed project was done by Mr. Ole Aspholm.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr. A.K. Armah.

Deliberations

On the issue of logistics base, Mr. David Halm of GPHA wanted to know if AKER Energy had plans of using the Port or port facility during their operation, and which agency was going to be used as middle-man. Mr. Emmanuel Appiah responded by indicating that AKER Energy took over from HESS, which had been using facility from the port, and hence AKER would definitely continue in HESS stead and make use of the port facilities. He added that AKER Energy had

inherited an established scholarship programme from HESS, which it was going to continue to administer as part of its corporate social responsibility (CSR).

Captain James R. Quayson of GPHA drew attention to the need to notify Petroleum Commission to direct GPHA to conduct an inspection of the FPSO before start of activities. He also indicated that GPHA had the means of mitigating minor oil spills at tier 1 level. The spill kits/equipment are kept at the port. Any spill incidence above tier 1 would be handled by ZOIL Company.

Captain Ebenezer Afedzi emphatically mentioned New Takoradi as the community that ought to be prioritised among the list of communities that were going to benefit from their CSR programmes. Mrs Agnes Devis-Moses also recommended that, as part of AKER Energy's corporate social responsibilities, tagging or labelling such CSR projects in communities as a way of raising public awareness/education towards the need for such responsibility is important, and cited an instance where a dilapidated community school could be identified and renovated and AKER Energy logo embossed on it.

Captain James Quayson, further advised the use of local expertise/skills rather than importing skills from outside the project region/district of influence. This was to avoid disadvantaging the local people who might equally have the skills, and stated as a case in point, that the local skilled divers could be used on the vessels after being given a little training. The Director of Port, Captain Ebenezer Afedzi, in turn re-emphasized Captain James' concern.

Closing

Captain Afedzi promised readiness to offer help and cooperate at any time GPHA would be called upon or a need might arise. Mr. Emmanuel Appiah then gave the vote of thanks.

The meeting ended at 3.50 p.m.

3. AKER ENERGY STAKEHOLDERS' ENGAGEMENT MEETING WITH THE FISHERIES COMMISSION, TAKORADI

MINUTES OF MEETING

DATE: TUESDAY, 19TH JUNE 2018 TIME: 9: 32AM VENUE: REGIONAL DIRECTOR'S OFFICE

ATTENDEES

1. Josephine Laryea (Fisheries Commission)
2. Theodore Kwadjosse (Fisheries Commission)
3. Alex Y. Sabah(Fisheries Commission)
4. Kenneth Y Assi (Fisheries Commission)
5. Ole Aspholm (Aker Energy)

6. Mr Emmanuel Appiah (Aker Energy)
7. Desmond Asiedu (Aker Energy)
8. Prof. A.K Armah (ESL consulting)
9. Fergus Agyeman(ESL consulting)

DISCUSSIONS

The meeting began at 10:10am. Mr Sabah, the Regional director of Fisheries commission welcomed the Aker Energy and the ESL teams. Mr Appiah introduced the team members and made known the purpose of the meeting. Attendees introduced themselves and then Mr Appiah led the discussions. He mentioned that HESS Exploration Ghana Limited has been taken over by Aker Energy. He then introduced the company and gave Ole Aspholm the opportunity to do a presentation on the company after which A.K Armah spoke on the scoping study.

Mr. Ole Aspholm's presentation touched on the company's profile, its goals and objectives and its proposed project in Ghana. He emphasized that his company aims at being the leading oil and gas operator in Ghana and also want to be responsible for the social development of Ghana. According to Ole, Aker would be focused on sharing their knowledge in the industry.

He assured the attendees that Aker Energy is committed to exploring oil and gas in an environmentally friendly manner even as it considers the interests of its stakeholders.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr. A.K. Armah. He emphasized that the aim of the meeting was to capture important issues for the scoping study. After his presentation, forms were distributed and attendees were asked to put down their ideas and suggestions for the study. Arrangements for collection and pick-up were also made.

SUGGESTION

The director requested that Aker should involve the fisheries commission in their Community sensitization activities.

One challenge that has been identified is that leaders who attend meetings do not inform their members about the decisions made at the meetings. He advised that both leaders and members should be invited to meetings and that publicity and community involvement would enhance the image of the company. Also, in community sensitizations, fishermen in the western region should not be the main focus. Fishermen in the Volta and Greater Accra regions should be included. He indicated that most fishermen arrested in 2014 and 2016 were from the Central thus Central and Greater Accra regions would be greatly involved in the sensitization. The director mentioned that there are many regulations but the challenge is its compliance.

Again, Fisheries communicators have been instituted (a group of trained fishermen) so they could be involved in the engagement since they are the voice of the fishermen

CONCERNS

Mr Sabbah (the Regional Director of the commission) expressed his concern regarding issues of cumulative impact. He indicated that fishes are mostly drawn towards the exclusive zones where fishing is prohibited. He wanted to know how Aker would mitigate this impact. He is hoping that the company would tackle this issue.

Ole responded that his company would use processes that would not attract fishes to the exclusive zones. He explained that, for instance, the lighting system would be positioned such that it would not attract the fishes to the vessel.

The director indicated that Fishermen pose a great risk to the oil and gas industry and so he hopes that Aker would work closely with the fishermen.

Ole enquired about the fishing gears used by the fishermen. Mr Kwadjosse answered that the fishermen use Drift Gill nets (DGN) and the hook and lines are normally used. He added that the DGN are not stationary and are quite huge. They are about Twenty (20) meters in depth. The DGNs are not visible to vessels even though they have filters. This poses a lot of danger to a lot of fishermen who come around and could damage the nets.

A drilling impact assessment had been done prior to Aker's drilling operations and the main challenge that was identified was with the fishermen and the net. The net can easily destroy the trister in place.

Mr Kwadjosse asked about how fishermen could identify the exclusive zone. Ole responded that floating buoys would be provided for the FPSO and not for the drilling ships as they are mobile during drilling.

Josephine Laryea made the team aware that they have a data fishermen and canoes which will be provided to Aker upon request. Ole mentioned that canoes will be equipped with radars and locators. Mr Appiah added that acoustic sound device were given to fishermen to alert them when they came close to drilling vessels but unfortunately the fishermen damaged them so locators and radars, locators and reflectors will be appropriate.

Desmond Asideu asked if they could be given canoe registration and Mrs Laryea explained that canoe registration and embossment have been done but their challenge was that fishermen scrap off the registration numbers during canoe maintenance. A plastic plate with embossed numbers would be a better alternative. She added that canoe registration will be compulsory and every canoe must have its registration number embossed on it.

Mr Laryea indicated that the chief fishermen and some technical men are assisting with these issues at landing beaches.

Mr Appiah asked that if fishermen still engage in pair trawling and Josephine Laryea responded that fishermen do not engage in that activity anymore since accidents can easily occur on the coast. He added that it would be prudent to install AIS in fishing boats. Ole stated that Aker is committed to working with fishermen rather than against them.

CLOSING

Meeting ended at 11:30 pm with a closing prayer from Mr Appiah. He thanked all their attendees

4. STAKEHOLDER ENGAGEMENT MEETING WITH THE WESTRN REGIONAL COORDINATING COUNCIL

DATE: MONDAY: 20TH JUNE 2018

TIME: 10: 03AM

VENUE: REGIONAL OFFICE, RESIDENCY CONFERENCE ROOM, SEKONDI

ATTENDANCE: 51

DISTRIBUTION: To attendees via email

OPENING:

The meeting started with a prayer by Prince N.A Awere, the PRO of the Regional Coordinating council, after which Claude, the Protocol Officer gave a safety briefing.

Mr Appiah then welcomed attendees and stated the purpose for the meeting. The Deputy Regional Minister, Honourable Mrs Gifty Kusi, followed with a short address, and called for self-introduction of attendees.

PRESENTATIONS:

Environmental Manager for Aker Energy, Ole, did a Company presentation of Aker Energy, outlining its goal to develop the pecan oilfield in Ghana and start production in 2021. He reiterated Aker Energy's intent to bring to Ghana its experience and competence in oil and gas production.

A.K Armah followed with a presentation on the Deep Water Tano Cape Three Point (DWT/CTP) project scoping study. He explained that the purpose was to develop the Terms of Reference (TOR) for the full ESIA study, and that their views, concerns and suggestions were of paramount importance.

DISCUSSIONS:

1. Mr Joe Appiah, the Metro Youth Director (National Youth Authority), on the issue of Corporate Social Responsibility, indicated that the project has the potential of affecting the activities and incomes of the fisher-folks within the project area of influence leading to local unrest; and the use of the FPSO would lead to setting exclusion safety zones that limit their fishing area. He wanted to know if Aker Energy would compensate or provide some sort of alternative livelihood for the fisher-folks.

In Response, Mr Emmanuel Appiah, the CSR Manager of Aker Energy, explained that Aker Energy took over from Hess Exploration and had inherited a scholarship scheme established for the fishermen's children as part of their corporate social responsibility. Aker Energy would continue with the scheme and even expand and improve upon it. Improving the programme, Aker Energy would, however, adopt the bottom-up approach where the concerns of the affected people would be considered first in rolling out the programme, and not to impose anything on them.

Mr A.K Amarh said that the distance from the shore is 70km and that fishermen will not be destructed when fishing. It is only when they come close to the FPSO to fish where the light attract the fishes, but Aker Energy will plead that the fishermen should obey the rules giving them.

- 2 Mr Baba Nyina of the Trade and Industries, in response to the scholarship programme, wanted to know if Aker Energy had plans for the young ones that would not be in school and so not benefit from the scholarship programme. He suggested Aker Energy consider in their corporate social investments, providing opportunities for various standard vocational trainings for such young ones and cited such vocation as catering as a case in point, so they could be engaged to also provide various standard services in the oil and gas industry, by which both Aker Energy and these non-school going young ones would symbiotically benefit. Further, he pointed out that cumulatively, the exclusive zones that had been set by Tullow, Tein, Sankofa etc., and would be set by Aker Energy were going to increase, and would potentially reduce the fisher-folk's effective area of fishing activity thereby limiting the fish stock. What alternative livelihood plans, he wanted to know, would Aker Energy have for the fisher-folks?

In response, Ole Aspholm, Aker Energy Environmental Advisor, on the issue of safety exclusion zone, explained that the exclusion zone would be only 500m radius round one FPSO vessel that would be inaccessible for fishing, and that was infinitesimally small compared to the entire block. The rest of the area would still be accessible for fishing activities. He further explained, touching on the issue of depleting fish stock caused by the oil and gas industry that Environmental Impact Assessments, especially in the oil and gas industry, were largely based on scientific evidence, and that learning had improved over the years hence a lot of scientific data was available currently to rely on. However, perceived impacts or public perceptions that centered largely on the concerns of society could not be overlooked in the assessment of environmental impacts. Nevertheless, they could not solve problems that would be outside of the impacts of the oil and gas industry, for instance, the depletion of fish stock. To this effect, he explained that in Norway there was a similar perception in the 80s held by the fish industry that the oil and gas industry was causing the depletion of the fish stocks. Scientific proofs on the other hand demonstrated that there was a mismatch between fish breeds and the activities of the oil and gas industry, and that Norway currently had both the biggest fish stock and the highest oil and gas activities ever. He concluded, nonetheless, with the promise that Aker Energy would always consider primarily the concerns of the people and would ensure application of international best practice to minimise impacts.

3. Rexford Arthur (Sekondi Takoradi Metropolitan Assembly) said the Assembly has a 4-year development plan. He lamented that the Assembly over the years had been left out, not involved or consulted by the oil companies to see what they had in their plans to be implemented when they undertook such projects as school building construction and the like as part of their Corporate Social Responsibility (CSR); the Assembly was only invited to commission or witness commissioning of such projects. However, in the event of any such accidents as the collapse of the structure, the Assembly would then be called upon. He advised Aker Energy to involve and collaborate with the Assembly for technical supervision of such infrastructural development projects from the outset.

In response, Mr Emmanuel Appiah remarked that Aker Energy had taken note, and that the Assembly was one of their major stakeholders and so promised they would be involve for technical supervisions.

4. Ebenezer Sam, Ghana Fire Service mentioned some FPSO fire incidents that had occurred in other countries due to failure of safety systems. He tasked Aker Energy to do well to involve the Fire Service right from the inauguration of their FPSO so that they could also give the necessary training with regards to safety systems so that the likelihood of fire incidents occurring on their (Aker Energy) FPSO would be reduced.
5. Joyce Obiri Yeboah, Head Department of Development reiterated the help to be giving to fishermen since Aker Energy's activities will distort their fishing activities and these fisherfolks won't be able to make a living. Does Aker have any alternative economic activities for the fishermen?
6. Nelson Setogbor, Research Officer, Western Regional House of Chiefs said that the Scholarship Program that most oil companies have in place for indigenes should be managed properly in that he realised these oil companies that give the scholarship do not want to employ the scholars after school and most of these ones become unemployed at the end. He also suggested that a school (university to be precise) should be built in the locality, this will make up for a sustainable development.
7. Micheal Tabiri, National Sports Commission raised a concern that because oil production activities goes on in the region, its capital Takoradi has been branded oil city creating the impression that the oil activities are being done in Takoradi, and this is making the cost of living in Takoradi expensive and this is affecting other people who are not in the oil industry, what will Aker Energy do to address this issue.
8. Owusu Ameyaw from Forestry raised the issue of unemployment in the region, he appeals that Aker Energy should do their best to address this c=issue and especially pay attention to youth without any school certificate. He added that such ones can be giving menial jobs that doesn't require and qualification so that they can also make a living.
9. Angelina Awah from Lands Commission said that oil companies should make it a point to put up infrastructures embossed with their company name on it to depict that the company is in operation.

10. Henrietta Ampah from immigration, mentioned that Expats who work for oil companies should be housed in Takoradi instead of being in Accra to increase the activities in the region.
11. Prince, Police appealed that the Deputy Regional Minister should push for the regulators of the oil and gas industry to be headquartered in Takoradi to show that oil production activities are done in the region.
12. Lawrence Agdu Of Minerals Commission asked about how ballast water will be managed.
13. Amanda Dudimah, from Lands Commission asked about how greenhouse gases and other gas flaring be managed.

ANSWER; The Environmental Manager of Aker Energy said oil comes with gas and water and that Aker Energy will separate and send to shore. The pipeline will be joined to the Sankofa pipeline. Gas flaring will be controlled.

14. Isaac Kofi Amakye, BNI asked about the security measures that Aker Energy will put in place during their operations, and what mitigation measures will be there for air pollution

ANSWER; Regarding air pollution from the FPSO, it gets diluted in the air and it does not affect those living on land

15. David Annor Kesse from Department of Small Scale Industries asked about the plans that Aker Energy has for the oil by-products if possibly it can be diversified to generate income for the people in the communities

ANSWER; A.K Armah pleaded that the attendees are in the communities and they know the real issues so they should let Aker Energy know their suggestions that are doable and sustainable to help the unemployed indigenes.

16. LT CDR Lucas Ocloo, Ghana Navy asked about security measures that will be in place especially of the FPSO

ANSWER; Mr Appiah assured the house that the security issues will be looked at and addressed.

CONCLUSION

The Deputy Minister thanked the Aker Energy team for their presentation and urged all attendees to put down their suggestion on paper.

She added that in 2012, they ensured that while they were dealing with the mining companies, a percentage of their profit was given to the committee to be managed by them for CSR Projects.

She asked that Aker should establish a foundation and invest in it so that when they are done drilling the oil and left the country the locals will benefit.

She also added that Employment for Aker Energy should be done in Takoradi so that indigenes will benefit.

Mr Appiah mentioned that for Aker most of it employment will be done in Takoradi

TASKS

All stakeholders should fill out a form given to them. They should put down their suggestions and ideas regarding the scope study.

CLOSING

The meeting was ended with a closing prayer by Freda Owusu Ansah at 11:40am.

5. AKER ENERGY STAKEHOLDERS' ENGAGEMENT MEETING THE GHANA MARITIME AUTHORITY

MINUTES OF MEETING

DATE: WEDNESDAY, 20TH JUNE 2018 TIME:1:40 PM VENUE: MARITIME AUTHORITY CONFERENCE ROOM, TAKORADI

ATTENDEES

1. George Anti Kwakye (Maritime Authority)
2. Divine Kofi Gli (Maritime Authority)
3. Captain Kwabena Adu (Maritime Authority)
4. Nana Otoo (Maritime Authority)
5. Emmanuel Appiah (Aker Energy)
6. Desmond Asiedu (Aker Energy)
7. Ole Aspholm (Aker Energy)
8. Ayaa K. Armah (ESL Consulting)
9. Fergus Dumenyo Agyeman (ESL Consulting)
10. Kenneth Y Agbi (ESL Consulting)

OPENING

The meeting started at 1:40 pm. Mr. Emmanuel Appiah (AKER Energy Corporate Social Responsibility Manager) then introduced himself, followed by self-introduction of the other scoping study team members. The scoping study team was made up of the AKER Energy and ESL Consulting teams. He made known the purpose of the meeting. Mr. Ole Aspholm (AKER Energy Environment Manager) and Mr. A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

DISCUSSIONS

Presentations

Mr. Ole Aspholm's presentation touched on the company's profile, its goals and objectives and its proposed project in Ghana. He assured the attendees that Aker Energy is committed to exploring oil and gas in an environmentally friendly manner even as it considers the interests of its stakeholders.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr. A.K. Armah. He emphasized that the aim of the meeting was to capture important issues for the scoping study. After his presentation, forms were distributed and attendees were asked to put down their ideas and suggestions for the study. Arrangements for collection and pick-up were also made.

CONCERNS

Captain Adu mentioned that HESS (now Aker Energy) has gained a good reputation in the communities and asked for information on how the company gained such popularity in the communities. Mr Appiah responded that it is because of their Corporate Social responsibility (CSR) project in the communities. He added that the HESS-GNPC scholars' program was an initiative of the company and it gained so much popularity. The program provides full tuition and boarding fees and other items that would be needed by a student to go through their Senior High School (SHS) education. The scholars receive counselling and mentoring services and they are also given university admission forms.

Mr Appiah discussed their previous encounter with fishermen and their canoes. He added that some fishermen come too close to the vessel and even go to the extent of anchoring their canoes to the vessels. This poses a lot of danger to the fishermen.

Mr George Anti Kwakye indicated that blue prints already exist and that since Aker has taken over from HESS, they would do an even better job.

He added that sea traffic and accidents are likely to happen.

Ole mentioned that training of fishermen will be one of Aker's goals and that AIS should be installed in canoes.

Captain Adu explained that fishermen were given metallic reflectors to be put on their boats but refused to use it.

Ole asked if Maritime Authority could provide his company with vessel traffic data.

Mr Appiah asked that in terms of security and piracy, what can maritime suggest to Aker.

Mr George Anti Kwakye responded that since the rate of piracy has increased since the discovery of oil and he believes that both the marine police and the navy are working closely to eradicate this menace.

Mr Appiah enquired if the Maritime Authority has an oil spill contingency plan and what their role is.

TASKS

The Background Information Document (BID) s would be picked up on Friday.

CLOSING

The meeting ended at 2:40pm with a vote of thanks from Mr. Emmanuel Appiah.

6. AKER ENERGY
STAKEHOLDER ENGAGEMENT MEETING
MINUTES OF MEETING

Venue: Conference room, Friends of the Nation (FON), Takoradi

Date: 21ST JUNE 2018

ATTENDANCE: 27 people attended the program

Desire Aggor (AGRIDEF, CED)

Richmond Agbanyaklu (AGRIDEF, Program Director)

William Awotwe-Mprah (CEMAG)

Martin James Dadjo (New Crusading Guide)

Alfred K. Gyimah (CF/Administrator)

Mark Arthur (CEMAC)

Theo K. A. Abrempong (Citi TV)

David Acquah

Eric Mawuko Atsiatome

Theophilus Boachie-Yiadom

Will C Mu

I

Opening The meeting started at 9:37 am with a prayer by Mark Aurthur (Communitie, Environmental and Advocacy Group-CEMAG)

DISCUSSIONS

Introduction

Dr Chris Mevutor (the Executive Director of Friends of the nation) gave a welcome address and mentioned the purpose of the meeting. He urged the attendees to cooperate with the Aker and ESL teams and give them the information that they need. He asked attendees to introduce themselves after which he handed over to Mr Appiah and his team.

Mr Appiah explained the HESS –Aker take over and then introduced Aker Energy. He explained that Mr. Ole Aspholm (AKER Energy Environment Manager) will do a short presentation on Aker Energy and then Mr. A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) will talk on the company's

proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study. He pleaded with attendees to go through the Background Information Document (BID) in front of them.

Presentations

Mr. Aspholm introduced himself and then gave a brief background on Aker Energy, its aims and objectives as well as its mission in Ghana. He explained that his company aims at developing the Pecan oil field and produce oil by 2021. He quickly added that his company aims at becoming the preferred oil and gas operator in Ghana even as they do so in compliance with the national and international regulations. His company will also consider the interests of its stakeholders. He indicated that safety and Corporate Social Responsibility (CSR) will be their top most priority. He added that his company has a lot experience and skills in oil and gas industry and that they will to share it with the Ghanaian industry.

The presentation on the DWT/CTP Development Environmental and Social Impact Assessment (ESIA) Scoping study was done by Mr. A.K. Armah. He highlighted the importance and the process of the ESIA and what is expected of attendees. A.K mentioned the areas under consideration for the scoping and their mitigation measures. He pointed out that the ideas and suggestions of the attendees were very important at this stage and so invited their comments and suggestions.

Deliberations

Mark Aurther (CEMAG) enquired if Aker has thought of alternative source of livelihood for the fishermen as nothing has been done for them so far. He also asked why Aker decided to come to Ghana to drill oil. Mr. Appiah responded that business people always look for productive places to do business and Ghana is a fertile ground for drilling oil. Ole also asked why Ghana should not be considered by Aker Energy for drilling oil.

William Awotwe Prah (CEMAG) enquired about how fishermen who encounter accidents with oil companies' the FPSO and their vessels could alert the companies to be compensated. Mr Appiah replied that they have an existing relationship with fishermen and some of them know their community liaison officers and their vessel numbers so in case of such incidents, they report it to them. He added that Aker will establish a good relationship with the fishermen and will let them know the numbers of their vessels before they start operating on the sea. A.K emphasized that such incidents are not intentional so the fishermen should contact the companies for a positive action to be taken by them.

Richmond Agbanyaklu asked what one thing will Aker would do differently as an oil company and that the layman may not directly feel the positive impact of an oil company despite its positive influence in the community. A.K replied that he should suggest things that Aker could do differently even as that is the purpose of the meeting.

Dr Chris Mevicta explained that Aker inherited both assets and liabilities from HESS Exploration but he could already see an improvement in the way they are operating for example, even in their stakeholder engagement, they have provided documents ahead of the meeting. He admitted that Aker is being challenged to demonstrate the best practices they are known for in the oil and gas industry. He enquired about the precautions Aker would take to protect the marine mammals since there have been the washing at shore of whales since the beginning of oil drilling in Ghana.

William (FON) asked about the provisions Aker will make to ensure a zero impact on the environment even as there is an existing blue print. Ole replied that Aker would do a thorough risk assessment and environmentally safe products will be used. He added that his company would look for zero levels of harmful discharge.

Armah Yeboah suggested that Aker should go to all the communities in the coastal districts and take their inputs for the scoping study.

Marvin James (Crusading guide) pointed out that the 'no fishing' zone areas are not properly marked so the fishermen end up in those zones accidentally and are caught and fined. He asked what Aker would do to address this matter. Ole responded that Aker would find the best solution to this problem and would do a fisheries impact assessment to produce safety measures. He added that his company would gather more information regarding this issue.

Dr Mevita added that this issue has come up several times and Aker is committed to using best practices.

Emmanuel Donkor (CEMAG) explained that the coastal belt is experiencing sea erosion because of the oil exploration and asked what Aker would do to address this problem. A.K explained that the oil field will be 70 km away from the shoreline so their activities is not likely to cause sea erosion. He added that operators are not responsible for what happens on the shores. Mr Appiah added that the erosion at Ketan begun long before Ghana started drilling oil so oil exploration does not affect the coastal lines in any way.

Dr Mevita quickly added that the issue is not the erosion but the perception that the erosion is caused by the oil exploration as it could cause tension between the operators and the fishermen. He asked how Aker will tackle this matter.

James Dadgo (CEMAG) enquired about the measures that Aker would put in place to mitigate any future oil spill into the borders of Ivory Coast as Aker's field will be close to their borders. Ole responded that Ghana already has measures in place to deal with such spill in the future. He added that Aker would bring in their own equipment to tackle with that issue.

Eric Mawuko (FON) asked for clarification on the space that would be left around the FPSO. Whether it would be one logical mile or 500 meters as presented. He also asked if an environmental assessment would be done before decommissioning of the FPSO and if there would be coral reefs to help the environment quickly recover after decommissioning. Eric added that Aker should consider having a refinery plan on shore in order to create more jobs for the communities both directly and indirectly.

Yaw Ampofo (Citi Fm) asked if Aker could possibly produce oil using existing structures instead of creating new FPSOs which will push fishermen further away from the sea. This situation tends to create tension between operators and the fishermen. Ole added that for gas, Aker will join their pipeline to the already existing pipeline of Sankofa. He also commented that 500 meters around the FPSO has a 'no fishing' zone is quite small so the cannot be blamed for low fish harvest of the fishermen. A.K emphasized this point. Yaw Ampofo suggested that Aker should engage their best practices as promised. To this Ole replied that they would use their best practices.

Chris argued that fishermen will always be drawn to places where they can find fish so Aker should let the fishermen know the zones and the precautions they need to take.

He added that a refinery is preferred to an FPSO and asked what FPSO Aker would use.

Ole described the kind of FPSO that his company will use. He added that the FPSO will not use lights that will attract fishes to a large extent. Eric suggested that Sola lights should be used as they don't attract fish. A.K added that they will look into the use of the Sola lights on the FPSO.

William Awotwe Prah asked about how fishermen will lodge their complaints or grievances since there is the likelihood of moving vessels causing accidents

Emmanuel Donkor asked about what will be done to minimise coastal erosion?

Richmond suggested that Aker should be head quartered in the western region so that it will create jobs for the indigeons. This suggestion was reiterated by Theophilus . Mr Appiah replied that employees would be taken from Takoradi if only they qualify for the positions.

Theo asked if the paths of mammals will not be disturbed by the operators and A.K replied that mammals do not have defined paths so movement of vessels will not affect them in any way.

Chris wanted to know Aker's position on the preservation of whales as in some time past, Norway did not support the preservation of whales. William argued that whales breed in the Ghanaian shores but they feed elsewhere so they are endangered in the midst of the operators. He suggested that Aker should establish a defined path and speed for oil vessels.

Will suggested that Aker should invest in the studies of megafauna and benthic communities since little is known about these things and knowledge in these areas would benefit the industry. He added that Aker could look into real oil contemporary plans.

Theo suggested that Aker should do a fisheries impact assessment in addition to the ESIA as it is requested by the EPA.

Theophilus Ampofo (Citi TV) suggested that Aker should look into the washing ashore of sea weeds as a result of the exploration.

Hosea Agu suggested that Aker should extend its CSR activities to those in the hinterlands and the forest belt in the western region instead of focusing on just the coastal communities.

Chris asked if Aker could help develop a marine special planning to deal with the health of the ocean.

Ole thanked the attendees for their inputs and pointed out that the company cannot meet all the needs of its stakeholders but it will try and do what they can do in their means such as creation of jobs and sharing of knowledge and skills with the Ghanaian industry.

Closing

The meeting ended at 11: 36 am with a prayer by Mark Aurthur. Mr. Emmanuel Appiah then gave the vote of thanks.

7. CONSULTATIONS

Minutes/Concerns of meeting of Environmental Protection Agency - Takoradi

Venue: EPA Conference Room, Takoradi

Date: 22nd June 2018

Attendance: 18 people attended the meeting.

Opening The meeting started at 9:30am with an opening prayer by Hamza (Environmental Protection Agency).

DISCUSSIONS

Introduction

Mr Yaw Fosu Afriyie (Regional Director of EPA) opened the meeting by welcoming the AKER Energy and ESL Consulting teams There was a brief introduction. In response, Mr. Emmanuel Appiah (AKER Energy CSR) gave the purpose of the visit. Mr. Ole Aspholm (AKER Energy Environment Manager) and Mr. A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Presentation

Presentation on AKER Energy company profile, detailing its ambitions, aims and objectives, and introducing the proposed project was done by Mr. Ole Aspholm.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr. A.K. Armah.

Deliberations

On the issue of CSR, Mr. Shine of EPA wanted to know if AKER Energy consults the district assembly to know the medium-term plans that they have for the various communities before Aker Energy rolls out its projects? Mr. Emmanuel Appiah responded that a needs assessment is done and that informs Aker Energy what exactly the communities need before the projects are embarked on.

Kwodwo Opoku Mensah of EPA asked about how produce water will be managed, and if Aker Energy has any considerations for it apart from it been discharged.

Ing. George Diawouh, asked about how the Bottom hole pressure (BHP) will be sustained. He also asked if it will be possible to dilute the produce water and treat it to the standard required for reinjection.

He wanted to know more about the production Aker Energy has anticipated since the longevity of the project has been determined. He complained that most fishermen claim that most companies do not have markings for their exclusive zones, and that if it is possible for Aker Energy to anchor a buoy so to make the area visible.

He also suggested that since Aker Energy is a well acclaimed oil and gas company, they should come up with some of their best practices with regards to CSR. He also suggested that A.K Armah will liaise with Dr. Aggrey Fynn of University of Cape Coast to get a report on the stock of Dolphins so that they can be preserved.

Mr. Yaw Fosu Afriyie wanted to know what will be the alternative plan for the gas line if discussions with ENI do not go well.

Mr Shine asked about Aker Energy's plan for tier one (1) oil spill and what oil response plan they have.

Mr. Yaw Fosu Afriyie suggested that if it's possible to bring the waste from the FPSO onshore.

Kwodwo Opoku Mensah hinted that A.K Armah mentioned marine spacial planning and that what considerations Aker Energy is bringing on board. He again asked about how Aker Energy will compensate the fishermen during their seismic activities in future.

Mr Diawouh asked if Aker Energy has considerations for health impact assessment. A.K Armah said that this will be noted and meetings will be held with the district health office to have their inputs and that will be part of Aker Energy's terms of reference in the scoping.

Mr Diawouh again came up with a complaint that it is a rumour that those who manage the exclusive zones also fish in the area and since this will agitate the fishermen and so Aker Energy should come up with a policy on "NO FISHING IN THE EXCLUSIVE ZONES".

Closing

Mr Emmanuel Appiah promised to bring an letter to officially invite EPA for the upcoming scholarship launch in September. Mr. Emmanuel Appiah then gave the vote of thanks.

The meeting ended at 11:40am

8. AKER ENERGY
STAKEHOLDER ENGAGEMENT MEETING
MINUTES OF MEETING

VENUE: Conference Hall, Western Regional House of Chiefs, Sekondi-Takoradi

DATE: 25th JUNE 2018

A. ATTENDANCE:

Thirty-Five (35) people attended the meeting

B. OPENING

The meeting started at 11:10 am with an introduction of all the attendees by the Assistant Registrar and an opening prayer by the president of the Regional House of Chiefs.

C. DISCUSSIONS

I. INTRODUCTION

The president chaired the meeting and gave an opening remark. The Aker Energy and the ESL teams introduced themselves and were welcomed by Nananom. The chairman made known to Nananom the purpose of the meeting and apologized for the late notice given to them. He encouraged them to assist the teams with the information that they need for the scoping study even as HESS Exploration Ghana Limited has been acquired by Aker Energy. He handed over to the teams to lead the discussions.

II. PRESENTATIONS

Mr. Aspholm (AKER Energy Environment Manager) introduced himself and then gave a brief background on Aker Energy, its aims and objectives as well as its mission in Ghana and how they intend to achieve it. He emphasised that his company aims at becoming the preferred oil and gas operator in Ghana even as they do so in compliance with the national and international regulations. He indicated that safety and Corporate Social Responsibility (CSR) will be their top most priority. Ole pointed out t that his company has a lot experience and skills in the oil and gas industry and that they intend to share it with the Ghanaian industry.

Prof A.K Armarh (Director of ESL Consulting Ltd and Lead consultant) did a presentation on the Deep Water Tano Cape Three Point (DWT/CTP) Development and the Environmental and Social Impact Assessment (ESIA). He highlighted the importance and the process of the ESIA and

explained the scoping study and what was needed from Nananom in that regards. He then invited comments, suggestions and questions from the chiefs and queen mothers.

III. DELIBERATIONS

The team handed over to the president to lead the open forum. He encouraged Nananom to come out with their questions, suggestions and concerns. Below are the issues that came up.

Okogyeman Kweku Gyamprah (Chrano) enquired about the employment opportunities Aker has for people of various qualifications (SHS, Degree, Maters and PHD) and pointed out his difficulty in giving the required advice to Aker. Mr. Armah replied that Aker would conduct a survey of skills in the region to identify the available skills and those skills that need to be upgraded. The information will be put in the scoping report.

Awulae Attibrukusu III (Lower Axim) asked about the block that is close to the border between Ghana and Cote d'ivoire and enquired about its ownership. Mr. Armah replied that the block belongs to Aker now since the company has acquired the concession for it.

Ole (Aker Energy) added that all the issues raised will be noted and worked on. He pointed out that with regards to jobs, particular skills will be needed in the company so Ghanaians in western Region with the required skills will be considered. Drivers, caterers and others will be employed from the Western region and that Aker intends to have intense operations in the region though they are currently headquartered in Accra.

Awulae Attibrukusu III (Lower Axim) enquired about how Aker intends to train people for jobs in the company and how Aker would protect the fishing industry

The Queen mother of Essikado expressed her disappointment in the fact that Aker is currently headquartered in Accra. She suggested that it should be headquartered in the Western Region if they intend to employ the people of the region. She also asked if Aker would hand over the block back to the Ghana government after 2036 even if the block still has oil.

Ole replied that the decision to have Aker head quartered in the Western region lies with the company's management. With regards to the block, he explained that Aker would consider continuing operations if after 20136 the block still has oil. He added that the company will maintain its installations.

Awulae Agyefi Kwame (Nsein) pointed out that most companies consult Nananom before beginning operations but as soon as they succeed, they forget about them so what will Aker do differently in this regard.

The president of the House of chiefs sought for further clarification regarding the owners of Aker's block and indicated that he had little advice to give with regards to the environmental and risk management issues Aker needs guidance on. He recommended that Aker should assess the environment every five years. The president observed that Aker would be the only operator on that block, leaving the local operators with no block for oil exploration. He enquired about the areas within the company that indigenes could be trained and employed in. He suggested that the chiefs could provide people for interview so that Aker would select some of them for training and for future employment in the company in the next three years. He also asked about the plans Aker has for the nananom in the region.

Mr Appiah thanked them for their input and reminded them that Aker was there to hear their comments and suggestions as they are a fairly new company. He assured them that Aker would create an alternative livelihood for the fishermen and would also engage the chiefs more often than not.

The President of the House of Chiefs made the following recommendations:

- Aker should have an operational office in the Western Region
- The company should train at least fifty (50) people who can work on the rig
- Aker should select three (3) communities in the region and provide them with state of the Art schools (both Basic and Senior High) and one state of the art hospital.
- Aker should establish an estate for their workers
- The company should not airlift their workers from Accra to Takoradi as it has environmental and financial implications to the government and the people of Ghana.
- The company should train the local farmers in the production of vegetables so that they can supply the rig with high quality vegetables. This would prevent the importation of vegetables from Cote d'ivoire by oil companies.
- Aker should engage caterers from the western region and not from Accra.

Awulae Annor Adjaye III (Benyin) asked why oil companies do not add value to the crude oil on-shore but rather take it abroad for refining. He suggested that Aker should build an on-shore refinery so that more jobs will be created in the region. He argued that environmental pollution that is brought about by the oil production has killed people so what will Aker do to address this issue. He also added that meeting with fishermen and fishmongers is no news so what will Aker do differently. He added quickly suggested that Aker should set up a foundation for the fishermen and fishmongers and put some funds into it so that they can get the support that they need, as and when necessary.

Ole responded that, with regards to refining oil, the country generates more revenue in the exportation of crude oil and that there is more value in the crude oil than its refinement. He also added that his company will look into refining some of it on-shore. Mr. Appiah contended that Nana's suggestion on the on-shore refinery has policy implications. The government of Ghana would have to ensure that oil companies build refineries on-shore.

In response to the president's question on the ownership of Aker's block, Ole explained that the ownership portions were still being discussed. He added that his company's operations will be environmentally friendly thus that flaring will be reduced so that the environment would be preserved for future generations.

Tretrete Okuamoah Seyim II (Wassa Amenfi) sought for clarification on the ownership of Aker's block and Desmond Asiedu (Corporate Social Responsibility, Aker Energy) explained that the operator of the block is Aker Energy but other companies have shares in its profit.

Nana for Upper Discove asked if Ghanaian workers with HESS have been laid off because of Aker's take over and if Aker would continue with HESS' scholarship scheme. He added that the livelihood of fishermen should not be created but that it should be enhanced. Nana also asked what Aker would do to enhance the standard of living of the people of the western region.

Mr Appiah explained that with regards to the laying off of Ghanaian employees, HESS had already laid off most of its workers off even before Aker acquired it. With regards to fishermen, Mr Appiah was of the view that enhanced livelihood of fishermen will be considered. Regarding HESS's scholarship program, Mr Appiah pointed out that Aker would continue with it and even enhance

and expand it. The program will be expanded to schools in Tarkwa and Mpoho. He went on to give details of the scholarship package.

Awulae Agyefi Kwame (Nsein) asked about the Ghana National Petroleum Corporation (GNPC) scholarship and the courses it considers as part of its requirements (Science and Maths). Mr Appiah replied that Aker will partner with GNPC so that their scholars will be enrolled on the program despite their course. He added that currently, HESS scholars are enrolled in the nursing school (NMTC) and that the company is considering training some scholars in French as Ghana is surrounded by French speaking countries.

The Queen mother of Shama enquired about how fishermen and fishmongers are involved in the scholarship and how they are selected. She also asked about the possibility of an oil spill at the shore even though Aker's block is located far from the shore. She asked if Aker would double up its Corporate Social Responsibility (CSR) activities. Mr Appiah replied that AGM (an oil company) will partner with Aker to carry out its CSR activities. He also added that fishermen have a representative on the scholarship program and that they are even selected by the fishermen themselves.

The Chief for Lower Discove thanked the teams for their presentation and commended them for its content. He enquired about emissions and how it will be managed. He added that most oil companies do not consult Nananom after their first consultation meeting and thus suggested that Aker should consult them regularly without any hesitation. He added that Aker should not be burdened with the improvement of the livelihood of fishermen as the fishermen themselves contribute less to the oil industry. He rather suggested that fishermen can be trained to set up their own businesses and that a few of them could be identified for support.

Prof. Armah thanked the House of Chiefs for their contributions and suggestions and commended the suggestions made about the livelihood of the fishermen as the fish do not increase to meet the market. A.K observed that Ghanaians are not arguing for an increased share of the government in the oil companies as GNPC has only ten (10) per cent shares in the companies. He argued that government should increase its shares to about fifteen (15) or twenty (20) per cent and that Ghanaians must ensure that the government does more for us.

The president of the National House of chiefs gave a closing remark and thanked the Aker and ESL teams. He encouraged the chiefs to set up Foundations and engage consultants so that they would have more contributions at the next meeting. He suggested that summer courses should be organized for the mathematics and science teachers in their basic schools. He also suggested that training sessions should be organized for the National House of Chiefs and their staff. He added that their children should receive training in Information and Communication Technology (ICT) and that Aker should engage Nanaom to select, train and equip students in the region with the skills that would be required to be employed on the rig.

Nana Kwobina Nketsia V (Essikado) made some observations about the ESL team. He noticed that most of the suggestions made at the meeting had to be directed to the Ministry of Energy even as some of their laws are not host friendly. He argued that the indigenous companies that have shares in Aker's block should be investigated.

"Nana Kwobena Nketsia V commended the team for its presentation. He noticed that though the team was made up of Aker Energy and ESL Consulting, the members of the ESL team seemed to be silent throughout the meeting. He wondered whether Mr Armah represented the government or ESL consulting because of his earlier response to some of the suggestions made at the meeting. Mr Armah observed that Ghanaians are not arguing for an increased share of the

government in the oil companies as GNPC has only ten (10) per cent shares in the oil companies. Mr Armah argued that government should increase its shares to about fifteen (15) or twenty (20) per cent and that Ghanaians must ensure that the government does more for them.

Nana Kwobena Nketsia V was of a strong opinion that many of the suggestions made at the meeting should be directed to the Ministry of Energy (MOE) even as many of their policies do not favour Ghanaians. He also commented on the shareholders the Aker Energy block. Nana pointed out that most of the shareholders are owned by Ghanaians so their owners need to be identified through further investigations.”

D. CLOSING

The meeting ended at 1: 30pm with a prayer by Nana Hema of Shama. Nana Kwabena Nketia gave the vote of thanks.

(ACCRA MEETINGS)

3A. CONSULTATIONS

Minutes of meeting with Ghana Environmental Protection Agency (EPA) - Accra

Venue: EPA Director for Petroleum Sector's Office, Accra

Date: 11th July 2018

Attendance: 7 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 10:00am with Mr Efunam, Director of EPA Petroleum Sector, welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Mr Kodzo Efunam (*Director of Petroleum Sector, EPA*) opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself. In response, Mr Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Mr Ole Aspholm (AKER Energy Environment Manager) and Mr A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Concerns

EPA acknowledged receipt of the takeover letter from Hess ownership to Aker Energy, and thus there is no need to fill any new forms since Aker is not changing significantly in its operation. A letter however, should be written stating these changes and added to the PO1 for record purposes to support the transition from Hess operations to Aker Energy.

Mr. Ole asked how much EPA would want to be involved in this process, of which Mr. Efunam responded that EPA gets involved on case-by-case basis. Usually, EPA gets involved because some of the questions posed are aimed at EPA itself and thus the operating company would have to be escorted in by EPA delegates. In this case, since there have been numerous operations in the Western region, there would be no need to send an EPA officer. Should the need arise, EPA offices in either Takoradi or Ellembelle District of the Western Region would be called upon for assistance.

Mr. Efunam added that since Aker was still at its scoping stage, all they needed to work on was their Terms of Reference, which should include identifying all the issues at the baseline side, major risks, proposed mitigation tactics within the EIA. In case some items are lacking after EPA

reviews the document, then they additional information can just be attached to the document due to time constraints.

Furthermore, he pointed out that the environmental aspect of the report is an issue granted ecology may be different. In some cases, residents can stress on certain concerns that may seem minor but it is important to take care of these issues to get them on one's side.

To this, Ole mentioned that issues raised may not even be related to the oil industry, to which he was advised to take down these issues, add them to his report so that the relevant body would take it up, be it on the private sector side, or a government body.

Another question asked was with regards to publishing the ESIA, if EPA could do it on their behalf. EPA can do it on their behalf but Aker would have to take on the cost involved.

He also had a regulation question: Does EPA approve the Oil-Spill Contingency Plan, or is it just for their informational purposes? Mr. Efunam responded saying EPA approves it but it does not have to come on its own; it can be added to the EIA. He added that the Oil Spill Contingency Plan can be a separate document, outlining the Operation, Risks, Mitigation of those risks.

Conclusion

Mr Appiah moved the meeting to a close expressing his gratitude, and that of Aker, for the support granted them.

3B. CONSULTATIONS

Minutes of meeting with Ghana Environmental Protection Agency (EPA) - Accra

Venue: EPA Conference Room, Accra

Date: 28th June 2018

Attendance: 9 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 9:45am with Mr , Director welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Mr (*Director of EPA*) opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself and his team. In response, Mr Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Mr Ole Aspholm (AKER Energy Environment Manager) and Mr A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Presentation

Presentation on AKER Energy company profile, outlining its ambitions, aims and objectives, and introducing the proposed project was done by Mr. Ole Aspholm.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr A.K. Armah.

Concerns

EPA found issues with the takeover process from Hess by Aker Energy. This is because the EPA had been dealing with Hess and still did not legally recognize Aker. It had to come from the Ministry of Energy or GNPC. Also, the contact person/representative had to be made clear before EPA could issue the permit. However, the EPA Director has been in communication with Aker consultant which then kick starts the drilling process.

Recommendations

It was recommended to download the EPA scoping form for field development. The EPA POD (Field Development Plan) has to be approved before the Environmental Impact Assessment (EIA). If there are no significant changes to the POD, then the EIA would be fine, but the reverse means having to repeat the EIA process.

Additionally, a baseline survey has to be conducted in order to insulate contractor from any negative impacts during and after the drilling process. Because the deep sea environment does not change much the same way shallower environments do, the negative impacts should not be expected.

Conclusion

Mr moved the meeting to a close stating that a follow-up meeting be held in the week starting on 9th July, 2018.

4. CONSULTATIONS

Minutes of meeting with Ministry of Energy (MoEn) - Accra

Venue: MoEn Conference Room, Accra

Date: 28th June 2018

Attendance: 9 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 1:30pm with Mr Fitzgerald Kitty, Director welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Mr Fitzgerald Kitty (*Director at MoEn*) opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself and his team. In response, Mr Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Mr Ole Aspholm (AKER Energy Environment Manager) and Mr A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Presentation

Presentation on AKER Energy company profile, outlining its ambitions, aims and objectives, and introducing the proposed project was done by Mr. Ole Aspholm.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr A.K. Armah.

Concerns

There were a number of concerns raised by the MoEn representatives and they included:

- Corrosion of metal bars used in the water injection process (Mr Ole Aspholm spoke to concerns of using toxic chemicals like sulphur to mitigate corrosion and that they would have to revisit that).
- Limited number of consulted communities in the catchment area (to which Mr AK Armah hinted that there were plans to expand this from the six Western Region coastal communities to all the way in Winneba in the Central Region.)

- On the social impact side, unemployment faced by youth after graduating, challenges faced with students refusing to go to technical schools.
- What are the alternative livelihoods for the fisher folk? (Mr Appiah responded by adding the need to enhance livelihoods rather than offering alternatives. He added that there would be skills availability assessments to merge skills available so as to have sustainable livelihoods.)
- With the FPSO fabrication, is there any local content already?
- There was a caution to avoid Modec due to bad previous dealings and that the ministry would appreciate variety
- The issue of lighting with FPSOs that could attract fish and thereby fishermen, what is the remedy to this? Industrial terminologies like Safety Zone were misleading to fisher folk and so it was recommended using “Danger Zone” which sends out a clear message of keeping off the FPSO zone. Also, tracking devices for fish movement during the bumper season so they are rerouted away from the FPSOs.
- The issue of safety and security. (Marine police would be brought on board and this would greatly aid the industry.
- 5th generation Blow-Out Preventers (BOPs)
- Aren't 4 FPSOs and 40-45 water injections too many?

Conclusion

Mr Fitzgerald Kitty moved the meeting to a close stating that more feedback would ensue once the Executive Director and other major stakeholders were briefed on the meeting by the next day.

5. CONSULTATIONS

Minutes of meeting with Fisheries Commission (FC) - Accra

Venue: MoEn Conference Room, Accra

Date: 29th June 2018

Attendance: 14 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 9:10am with Mr Michael Arthur-Dadzie, Director of Fisheries Commission welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Mr Michael Arthur-Dadzie (FC Director) opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself and his team. In response, Mr Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Mr Ole Aspholm (AKER Energy Environment Manager) and Mr A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Presentation

Presentation on AKER Energy company profile, outlining its ambitions, aims and objectives, and introducing the proposed project was done by Mr. Ole Aspholm.

Presentation on the DWT/CTP Development ESIA Scoping study was done by Mr A.K. Armah.

Concerns

There were a number of concerns raised by the Fisheries Commission stakeholders and they included:

- A deeper look into security issues like piracy and bunkering.
- Bunkering – hijacking and selling oil and gas on international waters, hard to curb and also loses foreign revenue that Ghana would have benefitted.
- Light attracts fish, what will be done to curb the dangers this poses?
- Basic necessities: What are the alternative livelihoods for fisher folk and to educate them that there are these dangers?

- With regards to CSR projects, is it for certain that this what the fishermen really need?
- Why is Dubai moving from oil and going into property investment? It can be a necessary evil that Ghana will need to realize it may not be a great blessing after all.
- Creating jobs and investing in people: What has been the ratio of expats to local people employed in the project? It was recommended that decisions made in that line would bless rather than curse Ghana.
- What is being put in place to ensure sustainable development for locals first?
- The Director of Public Policy, Monitoring & Evaluation gave an analogy of Obuasi and how the locals 50 years later wished they had not been blessed with gold since it brought more harm than good.
- Mr Appiah spoke about a skills availability assessment to ensure sustainable livelihoods. He added that the Scholarship Scheme adopted by Hess, now Aker, and how it was going a long way to promote a diversity of skills needed in the catchment areas.
- Mr Ole added that competence will be looked into as a Ghana-first approach and thus increasing skills for Ghanaians to work in the industry.
- Is there a way qualified Ghanaians can be certified to work on these rigs since they require specialized skills?

Conclusion

Mr Arthur-Dadzie moved the meeting to a close stating that more feedback would ensue once the Minister and other stakeholders were brought on board. The Deputy Director for Administration would be tasked with collating these and distributing the feedback to Aker by the following week.

6. CONSULTATIONS

Minutes of meeting with Ghana Maritime Authority (GMA) - Accra

Venue: GMA Deputy Director's Office

Date: 5th July 2018

Attendance: 4 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 2:05pm with Captain Inusah Abdul-Nasir, Deputy Director, Environment & Safety Standards, welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Capt. Inusah opened the meeting by welcoming the scoping study team made up of ESL Consulting team, in place of AKER Energy, that had an engagement in the Western Region. In response, Mr AK Armah (ESL Consulting Ghana) introduced himself and his team, after which he hinted on the purpose of the visit. Mr Armah (Director of ESL Consulting Ltd and Lead consultant) then made a presentation on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study.

Concerns

Capt. Inusah was pleased with the proposed location of the FPSO, which was tagged to the centre of the Pecan block. This is to maximize the drilling process, and avoid infringing on any concessional boundary.

Conclusion

Capt. Abdul-Nasir moved the meeting to a close stating that Mr. Armah to send a soft copy of his presentation, and a follow-up meeting be held in the following week.

7. CONSULTATIONS

Minutes of meeting with Ghana Navy - Accra

Venue: Ghana Navy Headquarters – Burma Camp, Accra

Date: 18th July 2018

Attendance: 15 people attended the meeting.

Distribution: To attendees via email

Opening: The meeting started at 9:30am with Commodore Issa Yakubu, Ag. Chief-of-Staff, Ghana Navy, welcoming the delegates and self-introductions took place.

DISCUSSIONS

Introduction

Commodore Issa Yakubu opened the meeting by welcoming the scoping study team jointly made up of AKER Energy and ESL Consulting teams, and then briefly introduced himself. In response, Mr Emmanuel Appiah (AKER Energy CSR) introduced himself, followed by self-introduction of the other scoping study team members, after which he hinted on the purpose of the visit. Ms Unn (AKER Energy) and Mr A.K. Armah (Director of ESL Consulting Ltd and Lead consultant) took turns to make presentations on AKER Energy Company and its proposed Deep Water Tano Cape Three Point (DWT/CTP) oil and gas project in Ghana, and the DWT/CTP Development ESIA Scoping Study respectively.

Concerns

Commander Ako Aryee (Maritime Lawyer) had a concern with regards to CSR. She stated that she had done extensive research in this area and discovered that most companies took more than they gave back to the communities, and that they didn't put into consideration health impacts, safety concerns and social vices that their activities brought to the native communities within their area of operation. She was wondering if Aker could open more in CSR and look beyond just educational scholarship and rather enhance livelihoods as well as providing alternative livelihoods by engaging deeper with communities to ascertain their needs. She advised that Aker Energy take their CSR up a notch, by engaging more to get other things done.

Mr. Appiah then answered by saying they involved women in their stakeholder engagements to know what unique needs they would bring to Aker so it finds ways to tackle them.

Commodore Yakubu added that extractive industries usually depleted resources and sometimes halted livelihoods present and thus alternatives must be considered, to impact local economies positively.

He added that he was not aware of the safety and security measures in place to protect rigs and ensure. He also mentioned that the Ghana Navy is interested in Aker's Tier 1.

He went ahead to ask what would be done, should oil be discovered on the International maritime border with Cote d'Ivoire, to which Mr Armah mentioned that since there is peace now between Ghana and its neighbour Cote d'Ivoire, there would be a joint development approach to this. In this instance, Cote d'Ivoire would have to be in the know once this discovery is 10 miles within its boundary.

Commander Arhen raised issues surrounding flaring of natural gas, and that since flaring would be allowed to a minimum level, there is a need to operationally define minimum in terms of percentages. He added that Ghana has a Zero Flaring policy, but since flaring must be permitted to reduce pressure, there is a need to reconcile the desired minimum levels specifically to maintain them.

Furthermore, he asked if Aker had engaged with Ghana Maritime Authority to know who will be in charge for the rescue and search response.

Mr Appiah also had a question that pertained to pirating and what the Navy was doing about it. Commodore Yakubu mentioned that pirates usually do not target oil rigs but rather tankers and processed oil. He stated that there is a need to have a plan, and that in the past they have had the "Closed Protection" Plan, where there are on-service personnel on the vessel to provide security. The Navy wants to move from that plan so that they are not stationed on civilian vessels and thus another plan where the Ministry of Environment is to lease vessels to security companies that would cater for security, tendering and logistics support. Most of these companies have the Navy providing security. An example of this is with Gulf Frontiers, which provides local content for Petroleum Commission to help with security, and Navy vessels are on board to provide training for security purposes.

Conclusion

Mr Appiah moved the meeting to a close expressing his gratitude, and that of Aker, for the support granted them.

APPENDIX 8-D: Attendance Record Sheet

DAY 1, 18 TH JUNE, 2018

FISHERMEN/FISH MONGERS (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	AMOUNT (GHC)	SIGNATURE	DATE
1	Nana Kofi Konduah	Chair. GNCFE Aburi	0243681060			
2	Ablo-Blankson	Sec. - L	0274903439			
3	Evans A. Tackie	HOOK AND LINE ORGANISER	0243861912			
4	NANA KOFI ANKRAH	CHIEF EXECUTIVE	0208225201			
5	NANA KOJO POGU	✓	0241045399			
6	Nana Kofi Bentil	✓	0243634081			
7	Nana Emm. Adwiae	Chairman	0245065869			
8	Nana Effrimu	Welfare Off.	0248449155			
9	Cecilia S Anaan	Fish monger	0208134949			
10	Emelia Abaka-Gedu	Fish Monger	0208825370			
11	Mike Abaka-Edu	Reg. Sec - GNCFE	0244880174			
12	Nana Papa Yalley	Chairman (Akwai)	0547469514			
13	Kyru Salifu	Abashedropu Chairman	0249784378			
14	Susana Bissie	Fish Monger	0541196678			
15	Nana J. F. Sandley	Fisherman	0249495819			
16	Antoinette Adu	Fish Monger	078219092			
17	Gifty Cobbimah	Fish Monger	0200195475			
18	Nana Kofu Dechie	Chief Fisherman	0572058416			
19	Nana Eru Bassaw	Steno (Chief Fisherman)	0246824399			
20	Theresa Freeman	Fish Monger (Akwai)	0246603371			
21	John D. Fishu	Reg. PRO - GNCFE	0240749611			
22						
23						
24						
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DAY 1, 18 TH JUNE, 2018, PART II
GHANA PORTS AND HABOURS AUTHORITY (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	SIGNATURE	DATE
1	AGNES DENNIS-MOSES	MKT/PUB. AFFAIRS MGR.	0202013764		18-06-18
2	DAVID IYAM	ESTATE & ENV. MGR	0573518333		18-6-18
3	KWAME B. SANDO	CHIEF PILOT	0573518120		18-06-18
4	FRANCIS KORDIEH	SA	0573578184		18/06/18
5	CAPT JAMES R. QUAYSON	HM/PPSO	0573578184 0208843336		18/06/18
6	JAMES HYDE-GUNTER	POM	0573516196		18/06
7	CAPT EBENEZER AFEDZI	Director of Port	0208181428		18/06/18
8	EBENEZER NKETSICH	MCM	0209050510		18/06/18
9	RENE ANNU-BEDALAH	DP-MPAM	057-351-8246		18/6/18
10	Ole Aspholm	Environmental Mng	+47 90411042		18/6/18
11	Desmond Ariedu	0209986439	CSR		18-6-18
12	Emmanuel Appiah	0544338699	CSR		18-6-18
13	Kenneth Agsi	0246146600	Env. Consultant		18/06/18
14					
15					

DAY 2, 19 TH JUNE, 2018

ESIA

FISHERIES COMMISSION (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	SIGNATURE	DATE	Email
1	Josephine Lanyea	Zonal Director	0242629263		19/06/2018	joashnee@gmail.com
2	Theodore Kwadjosse	Dir MCRD, Z.	0244926211		19.06.2018	tdj2002@gmail.com
3	Alex Y. Sabah	Regl. Dir	0244574498		19/06/18.	alexssab66@yahoo.com
4	Kenneth Y. Asih	EEL Consultant	0246146608		19/06/18	
5	Alex K. ARUMATI	EEL Director	0244771707		19/06/18	
6	Emmanuel Appiah	Aker Energy	0544338699		19-6-18	
7	Demad Aredv	Aker Energy	0209986439		19-6-18	
8	Ole Aspholm	Aker Energy	+47 90411042		19/6-18	
9	FERGUT DURENTO AYEMAN	EEL CONSULTING	0244110415		✓	
10						
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DAY 3, 20 TH JUNE, 2018

ESIA

REGIONAL COORDINATING COUNCIL -RCC (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE	DATE
1	Michael Mensah Tabiri	Head IT & Ag. M&A	0208573914	sdemic14@gmail.com		20/06/18
2	Nelson Setogah	Research Officer	0242244186	nelson.setogah@yahoo.com		20/06/18
3	LT CDL LUCAS Ocloo	GHANA NAVY	0243310674	lxocloo@gmail.com		20/06/18
4	ASP/MR ISAAC MENSAH ASENTENG	MARINE POLICE	0242661620	mensahisenteng@yahoo.com		20/06/18
5	Francis Kwasi Esorede	Environmental RCC	0547661201	Francis.esorede@gmail.com		20/06/18
6	Gilbert Q. Etey	REGIONAL AGRIC EXT. WRCC	024482323	egillyan@gmail.com		20/06/18
7	HON GIFTY EUGINE KUSI	DEPT. ASSISTANT FOR VEGETATION REGION	0554016688			20/06/18
8	ROBERT HACKMAN ANINI	SURVEY/MAPPING DIVISION OF LL	0241039019	robbyhacky@yahoo.com		20/06/18
9	Nana Kusi Nsiah	Physical Pln Dept S.T.M.A	0247108985	kusince@gmail.com		20/06/18
10	Rexford Adlin	Dept Planning STMA	024386291	nana.kusince@yahoo.com		20/06/18
11	Supt. Henrietta Amparbeng	GIS Enj. GIS. F.S.D	0244367389	nanagyiewac@gmail.com		20/06/2018
12	Dimusu Ameyaw	ASST. Manager Ghana	0243647166	Ameyaw17@hotmail.com		20/06/18
13	Samuel Appiah	ASSO Shippers	0554447718	Samuel.appiah@shippers.org.gh		20/06/18
14	Otuo ACHEAMPONG R.	Accountant	0556606765	otuo.acheampong.shippers.org.gh		20/06/18
15	PRINCE N.A. AWERE	P.R.O	0244592236	addrince1@gmail.com		20/06/18

DAY 3, 20 TH JUNE, 2018

ESIA

REGIONAL COORDINATING COUNCIL - RCC (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE	DATE
16	Jonathan Djan Gyau	Social Welfare	0243187745	dstw@western@yahoo.com		20/06/18
17	ISAAC KOFI AMARCYE	BNI - WIZ-Hqs	0553656745	amarcyei774@gmail.com		20/06/18
18	Rev (SP) George Akumiah-Bonteng	ECOWAS PRISONS Soc	0244664784	r.vyambate@yahoo.com		20/06/18
19	ADDI Ebenezer Sam	G.N.F.S	0206619365	ndebosam@gmail.com		20/06/18
20	Amanda Dudimach	LVD (Lands C'ssion)	0234338952	ndidior1@gmail.com		20/06/18
21	Priscilla Ankomah-Hackman	P.P.D	0502690661	ankomahhackman@yahoo.com		20/06/18
22	Baba Ayine Akatili	Ministry of Trade & Industry	0243170777	moti_bakoradi@gmail.com akatiliiba.22@yahoo.com		20/06/18
23	Joyce Obiri-Teboah	Dept of Comm. Devt	0244265669	joisoy@yahoo.com		20/06/18
24	Cpt Daniel Quarfi	GPAA - Oum/Hqs	0570691970	dannangquarfi@gtaniporfs.net		20/06/18
25	Lawrence Aguchi	Minerals Commission	0240400114	larryaguchi@hstmad.com		20/06/18
26	James Melle	NMA	0244021275	James.Melle@nhia.gov.gh		20/06/18
27	Angelina Awo	Lands C'ssion	0244547799	awoange@yahoo.com		20/06/18
28	Aurita Offei	ICO/IMMIGRATION	0243127532	-		20/06/18
29	Henry Asiri	Rural Housing	0244519287	drh.wvgham@gmail.com		20/06/18
30	Rebecca Williams	Ghana State Habitat	0201643445	beckwill1986@gmail.com		20/06/18

DAY 3, 20 TH JUNE, 2018

ESIA

REGIONAL COORDINATING COUNCIL -RCC (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE	DATE
31	Mercy Aldo	ICCES	0277596888	iccburk@plongar.com		20/6/18
32	Ben Yaw Frimpong	Regional Director	0277211618	benfrimpong2000@yahoo.com		20/6/18
33	Elizabeth Aeguchi	RLO - Labour	0240163008	jabbaeguchi@yahoo.com		20/6/18
34	William K. Dantie	Dep. of Coops	0243136888	williamdantie@yahoo.com		20/6/18
35	Raphael Borezi	NBS	024729045	raphaelborezi@gmail.com		20/06/18
36	Joseph K. Appiah	Meto Yam Dir. (NYM)	0279762015	joepk809@gmail.com		20/06/18
37	Julian Nana Aneku	(GADANA HUGHWAY ANEKU) RAN TAKOPADI	0249298942			20/06/18
38	Theresa M. Mensah	Dep Regional Director, NADDA	024+21475	theresa-mensah81@yahoo.com		20/06/18
39	Freda O-Ansah	Dep Regional Director NPC	02488577	afisampansah@gmail.com		20/06/18
40	Carlos F. Ameyaw	PFO	024671138	carlosameyaw@gmail.com		20/6/18
41	Joseph R. Achim	Dep. Dir. RCC NBSSI	0265108116			20/6/18
42	DAVID ANDOH-KESSON	Reg Manager	0502888476	davidkesson@yahoo.com		20/6/18
43	Azeez M. O. Ajadi	Plant Manager	0570121675	azeezajadi@victa.com		20/6/18
44	Andrews B. M. Go	Administrator	0202050268	andrews.bmgo@alcaighana.com		20/6/18
45						

DAY 3, 20 TH JUNE, 2018 PART II

ESIA

GHANA MARITIME AUTHORITY (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE	DATE
1	Demand Fred	CSR	0209986439	desmond.asiedu@akereenergy.com		20-06-18
2	Emmanuel Appiah	CSR	0544338699	✓		20-06-18
3	Joseph AUSTI Kwahye	Resource Management Officer	0249998520	George K. Awhi @gmail.com		20-06-18
4	Divine Kofi Gti	Sur Planning Officer	0244766998	ketidivine@yahoo.com		20-06-18
5	CPGT KWABENA ADU	SNR MARINE OFFICER	0209886057	Kwabena, Adu Gmtu		20-06-18
6	Fergus Munonyo Steteman	EST CONSULTING	0244110915	ferguststeteman@gmail.com		20-06-18
7	AYAA K. ARIMATH	ESL CONSULTING	0244771707	ayaa.k@eslconsulting.com		20/06/18
8	Ole Aspholm	Aker Energy	+47 90411042	ole.aspholm@akerenergy.com		20/06/18
9	Kenneth F. Abo	EST Consulting	0246146600	kendrickpogor@yahu.com		20/06/18
10	Nana Otoo	SNR. ADMIN. OFF.	020165740	isaac.n.otoo@ghnamaritime.gov		✓ ✓ ✓
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DAY 4, 21 ST JUNE, 2018

ESIA

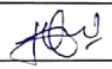
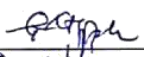


NGO,S (STAKEHOLDER ENGAGEMENT)

No.	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE	DATE
16	AGTEMAN FERGIUS DUMENYU	ESL	0244110915	fergiusdumeny @gmail.com		21-06-2018
17	Dominic Mervick	Friends of the Nation	0244520888	info@fondam.org		✓
18	Desmed Asiedu	CSR/After Energy	0209986439	desmond.asiedu@ dzerenergy.com		21-6-18
19	Emmanuel Appiah		0544338699	✓		21-6-18
20	Obrempong Yaw Ampofo	Citizen	0244835335	walkerjazz223@gnl		21-06-18
21	don Joseph Isaac Mensah	ccba-stmnt	024651263	paatwamina19@ gmail.com		21-06-18
22	Daniel Kwame Ntiakoh Anah	CENAGU	0246374274	dantiake@yche com		21-06-18
23	Emmanuel Donkor	CENAGU	0248884138	edcho2013@gmail.com		21-06-18
24	James Fosu Boguloh	CENASS	0244165447	boguloh2017@gmail		21-06-18
25	Augustina Kwadwo	CENASS	0244249800			21-06-18
26	Osei-Akoto Nyantakyi	COLATIDEF	0203023631	osei-akoto.n@ @latidef.org		21-06-18
27	Deborah Ackbe	ESL	0200587860	deborah.ninnes@ yachoo.com		21/06/18
28						
29						
30						

ENVIRONMENTAL PROTECTION AGENCY - SEKONDI
SCOPING PHASE STAKEHOLDER ENGAGEMENT BY AKER ENERGY GHANA LIMITED
HELD ON FRIDAY, JUNE 22, 2018 AT THE AGENCY'S CONFERENCE ROOM

ATTENDANCE SHEET

NO.	NAME	ORGANISATION	CONTACT NO.	EMAIL	SIGNATURE
1.	Yaa Sarko-Appiah	EPA	0501301391	y.sarko@epa.gov.gh	
2.	Shine Fiegome	EPA	0501301697	shine.fiegome@epa.gov.gh	
3.	Ernest Amoh-Appiah	EPA	0501301695	ernest.amoh-appeh@epa.gov.gh	
4.	Ingr. George Diawwah	EPA	0501301699	gkldiawwah@gmail.com	
5.	Lawrence Akoto	EPA	0501301657	lawrence.akoto@epa.gov.gh	
6.	Ole Aspholm	Aker Energy	+790411042	ole.aspholm@akerenergy.com	
7.	A. K. SAKATAH	ESL	024477707	akatah@esl-ghana.com	
8.	Desmond Asiedu	Aker Energy	0544338699	desmond.asiedu@akerenergy.com	
9.	Emmanuel Appiah	✓	0209986439	emmanuel.appiah@akerenergy.com	
10.	Kenneth Y. Asibi	ESL	0246146600	kenneth.y.asibi@esl.com	
11.	FERGUS DUNN	EL	0244110715	fergus.dunn@gmail.com	
12.	Hambal Adam	EPA	0501301698	hambal.adam@epa.gov.gh	
13.	Kwadwo Opoku-Mensah	EPA	0501301692	kwadwo.opoku-mensah@epa.gov.gh	
14.	Richard A. Odame	EPA	0501301680	richard.a.odame@epa.gov.gh	

15.	Amada Asse-Beyeur	ESL	0226014057		
16.	Dady's Appiel	EPA	0540727127		
17.	Hassina Abul-Rashed	EPA	0577362846	rashed.hassina.13@gmail.com	
18.	Bmce Janet	EPA	0501301658	jannjome7@gmail.com	
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WESTERN REGIONAL HOUSE OF CHIEFS

DATE: 25 th JUNE, 2018








NAME OF CHIEF

No	NORTHERN BELT	LOCATION	TELEPHONE	EMAIL	SIGNATURE
1	Ogyeahoho Yaw Gyebii II (President)	Setwi Anhwiaso	02440577883	nawagyebii@gmail.com	
2	Okogyeman Kwaku Gyamprah III	Setwi Chrano	0244463278	okogyeman@ppl.com	
3	Odeneho Brentum IV	Suaman Dadieso			
4	Nana Kwaw Ampim Ababio II	Setwi Wiaso	024478608	Nanawiam@chancem.com	
5	Nana Kojo Twum II	Setwi Bekwai	0247573571		
6	Nana Kojo Sikantia II	Aowin	0553153475		
No	MIDDLE BELT	LOCATION	TELEPHONE	EMAIL	SIGNATURE
7	Tretrete Okuamoah Seyim II	Wassa Amenfi	026582795	tretrete.okuamoah@gmail.com	
8	Nana Kwadu Kyerefo III	Wassa Fiase	0242038995		
9	Awulae Agyefi Kwame II	Nsein	0244472743		
10	Awulae Kweku Akyirisuo III	Apatam	02440916786		
11	Awulae Annor Adjaye III	Benyim	0244758769		
12	Awulae Amihere Kpanyini II (Vice President)	Atuabo			
13	Awulae Angama Tu-Gyan II	Bamianko			

No	SOUTHERN BELT	LOCATION	TELEPHONE	EMAIL	SIGNATURE
14	Nana Kwesi Agyeman XV IX	Lower Dixcove			
15	Obrempong Hima Dekyi XIV	Upper Dixcove	0541423579	obremponghimadekyi@gmail.com	
16	Awulae Attibrukusu III	Lower Axim			
17	Nana Kwaw Tendele II	Upper Axim	0547166191		
18	Otumfuo Baidoo Bonsoe XV	Busua			
19	Osaberima Kwaw Entsie II	Mpohor	0244466057	okozga@gmail.com	
20	Nana Kwobina Nketsia V	Essikado	0808408357	nanananketsiak@gmail.com	
21	Nana Kwame Wienu II	Shama	0246704630		
22	Nana Kwesi Bedu II	Sekondi	02447759785		

WESTERN REGIONAL HOUSE OF CHIEFS
NAME OF QUEEN MOTHER

DATE: 25 th JUNE, 2018

No	NAME OF QUEEN MOTHER	LOCATION	TELEPHONE	EMAIL	SIGNATURE
1	Nana Nda Bozoma II (President)	Benyin	0243736865		
2	Nana Abena Konadjoa II (Vice President)	Wassa Fiase	0244455791		
3	Nana Nda Esi III	Upper Dvrae	0226189883		
4	Nana Akosua Gyamfi Ahi II	Shama	0207003786		
5	Nana Efiua Afiima II	Sekondi	02444534539		
6	Nana Ekuu Kodu II	Esikado	0244978662		
7	Nana Adelekyi III	Nsein	0557706455	mfasesy4@gmail.com	

APPENDIX 8-E: Tabulated Extracts of Written Comments

APPENDIX 6-E: Tabulated Extracts of Written Comments.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
NGOs			
Alfred K. Gyimah (Conservation Foundation – Administrator)	Social responsibility in the coastal communities	Proper mitigation measures	X
Marlvin-James Dadzie (New Crusading Guide – Senior Reporter)	How the zone will be marked to prevent the incursion of fisher folk	(+) Generate revenue for Ghana (-) Impact on fishing activities	X
Hon. Joseph Isaiah Mensah (Centre for Community Development Initiatives and Advocacy – Executive Director)	Stakeholder engagements in the communities to assess impacts Incorporate concerns of the communities in terms of health, environmental and social impacts	(+) Create employment for citizens (+) Strengthen/Better the livelihood of citizens (-) Could affect the livelihood of fisher folk	Proper mitigation measures to take care of the environment of coastal communities Support the communities with developmental facilities (Health, Educational etc.)
William Awortwe-Mprah (Community Environmental Monitoring and Advocacy Group – Member)	How fisher folk affected by the activities of the FPSO can make their concerns known	(+) Increase resource base of the nation (-) Limit the area of fishing for fishing folk	Proper and constant education of coastal communities to erode their perception that oil and gas exploitation causes sea erosion etc.
Richmond Agbanyaklu (Evangor Foundation – Executive Director)	How different will the social responsibilities of the firm from that of existing firms?	(+) Boost economic activity and consequently the economy of the nation (-) impact on fishing activities. The more the number of FPSO's the less the area for fishing.	X
Desire Aggor (AGRIDEF – Director)	Will non-coastal communities (hinterlands) benefit from AKER's CSR?	(+) Job creation for citizens to aid development (-) Impact on the livelihood of fisher folk	X
James Fobah Bogoloh (CEMAGS – Organizer)	Unemployment and social vices	(+) Job creation and development	X

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Emmanuel Donkor (CEMAGS – Member)	Inadequate community participation. What measures will be put in place to erode public perception about the activities of offshore companies?	(+) Direct and indirect employment for the locals.	X
Daniel N.K. Andoh (CEMAGS)	Engage both opinion leaders and the community as a whole in issues of development.	(+) Helps the government (-) Sea erosions	No proper health facilities in the coastal areas. Spread of headache in the district; cause is yet to be known.
Mark Arthur (CEMAGS – Assembly Member)	Fear that fisher folk will be thrown out of business since the area of operation will be restricted as done by existing firms.	(+) Government would have enough resources for development. (-) Some fisher folk will be thrown out of business	Developing the forest communities as part of CSR instead of only coastal communities.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
GPHA			
Agnes D-Moses (GPHA – Marketing Manager)	Proper laying of pipelines An added business in community and port	(+) Offer employment in the community (-) Improve the nation’s economy (+) Enhance oil delivery services	There should be a policy to guide oil spill incidence Livelihood enhancement programs for the fisher folk
Jacob Hyde-Cooper (GPHA – Port Operations Manager)	How will oil production and fishing activities be balanced to avoid agitation of fisher folk whose livelihoods will be affected?	(+) Direct employment, auxiliary services, investment in the economy. (-) Disturbance to the sea environment, seismic waves and associated sound effects to sea organisms (-) Oil spillage	X
Capt. James Quayson (GPHA – Harbor Master)	Capacity Building, Technology transfer, Job opportunity for young Ghanaians in the offshore maritime sector	Track records of AKER indicate a good partnership in their operations.	Developing the local manpower base for young Ghanaians to benefit from oil and gas activities Community engagement and transfer of technology
Ebenezer Nketsiah (GPHA – Port Monitoring and Control Manager)	Structural pollution caused by the presence of the FPSO and the activities carried out in it. Service boats for the development that will use the Takoradi Port as their base.	(+) Social and Economic benefit/impact.	X
David Halm GPHA – Estate and Environmental Manager)	The use of Takoradi Port with the expected increase in revenue generation	(+) Employment opportunities, Increased revenue from Port activity, Transfer of technology (-) Possible spillage, Congestion in Port, Increased land values	There is the need to engage the fishing communities Investing

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Owusu Brempong. Asst. National Registrar. House of Chiefs – Sekondi.	Include locals in job allocations and training.	(+) Improvement of socio-economic & infrastructural development. (-) Activities of fisher-folks might be hampered.	X
Nana Alelaekyi II Western Region House of Chiefs – Paramount Queen Mother.	Job for the jobless including qualified personnel of the community. Training programs to equip Community members with requisite skills and knowledge for a better future.	(+) Creation of job opportunities and training of community members made easier. (-) Disease, pollution of sea and destruction of the natural habitat of aquatic animals.	X
Nana Abena Konadjoa. Wassa Fiase Traditional Council – Paramount Queen Mother	Recruitment of staff from the Region.	(-) Oil spills in the sea will have adverse effect on the fishes and the fisher folk.	Proper health facilities and improved road networks.
Nana Benuah III Western Region House of Chiefs – Awulae Tufuhene.	Aker Energy company should meet Awulae and sub-chiefs at their traditional areas.	(-) Aker operations should be extended to other areas in the community not only at the shores.	Air pollution should be tackled with all seriousness
Awulae Attibrukusu III Western Region House of Chiefs – Paramount Chief.	Train community members to get jobs. Develop the manpower and infrastructure of the community and to hear them out when there is a problem.	(+) The State will get money for development. (-) Previous same project dumped into the mud contrary to their expectations. Proposed project will affect the livelihood of our fishermen and fishmongers.	Air pollution – flaring of gas e.g. residents of Atuabo Gas plant complain of cough. Mitigation measures should be put in place.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Nana Kwesi Agyeman II Western Region House of Chiefs - Member	What can be done to help the fishing industry/fisher folk? Protect communities from air pollution hazards. Provide residential accommodation for its workers in the Western Region. Provide employment quota for W/R.	<p>(+) Provision of employment support CSR projects/community initiated projects.</p> <p>(-) Will disturb the fishing industry, the social and economic life of fisher folks and local people. Does little to improve the local economy.</p>	Baseline study as benchmark for future monitoring to see changes.
Otumfuor Baidoo Bonsoe XV. Western Region House of Chiefs - Paramount Chief Ahanta.	Requisite qualification training. Support fisher folk to improve their trade. Aker Energy should site their offices in the Western Region. Support provide developmental projects for communities.	<p>(+) Helps national economy and provides jobs. Youth will be trained in skills.</p> <p>(-) Will affect local communities including bad social practices. Does little to improve local economy. Influx of people with varied characters.</p>	Help with baseline study to determine any future changes in health status of the communities.
Nana Kwasi Atobrah II Traditional Ruler, Chief of Esuaso Division.	Sustainable livelihood for fishermen/fishmongers in the local communities of the enclave.	<p>(+) Improves the economy of the country.</p> <p>(-) Greater percentage of the oil money goes out. Local shareholding very small. Oil not refined fully in the country so all by-products lost to the country.</p>	Inhabitants shall suffer health hazards from pollution. Need for a baseline study to serve as benchmark for health status checks in the future.
Nana Kwadwo Twum II Western Region House of Chief – Acting President.	Build a school to train the youth in technical skills for the future.	(-) Air pollution will bring diseases to the community.	Build emergency hospital at the coast for the whole area.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Awulae Annor Adjaye III. Western Regional House of Chiefs – Paramount Chief, West Nzema.	Littering of coastal beaches with debris/weeds from the sea and preventing/obstructing drag net fishing. Lack of sponsored development projects in Beyin and other coastal towns.	<p>(+) Increase in Ghana’s Oil and Gas revenue especially with the establishment of oil refineries.</p> <p>(-) Increased fishing industry challenges. Establish Fisherman’s Foundation Fund to mitigate.</p>	Use best international practices to address environmental and air pollution problems that affects the climate, atmospheric conditions and the air that we breathe.
Nana Kwaw Tendele II. Upper Axim Traditional Council. Acting President.	Upgrade Axim Government Hospital to a Teaching hospital status. Clear sea weeds properly by Zoil or appointed agents.	(+) Encourage farmers in the area to grow foodstuff and vegetables needed by company’s staff. Grant children of fishermen scholarship up to university level through each Traditional Council.	Company should abide by all the laws and regulations since it is a government approved project and go by my earlier submissions. Supply sufficient anti-malaria drugs, conduct mosquito spraying exercises to eliminate malaria.
Awulae Agyefi Kwame II. Western Region House of Chiefs. Omanhene of Nsein Traditional Area.	Creation of jobs. Scholarships for Community fisher folks’ children. Health facility e.g. Clinic.	(+) Enhance living standards and enjoy good livelihood.	x
Ogyeahoho Yaw Gyebi II. Western Region House of Chiefs – President.	Provision of educational facilities, skills training and economic empowerment to the people.	(+) Establishment of Oil Exploration Fund Foundation for the local people. Estate development for the workers.	Organize environmental, health and safety surveys before and during oil exploration activities.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Nana Kwaw Anysim Ababio. Western Region House of Chiefs. – Divisional Chief S/W	Extend company’s programs to the remote parts of the region. E. g. Sefwi Wiawso Traditional Area. Engage Nananom periodically.	(+) Build Oil Refineries in Ghana.	Think about the environment and find solutions. E. g. global warming. Educate fishermen well and engage them in company’s operations.
Nana Nda Esi III. Western Region House of Chiefs – Paramount Queen Mother.	Training of community and town dwellers.	(+) Aker Energy to do something better for the town.	Environment and community should be healthy and fine all the time.
Nana Efua Ahima II. Western Region House of Chiefs- Paramount Queen Mother.	Aker should help other companies to build their headquarters in the Western Region. Employ office staff from the Region.	(+) Employment and revenue generation for development.	Care should be taken to prevent water and air pollution through oil/gas spillage.
Nana Kobina Nketia. Western Region House of Chiefs – Paramount Chief.			
Nana Ekua Kodu II. Western Region House of Chiefs – Queen Mother (Essikado)	GNPC’s 10% should be increased. Increase educational facilities.	(+) Queen Mothers should be involved in the supply chain.	Use local content as a guide for employment. Improve health facilities.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Obrempong Hima Dekyi XIV. Western Region House of Chiefs – Paramount Chief.	Involve the locals by providing them with jobs. Provide key social amenities in Education, Health and Sanitation.	(+) Provision of revenue for National Development. (-) High cost of living due to influx of people.	Lack of dumping sites and refuse collecting materials led to plastic waste pollution of the sea. Defecation at the shores. Bad fishing practices.
Tetrefe Okuamoah Sekyira II. Western Region House of Chiefs – Paramount Chief. Member.	Infrastructural developments will spring up – roads, buildings etc.	(+) Raise standard of living. (-) Environmental impact on the immediate vicinity	No comments
Nana Akosua Gyanfiaba II. Western Region House of Chiefs – Queen Mother.	Restore bad drainage system. Rehabilitate our bad roads. Our beaches are very filthy.	(+) Aker Energy will bring a difference to the industry because of Norway's experience.	No comments
Okogyeman Kwaku Gyamponsah III. Western Region House of Chiefs – Omanhene.	Training and providing youth with jobs.	(+) Job creation. (-) Part – pollution of the environment.	Pollution of the air. Company should meet Nananom regularly.
Awulae Nda Bozoma II. Western Region House of Chiefs – Queen Mother.	GNPC'S 10% is too small. Should be increased.	(+) Involve Queen Mothers in day to day activities to be of value to the company projects.	Employ the Indigenes to benefit the community. Needs a modern Hospital.
Nana Kwamina Wienu II. Shama Traditional Council – Acting President.	Oil companies in the Region led to influx of people into our communities with its attendant accommodation and unemployment problems. Employ some of our people.	(+) Provides employment and revenue for national economic growth and development.	Avoid oil and gas spillage which causes health and environmental problems.

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
Francis Kwasi Osorede (Environmental Health Dept. – Env. Officer)	Will Aker Energy be sampling and screening community members along operational areas?	(+) Job creation. (-) Aquatic lives in danger. Air and water pollution.	Lives of all living organisms to be considered. Hospitals to be built around operational areas.
Ebenezer Sam (Ghana National Fire Service (GNFS) – Staff Officer)	The GNFS to be helped to develop offshore fire-fighting and rescue operation capacity. To be involved in fire-watching activities and planned maintenance events.	(+) Development of the Western Region through CSR.	x
Joseph Kwesi Achim (Civil Servant – Deputy Director)	Regional Development	(+) Employment. (-) Disruption of fishing activities.	Help to facelift the regional hospital.
Supt. Henrietta N. Amparbeng (Ghana Immigrations Service – O.I.C Enforcement Unit)	Aker Energy Headquarters to be in Takoradi, not in Accra, to enable processing of permits for expatriates to be done in the region of operation.	(+) Income generation for the nation. (-) Adverse environmental impacts.	X
Anita Offei (Immigration – Intel Unit)	Immigration related issues to be handled in the region.	(+) Increase in national revenue. (-) can create poverty in communities around the shore.	X
Freda Q-Ansah (National Pop. Council – Regional Population Officer)	Alternative livelihood, Scholarships and educational benefits to be provided. Infrastructural development necessary. Teaching improved forms of fishing.	(+) Jobs creation. (-) Absence of alternative livelihood can breed miscreants.	X
David Andoh – Kesson (National Board for Small-scale	Aker Energy to make available oil bye-products to help affected	x	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
Industries – Regional Manager)	communities to establish medium to small scale industries to reduce economic impacts.		
Owusu Ameyao (Forest Services Division – Managerial)	Measures to be taken to minimize greenhouse gas emissions. Measures to be taken to ensure local content in job allocation.	(+) Employment creation. (-) Environmental pollution resulting from poor management of project.	Aker Energy to assist in reforestation as part of their CSR.
Becky Williams (Ghana Standards Authority – Ag. Regional Officer)	Ghana Standards Authority to be consulted for all the set standards for Ghana and what is to be produced.	x	x
Henry Asirifi (Dept. of Rural Housing – Regional Director)	Aker Energy to help improve housing in terms of the use of local materials.	(+) Communities may benefit.	X
Nana Kusi Nsiah (Physical Planning Dept. – Town Planning Officer)	Urbanization. Public transportation. Alternative livelihood. Waste management. Security. Public Housing.	(+) Job creation. Infrastructure and amenities development. (-) Disruption of fishermen activities. Fishstock depletion. Urban traffic problem. Housing problem.	Of noteworthy is the fact that fishing is the main occupation of the coastal residents. Global warming should be considered.
Robert Hackman Antwi (Geomatic Engineering – Head of WR Survey/Mapping Division)	Local Content application regarding employment. Constant and regular consultation with local people to consider their needs.	(+) Beneficial to the nation. (-) Local agitation if they are sidelined in terms of what they deserve.	X
Angelina Awa (Lands Commission – Head	Lack of infrastructural development in the area of	(+) Employment creation. Human resource improvement.	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
PUCMD)	operation. Lack of coordination between oil companies and the lands commission. The delinking of the region and national headquarters of the company/operators.	(-) Environmental pollution. Poor service condition for Ghanaian workers, compared to the expatriate counterparts.	
Rexford Arthur (Sekondi-Takoradi Metro Assembly – Asst. Development Planning Officer)	Increase in cost of accommodation. Unemployment among the fisher folks. Climate change due to gas emissions.	(+) Job creation. Infrastructural development. Competence and vocational skill development. (-) Climate change. Unemployment due to adverse impact on livelihood of fisher folks.	Flaring of gas can potentially contribute to climate change. Help in afforestation.
Elizabeth Acquah (Labour Dept. – RLO)	Arker Energy to establish contacts with development partners to ensure employment generation.	(+) Promote schooling (-) Adverse impact on people's livelihood. Spillage.	Capacity building in employable skills and agro-based occupation.
Capt. Daniel Quartey (GPHA – Oil & Gas/HSE+Q Manager)	Aker Energy to source for their oil and gas equipment/requirements from the Ports Authority. Adequate consultation required.	Various impacts, both positive and negative.	X
Isaac K. Mensah (PWD – Architect)	The lives of the people should be improved, hence local content on employment to be followed.	(+) Employment creation. (-) Adverse impacts will be avoided if international good practice is followed.	x
Amanda Dudimah (Land Valuation Division – Land	Measures to minimize greenhouse gas.	(+) Employment creation. Contribution to national GDP.	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
Administration Officer)	Alternatives to be considered.	(-) Loss of employment for the fisher folks.	
Joe Appiah (National Yout Authority – Metro Youth Director)	Aker Energy to consider negative impacts on the communities with respect to ecological imbalance, health, fishing activities and oil spillage. Creation of employment avenues for the youth. Speeding up of development in the communities.	(+) Creation of Employment. Enhanced/Improved educational standards. (-) Pollution increases and respiratory diseases.	Accumulation of plastic wastes (bags) at the beaches.
Nelson Setugah (Western Regional House of Chiefs – Research Officer)	Aker Energy to help provide educational and health infrastructure for the communities.	(+) Employment. Revenue generation. Skill transfers. (-) Fisher folks deprived of their livelihoods. Pollution (in case of accident).	x
Baba Ayine Akafili (Ministry of Trade and Industry – Industrial Promotion Officer)	Aker Energy to consider engaging the locals, especially the women to provide services and goods local to the region.	(+) Job creation. Skill training for the youth.	Aker Energy to help facelift the regional hospital to a world-class standard, as well as health posts in the communities.
James Mettle (NHIA – Regional Operations Manager)	To collaborate with the health directorate to handle associated project induced health issues.	(+) Job creation and development. (-) Environmental impacts and associated health issues.	X
Isaac Mensah Apenteng (Marine Police – Asst. Superintendent (ASP))	The Marine Police needs additional boats to patrol the sea to prevent the incursion of fishermen into the safety exclusion zone.	(+) The project will make Ghana a better place to live.	x
Prince Gabriel Waabu	The Police Service’s response to	(+) Development to the	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
(Police – C/Supt.)	the potential/likelihood of demonstration against Aker Energy by the fishermen.	communities. (-) Decrease in fish stock.	
Priscilla Ankomah-Hackman (Physical Planning Dept. – Intern Secretary)	Safety and security in and around the metropolis from criminals bred by project induced unemployment.	(+) Creation of direct and indirect employment. (-) High standard of living translating into higher rents and land costs.	Need for infrastructure for socio-economic development in the region.
Jonathan Djan-Gyau (Dept. of Social Welfare – Regional Director)	CSR to be directed towards alleviating the hardship faced by the vulnerable, marginalized, excluded and the disabled persons in the project affected communities.	(+) Job creation. Alternative livelihood considerations. CSR performance. (-) Pollution from oil and gas. Denying the fisher folks their daily subsistence.	Educations, Health and Job creation to be considered.
Raphael Dordzi (National Service Scheme – Representing Regional Director)	Loss of jobs. Long term CSR benefits.	(-) Destruction of fish due to pollution. Reduction in fish stocks.	Skill training to make community inhabitants employable.
Michael Mensah Tabiri (National Sports Authority – Head IT/AG. HR.)	The National Sports Authority needs help in repairing the structural deterioration of the only stadium in the region.	(+) Job creation (-) End products can affect the fitness of the people.	To support the various sporting disciplines to engage the unemployed youth.
Theresa M. Mensah (NADMO – Dep. Reg. Director)	Location of Aker Energy’s Office in the W/R. Aker Energy to employ people from the region. Aker Energy to provide alternative livelihood for the fishing folks and their siblings.	(+) Revenue from the oil and gas will be used to support the free SHS.	Engage the communities when administering Aker Energy’s CSR - no imposition of any form. Establish some form of scheme that will continue to operate even after project’s life span.
Mercy Addo	Sponsorship to cover both	x	Communities should be provided

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
(ICCES – Secretary)	literate and illiterate in the communities. Training of youths and employing them.		with clinics, schools.
Gilbert Q. Etey (Dept. of Food and Agriculture – Regional Agric Engineer)	Standardization training in food crop production to local farmers to feed workers on the FPSO – high value crops and vegetables.	(+) Income generation. Improved livelihood. Employment opportunities along the value chain.	X
William K. Darlie	Reduction in effective areas for fishing. Air pollution and oil spill incidence.	(+) Additional oil revenue for development. (-) Increasing exclusion zones. Flaring of gas. Oil spills.	X
Julian Nana Pireku (Ghana Highway Authority – Road Area Manager)	The road from the Sankore Junction to the Cape Three Point road needs upgrading.	(+) Employment for the indigenous community members with improved living standards.	x
Lt CDR Lucas Ocloo (Ghana Navy – Commanding Officer, GN Ship Chemle)	Security plan for responding to security threats to workers and facilities. Efforts to be made to address social needs of the host city.	(+) National development.	x
Lawrence Agudu (Minerals Commission – Snr. Inspector of Mines)	Ensure proper management of project to make way for mutual benefits. Management of ballast water should be a priority.	x	x
Samuel Kwame Appiah (Ghana Shippers Authority – Asst. Shippers Service Officer)	Measures to be put in place to mitigate adverse impact of oil production on fishing and fisher folks within the oil enclave.	x	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
Otuo Acheampong Richard (Ghana Shippers Authority – Accountant)	Air pollution from operations. Security matters in respect of operations. Effect on the fishing folks.	(+) CSR for the communities.	x
Joyce Obiri-Yeboah (Dept. of Comm. Dev't – Regional Director)	Ensure women are given alternative economic ventures (by way of skill development to ensure women continue to be economically viable.	(+) Improved economic development of the region and country. Aker Energy's Corporate Social Responsibility to assist locals along the coast. (-) Likely decline of country's fish supply.	Disturbance to the economic activities of the communities. Training in alternative economic ventures for sustainable economic development to be ensured.
Rev (CSP) George Akuamoah- Boateng (Ghana Prisons Chaplain)	Establishment of alternative job opportunities for the local communities. Establishment of fishponds in the localities in close proximity to project site. Education of fishermen on scientific ways of fishing, allowing for spawning of fish. Establishing a quota for employment for the Western Region. Sekondi-Takoradi to be considered when it comes to purchasing of spares for maintenance purposes.	x	x
Isaac Kofi Amakye (BNI – Field Officer)	Security measures to be put in place. Mitigating measures to be put in	x	x

Entity/Name No:	Concerns and Benefits NO:	Project Impacts NO:	Information on Environment, Community and Health Status. NO:
Western Regional Coordinating Council			
	place for air pollution and associated health problems.		

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Ministry of Fisheries (& Aquaculture Development) - Accra			
William Agbenu (Fisheries Commission – Head of Procurement)	Displacement of fish from their biological niches. Distribution of fish movement and resting places. Attracting fish to the rigs and other equipment as well as fishers, which is dangerous to life and equipment.	(+) Discovering of new species and biological niches. Opportunity to study the economic and biological aspect of new discoveries. (-) Polluting the environment through introduction of chemicals and machinery.	x
Anonymous	Impact to fishing.	(+) The maintenance of exclusion zones / marine protected areas, increasing fish populations. (-) Loss of fishing grounds, leading to agitations by the fishermen.	x
Nemonius N. Pengyir (Fisheries Commission – Deputy Director)	More sea area (fishing grounds) will be lost to the fishermen; there will be the need to initiate social interventions that will compensate for this, i.e. for the local content in workforce, offer specialized training to children of the fishers in accredited oil and gas training institutes abroad to	(+) Income and other resources to the country. Development and training for local people with opportunity to take up jobs according to the local content component in the oil and gas industry policy (foreign training). (-) Restriction of fishing grounds	The accumulation of plastic wastes in the ocean.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Ministry of Fisheries (& Aquaculture Development) - Accra			
	take up job opportunities in the oil and gas industry.	of the fishers. Adverse effects on the marine mammals and other aquatic animals.	
Eric Agyeman (WARFP – IT Specialist)	Oil spillage. Effect of the development on the fishing industry.	(+) Financial gains in terms of royalties. Job creation. (-) Oil spillage and its long term devastation on the fishing industry.	x

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Forestry Commission			
Charles C. Amankwah (Wildlife Division of the Forestry Commission – General Service Manager/ Wetlands Coordinator)	Impacts of development on migratory animals – sea turtle, whales and dolphins. Impact / Destruction of coastal beaches for breeding of marine turtles.	x	x

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
The Ghana Navy			
CDR N.A. Akwei-Aryee (Ghana Navy – Legal Advisor)	Failure of oil companies to carry out their corporate social responsibilities. Lack of adequate and well-rehearsed oil spill contingency plans. Effect on sources of livelihood of locals and increasing cost of living.	(+) Provision of jobs and other infrastructure. (-) Loss of jobs for the fisher folks. Oil pollution.	X
Maxwell Arhen (Naval Captain) (Ghana Navy – Director, Naval Operations)	Security and safety within and around the contract area. Collaboration with the Ghana Navy in terms of their role in the event of any such incident as oil spill and fire.	(+) Employment creation. Revenue generation for the nation/country. Enhanced social and community development. (-) Interruption of fishing activities. Oil and environmental pollution.	x

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Petroleum Commission			
Charles Kweku James (Petroleum Commission – HSE Manager)	That: As the regulator of the upstream industry, petroleum operations are conducted in a safe and prudent manner in line with HSE regulations (LI 2058), and best industry practices.	(+) Employment creation. Energy security for the state. (-) Unmet expectations due to inadequate sensitization.	The Commission should be involved in community engagement exercises to ensure adequate information is provided to the communities. Safety zones management.

	Maximum local participation in oil and gas operations is ensured.		
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Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Owusu Brempong. Asst. National Registrar. House of Chiefs – Sekondi.	Include locals in job allocations and training.	(+) Improvement of socio-economic & infrastructural development. (-) Activities of fisher-folks might be hampered.	X
Nana Alelaekyi II Western Region House of Chiefs – Paramount Queen Mother.	Job for the jobless including qualified personnel of the community. Training programs to equip Community members with requisite skills and knowledge for a better future.	(+) Creation of job opportunities and training of community members made easier. (-) Disease, pollution of sea and destruction of the natural habitat of aquatic animals.	X
Nana Abena Konadjoa. Wassa Fiase Traditional Council – Paramount Queen	Recruitment of staff from the Region.	(-) Oil spills in the sea will have adverse effect on the fishes and the fisher folk.	Proper health facilities and improved road networks.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Mother			
Nana Benuah III Western Region House of Chiefs –Awulae Tufuhene.	Aker Energy company should meet Awulae and sub-chiefs at their traditional areas.	(-) Aker operations should be extended to other areas in the community not only at the shores.	Air pollution should be tackled with all seriousness
Awulae Attibrukusu III Western Region House of Chiefs – Paramount Chief.	Train community members to get jobs. Develop the manpower and infrastructure of the community and to hear them out when there is a problem.	(+) The State will get money for development. (-) Previous same project dumped into the mud contrary to their expectations. Proposed project will affect the livelihood of our fishermen and fishmongers.	Air pollution – flaring of gas e.g. residents of Atuabo Gas plant complain of cough. Mitigation measures should be put in place.
Nana Kwesi Agyeman II Western Region House of Chiefs - Member	What can be done to help the fishing industry/fisher folk. Protect communities from air pollution hazards. Provide residential accommodation for its workers in the Western Region. Provide employment quota for W/R.	(+) Provision of employment support CSR projects/community initiated projects. (-) Will disturb the fishing industry, the social and economic life of fisher folks and local people. Does little to improve the local economy.	Baseline study as benchmark for future monitoring to see changes.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Otumfuor Baidoo Bonsoe XV. Western Region House of Chiefs - Paramount Chief Ahanta.	Requisite qualification training. Support fisher folk to improve their trade. Aker Energy should site their offices in the Western Region. Support provide developmental projects for communities.	<p>(+) Helps national economy and provides jobs. Youth will be trained in skills.</p> <p>(-) Will affect local communities including bad social practices. Does little to improve local economy. Influx of people with varied characters.</p>	Help with baseline study to determine any future changes in health status of the communities.
Nana Kwasi Atobrah II Traditional Ruler, Chief of Esuaso Division.	Sustainable livelihood for fishermen/fishmongers in the local communities of the enclave.	<p>(+) Improves the economy of the country.</p> <p>(-) Greater percentage of the oil money goes out. Local shareholding very small. Oil not refined fully in the country so all by-products lost to the country.</p>	Inhabitants shall suffer health hazards from pollution. Need for a baseline study to serve as benchmark for health status checks in the future.
Nana Kwadwo Twum II Western Region House of Chief – Acting President.	Build a school to train the youth in technical skills for the future.	(-) Air pollution will bring diseases to the community.	Build emergency hospital at the coast for the whole area.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Awulae Annor Adjaye III. Western Regional House of Chiefs – Paramount Chief, West Nzema.	Littering of coastal beaches with debris/weeds from the sea and preventing/obstructing drag net fishing. Lack of sponsored development projects in Beyin and other coastal towns.	<p>(+) Increase in Ghana’s Oil and Gas revenue especially with the establishment of oil refineries.</p> <p>(-) Increased fishing industry challenges. Establish Fisherman’s Foundation Fund to mitigate.</p>	Use best international practices to address environmental and air pollution problems that affects the climate, atmospheric conditions and the air that we breathe.
Nana Kwaw Tendele II. Upper Axim Traditional Council. Acting President.	Upgrade Axim Government Hospital to a Teaching hospital status. Clear sea weeds properly by Zoil or appointed agents.	(+) Encourage farmers in the area to grow foodstuff and vegetables needed by company’s staff. Grant children of fishermen scholarship up to university level through each Traditional Council.	Company should abide by all the laws and regulations since it is a government approved project and go by my earlier submissions. Supply sufficient anti-malaria drugs, conduct mosquito spraying exercises to eliminate malaria.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Awulae Agyefi Kwame II. Western Region House of Chiefs. Omanhene of Nsein Traditional Area.	Creation of jobs. Scholarships for Community fisher folks' children. Health facility e.g. Clinic.	(+) Enhance living standards and enjoy good livelihood.	x
Ogyeahoho Yaw Gyebi II. Western Region House of Chiefs – President.	Provision of educational facilities, skills training and economic empowerment to the people.	(+) Establishment of Oil Exploration Fund Foundation for the local people. Estate development for the workers.	Organize environmental, health and safety surveys before and during oil exploration activities.
Nana Kwaw Anysim Ababio. Western Region House of Chiefs. – Divisional Chief S/W	Extend company's programs to the remote parts of the region. E. g. Sefwi Wiawso Traditional Area. Engage Nananom periodically.	(+) Build Oil Refineries in Ghana.	Think about the environment and find solutions. E. g. global warming. Educate fishermen well and engage them in company's operations.
Nana Nda Esi III. Western Region House of Chiefs – Paramount Queen Mother.	Training of community and town dwellers.	(+) Aker Energy to do something better for the town.	Environment and community should be healthy and fine all the time.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Nana Efua Ahima II. Western Region House of Chiefs- Paramount Queen Mother.	Aker should help other companies to build their headquarters in the Western Region. Employ office staff from the Region.	(+) Employment and revenue generation for development.	Care should be taken to prevent water and air pollution through oil/gas spillage.
Nana Kobina Nketia. Western Region House of Chiefs – Paramount Chief.			
Nana Ekua Kodu II. Western Region House of Chiefs – Queen Mother (Essikado)	GNPC’s 10% should be increased. Increase educational facilities.	(+) Queen Mothers should be involved in the supply chain.	Use local content as a guide for employment. Improve health facilities.
Obrempong Hima Dekyi XIV. Western Region House of Chiefs – Paramount Chief.	Involve the locals by providing them jobs. Provide key social amenities in Education, Health and Sanitation.	(+) Provision of revenue for National Development. (-) High cost of living due to influx of people.	Lack of dumping sites and refuse collecting materials led to plastic waste pollution of the sea. Defecation at the shores. Bad fishing practices.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Tetrefe Okuamoah Sekyira II. Western Region House of Chiefs – Paramount Chief. Member.	Infrastructural developments will spring up – roads, buildings etc.	(+) Raise standard of living. (-) Environmental impact on the immediate vicinity	No comments
Nana Akosua Gyanfiaba II. Western Region House of Chiefs – Queen Mother.	Restore bad drainage system. Rehabilitate our bad roads. Our beaches are very filthy.	(+) Aker Energy will bring a difference to the industry because of Norway’s experience.	No comments
Okogyeman Kwaku Gyamponsah III. Western Region House of Chiefs – Omanhene.	Training and providing youth with jobs.	(+) Job creation. (-) Part – pollution of the environment.	Pollution of the air. Company should meet Nananom regularly.
Awulae Nda Bozoma II. Western Region House of Chiefs – Queen Mother.	GNPC’S 10% is too small. Should be increased.	(+) Involve Queen Mothers in day to day activities to be of value to the company projects.	Employ the Indigenes to benefit the community. Needs a modern Hospital.

Name/Entity No:	Concerns and Benefits NO: 23	Project Impacts NO: = 23	Information on Environment, Community and Health Status. NO: 18
Western Regional House of Chiefs (WRHC)			
Nana Kwamina Wienu II. Shama Traditional Council – Acting President.	Oil companies in the Region led to influx of people into our communities with its attendant accommodation and unemployment problems. Employ some of our people.	(+) Provides employment and revenue for national economic growth and development.	Avoid oil and gas spillage which causes health and environmental problems.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
The Fishermen Association			
Cecilia S. Annan (Fishermen Association)	Job training and employment for the people.	(+) Job creation. (-) Reduction in fish stock, hence livelihood worsening.	Cholera, typhoid, pulmonary, tuberculosis, chicken pox, tetanox, yellow fever, measles, infectious hepatitis, pneumonia, malaria
Mike Abaka-Edu	Continue, intensify and expand the SHS scholarship programme to include vocational education.	(+) Commended Arker Energys restore to handle waste (well fluids, hazardous waste and drill cuttings in a professionally accepted manner.	Gas flaring, Ballast water and oil spills. Bi-annual health screening.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
The Fishermen Association			
		(-)The safety exclusion zone and lack of Fishery Impact Assessment. (-)Stakeholder engagement with fishermen.	
Chief fisherman (Nana Kofi Bentil) Chief fisherman,axim	Extend scholarship programme to include university education and vocational training. Assist communities with sanitation along the shore.	(+)Local content necessary to factor good communication and understanding with fishermen. (-)Local content on employment such as security crew on the FPSO.	Health screening for the fishing community on yearly basis.
Emelia Abaka-Edu National Fish Processors and Traders Association (National Vice president)	Alternative livelihood for both fishermen and fishmongers is required to offset loss and livelihood as a result of the project.	(+)Employment creation. (-)Dying of sea mammals and sea accident. Safety exclusion zones are increasing.	Publicity for the scholarship is less hence most prospective student miss out on information on interview for scholarship. Health screening on yearly basis.
Philomina Aidoo NAFPTA	Loss of livelihood of the men. Potential adverse impact on biological environment.	(+)Job creation	Health screening once a year
Susana Bissue NAFPTA	Loss of livelihood of the Fishermen Need fishermen fund support	Job creation Operational risk	Proliferation of sea weeds to be considered and tackled. Suggesting health insurance as part of Arker Energy CSR.

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
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FISHERIES COMMISSION

J.F.Esumbey (Fisheries)	Coastal communities needs facilities like laterine and livelihood ventures as part of their social intervention.	Disruption of fishing activities during construction period. Suggesting a kind of compensation in a form of a token to the fishermen.	Communities around the catchment area experience severe heat and other health hazards.Need for health screening for coastal communities.
Theodore Kwadjosse	Increased Livelihood of accident at sea with fishermen. Depth of communities engagement to disseminate information regarding the development.	(+)Employment creation for its locals (-)Development could affect livelihood due to increasing number of exclusion zones,high rent.	Among the fishing communities those engaged in the line hook and drift –gillnet users are likely to be affected. Shama,Discove,Sekondi should well be engaged.
Alex .Y.Sabah (Regional Director)	Accident,damage to fishing net and craft due to increased vessel traffic. Several/multiple safety exclusion zones taking up more fishing space. Effect of waste water dischargeto sea on flora and fauna.	(+)Social and economic development. (-)Immigration,increase in social vices,land grabbing.	*
Josephine Laryea (Zonal coordinator)	Reduction of sea access by multiple safety exclusion zones. Possible accidents and destruction of gears of fishermen. Collaboration between the FC and Aker Energy for alternative livelihood or enhanced ventures for fishermen.	(+) Income generation for Ghana (+) Local content caoacity development. (+) Mutual coexistence between the oil and gas and fisheries sectors using best practices. (-) Marine mammals facing adverse impacts(other fish species)	Special attention for drift gill net (DGN) fishers-they go further offshore.(Shama,Dixcove,Axim) Hook and Line fishers are also to be considered(Sekondi mostly,and Axim)

Name/Entity No:	Concerns and Benefits No:	Project Impacts No:	Information on Environment, Community and Health Status. No:
Ghana Maritime Authority - Accra			
Captain Inusah Abdul-Nasir (Ghana Navy - Deputy Director, Environment & Safety Standards)	Key comment (See Appendix 86-F))		
Friends of the Nation			
Friends of the Nation (FON)	Key comment (See Appendix 68-F))		

*APPENDIX 8-F: Key Comments - Friends of the Nation (FoN), Takoradi
and Ghana Maritime Authority (GMA), Accra.*



Friends of the Nation

Comments
on the Scoping Exercise of Activities by Aker Energy in Deep
Water Tano/Cape Three Points block

July, 2018

1.0 Introduction

The following comments are submitted by Friends of the Nation (FoN) to serve as inputs for a scoping study being carried out by Aker Energy Ghana as part of the Environmental and Social Impact Assessment (ESIA) for the proposed offshore oil and gas production in the Deep Water Tano/Cape Three Points block.

The proposed project will consist of:

- Installation of 40-45 oil and gas production and injection wells
- Installation of a ship-shaped FPSO and mooring systems; and
- Installation of sub-sea infrastructure
- Subsea connections from wells to the FPSO

2.0 Comments

2.1 Consider cumulative impact of exploration activities in Deep Water Tano/Cape Three Points (DWT/CTP) block

The scoping exercise concerns the activities of Aker Energy in the DWT/CTP block. However, it has to be emphasized that other operators are already active in adjacent blocks whereas others will follow, the most recent being AGM. Therefore, the cumulative impact of these activities should be prominently addressed in any future ESIA given the environmental footprint of existing installations which is already measurable (distribution in 2009 as compared to 2012 of Barium in sediments (as a marker for the discharges of drill cuttings), collected by the RV Fridtjof Nansen and analyzed by the Norwegian Institute for Marine Research (IMR; Serigstad 2017). *Therefore, addressing the contribution of Aker Energy as a stand-alone activity will be insufficient in any ESIA to be prepared in relation to the activities of Aker Energy in the DWT/CTP block.* The present comments relate to the scoping exercise. However, as far as issues addressed by FoN in the comments on the PER for drilling activities have not been repeated in the current document, they are considered to be an integral part of it. These comments can be found in Appendix 1.

2.2 Zero discharge policy must be adopted

Based on (A) the environmental footprint already present, (B) the cumulative impact of multiple operators over a large geographic area and (C) the precautionary principle because of the largely unknown biodiversity of the Ghanaian EEZ, a **zero discharge policy** should be adopted and applied, which would include reinjection of both drill cuttings/mud and produced water. If there is compelling evidence that such an approach cannot be applied, which should be motivated in verifiable detail, then Aker Energy needs to adopt a **zero risk discharge policy**, with a risk based assessment by the combined use of DREAM/EIF (Dose related Risk and Effects Assessment Model/Environmental Impact Factor; the water volume where the ms-PAF (multi-stress or multi-substance Potentially Affected Fraction of species, calculated from an SSD) is greater than or equal to 5%) (SINTEF/University of Wageningen) and of a well defined monitoring programme of micro-contaminants, both chemical and biological markers, over a sufficiently large geographical area, pre and post block development to verify the outcomes of the modelling study. To reduce hydrocarbon content

in drill cuttings and other materials to be discharged to below measurable concentrations, the latest state-of-the-art (BAT/BEP) technology such as **thermal desorption treatment** should be applied on board or **bioremediation** in cuttings shipped to landfill sites. If these alternative treatments are not planned, the environmental justification should be motivated *in extenso*. Modelling of the impact of the discharge of drill cuttings should be done by state of the art modelling software. In all cases, modelling predictions should be verified *in situ* by active monitoring and subsequent technology adaptations if desired results cannot be achieved. *In NO case payment of fines to the EPA should be used as an alternative for application of BAT/BEP.*

2.3 Double-hulled FPSO needed

If not automatically considered by Aker Energy, the FPSO should be double-hulled, and responding to the most recent and most stringent safety requirements.

2.4 Blow Out Preventers must be constructed according to latest BAT/BEP

Sufficient and convincing information needs to be provided to prove that the Blow Out Preventers (BOP) are constructed according to the latest BAT/BEP. The Deepwater Horizon is the example to show how it can go wrong.

2.5 Quantitative Spatial Information on sensitive benthic communities and bottom morphology

There is a pressing need to have quantitative spatial information on the presence of sensitive benthic communities (such as cold water coral reefs) and bottom morphology and composition (carbonate mounds, canyons, mudslides, cold seeps, etc.) of the entire DWT/CTP block collected by side scan sonar or other appropriate technology and verified by inspection by ROV and sampling. Collaboration with specialized marine scientific institutions should be developed. *Lophelia pertusa* coral reefs on the continental shelf at a depth of c. 550m, which have been recently described in the scientific literature (Buhl-Mortensen *et al.* 2016) to occur North of the DWT/CTP block, bear a large resemblance with cold water coral reefs off Mauritania and Norway. On these reefs many undescribed species are to be expected and four new Tanaidacea (crustaceans) were already found on the coral mound in Ghana and recently described (Jakiel *et al.* 2015). The discovery of the largest chain of cold water coral reefs of the Eastern Atlantic was done by the Australian oil company Woodside off Mauritania. By making their discoveries available to the scientific community Woodside contributed significantly to their studies which has now culminated in their proposed protection. Aker Energy could positively distinguish itself from other companies active offshore Ghana by actively seeking collaboration with the scientific community and making their non-commercial data freely available.

The reefs and associated fauna are expected to be sensitive to very low concentrations of micro-contaminants such as those found in typical discharges from offshore oil and gas installations if these are not re-injected or brought to shore. The coral reefs of Mauritania have been extensively studied and could serve as a model for those present in Ghana. Modelling results as well as measured contaminant levels should be provided pre- and post-

operation to show that the reproduction of these *Lophelia pertusa* reefs and associated fauna will not be impaired.

2.6 Spatial and temporal information on the occurrence of megafauna needed

There is an equally pressing need to obtain spatial AND temporal information on the occurrence of megafauna, in particular cetaceans, birds and turtles. We are not aware of any earlier quantitative studies of seabirds and other top predators off Ghana, other than some fragmentary and largely unpublished, essentially qualitative data that MMO's have gathered, mainly during previous seismic surveys or from platforms of opportunity such as the Dr Fridtjof Nansen. These data need to be collected, not only in the DWT/CTP block, but along the entire Ghana coast across the shelf break by way of standardized transects and executed by renowned experts using internationally accepted standardized methodology. Standardized and systematic observations of seabirds and cetaceans from the bridge of (research) vessels provide quantitative information on their presence, numbers, habitat requirements, inter- and intraspecific interactions, on the presence of marine hotspots and on fisheries interactions. These are ecological studies, rather than warning systems (such as with MMO's on board seismic vessels), and the results are also essential to provide vulnerability maps for sea areas with respect to for example hydrocarbon pollution (spills). These data need to be available at least for each quarter, but preferably for each month of the year. These data are a minimum requirement for the development of a Wildlife Response Planning as part of an Oil Spill Contingency Plan, see next paragraphs. It is suggested that all oil companies actually executing either exploration or exploitation together provide sufficient funds to execute such inventories as a part of their corporate responsibilities towards the host country. Needless to say that any studies undertaken should be executed by independent scientists. In Mauritania, financial contributions from the oil and gas industry allowed researchers to monitor marine megafauna across the shelf break during critical periods of the year, largely contributing to a better knowledge of their distributions throughout the year to be used for Wildlife Response Planning (see also under 10 hereafter).

2.7 Full Oil Spill Contingency Plan needs to be developed

In the documentation of the PER for drilling it was stated that Aker Energy will prepare an Oil Spill Contingency Plan (OSCP) prior to drilling. It needs to be stated that the National OSCP of Ghana is a very general, rudimentary guideline, and actually more a plan for industry and agencies **TO DEVELOP OSCP's IN THE FUTURE**, not an actual spill prevention and response plan itself. The OSCP does not meet in itself most of the nine "Aims and Objectives of the Plan". This leaves us actually with a vacuum and starting drilling without having a fully operational OSCP is asking for trouble in case of a spill. Furthermore, as stated in a previous paragraph, there is no wildlife response plan, no marine sensitivity map and the existing dispersant use policy is entirely based on the use of Corexit 9527 or 9500. **Corexit 9500 and 9527** was massively used after the Deepwater Horizon spill. The research that followed the spill has shown major impacts on:

- Human health
- Benthic communities
- Fish

- Penetration of Poly-Aromatic Hydrocarbons (PAHs) in the sediment
- Enhanced toxicity of hydrocarbons
- Reduced degradation of hydrocarbons

A large part was due to dispersants. The OSCP should identify mechanical recovery of spilled oil as the priority, rather than chemical dispersants (or burning).

There is also an urgent **need for a pre-spill Natural Resource Damage Assessment and Restoration (NRDA&R) protocol**, with arrangements between government agencies and oil companies, pre-spill baseline environmental assessments, an NRDA plan, etc... Such a protocol **also details the aftermath of a spill** and the necessary actions to be taken for monitoring. This can take years.... See therefore hereafter 9. Oil spill liability. The view of FoN on the OSCP can be found in the Power Point Presentation, Appendix 2.

2.8 Coverage of oil spill liability needs to be specified

There is no international convention to date that covers liability from spills from offshore drilling/production facilities, so this important issue needs to be fully taken care of in a detailed and satisfactory way.

2.9 Address inadequate quantitative data on onshore environmental sensitivities

Onshore environmental sensitivities are incompletely known as only based on an outdated EPA assessment from 2004 (<http://www.ghanaein.net/wp/projects/coastal-sensitivity-atlas/2004-version/>). This assessment is furthermore qualitative and not quantitative and entirely misses the point that exposed coarse sand coastal beaches, which they considered as low in biodiversity, in fact harbor specific faunal elements and according to RAMSAR criteria an internationally significant percentage of the East Atlantic Flyway population of Sanderlings *Calidris alba* (maximum count c. 8000 on a population of 123,000 or 6.5%) (Ntiamoa-Baidu *et al.* 2014, Van Roomen *et al.* 2015). Sanderlings showed a clear preference for the c. 13 km stretch of sandy beach between the Ankobra and Amansuri Rivers near the village of Esiana in the Western Region. The situation of the Esiana beach between two estuaries makes it potentially one of the most productive beaches in the country, especially with respect to young and small individuals of the bivalve *Donax pulchellus* which occur in enormous densities of 5700–14,300 individuals/m². Sanderlings feed almost exclusively on this species (Ntiamoa-Baidu *et al.* 2014, Grond *et al.* 2015).

Sensitivities of offshore biodiversity (benthic communities, megafauna, ichthyofauna, ..) in Ghana have never been assessed. What is particularly needed is a grid based mapping of sensitivities of seabirds to oil pollution preferably covering the entire EEZ (200 nautical miles zone) of Ghana (hence the need for standardized transect data as mentioned in the previous paragraph, but at least covering the relevant oil blocks offshore and areas likely to be impacted by a major oil spill, to be used in a wildlife response planning. According to Oil Spill Response Ltd. (Southampton), a response without a pre-spill agreed wildlife plan in place will have a **large potential for delays and inefficiency**. Therefore the best guarantee for a fast and effective wildlife response mobilisation is provided by a **pre-spill developed wildlife response plan**, implemented through **training and exercises**

<https://www.oilspillresponse.com/services/member-response-services/oiled-wildlife-response-services/>).

2.10 Exclusive Fisheries Impact Assessment needed

One most important socio-economic impact is on artisanal fisheries which essentially thrives on a healthy clean and undisturbed ecosystem. Therefore, a thorough understanding of the likely impacts on fisheries with its cascading impacts on local economy and how the burden of these impacts will be distributed will be required. Ghanaian law (Section 93 of the Fisheries Act, 2002, Act 625) now requires a **Fisheries Impact Assessment** be executed in parallel with an ESIA and not only as a short paragraph in the latter.

([http://laws.ghanalegal.com/acts/id/131/section/93/Fisheries Impact Assessments](http://laws.ghanalegal.com/acts/id/131/section/93/Fisheries_Impact_Assessments))

2.11 Extensive Stakeholder consultations on the Mitigation and management measures

Mitigation and management measures, including emergency response plan, oil spill contingency plan, waste management plan, safe practices and procedures and physical controls need to be in place and discussed with all stakeholders as part of the ESIA process and well before an environmental permit is granted, in order to prevent any major negative environmental or social impacts from the project..

All activities which will eventually be allowed in the environmental permit and which are potentially harmful to the marine environment should be adequately monitored and results of such monitoring activities should be made publicly available. Feedback mechanisms to stakeholders are important to show that their inputs have been taken serious, which will help the oil industry to regain confidence within stakeholder groups.

2.12 Presence of Marine Mammal Observers and Automatic Identification System

Marine Mammal observers should be present during critical phases of executing noise generating activities and also on board of project related vessels. The information gathered should be made publicly available as it has no commercial value for Aker Energy and will add to the little knowledge thus far available. Vessels of 65 feet or greater should be subjected to a maximum speed of 10 knots on fixed trajectories to avoid whale-vessel collisions. These trajectories should also be communicated to the fishing communities to help preventing interactions with fishing gear and fishing vessels. All service vessels should have Automatic Identification System (AIS) installed to avoid collisions and it is highly recommended that a communication system be put in place to communicate with artisanal vessels such as canoes.

By applying the precautionary principle, because scientific information on the periodicity of whale presence and behaviour is incomplete (but available data show that the at least Humpback Whales breed in the Ghanaian EEZ), these restrictions should not be time limited. Conn & Silber (2013) showed the effectiveness of such regulation in a modelling study. Such mandatory vessel speed restrictions are in effect since 2008 along the U.S. eastern seaboard. Underwater noise has been shown to be a function of vessel speed and thus by limiting speed the potential impact of sound on marine fauna will be reduced as well. All sightings of, and

physical encounters with, marine mammals and turtles should be noticed/recorded in a logbook with date, time, vessel speed and geographical coordinates and be available for consultation.

2.14 Prohibition of Seismic surveys during migration period of whales

Seismic surveys should NOT be carried out during the main period when whales are present in Ghanaian waters. Although detailed information is not available, strandings of whales –as a proxy for their occurrence– have mainly been recorded between July and November, with less frequent strandings recorded until February (Ofori–Danson 2014, FoN archives). Contribute to high-quality scientific research on the chronic effects of seismic surveys and other sources of underwater noise (of all frequencies) on fish and invertebrates (acute effects are better-known). According to Hawkins & Popper (2016), most of the concerns by regulators and others have focused upon effects on marine mammals and other protected species. However, examining the impacts upon the overall ecology of affected habitats is also important as it may be dominated by effects upon the far larger biomasses of fishes and invertebrates, which do not have the same degree of legal protection. Many of these assessments of the impact of noise on fishes and invertebrates have overlooked important issues, including the sensitivity of a substantial proportion of these species to particle motion rather than sound pressure.

2.15 Code of practice for communication needs to be developed

To avoid an unconstructive climate of distrust in fishing communities, a code of best practice for corporate communication needs to be developed, implemented and monitored.

3.0 Contacts

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References

Anthony D. Hawkins Arthur N. Popper. 2016. A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates. *CES Journal of Marine Science*, Volume 74, Issue 3, 1 March 2017, Pages 635-651, <https://doi.org/10.1093/icesjms/fsw205>

Buhl-Mortensen L, Serigstad B, Buhl-Mortensen P, Olsen MN, Ostrowski M, Błażewicz-Paszkowycz M and Appoh E. 2016. Structure and megafaunal community of a large Lophelia reef on the Ghanaian margin (the Gulf of Guinea), *Deep Sea Research*, <http://dx.doi.org/10.1016/j.dsr2.2016.06.007>.

Conn PB & Silber GK. 2013. Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. *Ecosphere* <https://doi.org/10.1890/ES13-00004.1>

Grond et al. 2015. Prey type and foraging ecology of Sanderlings *Calidris alba* in different climate zones: are tropical areas more favourable than temperate sites? PeerJ3:e1125; DOI10.7717/peerj.1125

Jakiel A, Stępień A, Józwiak P, Serigstad B, Błazewicz-Paszkowycz M. 2015. First record of Tanaidacea (Crustacea) from a deep-sea coral reef in the Gulf of Guinea. *Zootaxa*. 3995:203-28. doi: 10.11646/zootaxa.3995.1.18.

Ntiamoa-Baidu Y., Nuoh A.A., Reneerkens J. & Piersma T. 2014. Population increases in non-breeding Sanderlings in Ghana indicate site preference. *Ardea* 102: 131–137. doi:10.5253/arde.v102i2.a3

Ofori–Danson PK *et al.* 2014. *Report of the Subcommittee set up to investigate the Incidence of Mortality of Cetaceans in Ghana’s Waters*. Environmental Protection Agency.

Serigstad, B. 2017. *Activities and outputs from the Nansen environmental baseline studies and monitoring In Ghana 2009-2012*. Accra, EPA Workshop.

van Roomen M., Nagy S., Foppen R., Dodman T., Citegetse G. & Ndiaye A. 2015. *Status of coastal waterbird populations in the East Atlantic Flyway. With special attention to flyway populations making use of the Wadden Sea*. Programme Rich Wadden Sea, Leeuwarden, The Netherlands, Sovon, Nijmegen, The Netherlands, Wetlands International, Wageningen, The Netherlands, BirdLife International, Cambridge, United Kingdom &, Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

APPENDIX 1 - comments FoN on PER drilling AGM and Hess (Aker Energy)

A stakeholder consultation meeting was held with representatives of the Centre for Environment & Health, Research & Training (CEHRT) on April 25th 2018 regarding Preliminary Environmental Assessments for

- (1) Hess/Aker Drilling Project - Deepwater Cape Three Points Block, and
- (2) AGM Exploratory Well Drilling Project - South Deepwater Tano Block

During this meeting a document was provided entitled: "*Deepwater Tano Cape Three Points Block Drilling Preliminary Environmental Assessment. Rev. 0.1 2. Project Description*" on behalf of Aker Energy. However, no information was provided on behalf of AGM. Therefore, our comments will be based only on the Hess/Aker document, but as both projects have elements in common, it equally applies to similar sections of the PEA of AGM.

The provided documentation only covers the summarized project description which, however, is insufficient for a thorough analysis as it lacks essential information as will be outlined below. The bottom line is that the existing environmental footprint of previous drilling activities by oil companies active in the various offshore blocks, as can be visualized by the concentrations of barium in sediments (as a marker of the offshore disposal of drill cuttings and drilling mud), vastly exceeds their concession areas and as such any new discharges will further add to this footprint. By applying the precautionary principle and in the absence of detailed analysis of benthic communities in a wide area surrounding the proposed wells and further recognizing that coral reefs and adjacent sponge grounds are hotspots of carbon processing in the food-limited deep ocean, and that these deep-sea ecosystems play a more prominent role in marine biogeochemical cycles than previously recognized, FoN has the opinion that any drill cuttings and drilling muds produced should be re-injected using the latest technology available.

FoN further formally objects the followed procedure in which stakeholders were not given access to all documentation necessary to provide inputs to improve either the process or the proposed solutions/mitigations for activities that are potentially environmentally or socially unacceptable.

Page	PEA statement	Comments Friends of the Nation (FoN)
4	The physical, biological and socio-economic environment surrounding the block and the area of influence of the project are described in Chapter 3.	Chapter 3 is not provided. It is therefore impossible to draw detailed comments. In particular the lack of quantitative spatial information on presence of sensitive benthic communities (coral reefs, carbonate mounds,...) in a large area around the proposed wells is missing. In general, no information on other marine biodiversity such as megafauna has been provided for stakeholder consultation. The lack of such information is becoming critical as the cumulative impact of the proposed activities together with the environmental footprint of existing installations
4	However, the results of spill modelling currently being performed will be incorporated into response planning to mitigate any potential spill and protect the environment and artisanal	One most important socio-economic impact is on artisanal fisheries which essentially thrives on a healthy clean and undisturbed ecosystem. Even though the operator recognises this fact, a greater understanding of the likely impacts on fisheries with its cascading impacts on local economy and how the burden of these impacts will be distributed was not considered.

	fishing activities.	
4	The project is a significant distance (approximately 70 km) from coastal and onshore environmental and social sensitivities	Onshore environmental sensitivities are incompletely known as only based on an outdated EPA assessment from 2004. This assessment is furthermore qualitative and not quantitative. Not a single word was found on the sensitivities of offshore biodiversity (benthic communities, megafauna, ichthyofauna,...). What is needed is a grid based mapping of sensitivities of seabirds to oil pollution preferably covering the entire 200 miles zone off Ghana, but at least covering the relevant oil blocks offshore, to be used in a wildlife response planning. According to Oil Spill Response Ltd. (Southampton), a response without a pre-spill agreed wildlife plan in place will have a large potential for delays and inefficiency . Therefore the best guarantee for a fast and effective wildlife response mobilisation is provided by a pre-spill developed wildlife response plan , implemented through training and exercises .
4	Mitigation and management measures described later in this PER; including emergency response plan, oil spill contingency plan, waste management plan, safe practices and procedures and physical controls; will prevent any major negative environmental or social impacts from the project	No such appendices have been found in the provided information making it impossible to provide detailed comments.
11	Side-tracking involves drilling new hole, starting from some way down the vertical original hole, stepping off to <i>one</i> side in a preferred direction, then continuing vertically approximately 50m from the original well.	side-tracking has additional risks and hazards. How have these been accounted for? We have not found any detailed information in the provided document.
12	The existing upper plugs will be drilled out using WBM and the NABF drilling mud left in the hole will be removed and disposed of ashore.	It is unclear which criteria are used to decide why (a) this will be disposed of ashore and (b) NABF drilling fluids recovered and remaining mud from other drilling activities discharged at sea. For any disposal ashore there needs to be a detailed disposal plan of how and where this will be treated and which rest products will remain and how soil and groundwater/surface water contamination will be prevented and monitored. As stated earlier, reinjection is a first choice of FoN, disposal ashore a second.
13	Some Materials used in Drilling	We should like to know (a) which yellow or green categories chemicals can be replaced by PLONOR chemicals and why this has not been done and (b) detailed information based on modelling or real world data that the concentrations of the Red and Yellow classified chemicals are lower than their respective NOECs at the limit of 500 m around each well at any time. But in any case FoN opts for reinjection, among others to apply the precautionary principle.
15	When drilling out the cement plugs in the three existing wells, Aker Energy plans to use an environmentally low toxicity water-based drilling fluid	No information found which water-based drilling fluid will be used. Not all WBDFs have a low aquatic toxicity.
15	When drilling out the cement	How does the company intend to dispose of this waste?

	plugs in the three existing wells, Aker Energy plans to use an environmentally low toxicity water-based drilling fluid	If disposal into the sea is foreseen, the results of relevant ecotoxicity tests should be provided and if these are not compliant with internationally accepted standards other solutions should be provided. See also comments above re. materials used in drilling.
15	Prior to release, cuttings will be passed through the solids control equipment to remove the majority of drilling fluids prior to being discharged to the sea.	majority: 51% or 99%...both are majority. Specify please. We don't see mention of any monitoring programme.
15	Aker Energy will endeavour to meet the discharge standard established by Ghana EPA to reduce oil on cuttings to 2 percent (dry weight) prior to discharge.	How would the operator achieve this, as evidence shows that the other partners have never been able to meet the 2 percent oil on cuttings established by Ghana EPA before discharge (They pay a fine to be in compliance). State of the art technology and commitment to meet this requirement is needed, but as stated above: FoN wants reinjection of cuttings as avoiding investment in available state of the art technology (and rather pay the too low fines...) by industry is considered as unacceptable and a potential threat to the marine environment.
17	For all of the drilling campaign, cuttings generated during the jetting of the 36" pipe and drilling of 26" hole sections will be discharged to the seabed. During drilling of the 17-1/2" and 12-1/4" holes, which will be drilled with NABF, the cuttings will be removed and mud reconditioned and re-circulated. Drill cuttings and fluids will pass through solids control equipment to remove most (estimated up to 98%) of the drilling fluids from the cuttings.	See point of view of Friends of the Nation regarding discharges: We opt for reinjection
17	Larger solids are retained on the screen, passed through the cuttings dryer and discharged.	The cutting dryer which is proposed has been developed in the early 1990s and is not state of the art. It is not able to remove oil on rock to 2 percent as required by Ghana EPA. (cutting dryer efficiency is less than or equal to 5%, typically 5-15% oil remaining). It is overly simplistic to assume that only oil will be in the discharge. There are lots of micro-contaminants dissolved in the oil fraction. The graphical representation of the distribution of barium in sediments in 2012 as compared to 2009 shows that the geographical area where impacts of drilling discharges potentially might occur is much larger than the description in previous environmental and social impact statements. This is one of the reasons why FoN asks for reinjection of drill cuttings from now on.
19	The Ghana EPA limit is up to 3°C above ambient sea temperature within 100m of the discharge point.	We haven't found any indication how this and other activities which are potentially harmful to the marine environment will be monitored and how results of such monitoring activities will be made publicly available. Feedback mechanisms to stakeholders are important to show that their inputs have been taken serious, which will help the oil industry to regain confidence within stakeholder groups.
20	Flaring may take place for	There is no information on control mechanisms and on feedback to

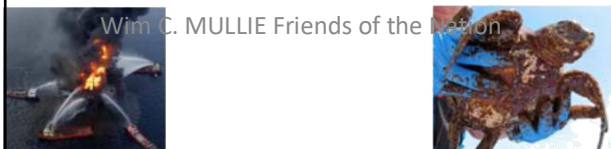
	circa 10 days.	stakeholders on actual flaring activities
21	<p>The most significant potential environmental impacts from offshore drilling operations are typically those associated with an oil spill, particularly a large spill from a loss of well control or blowout. Well control is primarily maintained by the column of heavy mud in the wellbore. Blowouts are rare and are usually associated with abnormally pressured intervals penetrated while drilling. For uncontrolled flow from the wellbore to occur, formation pressures must (1) overcome the hydrostatic pressure from the mud column and (2) the subsea well control equipment has to suffer multiple mechanical failures.</p>	<p>It is surprising that the "most significant potential environmental impacts from offshore drilling operations" according to the provided information, are not accompanied with more detailed and solid information than: "<i>Aker Energy will prepare an Oil Spill Contingency Plan (OSCP) prior to drilling</i>".</p> <p>The National OSCP is a very general, rudimentary guideline, and actually more a plan for industry and agencies TO DEVELOP OSCP's IN THE FUTURE, not an actual spill prevention and response plan itself. The OSCP does not meet in itself most of the nine "Aims and Objectives of the Plan". This leaves us actually with a vacuum and starting drilling without having a fully operational OSCP is asking for trouble in case of a spill. Furthermore there is No wildlife response plan, no marine sensitivity map and a dispersant use policy which is entirely based on the use of Corexit 9527 or 9500. Corexit 9500 and 9527 was massively used after the Deepwater Horizon spill. The research that followed the spill has shown major impacts on:</p> <ul style="list-style-type: none"> • Human health • Benthic communities • Fish • Penetration of PAHs in the sediment • Enhanced toxicity of hydrocarbons • Reduced degradation of hydrocarbons <p>A large part was due to dispersants. The OSCP should identify mechanical recovery of spilled oil as the priority, rather than chemical dispersants (or burning).</p> <p>There is also an urgent need for a pre-spill Natural Resource Damage Assessment and Restoration (NRDA&R) protocol, with arrangements between government agencies and oil companies, pre-spill baseline environmental assessments, an NRDA plan, etc... Such a protocol also details the aftermath of a spill and the necessary actions to be taken for monitoring. This can take years....</p> <p>Oil spill liability: There is no international convention to date that covers liability from spills from offshore drilling/production facilities, so what will be proposed by the two companies remains an open question and this should be clearly covered in the final document.</p>
22	<p>Oil spill trajectory modelling has been performed for other drilling programs in the vicinity of (closer to shore than) the DWTCTP Block. Results are summarized in the Impacts chapter of this PER and will be used in developing an appropriate OSCP</p>	<p>No such information has been found in the provided documentation</p>
22	<p>A minimum 1 nautical mile (1.857 km) Safety Zone will be established around the drillship to minimize the risk of danger to other mariners from coming in contact with the drilling operations</p>	<p>This is not consistent with international as well as Ghana's regulations. The mandatory safety zone around such installations is 500m.</p>
26	<p>As previously noted, given the water depth (>500m) the use of anchors to maintain</p>	<p>How safe is a DP Vessel at sea under adverse weather conditions?? We would need detailed information as this appears to be an element for a detailed risk assessment.</p>

	position over a well-site is not viable, so a DP vessel is required	We haven't seen any form of formal risk assessment for any of the operations carried out or materials and chemical used.
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Plan or Planned?

or: What did the EPA learn from MC252?

Some thoughts about the NOSCP,
version 5, 2015



Acknowledgements

My sincere thanks to the following colleagues for sharing their insights, information and time

- **Sandra Kloff** MSc – GIZ/GOPA Mauriania Programme Biodiversity, Oil and Gas, Spain
- Prof. Dr **Rick Steiner** – Oasis Earth and University of Alaska, Anchorage, Alaska
- Prof. Dr **Tinka Murk** - Marine Animal Ecology and Triple-P at Sea, Wageningen University and Research, The Netherlands
- **Hugo Nijkamp** MSc – General Manager Sea Alarm, Brussels, Belgium

Are we prepared?



On January 17, 2018, media reported an oil spill at two neighbouring towns in the Ada East District. It appeared to be due to a Togolese tanker which caught fire off the coast of Prampram.

Few of the coastal inhabitants had ever heard of an OSCP, let alone whom to contact or what to do...

Responding to the issue, Public Affairs Director at the EPA in the Greater Accra region, Irene Opoku, told that investigations are ongoing and **an official report would be published subsequently.**

The Bottom Line

The OSCP is a very general, rudimentary guideline, and actually more a plan for industry and agencies **TO DEVELOP OSCPs IN THE FUTURE**, not an actual spill prevention and response plan itself.

The OSCP does not meet in itself most of the nine "Aims and Objectives of the Plan," as given in Section 1.3 (page 12/13)

It is a plan to develop plans, not an actual plan itself

Independent Expert Reviews needed

The OSCP says that companies, vessels, and sites **"Shall develop OSCPs"** for Tier 1 spills, and the government for Tier 2/3 spills.

To really know how prepared the companies and government are to respond, we would need to have **independent expert review** of all such detailed plans.

We also need **independent expert review all Combat Agencies' OSCPs**, as required by National OSCP (2.2.3)

Too much remains to be developed

The OSCP says it **"Shall develop"** guidelines for oiled wildlife response, places of refuge, training and exercises, waste management, etc.

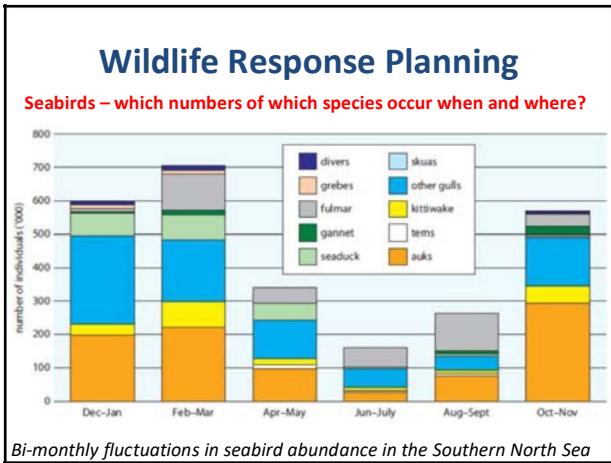
Thus, it is clear that we cannot judge the adequacy of the plan until we have reviewed all of this, which has yet to be developed.

Wildlife Response Planning

Wildlife Response Planning

According to the [H2O website](#), a response without a pre-spill agreed wildlife plan in place will have a **large potential for delays and inefficiency**. Therefore the best guarantee for a fast and effective wildlife response mobilisation is provided by a **pre-spill developed wildlife response plan**, implemented through **training and exercises**.

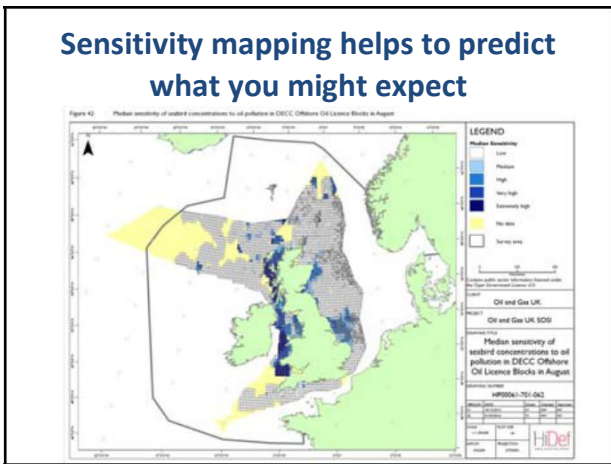
MAJOR PROBLEM: There is virtually **NO SYSTEMATICALLY COLLECTED INFORMATION** on marine wildlife (in particular of seabirds) in the EEZ of Ghana



Wildlife Response Planning

The use of sensitivity indices

Species	Williams et al. (1994)	F1	F2	F3	F4 (Winter)	F4 (Summer)	F5	F6	F7	F8	SOSSI (winter)	SOSSI (summer)
Glaucous gull	17	0.4	0.4	0.2	0.2	0.2	0.8	0.6	0.8	0.6		
Great black-backed gull	21	0.8	0.4	0.4	0.6	0.6	0.8	0.6	0.8	1		
Large gull sp.	18.5	0.8	0.4	0.2	0.6	0.6	0.8	0.6	0.8	0.8		
Black-backed gull	20	0.6	0.4	0.2	0.6	0.6	0.8	0.6	0.8	1		
Kittiwake	17	0.8	0.4	0.4	0.2	0.6	1	0.6	0.8	0.8		
Gull sp.	17	1	0.4	0.2	0.4	0.4	0.8	0.6	0.8	0.8	0.427	0.427
Sandwich tern	20	0.4	0.2	0.6	0.2	0.6	0.8	1	0.8	0.8	0.271	0.271
Roseate tern	N/A	0.6	0.2	0.6	0.2	0.4	1	1	0.8	0.8	0.339	0.339
Common tern	20	0.6	0.2	0.6	0.2	0.4	0.8	1	0.8	0.8	0.326	0.339
Arctic tern	16	0.4	0.2	0.6	0.2	0.4	0.8	1	0.8	0.6	0.268	0.279
Common/Arctic tern	16	0.4	0.2	0.6	0.2	0.4	0.8	1	0.8	0.8	0.271	0.282
Little tern	19	0.6	0.2	0.8	0.2	0.4	0.8	1	0.8	0.6	0.374	0.389
Black tern	18	0.4	0.2	0.2	0.2	0.2	0.4	1	0.8	0.4	0.124	0.124
Tern sp.	17.5	0.2	0.2	0.6	0.2	0.2	0.8	1	0.8	0.8	0.198	0.198
Gullenot	22	1	1	0.6	0.4	0.8	0.8	0.6	1	1	0.843	0.902
Gullenot/razorbill	23	1	1	0.6	0.2	0.8	0.8	0.6	1	1	0.811	0.902
Razorbill	24	1	1	0.6	0.2	0.6	0.8	0.6	1	0.8	0.799	0.865
Black gullenot	29	1	1	0.8	0.2	0.2	0.8	0.2	1	0.8	0.721	0.721
Little auk	22	1	1	0.4	0.2	0.2	0.2	0.6	1	0.6	0.655	0.655
Puffin	21	1	1	0.6	0.2	0.4	1	0.6	1	1	0.843	0.874
Auk sp.	24	1	1	0.6	0.2	0.4	0.8	0.6	1	1	0.811	0.843



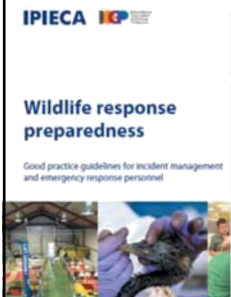
Wildlife Response Planning

With respect to pre-planning and preparedness regarding possible wildlife casualties during an oil spill, the three main issues are:

- (1) Which are the most sensitive sea areas under Ghana jurisdiction (know your area) and which species occur
- (2) Who are the trained experts that should be involved in the response (know your experts)
- (3) What facilities / material can be made available (prepare or select facilities beforehand).

Wildlife Response Planning

Two essential publications



Wildlife response preparedness
Good practice guidelines for incident management and emergency response personnel

HANDBOOK ON OIL IMPACT ASSESSMENT

editors
Kees (CJ) Camphuysen¹
Roberto Blaó²
Hugo Nijkamp³

Dispersant use policy



The OSCP should identify mechanical recovery of spilled oil as the priority, rather than chemical dispersants or burning.
The plan refers to the Ghana Dispersant Use Policy, which we would need to review as well.

DISPERSANT USE POLICY

Oil Spill Dispersants Guidelines

These guidelines are applicable to the National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances


Dispersant use policy

Policy **dates from 2008/2009** and has not been updated.
This was **BEFORE the Deepwater Horizon spill in 2010**

Annex A: Special Consideration Areas For Dispersant Pre-authorization Policy
Summary:

Area/Situation:	Additional Condition:	Submitted by:
Dispersant types other than Corexit 9527 or 9500 (US).	Not pre-authorized (Other stockpiled dispersants must receive specific approval from the EPA before they may be pre-authorized).	Oil Spill Response Limited
All pre-approval areas	Implementation of the 6-point Dispersant Monitoring Protocol, Bioassay protocol, and physicochemical data collection (temp, salinity, conductivity, pH) at each sampling location, etc.	
Areas where whales are present and feeding	Suspend dispersant application	
Known fishing grounds	Consultation with Fisheries Commission and EPA	

Dispersant use policy



Corexit 9500 and 9527 was massively used after the Deepwater Horizon spill. The research that followed the spill has shown major impacts on:

- Human health
- Benthic communities
- Fish
- Penetration of PAHs in the sediment
- Enhanced toxicity of hydrocarbons
- Reduced degradation of hydrocarbons

A large part was due to dispersants

A few citations

.....the **addition of dispersants** permits crude oil components to penetrate faster and deeper into permeable saturated sands, where anaerobic conditions may slow degradation of these compounds, **thus extending the persistence of potentially harmful PAHs in the marine environment.**

[PLOS One, 2012;7\(11\):e50549. doi: 10.1371/journal.pone.0050549. Epub 2012 Nov 27.](https://doi.org/10.1371/journal.pone.0050549)
Dispersants as used in response to the MC252-spill lead to higher mobility of polycyclic aromatic hydrocarbons in oil-contaminated Gulf of Mexico sand.
[Zuidgeest A¹, Huettel M.](#)

A few citations

..... biomass of large reef fish decreased by 25% to 50% in areas most affected by the spill, and **biomass of large demersal fish decreased** even more, **by 40% to 70%.**
.....Impacts on the food web translated effects of the spill far away from the oiled area..... **Recovery of** high-turnover populations generally is predicted to occur within 10 years, but some **slower-growing populations may take 30+ years to fully recover.**

[PLOS One, 2018 Jan 25;13\(1\):e0190840. doi: 10.1371/journal.pone.0190840. eCollection 2018.](https://doi.org/10.1371/journal.pone.0190840) **Impacts of the Deepwater Horizon oil spill evaluated using an end-to-end ecosystem model.** [Ainsworth CH¹, Paris CB², Perlin N², Dornberger LN¹, Patterson WF 3rd³, Chancellor E¹, Murawski S¹, Hollander D¹, Daly K¹, Romero IC¹, Coleman F⁴, Perryman H².](#)

A few citations

The presence of excreted Extracellular Polymeric Substances (EPS or "marine snow") in water with a high sediment load (e.g. sand or clay) and (dispersed) oil droplets, facilitates formation of negatively buoyant aggregates and subsequent sedimentation: MOSSFA (Marine Oil Snow Sedimentation & Flocculent Accumulation). In the aggregates, additional oil droplets and planktonic organisms (phytoplankton, zooplankton, eggs, larvae, etc.) can be caught and brought down to the sediment.

CONCLUSION: In situations of an algal bloom, the application of dispersants should be reconsidered

J van Eenennaam, M Zeinstra, E Foekema, T Murk. 2017. Marine algae and particles can greatly influence the fate and persistence of chemically dispersed oil. Poster Gomri Annual Conference. M
Murk & Foekema. 2017. Dispersants and algae: a deadly cocktail. WUR/GOMRI/C-Image

Risk Assessment

A Risk Assessment **"shall be carried out every 10 years"**...but has it? This is extremely important, and must be competently done, and technically and independently reviewed.

It should include a systematic analysis of ship (tanker and freighter) traffic patterns and types of vessels and cargoes, and identify traffic convergences and navigational characteristics that may increase the risk of large spill events. In addition, all petroleum facilities – terminals, offshore platforms, floating production, storage, offloading FPSOs, on-shore and offshore pipelines, etc. – should be thoroughly analysed in the assessment.

Crossing Borders

An MOU for cross-border spill arrangements is essential, but **has yet to be developed**.

Inter-Agency Agreement (IAA)


The Inter-Agency Agreement (IAA) should be **independently reviewed**.

Under the IAA there are five working groups, but their tasks and performance **under real conditions** are unclear.

Oil Spill Response equipment

The OSCP should specify what OSR equipment is in Ghana, and response times to cascade into the country additional equipment from OSRL base in Southampton UK. OSRL has also one of their bases in Ghana.

According to a country profile issued in 2010 by the International Tanker Owners Pollution Federation Limited (ITOPF), there is **very little dedicated oil spill response equipment available in Ghana**

This has perhaps improved, but a request for information to  OSCP Ltd remained unanswered.....

Oil Spill Response equipment

OSCP states that EPA **"shall arrange** Tier 2/3 equipment", but this plan does not do such. This should include equipment for night time response, fire, etc..

Who is in charge?

The relationship between the head of EPA, head of the Petroleum Department, and Ghana Navy in a spill response is unclear → who is in charge?

Natural Resource Damage Assessment

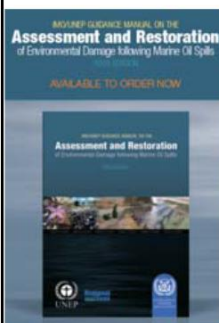
There is **need for a pre-spill Natural Resource Damage Assessment (NRDA) protocol**, with arrangements between agencies, pre-spill baseline environmental assessments, an NRDA plan, etc...the OSCP does not mention this.

Such a protocol **also details the aftermath of a spill** and the necessary actions to be taken for monitoring. This can take years....

Only for that Australia and New-Zealand have a joint **Maritime Oil Spill Monitoring Handbook**.

Oil Spill Natural Resource Damage Assessment & Restoration (NRDA&R)

September 2004



Richard Steiner, Professor
University of Alaska
richard.g.steiner@gmail.com

Written under contract to United Nations Environment Program Agreement HRMS/02/HM/ENW, August 2004; as original *Manual on the Assessment and Restoration of Oil Spilling Marine Oil Spills*, 2009.

Environmental Sensitivity Atlas

There should be a holistic **Environmental Sensitivity Atlas** available to public, not just EPA. Currently there is **ONLY** an outdated (2004) **Coastal** Environmental Sensitivity Atlas which is in need of updating.

The OSCP states that this atlas will be updated if necessary, but no such updates have been found despite ongoing and severe coastal erosion.

PROBLEM – There is an almost total lack of systematically collected data on environmentally sensitive areas at sea.
OBTAINING SUCH DATA IS URGENTLY NEEDED

Oil Spill Liability

Ghana's **oil spill liability** regime should be thoroughly reviewed and updated. Ghana is a member of some of the IOPC Funds (but not the largest Supplementary Fund) for tanker spills, but it is **not a member** of the Bunkers Convention (to cover spills of bunker fuel oil from all ships), or the HNS (Hazardous and Noxious Substances) Convention for chemical, natural gas, condensate etc. spills.

Oil Spill Liability

There is no international convention to date that covers liability from spills from offshore drilling/production facilities, so **what does Ghana law provides for such cases?**

It is highly recommended that Ghana establishes its own liability regime, providing no liability limitation for gross negligence, and a per barrel environmental damage (NRDA) fine (similar to the Oil Pollution Act of 1990 in the US.), outside of the IMO regimes (*which do not adequately cover environmental damage*).

Citizens Advisory Council

The OSCP **does not provide for establishment of a Citizens Advisory Council (CAC)** to provide stakeholder engagement and oversight of the offshore industry sector, in particular the development, review, and implementation of the Risk Assessments and OSCPs.

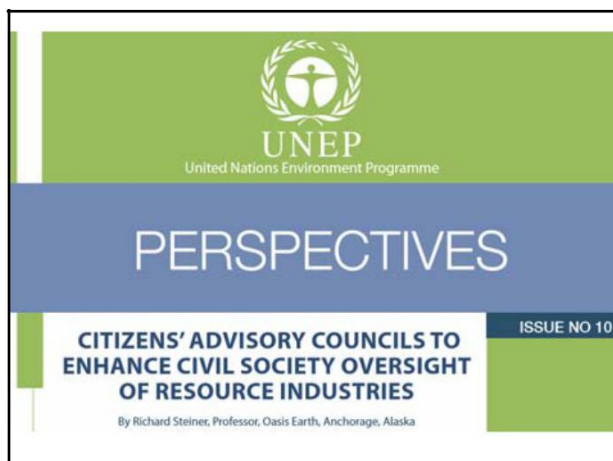
(see: http://www.oasis-earth.com/Resources/ENVIRONMENT_PAPERS_DISCUSSION_10.pdf)

Role of citizens in general

Fisherermen are on the sea most of their time and cover the entire EEZ. They could play an important role in reporting spills/suspect activities of any nature

CEMAGs, Community Environmental Monitoring and Assessment Groups, trained by Friends of the Nation are present in the six coastal districts of the Western Region

Civil Society Organizations could be involved as well



Thanks for your attention

Aker Energy ESIA COMMENT FROM GMA-Accra (Capt. Inusah)

1. *What are the primary concerns and or benefits faced by you/your community/your organization/with regards to the development of the DWT CTP*

Ghana's marine sector is reflected by its diversity of uses and the large population whose livelihoods depend on it. Therefore proper management of resources in this sector is highly important.

Fishing remains the dominant use of the coastal and marine space which include the proposed project development area. The fishing communities seem disappointed about the expectations of the offshore oil and gas sector's ability to address socio-economic challenges. There should be a better understanding among the fishing communities regarding oil and gas activity and environmental / resource management.

- The Maritime Administration

The new development will certainly have some implications with respect to the events listed in the BID.

The concern of the Ghana Maritime Authority is in the area of safety and security of vessels including (offshore installations) and the prevention of ship source pollution.

- Increase in maritime traffic

The E&P activities are often associated with influx of vessels and the use of heavy and complex equipment. Vessel traffic from the ports to the development area has to be effectively managed to ensure safety of navigation.

- Safety and Advisory Zones

We expect the mooring of an FPSO during exploitation. A 500m Safety Zone surrounding the FPSO facility and other installations will be generated. The Ghana Maritime Authority (GMA) will initiate processes to obtain approval from the International Maritime Organization (IMO) for the adoption of an advisory zone known as an Area to Be Avoided to protect the development area.

- Pollution prevention and Control

The increase in the volume of vessels for the activities will lead to increase in demand of ships bunkers, release of pollutants from ships engine combustions, discharge of ships engine cooling waters, discharge of sewage, garbage from ship generated waste etc

- Port Reception Facilities to receive and treat waste

Another issue of concern is the adequacy of reception facilities. Considering that large quantities of waste will be produced as a result of the E & P activities, GMA shall under the provisions of MARPOL Annex I Chapter 6, ensure the provision of adequate reception facilities in ports to handle discharges of waste and oily residues as a measure to prevent pollution of the marine environment.

- Ballast Water

VLCC calling at the fields from foreign countries will have the tendency of Importing and distributing or transferring of harmful aquatic organisms and pathogens through ballast water and sediments. The implication of this is a risk to the environment and human health and causing harm to property and resources

- Maritime Security

Considering that the FPSO JAK upon mooring assumes the status of a Port Facility in Ghana's Maritime Jurisdiction. The Ghana Maritime Authority, acting in accordance with the Maritime Security Act of 2004 (Act 675), shall carry out a Port Facility Security Assessment of the FPSO for the onward development of a Port Facility Security Plan. The plan will contain measures to address the various kinds of threats are identified during the assessment.

Regulatory requirements for FPSOs and associated activities of the project are set out by the Coastal and Flag States having regard to international maritime instruments. The International Maritime Instruments and Conventions that Ghana has ratified are relevant to the project.

The Ghana Maritime Authority will ensure the enforcement and compliance of the various Regulations /Legislative Instruments. These include:

- The United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- Maritime Zones (Delimitation) Law;
- Ghana Shipping Act, (as amended)
- Ghana Shipping (Protection of Offshore Operations and Assets) Regulations, 2012 (LI 2010); and
- The Maritime Pollution Act of 2016 (Act 932)
- The Ghana Maritime Security Act, Act 675

2. In your opinion, what are the positive and negative aspects of the proposed Project?

The project will bring a lot of economic benefits to Ghana. Secured offshore energy production is fundamental to sustainable economic growth, prosperity and employment.

However, if not well managed the project can lead to social vices such as growing angry militants of perceived claimants as beneficiaries, pirate attacks on the vessels calling at the project sites.

Uncontrolled exploitation and unsustainable development activities in the project area could result in environmental degradation and depletion of living resources - ecological scarcities.

APPENDIX 8-G: Picture Gallery (Photographs taken during and after the meetings)

APPENDIX 6-G: Picture Gallery (Photographs taken during and after the meetings)

1. Meeting with the Fishermen Association, Takoradi.



Figure 1: Aker Energy Company Presentation



Figure 2: Aker Energy Scoping Study Presentation





Figure 3: Photographs taken during the time of Discussions.



Figure 4: Photographs taken during and after the meeting with the Fishermen Association, Takoradi.

2. Ghana Ports and Harbours Authority (GPHA), Takoradi.







Figure 5: Picture taken during and after the meeting with the GPHA, Takoradi.

3. Fisheries Commission, Takoradi.





Figure 6: Photographs taken during and after the meeting with the Fisheries Commission, Takoradi.

4. Western Regional Coordinating Council (WRCC), Takoradi.



Figure 7: Western Regional Deputy Minister addressing the house.



Figure 8: Aker Energy Environment Manager making the Company presentation.



Figure 9: Presentation on the BID and the scoping process by the Director of ESL.



Figure 10: Some members of the house making contributions.



Figure 11: Aker Energy CSR Manager explaining a point.



Figure 12: Photographs taken during and after the meeting.

5. The Ghana Maritime Authority, Takoradi.



Figure 13: Photograph taken during and after the meeting.

6. Meeting with the Non-Governmental Organizations (NGOs), Takoradi.



Figure 14: Presentations on Aker Energy Company and the Scoping Process.



Figure 15: Points being explained during discussion time.



Figure 16: Photographs taken during and after the meeting.

7. Environmental Protection Agency (EPA), Takoradi.



Figure 17: Presentation Time.



Figure 18: Point being explained during deliberations.



Figure 19: Photographs taken during and after meeting.

8. Western Regional House of Chiefs (WRHC), Takoradi.



Figure 20: Time of presentations



Figure 21: Time of deliberations



Figure 22: Points being explained.



Figure 23: Photographs taken during and after the meeting.

1. Forestry Commission, Accra.



Figure 24: Photograph taken after the meeting.

2. Ministry of Energy, Accra.



Figure 25: Photograph taken after the meeting.

3. Fisheries Commission, Accra.



Figure 26: Photograph taken after the meeting.

4. Ghana Maritime Authority, Accra.



Figure 27: Photograph taken during the meeting.

5. The Ghana Navy, Accra.



Figure 28: Photograph taken during time of Presentation.



Figure 29: Photograph taken during time of Discussion.



Figure 30: Photograph taken during time of Discussion.



Figure 31: Photograph taken after the meeting.

