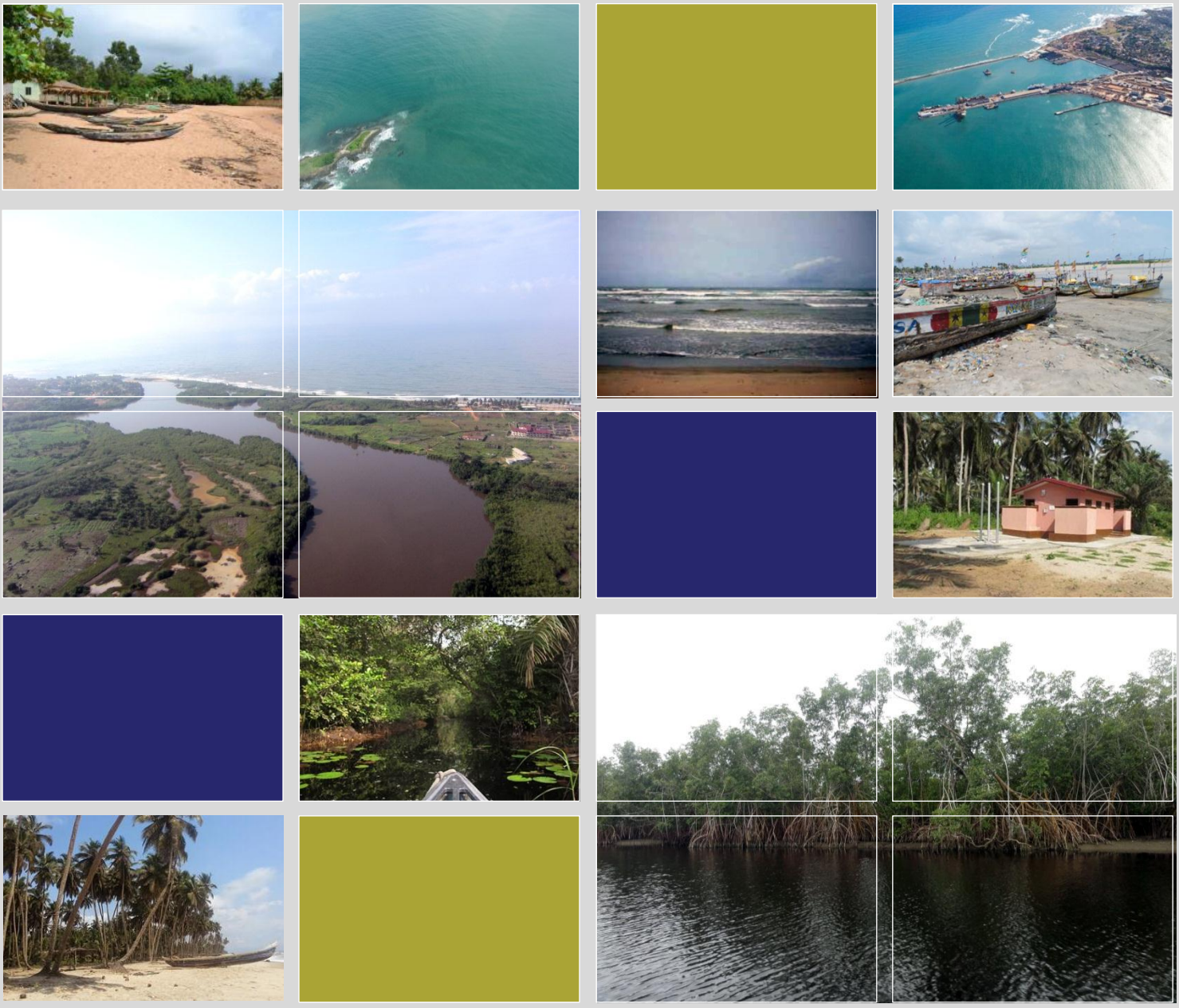
Offshore Cape Three Points (OCTP) Development

Non-Technical Summary (NTS)



Project Ref: 0272709

April 2015

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Non-Technical Summary Purpose

The main purpose of this Non-Technical Summary (NTS) is to facilitate communication and public involvement, as public participation is a pillar of modern approaches to impact assessment, in a fully transparent perspective. The NTS presents, in non-technical language, the findings of a detailed Environmental, Social and Health Impact Assessment (ESHIA) undertaken in connection with the Offshore Cape Three Points (OCTP) project in Ghana and is a tool that allows consultation of stakeholders and their participation into the EIA process. Moreover ESHIA disclosure is a requirement set by Ghanaian Environmental Protection Agency (EPA). The NTS provides an integrated overview of the two phases of the OCTP Development related to the oil exploitation - Phase 1 and gas exploitation - Phase 2, in order to make stakeholders aware the of the project activities and their consequences on environment, socio-economic and health components.

Introduction and Background

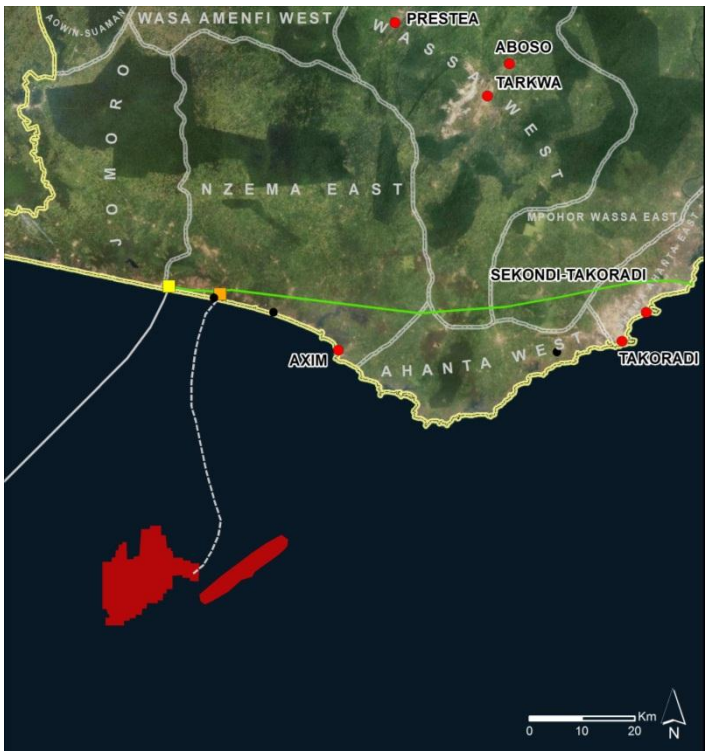
The Offshore Cape Three Points (OCTP) Development is a significant oil and gas initiative being operated by eni Ghana. The development involves three offshore oil and gas fields - Sankofa Main, Sankofa East and Gye Nyame – all located about 60 km offshore the Western Region (see Figure 1). The development is being executed in two phases:

- Phase 1: Oil Production Project
- Phase 2: Gas Production Project

The OCTP Development is a major achievement for Ghana. Production is expected to reach 45,000 barrels of oil per day (bopd) and 190 million standard cubic feet per day of gas (MMSCFD). The development has a 20-year life. Gas from the development will support the Ghana Gas Infrastructure Development Project currently under development in the Western Region. The development will also provide jobs and other economic benefits to local communities, the Western Region and to Ghana as a whole.

As required by Ghana laws and regulations Environmental Impact Assessment (EIA) were carried out for each of the development phases to identify environmental and social impacts and risks. The results of the assessments are reported in Environmental Impact Statements (EISs) submitted to the Ghana Environmental Protection Agency (EPA) in January 2015 (for Phase 1) and March 2015 (for Phase 2).

Figure 1: Location Area



Project Developers

OCTP Joint Venture

The Offshore Cape Three Points (OCTP) oil and gas exploration and development license is held by the joint venture (JV) composed of eni Ghana Exploration and Production Limited (47%), Vitol Upstream Ghana Limited (38%) and Ghanaian National Gas Company (GNPC) (15%).

eni Ghana is the operator of the license and is leading the development. eni Ghana is a wholly owned subsidiary of the Italian oil and gas company eni S.p.A., a global integrated energy company active in 85 countries with a staff of 82,000 employees.

Economic Benefits of the Project

The development will produce oil for sale to international markets and more importantly gas that will be used for domestic power generation. At the end of 2012, Ghana generated 12 billion kilowatt-hours (kWh) of power, of which 67% was from hydropower sources and the remainder from fossil-fuel powered sources. Despite this, Ghanaians, particularly those in rural areas still rely on biomass sources such as firewood and waste combustion as energy for cooking and heating. Firewood still accounts for more than 40% of Ghana's total primary energy consumption.

In terms of natural gas, Ghana imported 22 Billion Cubic Feet (BCF) in 2012 via the West African Gas Pipeline (WAGP). Gas volumes through the pipeline have been however decreasing since 2011 and remain unreliable, forcing Ghana to use heavy oil to fuel power plants.

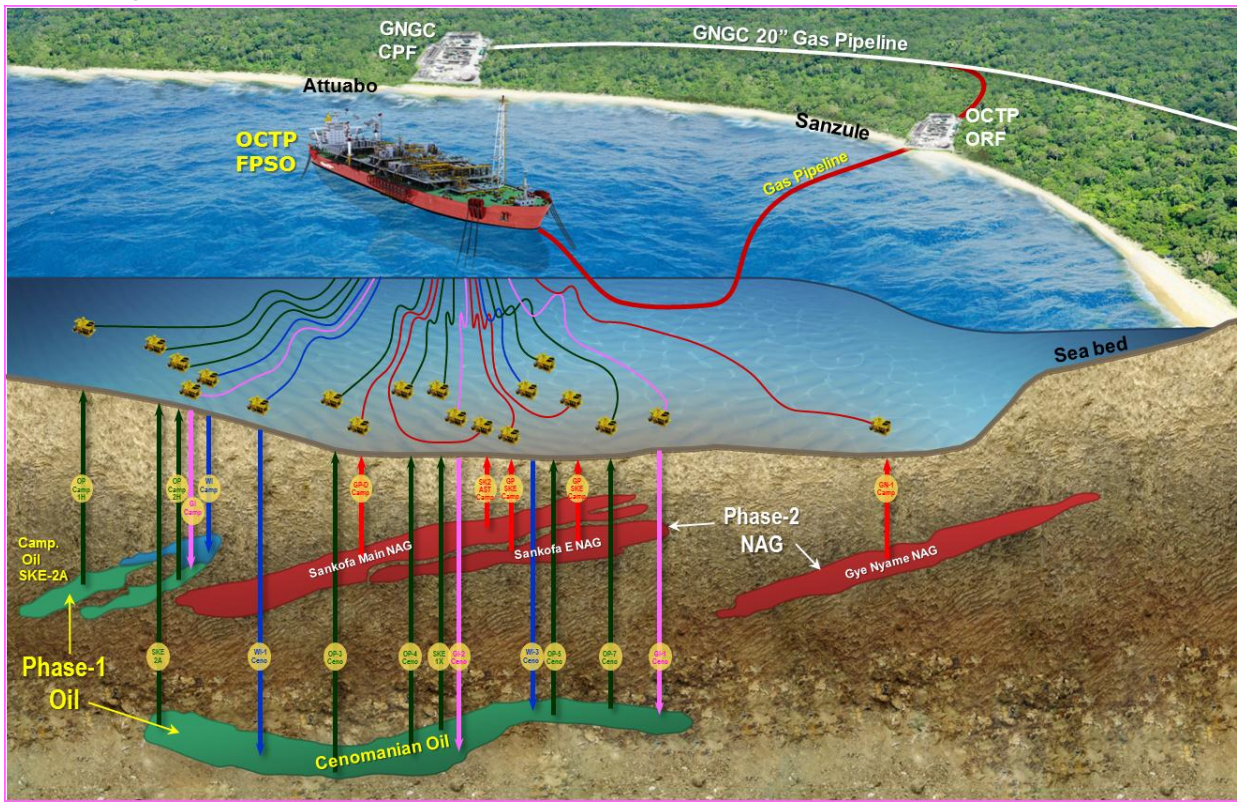
Ghana must expand its installed electricity capacity and distribution system to provide electricity to almost 30% of the population that does not have access to electricity. According to projections by 2017, Ghana will need more than 800 MMSCFD of natural gas for power generation.

The OCTP Development will bring Ghana sourced natural gas to the market for the benefit of industry and the people of Ghana. The Project will have positive impacts in terms of jobs and the economy through increased government revenue, employment opportunities and skills enhancement, local procurement and hospitality and tourism.

The development comprises two phases.

- Phase 1: Oil Development Project. This phase will consist of 14 subsea wells (8 oil producers, 3 water injectors and 3 associated gas injectors), subsea facilities, and a Floating Production, Storage and Offloading (FPSO) unit that would be located ca. 60 km offshore south of Sanzule.
- Phase 2: Gas Development Project. This phase will consist of 5 subsea wells, subsea facilities, gas treating facilities on the FPSO unit, a 63 km subsea gas pipeline, an Onshore Receiving Facility (ORF), and tie-in with the GNPC sales gas pipeline.

Figure 2: OTCP Development



Implementation of the development will include the following steps:

- **Onshore Site Preparation**: equipment mobilization, material transport, site clearance and infilling for the ORF (Onshore Receiving Facility) and construction of internal roads.
- **Offshore Construction**: well drilling and completion, subsea system installation, FPSO mooring and hook up, gas export pipeline laying, pre-commissioning and commissioning activities (well testing, FPSO commissioning, pipeline hydrotesting, subsea system testing).
- **Onshore Construction** (mainly related to gas production): gas export pipeline installation (underground), ORF (Onshore Receiving Facility) construction, permanent accommodation camp and helipad construction; temporary facilities construction, installation of pipeline from ORF to GNGC (underground), pre-commissioning and commissioning activities (ORF commissioning, pipeline hydrotesting).
- **Operation**: oil and gas extraction, reinjection of excess gas and produced water, oil stabilization and gas treatment on the FPSO, oil transportation via shuttle tankers, gas transportation via subsea pipeline, gas metering and compression at the ORF.
- **Decommissioning**: facilities will be decommissioned and abandoned in accordance with Ghana laws and regulations and international guidelines for abandonment of oil and gas facilities. A detailed program of abandonment and decommissioning will be prepared.

Well drilling is planned to start in July 2015 and the ORF construction to start approximately on Q1 2016 until Feb. 2018. Oil production is expected to start in 2017 and gas production in 2018.

Well drilling

Well drilling will be performed by the drilling ship Maersk Voyager (Figure 3). This drilling ship can operate in water depths up to 3,300 m. It is an advanced drilling ship designed to minimize emissions and discharges to the environment.

Well drilling requires the use of drilling fluids which are injected in the borehole to serve various purposes: move debris from the bottom of the well and carry it up to the surface, cool and lubricate the drilling bit, contain the fluids present in the rock formations, consolidate the walls of the borehole and reduce infiltration into the formation. The drilling fluids can be water or oil based depending on the drilling conditions. Both drilling fluids will used in this case: water based drilling mud for the shallow drilling section and non-aqueous drilling fluid system for the deep drilling section. There will be no discharges of exhaust drilling muds in the environment. Appropriately treated drilling cuttings will be discharged to the seabed near the drilling point. Collected liquids will be offloaded periodically to the supply vessel tanks and then carried to land for treatment and disposal.

Figure 3: Maersk Voyager Drilling Rig

Figure 4: Schematic of a FPSO (Floating Production, Storage and Offloading)

FPSO Operation

The FPSO unit (Figure 4) will be constructed in Singapore and will then be towed to Ghana for installation.

The FPSO unit's processing systems will perform the following:

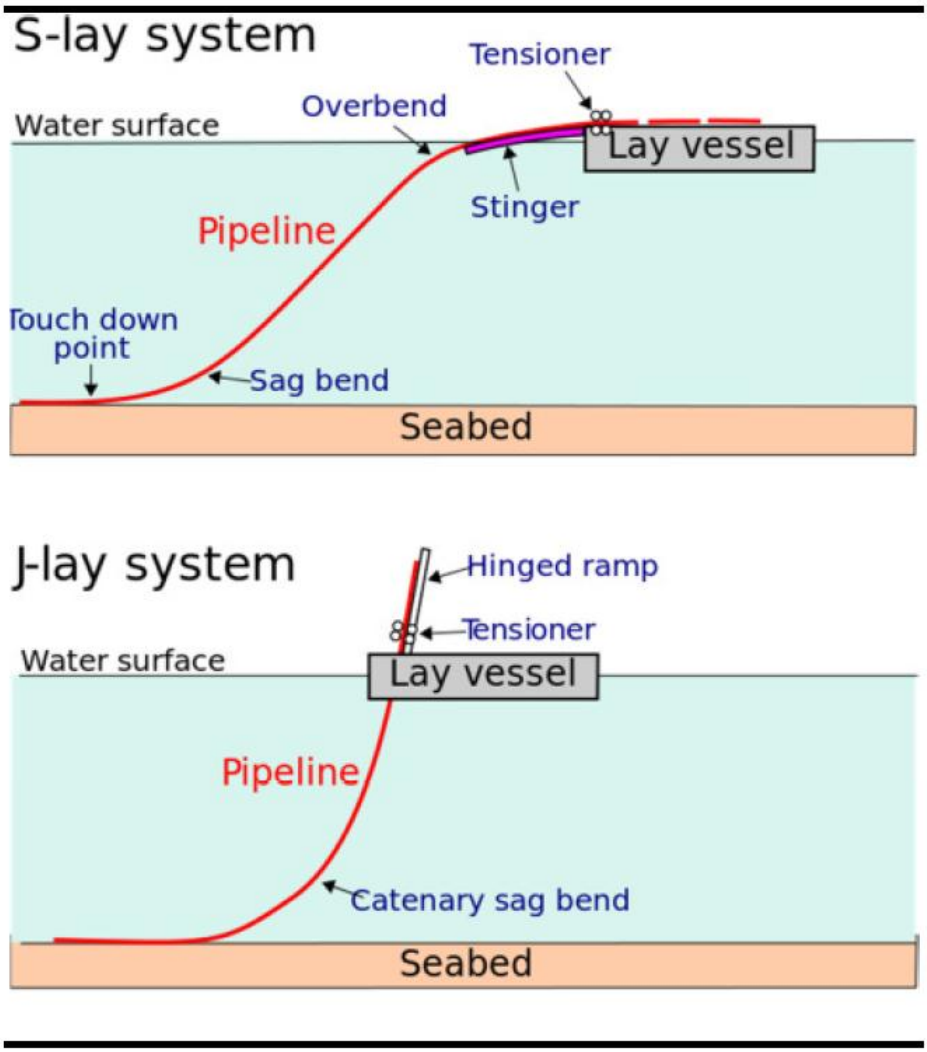
- separate, process to export specification, store and offload crude oil;
- separate, dehydrate, compress and re-inject associated gas;
- treat non associated gas to separate condensates and dry the gas;
- separate, treat and re-inject produced water; and
- lift and treat sea water.

The design, positioning and configuration of the FPSO consider the worst metoceanic conditions. The hull is designed to withstand 20 years of operation. In order to mitigate tank corrosion, a corrosion protection coating will be applied to ballast tanks and upper and bottom cargo tanks surfaces. The FPSO will provide accommodation for a total of 136 persons.

Offshore Pipeline

A 63 km long rigid pipeline will be laid on the seabed. The main subsea pipeline will be laid down by two lay barges using the S laying mode for shallow water section and J laying mode, for the deepest water (Figure 5).

Figure 5: S-lay and J-lay methods



Onshore Facilities

Onshore, there will be both temporary construction facilities and permanent operations facilities (Figure 6):

Permanent facilities:

- ORF
- permanent worker accommodation camp
- helipad
- roads and pipelines.

Temporary construction facilities

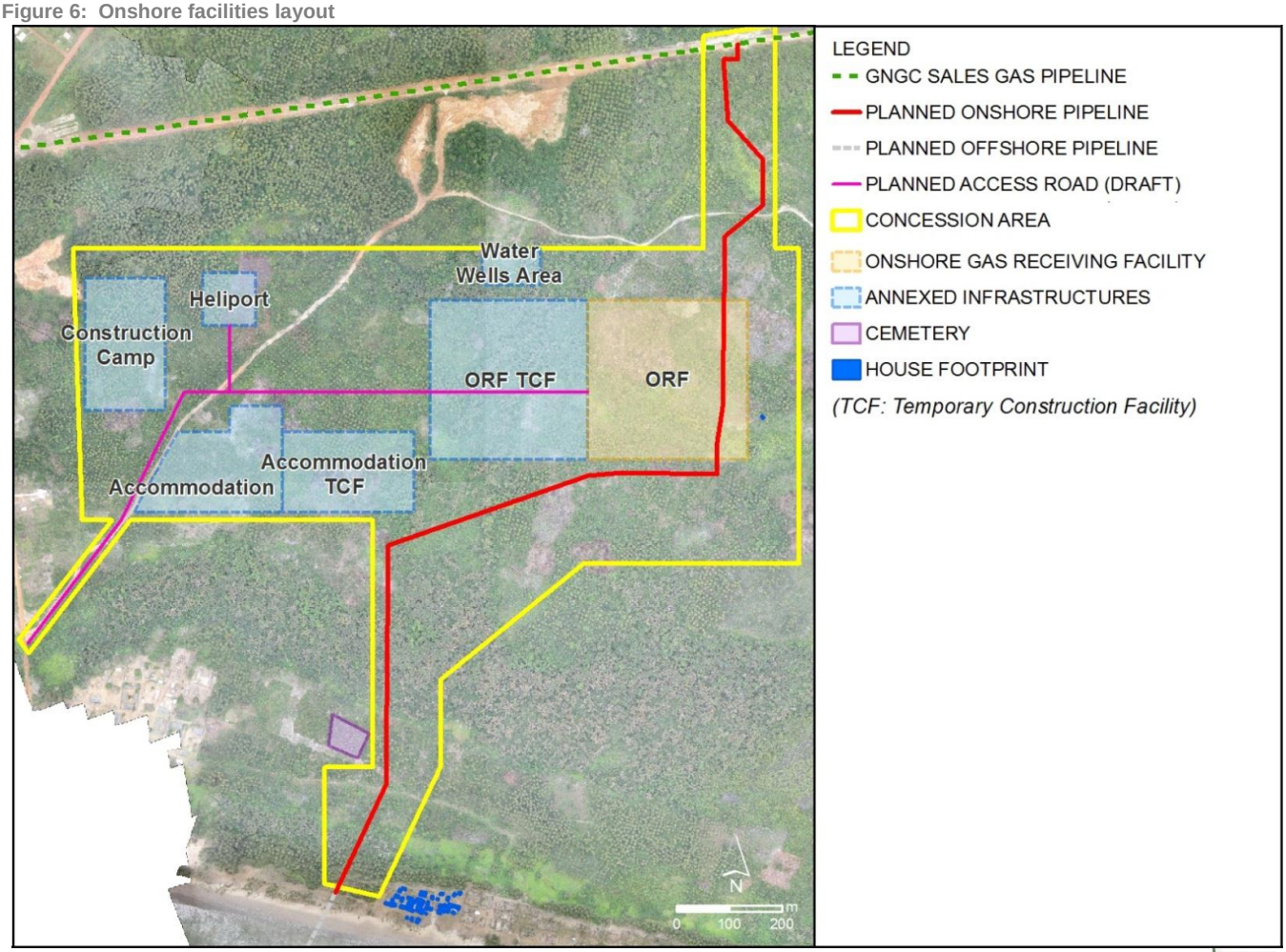
- temporary construction site
- temporary accommodation camp
- construction camp.

The initial step in the onshore construction process will involve site preparation by clearing vegetation and levelling the ground. The site road network will be constructed at this stage to assist the movement of heavy equipment.

The construction of the ORF is a conventional civil project and does not require unusual heavy equipment or construction techniques. The main machinery needed are bulldozers, heavy excavators, soil removal trucks, large heavy-lift cranes, generators, excavators, and rock breakers.

The temporary accommodation camp will be constructed to house personnel during the three year construction phase estimated at 400 to 600 workers. The permanent accommodation camp will be about 27000 m^2 and will be located near the ORF. The camp will house about 45 workers involved in the operation of the onshore facilities.

Figure 6: Onshore facilities layout



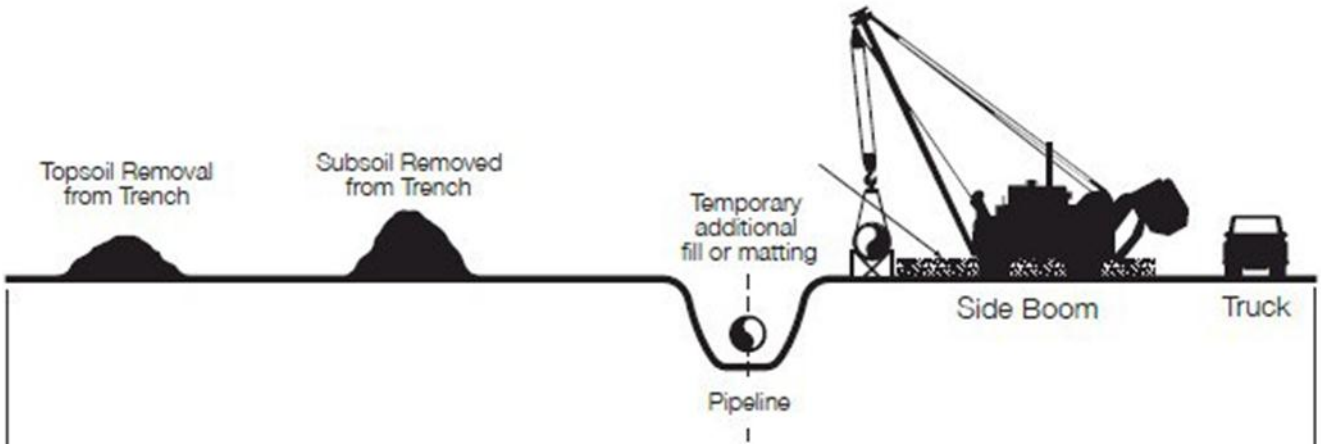
Onshore Pipeline

There will be two sections of gas pipeline onshore:

- Pipeline connecting the offshore section to the ORF (about 1500 m); and
- Pipeline connecting the ORF to the existing GNGC gas pipeline (about 800 m).

The onshore pipelines will be installed underground. This will involve clearing a strip about 34m wide and digging a trench. On one side of the trench, excavated topsoil and other material will be separately stockpiled. On the other side of the trench the pipeline assembly and vehicles movements will occur. A typical cross section of the construction working strip is shown in Figure 7.

Figure 7: Pipeline laying activity



The EIA Procedure

The EIA for the development was undertaken in accordance with the Ghana Environmental Assessment Regulations. The Ghana Environmental Assessment Regulations (Legal Instrument 1652 issued in 1999) define the EIA procedure. The EIA also considered the requirements of international financial institution environmental and social standards (e.g. World Bank Group). The EIA study included also baseline definition and impacts evaluation for the Social and Health components in the Project area.

The EIA for the Phase 1 Project was registered with Ghana EPA in September 2013. The scoping report was approved by EPA in 2014 and the EIS was submitted to EPA in January 2015. The EIA for the Phase 2 Project was registered in December 2014. The scoping report was approved by EPA in January 2015 and the EIS submitted in March 2015.

Stakeholder Engagement

Stakeholders are persons or groups who are directly or indirectly affected by the development as well as those who may have interests in a project and/or the ability to influence it. Stakeholder engagement is the process of dialog between the development and stakeholders.

Stakeholder engagement required as part of the Ghana EPA EIA regulations. It is also required by international lenders and by eni's internal policies. Stakeholder engagement in the context of the EIA process included the following:

Phase 1 EIA (March 2012 and November 2013):
- 25 meetings with national, regional and district authorities, traditional leadership, NGOs and fishermen;
- 4 meetings with communities.

Phase 2 EIA (December 2014):
- 30 meetings with national, regional, district and local authorities, NGOs, international organizations and fishery association;
- 10 meetings with communities.

A Stakeholder Engagement Plan will be developed as part of this project: it has the main purpose build and maintain positive relationships between the Project and relevant stakeholders. It facilitates constructive engagement and continuous dialogue with affected communities throughout the entire project life.

Baseline Studies

eni Ghana began collecting information about the environmental, social and health setting starting in 2011. This included a number of field surveys for data gathering.

Environmental surveys included:

- Offshore physical and biological surveys on seabed sediments, geophysical studies, seawater quality, plankton, benthic communities, fish catch studies and coastal erosion data.
- Onshore physical and biological surveys on air quality, background noise, surface and groundwater quality, geology and soils, habitats, flora, fauna, ecosystems and protected areas.

Social and health surveys included:

- Socio-economic surveys including meetings with community groups and members, interviews with experts on specific matters and community's or institutions' representatives.
- Fisheries studies and a Fisheries Impact Assessment.
- Community health survey through interviews with communities and direct observations.

Onshore Environment

The onshore Project area is a flat area of low altitude (0-10 m) with very few headlands or rocky outcrops, located along the Western Ghanaian Coast. The coast in this area is characterized by low sandy beaches. In the vicinity of the Project area, the coastal low lying areas extend inland for several kilometres. The habitat within the concession area consists largely of modified habitats with a large proportion of the area covered by degraded coconut palm plantations, degraded vegetation and wet evergreen forest with palms. The coastal areas are dominated by regenerating vegetation comprising of palm trees and thorny shrubs. To the east of the concession is a natural habitat that is classified as Swamp and Mangrove Forest. Sensitive habitat occurs along the coastal beaches where turtles nest.

The Ankasa Conservation Area and the Cape Three Points Forest Reserve are the most significant protected areas in the general area of the Project (located 25 and 42 km respectively from the project area).

The onshore components of the Project area lie within the greater Amansuri wetland area, and close to the estuary of the Amansuri river. This is not an officially designated protected natural area; however it is classified as Important Bird Area (IBA) as it offers a habitat for bird species.

Offshore Environment

Seawater quality in the offshore environment is good with low or very low levels of pollutants. In terms of sensitive animals, the offshore environment may also host up to 18 different cetacean species. The Gulf of Guinea is also an important migration route, feeding ground, and nesting area for sea turtles with nesting activity highest between October and January.

Fisheries

The key small pelagic fish species found in the Ghanaian waters are sardinella, anchovy and chub mackerel. These species are commercially important and represent approximately 80% of the total catch landed in the country.

The large pelagic fish species include tuna, billfish and sharks. These species are highly migratory and occupy the surface waters of the entire tropical and sub-tropical Atlantic Ocean. There is a long tradition of both artisanal and distant-water fishing fleets.
Fishing, fish processing and fish trade are among the most important sources of livelihood not only in coastal communities of the Western Region but also in communities inland.

The fisheries sector contributes 4-5% to agricultural Gross Domestic Product (GDP) and offers employment to about 10% of the population and their dependents.

Socio–economic Environment

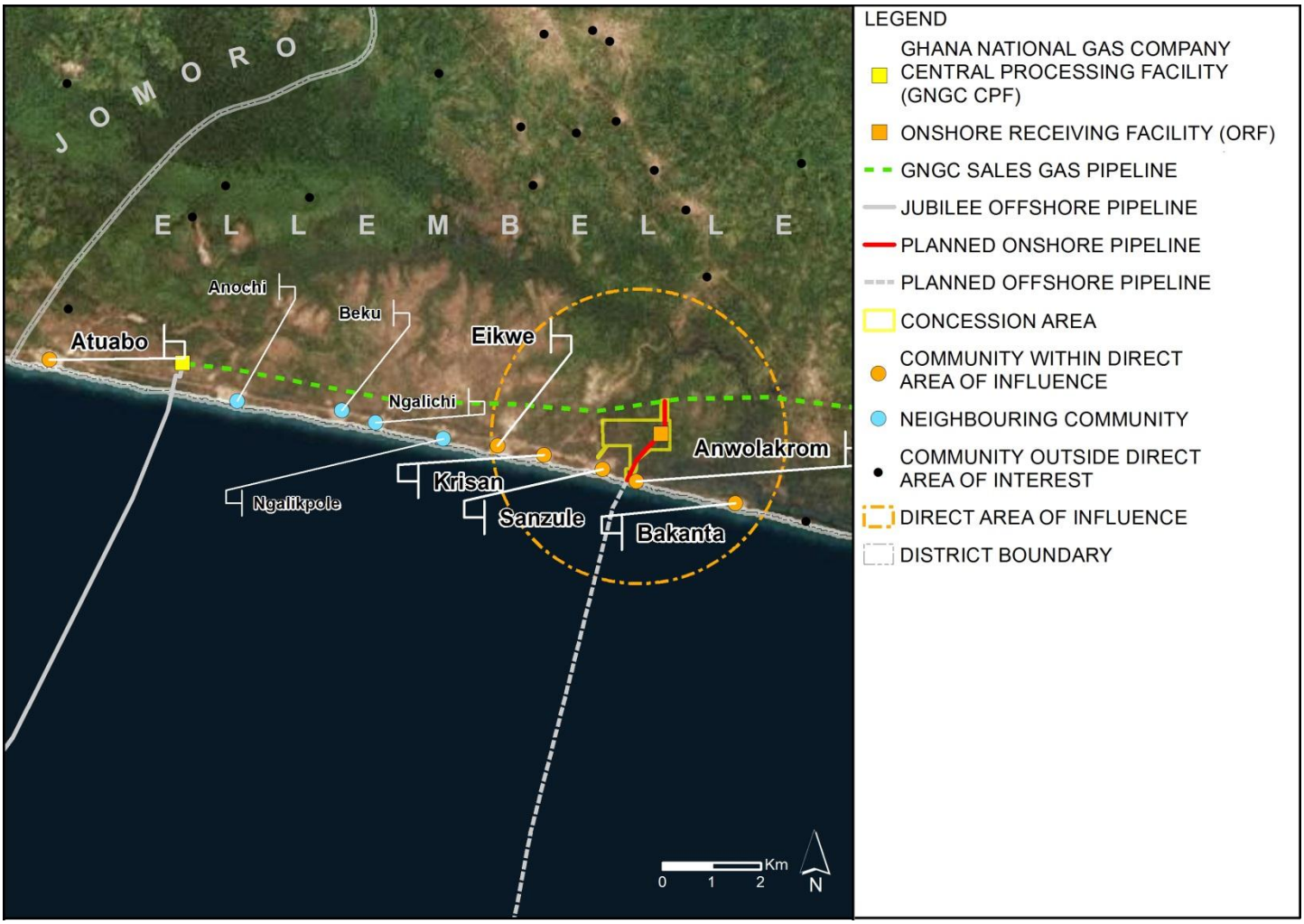
The onshore portion of the development will be located in the Ellemebelle District of the Western Region. The communities in the Direct Area of Influence (see Figure 8) include the communities of Anwonakrom, Sanzule, Bakanta, Krisan and Eikwe. Atuabo, which is located outside the Direct Area of Influence (DAoI) is however likely to be effected by project activities as it is a larger and better serviced community in the proximity to the project area.

The land that will be acquired (long term lease) for the onshore facilities is made up of cultivated palm groves, croplands or the remains of natural vegetation and water bodies. No settlements are located within the borders of the area and the closest community is Anwonakrom located on the south-eastern border.

The largest income-generating livelihood activity in the communities is fishing. Fish mongering is also an important livelihood activity. In addition almost every household in the towns participates in small-scale and subsistence agricultural activities.

Tourism in Ghana has become a major socio-economic activity and an important and fast growing sector of the Ghanaian economy. The tourism potential in the Western Region is related to the number and extent of tropical beaches as well as wildlife parks, forests and game reserves, inland lakes, and rivers. Currently none are being exploited for tourism in the Direct Area of Influence.

Figure 8: Communities within and around the Direct Area of Influence of the Project



Health

The most common diseases in the direct area of influence are malaria, respiratory infections, anaemia and diarrhoea. HIV prevalence rate in the Western Region in 2013 was 2.4%.

Predicting Impacts and Risks

The EIA considers potential **positive and negative impacts of the project** on:

- **environment** (internal and sea water, air, soil and groundwater, noise, flora and fauna, etc.),
- **socio-economics** (communities, land use and land tenure, fishery and other economic activities, cultural heritage, utilities and public infrastructures),
- **health** (health infrastructures, transmission of diseases, road traffic, security).

eni's impact assessment approach is based on the following **three steps**:

1. **Impacts prediction**: impacts and risks are identified by analysing disturbance factors and interactions of the project with the natural and social environment.
2. **Impacts evaluation**: according to eni standards requirements the significance of each impact is to be ranked according to the evaluation criteria of Table 1.
3. **Impacts mitigation design**: mitigation measures are developed to avoid or reduce negative impacts and enhance positive benefits.

Table 1: Ranking and Evaluation Criteria

Ranking	Evaluation criteria				Significance
	Duration	Extent	Importance / Resilience of Receptor/ Resource	No. of elements Involved	
Low 1	Less than 1 year / Temporary	Local scale: the proposed operating site and its immediate environs	Low value/ sensitivity of receptors or resources, able to recover or adapt to the change without interventions	Affecting small no. of individuals, households, individual enterprises and/or small no. of species	(ranging from 4 to 16)
Medium 2	Between 1 and 5 years	Regional scale: as determined by country's administrative boundaries	Moderate value/sensitivity of receptors or resources, able to adapt with some difficulty and which may require interventions	Affecting small number of individuals, communities or administrative and/or higher no. of species and habitats	
High 3	Between 5 and 10 years	National scale: Entire country	High value/ sensitivity of receptors or resources, poorly able to adapt to changes with strong interventions	Affecting great no. of individuals, households and /or medium/large enterprises and/or habitats and ecosystems	
Critical 4	Over 10 years / Irreversible	International scale: trans-boundary	Extreme value/ sensitivity of receptors or resources, resulting in permanent changes	Affecting huge no. of individuals, households and /or large enterprises and/or habitats structure and ecosystems functions	
Score	(1; 2; 3; 4)	(1; 2; 3; 4)	(1; 2; 3; 4)	(1; 2; 3; 4)	

Impacts significance is assessed both before and after mitigations definition and implementation in order to reduce the significance of each residual impact, to an acceptable level. For this reason, all proposed mitigation measures listed in the ESHIA become a commitment for the Project and will be implemented. To assure the proper and timely implementation of the identified mitigation measures management plans are developed, as presented in the "Action Plan" section.

Mitigating Impacts:

eni will implement a series of mitigation measures to reduce the negative disturbance and enhance the benefits of the project realization and operation on the environment. The mitigation hierarchy for planned events is outlined in Table 1.

Table 1: Mitigation Hierarchy for Planned Project Activities

AVOID AT SOURCE; REDUCE AT SOURCE Avoiding or reducing at source is essentially 'designing' the project. Often called "minimization" e.g. re-routing a pipeline, relocating facilities, etc.
REDUCTION ON SITE This involves adding design control system to the basic design to abate the effect - pollution controls fall within this category. Often called "end-of-pipe" e.g. wastewater treatment, NOx reduction technology
REDUCE OFF SITE Example soundproof equipment at a nearby residences, visual screening by planting of hedges)
RESTORE In case of unavoidable damages to a resource, e.g. vegetation disturbance. Repair essentially involves restoration and reinstatement type measures.
OFFSET Where other mitigation approaches are not possible or fully effective, then compensation, in some measure, for loss, damage and general intrusion might be appropriate. Example in a like-for-like biological offset attaining ecological no net loss.
NET POSITIVE OUTCOMES Make, if possible, a positive contribution to Biodiversity conservation and/or improvement of Ecosystem Services and communities development.

The main conclusions of the EIA are the following:

- The development has the potential for creating positive impacts through increased government revenue, increased procurement, employment and skills development.
- The significance of negative impacts could be reduced through design, use of control technology and operational management controls.
- There were no impacts or risks identified that could not be mitigated to an acceptable level.
- The area where there is a residual impact after mitigation is the economic effect of displacement of farming and further mitigation measures will be put in place.

A summary of the significance of impacts during construction and operation is provided in the following sections.

ONSHORE

As construction activities have a limited duration and the sensitivity of the onshore environment is low/medium, environmental impacts during **construction** were ranked of **medium to low significance**.

Medium significance impacts during the **operation** phase are likely to occur on the following components:

- **air quality**: due to the airborne emissions from ORF and vehicles
- **ambient noise** due to noise emissions from ORF and vehicles
- **soil and groundwater** connected reduction of groundwater resources, possible **accidental** fuels or chemicals **spills**, and soil compaction
- **fauna** as a result of the negative effects of pollution, traffic and hunting
- **landscape** due to the presence of the onshore infrastructure and offshore activities, including lighting.

Impacts during **operation** on surface water and on flora and fauna are expected to be of **low significance.**

Onshore Impacts Mitigations:

- Dust reduction measures
- Low emission vehicles, machinery and ORF equipment
- Zero flaring philosophy
- Selection of equipment with low noise emissions and good operational management
- Prevention of oil and chemicals spillages and proper waste management
- Proper groundwater wells management
- Avoid habitat reduction, fragmentation and isolation
- Minimizing disturbance and displacement of fauna
- Vegetation and restoration to screen the ORF

OFFSHORE

The **project works** on the **seabed** such as pipeline laying, deposition of drill cuttings and especially seabed intervention works and well drilling, will lead to impacts in terms of increase of **seawater turbidity** and potential release of. The impact of the cuttings on the seabed will be limited to the vicinity of the well and any potential toxicity introduced is likely to remain deposited there. The impact on the seabed has been evaluated as **medium significance**.

Low significance impacts are expected during the **construction** phase on other offshore components (air quality, benthic communities, underwater noise, and erosion).

Medium significance impacts during the **operation** phase are likely to occur on the following components (the significance of the impact is mainly due to their duration all along the project operation, not to their qualitative/quantitative importance):

- **seawater quality**
- **seabed** potential contamination by hazardous and non-hazardous accidental spills and sediment accumulation and/or erosion
- **air quality**: due to the airborne emissions from FPSO, vessels and helicopters
- **underwater noise** continuous disturbance of non-relevant intensity
- **marine fauna and flora** the noise disturbance going to be continuous but its limited intensity is likely to induce only behavioural changes and avoidance patterns of a few individuals of marine mammals and turtles.

Low significance impacts are expected on coastal processes that would cause erosion or accretion given the temporary interruption of existing sediment transport dynamics and the range of mitigation measures considered.

Offshore Impacts Mitigations

- Minimising turbidity and release of contaminants and nutrients
- Proper mud and drilling cuttings management
- Low emission vessels and FPSO equipment;
- Zero flaring philosophy
- Minimizing noise emissions and disturbance to fauna
- Minimizing erosion and scouring during near shore pipeline laying

SOCIO-ECONOMICS

High significance positive impacts for the national and/or local communities are expected from:

- **increased government revenue,** this impact is considered **high** during construction and enhanced to (positively) **critical** during operation;
- **procurement opportunities** during construction;
- **employment opportunities** during operation;
- **skills enhancement** during operation.

Regarding employment opportunities, at this stage of the project, it is estimated that approximately 200-300 persons could be potentially engaged during construction and 70 persons during operations, depending on the skill set required for the specific activities to be performed.

High significance negative impacts are associated to the **economic displacement** (loss of livelihoods) due to loss of access to farmland during construction and operation.

A **Medium significance** was assigned to **impacts on:**

- **employment opportunities** during construction;
- **skills enhancement** of workforce during construction;
- **price inflation** due to increased expenditure in the DAoI **and economic vulnerability** as low income households will be particularly vulnerable due to little/no savings availability;
- **workforce demobilization** (at the end of the construction phase);
- **disruption of onshore and near-shore fishing activities;**
- **damage to fishing** gear**;**
- **changes to cultural and social norms, increased anti-social behaviour, tension and conflict between villages** due to the influx of Project workers and jobseekers;
- **cultural heritage resources** (during operation) **and sense of place** due to the duration of the impact not to the quality/quantity of the impact;
- **social, road, health infrastructure and marine traffic and infrastructure** associated to the increase in population through introduction of a migrant workforce but also through other economic in-migrants settling in the area with the intention of securing employment with the Project or seeking other economic **opportunities**;
- **enhanced hospitality and tourism potential** during operation.

The following **impacts** are rated as of **low significance:**

- **access to offshore fishing grounds**
- **cultural heritage resources** during construction
- **infrastructure** lighting
- **Enhanced hospitality and tourism business potential** during construction.

HEALTH, SAFETY AND SECURITY

A **Medium significance** was assigned to **impacts on:**

- **increased transmission of STIs (Sexually Transmitted Infections) including HIV/AIDS, communicable diseases** due to the influx of workers and in-migrants
- **road traffic accidents**
- **increased pressure on health care resources** due to the influx of workers and in-migrants

Low significance impacts on

- **workers health, safety and rights** given that a number of mitigation and management measures will ensure the minimization of this impact.

Social and Health Impacts Mitigations:

- Influx management
- Development of local people skills
- Support to develop alternative economic activities
- Community Development Plan and Livelihood Restoration Plan
- Land replacement
- Cash compensation
- Stakeholder consultations and grievance mechanism
- Workforce code of conduct
- Social and Environmental Investment Plan

A cumulative impact of major significance was identified on livelihoods and ecosystem services, in particular fishing and farming based livelihoods.
Moreover, the following impacts assessed as of medium significance have been identified:

- Surface water pollution related to the additive effects of changes to the surface water flow and unplanned spills which could affect the Amansuri River system;
- Increased pressure in social infrastructure and service delivery;
- Increased price inflation.
- Increased potential for habitat degradation / land use change.
- Physical and social sense of place.
- Economic and psychological cumulative impact resulting from post-decommissioning.
- Health community and safety.

During all the Project life, eni will collaborate with the Government of Ghana, other operators and affected stakeholders in order to identify mechanisms to monitor and manage potential cumulative effects.

No significant trans-boundary impacts are expected to occur as a result of normal operations. However, modelling simulations of a large oil spill into the marine environment (blow out worst case scenario) show that oil could be transported throughout the Gulf of Guinea. Due to the high sensitivity of resources, the probability of a crude oil spill due to a blow out and receptors and the prevention measures defined the impact is assessed as being of **Medium** significance during operations. However, a number of mitigation measures aiming to decrease the probability of such events have been included in the project. Moreover, in order to reduce the consequences of the residual risk, eni Ghana has developed an Oil Spill Contingency Plan.

The Government of Ghana is currently working closely with the other contracting parties of the Abidjan Convention to seek and finalize formal arrangements for dealing with trans-boundary oil spill incidents.

Farming in OCTP area

Subsistence and commercial farming takes place in the DAoI, however land suitable for farming in the coastal zone is scarce.

A range of crops are grown in the land acquisition area, from cash crops to food crops (perennial and annual): the most common crops grown are cassava, pineapple, coconut and oil palm (Figure 9).
The size of plots reportedly depends on the strength of the individual or family to work an area. Average farm size per household is reported to be 2.5 acres even though some individuals have much bigger farms. Farmers rely on the rain for agricultural production, as there are no irrigation systems

The acquisition of this land will lead to the economic displacement (loss of income) of those currently using it for growing and harvesting crops.

OCTP Project and Land Acquisition

According to IFC Performance Standard 5, all parties affected by loss of land and livelihoods are entitled to alternative land or restoration of livelihoods lost – including those without formal title or use rights to the land. All individuals using land or natural resources for their livelihoods within the Project land acquisition area should therefore be identified, and considered eligible for compensation and restoration of livelihoods as part of the Project impact mitigation and management programme. Mitigation for economic displacement of land-based livelihoods will be detailed in a Livelihood Restoration Plan (LRP) and supporting measures described in the Project Community Development Plan (CDP). These documents will:

- Fully characterize the loss of use rights to land and associated livelihoods incurred by all affected households, and identify suitable compensation at replacement cost to guarantee improved or at least restored livelihoods;
- Identify additional support to affected households to diversify their livelihood strategies to develop alternative economic (non-farming) activities to supplement marine fishing and farming incomes and subsistence (e.g. small scale trade, transport, service industry); and
- In conjunction with measures in the Project Community Development Plan CDP, explore further investment opportunities to support and enable farmers to improve their farming income: e.g. through establishing producer groups to increase efficiencies and reduce/share the burden of transport of produce, and support with marketing to enable them to better manage supply and market their products.

eni Ghana will employ dedicated staff to manage the implementation of the Livelihood Restoration Plan (LRP).

The LRP will include a stakeholder engagement plan and standalone grievance procedure, which will explain how to express possible complaints in order to obtain response from eni.

Figure 9: Example of a typical Cassava Field Surrounded by Palms at Bakanta (outside the land acquisition area)

Fisheries in the Local Communities

The largest income-generating livelihood activity in all of the DAoI communities fishing and therefore the primary livelihood activity with both men and women involved, although they are divided by gender in their roles.

The fishing industry in Ghana consists of three main sectors namely (i) small scale (or artisanal) marine and onshore fishing, (ii) semi-industrial (or inshore) and (iii) industrial fisheries. Targeted fish species within the marine sector include pelagic, demersal and shellfish resources (Figure 10).

There are two fishing seasons, towards the end of June and peaking during August and September and towards the end of November, peaking between late January and March. April to May is a rest period for mending nets, boat repair and fishermen engage in onshore artisanal work to supplement their income.

Fish mongering is also an important livelihood activity for women who process fish by salting and drying or smoking. The women buy fish locally and transport for sale at Aiyinasie. Large catches are also sold to hotels in Axim. Income from fish mongering is reduced due to lack of cold storage such that fish prices are lowered by the high levels of supply during fishing seasons.

Fishermen reported locally declining catches over the past number of years, attributed to increased human populations and consumption, increase in fishing activities, increase in fishing canoes working the area and illegal fishing. Many community members in the Study Area believe that the offshore oil production activities have contributed to the decline in fisheries.

Figure 10: Typical large artisanal fishing canoes

OCTP Project and Fishery

The project is not expected to have any significant impact on the abundance of fish, crustaceans and cephalopods (all evaluated impacts on marine fauna are rated of Low significance).

However the following impacts have a potential to affect to some extent fisheries activities and fisheries based livelihoods:

- **Restricted access to offshore fishing**: A legally enforceable safety exclusion zone around drilling vessels will be maintained throughout construction and operation to reduce the risk of collisions at sea and to ensure personnel safety. Fishing vessels will not be able to fish within the exclusion zones for safety reasons. This restriction will result in a very small reduction in the available fishing grounds and will affect only those fishermen who fish around 60 km off shore in the project area.
- **Disruption of Onshore and Near Shore Fishing Activities** during construction: There will be an exclusion zone of approximately 100 m either side of the gas export pipeline preventing fishers from using the beach in front of the ORF land acquisition area for landing catches and boats and gathering for fish-mongering/trading activities. This area is small however, relative to the extent of the beach, and the exclusion zone will only be enforced during the installation of the pipeline (
- Figure 6).
- **Damage to fishing gear**: There is the potential for this gear, which is left floating in the open ocean, to enter the exclusion zone and become entangled in Project vessels and be lost to the fishermen. The exclusion zones around Project vessels are intended to reduce the likelihood of this impact occurring as far as possible.
- **Infrastructure lighting**: at night time fish may be attracted by the artificial lights on the Project vessels, where no fishing is allowed due to the exclusion zone. This could have the effect of reducing the fish catch.

There is concern amongst fishers in the Direct Area of Influence (DAoI) and Extended AoI that the Project will have a negative effect on fish catch due to exclusion zones. However, considering the mitigation measures put in place by eni, no high impact is expected on fishery. The disruption of onshore and near-shore fishing activities, and damage to fishing gear have been assigned a significance of medium, while restricted access to offshore fishing grounds due to exclusion zones and the impact of infrastructure lighting are anticipated are anticipated to have a low significance.

Eni has foreseen the following mitigation measures in order to minimize and if needed compensate any disturbance to fishery:

- eni will develop and implement a detailed Fisheries Management Plan (FMP). The FMP (and if appropriate, supporting measures in the CDP) will focus on fully characterising the losses incurred by fishermen, and establishing suitable compensation and livelihood restoration measures for any temporary or permanent loss of fisheries livelihoods, or damage to fishing gear due to Project activities. Eni will consult local fishermen on the possibility of implementing a participatory monitoring plan.
- The Project will limit exclusion zones around Project infrastructure as far as possible, without compromising safety measures.
- eni will employ a Fisheries Liaison Officer (FLO) to liaise with fishermen and to provide information to fishing communities, regarding eni's activities during construction.
- Interaction with fishermen and other users will be monitored through the CLO/FLO and the Project's grievance procedure.
- A vessel transit route will be agreed with the Ghana Maritime Authority and communicated to fishermen and other marine users through the CLO/FLO.
- The exclusion zone will be monitored with the assistance of the agencies of the Government of Ghana, for the safety of the facility and other users of the area (e.g. fishermen) when potentially close to Project infrastructure or vessels. Measures will be implemented to ensure that those engaged in maintaining the exclusion zones have received adequate training on the correct code of conduct and rules of engagement which will be based on the UN Voluntary Principles of Security and Human Rights.

Figure 11: Beach Seine Fishing

Onshore Concession Footprint

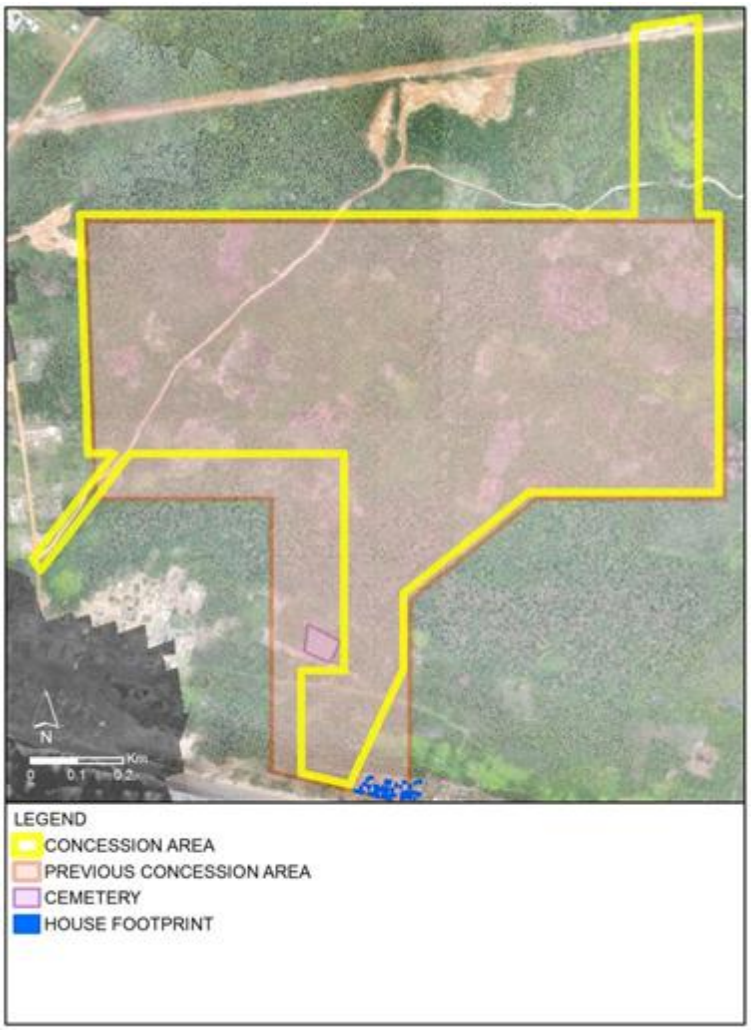
Known tangible resources in the Project area include places of formal religious worship (churches, mosques) as well as places and locations associated with traditional religious practices (sacred forest groves, lagoons, the sea). Also identified in the Project area are places of burial and worship. This includes the Branvien Shrine and cemeteries at the coastline at Sanzule and one to the east of the community, designated for burial of relations of the traditional royal family.

The initial concession area included the area of the Royal Cemetery near Sanzule (see Figure 12) as well as part of the Anwonakrom settlement (blue dots on the Figure). eni then re-aligned the land acquisition area to avoid the inclusion of the settlement and the cemetery.

In addition, for Cultural heritage protection, eni will:

- eni will adopt a participatory approach with communities directly impacted by Project activities to agree how archaeological and cultural heritage sites will be identified and protected.
- eni will fence off the Royal cemetery (if required) during construction activities to prevent accidental damage to the cemetery. Local people will be allowed to access the cemetery. The fencing, if present, can be removed during operations.
- eni will develop a Chance Finds Procedure to define the processes aligned with relevant national laws and regulations, local customs and traditional norms that must be followed to ensure appropriate treatment of a chance find, and to minimise disruption to construction activities.

Figure 12: Concession footprint modifications to avoid cemetery and village inclusion



In order to ensure that all mitigation measures and commitments are implemented, eni Ghana will prepare and put in place a number of management plans. These will define the requirements and monitoring for protection of environmental, social and health resources.

A number of management plans are already provided in the EIS:

- Health, Safety and Environment (HSE) Plan
- Emergency Response Plan
- Waste Management Plan
- Oil Spill Contingency Plan
- Medical Emergency Response Plan

Further plans which will be developed for construction and operations:

- Worker's Management Plan
- Influx Management Plan
- Community Health Management Plan
- Security Management Plan
- Project Procurement Plan
- Local Content Development Plan
- Project Recruitment, Employment and Training Plan
- Livelihood Restoration Plan
- Stakeholder Engagement Plan
- Fisheries Management Plan
- Pollution Prevention and Control Plan
- Biodiversity Management Plan
- Water and Wastewater Management Plan
- Social and Environmental Investment Plan
- Traffic Management Plan
- Marine Traffic Management Plan
- Decommissioning Plan
- Well Control Plans

A number of environmental, social and health indicators will be monitored to make sure that protective measures are effective. These include:

Offshore

- Ecological Monitoring Program (marine mammals and sea turtles);
- Participatory Fisheries Monitoring Program (fish catch surveys, water quality measurements, plankton measurements and stakeholder engagement);
- Environmental Monitoring Plan (sea water quality, marine fauna, FPSO air emissions, seabed monitoring, routine effluent and discharge monitoring).

Onshore

- Environmental Monitoring Plan (emissions and ambient noise, ORF air emissions and ambient air quality, fauna, vegetation and alien species, biodiversity and ecosystem services, water quality/quantity).

Further studies are being conducted to support the development of social management plans supplementary baseline livelihoods survey work:

- assessment of the proportional scale of livelihoods losses;
- assessment of the availability of alternative agricultural land in the direct area of influence;
- development of a livelihood restoration plan;
- development of a fishermen management plan;
- resettlement planning process.

Fisheries baseline is being further studied to confirm the data on fish catch, to inform the fisheries management plan and to develop the participatory fisheries monitoring program.

A noise and air quality computer model is being created to verify that emissions are within acceptable limits, which are protective of ambient noise and air quality. The discharge of treated drill cuttings offshore is being further studied using computer modelling to support the assessment that impacts on water quality and seabed sediments are localized and of minor significance.

A Biodiversity Management Plan is being developed to ensure protection of wildlife and habitats.