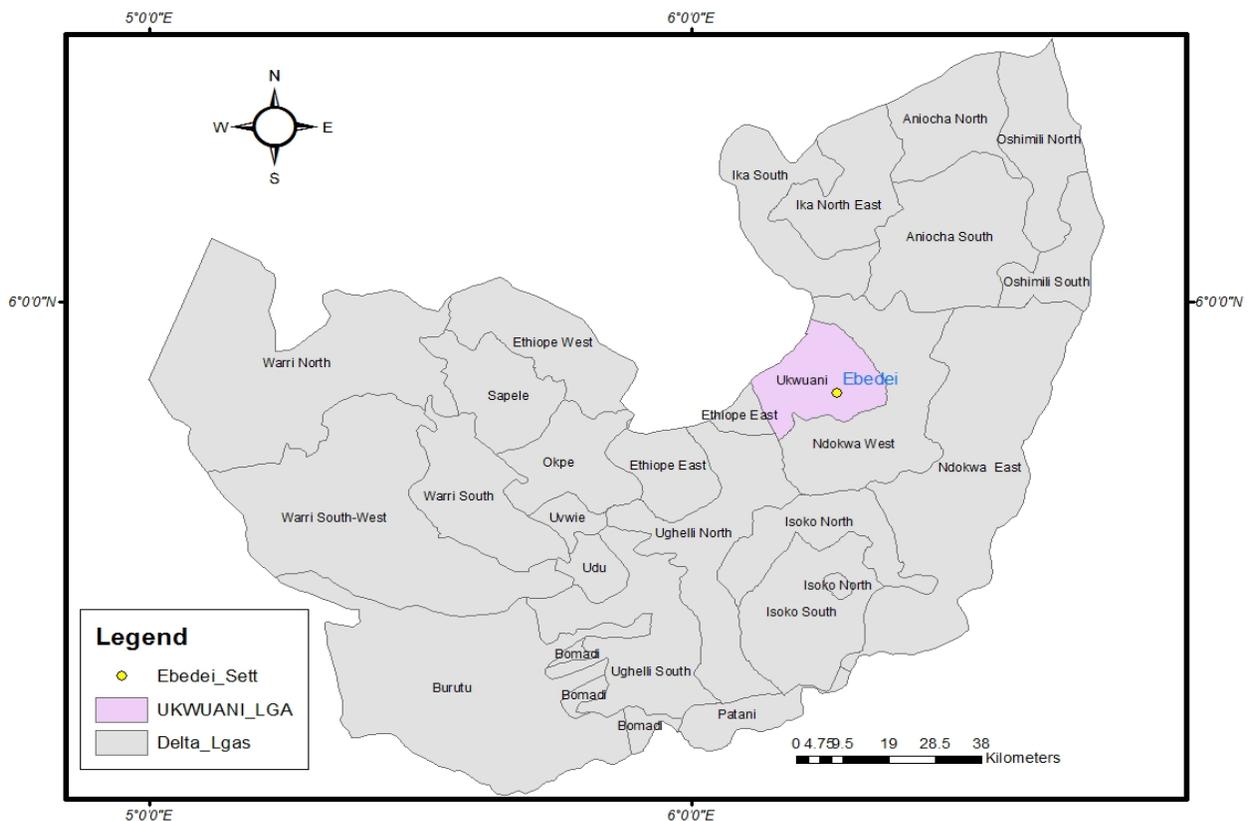




NON-TECHNICAL SUMMARY OF THE ENVIRONMENTAL IMPACT ASSESSMENT (“EIA”) OF THE COMPRESSED NATURAL GAS AND MINI-LIQUIFIED NATURAL GAS PLANT PROJECT LOCATED AT EBEDEI COMMUNITIES IN UKWUANI LOCAL GOVERNMENT AREA OF DELTA STATE

1. Introduction

Power Gas Ebodei Limited (“PEL” or the “Project Proponent”) commissioned Global Environmental Technology Limited (“GET”) to conduct an Environmental & Social Impact Assessment (“EIA” or “ESIA”) for its proposed Compressed Natural Gas (“CNG”) and mini-Liquefied Natural Gas (“Mini-LNG” or “Mini LNG”) facilities (“Project”). The Project is expected to be co-located with the existing Platform Petroleum Gas Flow Station near the Platform Petroleum Limited/ New Cross Petroleum Limited Gas Processing Plant (“PNGT”). The Project intends to capture natural gas that is currently being flared, compress or liquefy it, and then distribute it to Commercial & Industrial (“C&I”) consumers in southern Nigeria for their power and heat consumption needs. The Project is located in the Ebodei community, within the Ukwuani Local Government Area (“LGA”) of Delta State, as shown in the figure below.





As part of the Federal Government of Nigeria's thrust on gas for power projects (Source: National Gas Policy 2016 – Federal Republic of Nigeria, Ministry of Petroleum Resources), PEL proposes to compress or liquefy the natural gas byproduct from PNGT's current operations at Ebedei (the associated gas, which otherwise would continue to be flared) and manage the distribution of the resulting CNG / LNG via truck skids to power and process plants in other parts of Nigeria where no piped gas is available. The Project aligns with the other flare gas utilization and monetization projects that are expected to contribute to the national flare reduction campaign program and resultant environmental protection activities. The Investment Agency of Delta State Government is also supporting this Project, as it is expected to provide needed infrastructure enabling state industrial growth and employment. It is a clean energy solution which intends to utilize currently flared gas Nigerian natural gas and thereby displace imported diesel fuel currently used by C&I consumers. PNGT currently flares approximately 25 mscuf /day, and the Project is anticipated to use approximately 12 mscuf/day of that gas. This in turn is anticipated to:

- Reduce the current gas flare, emissions, and heat in the environment;
- Produce Nigerian CNG and LNG for virtual (via truck) domestic distribution to replace an estimated 83m litres of imported diesel (saving an estimated 48 USD Million + of forex by the Federal Government of Nigeria per year) (Source: Department of Petroleum Resources)
- Enable business/industrial growth in the state, region, and the country;
- Produce cleaner and cheaper alternate fuel to diesel;
- Provide immediate direct employment of an estimated 60 persons in permanent jobs during operations and an estimated 150 temporary jobs in the peak of the construction phase (the approximately 150 jobs would be throughout the three phases of construction);
- Catalyze demand for indirect services of over 500 persons; and,
- Bring economic development to the host communities (including support of social infrastructure among other potential benefits).

The assessment and planning activities undertaken as part of this EIA, as well as additionally planned assessment and management activities (e.g. further engagement with stakeholders, additional study of the local environment and communities, follow-on management planning, etc.), are being conducted to meet local (precedent set by other nearby projects), national (Nigeria regulations) and international (International Finance Corporation ("IFC") and World Bank) standards and expectations for the assessment and management of environmental and social impacts in project finance. All Project-related managements plans are being developed to meet those standards.

2. Project Justification

The proposed Project is being undertaken in response to the growing economic and environmental concerns associated with other typical liquid fuels, as this proposed solution has been evaluated to have a much smaller carbon footprint, a lower price (historically), and is safer to use (disperses more quickly). It also addresses environmental and human health concerns related to flared associated gas by capturing it for compression and liquefaction, thereby reducing GHG emissions and air pollutants (e.g. CO₂, CH₄, NO_x, and VOCs), as well as resulting issues like acid rain.



Nigerian oil fields are rich in natural gas. Of the 187 Trillion Cubic Feet (“Tcf”) of Nigerian gas reserves, only about 51 Tcf is available for production, which is comprised of 48% associate gas (gas found during crude oil extraction) and 52% non-associated gas (gas extracted from gas fields). Currently, Nigeria flares over 0.75 Billion Cubic Feet (“Bcf”) per day of gas not used for operational re-injection, LNG exports, and domestic consumption. Over 50% of associated gas is reportedly flared by marginal oil field operators, causing serious environmental damage related to climate change (natural gas is primarily comprised of methane, a GHG approximately 30 times more potent than CO₂), human health, and other environmental implications (due to potential negative impacts on air, soil, water quality, etc.).¹

The economic case for the Project is anchored by local demand in Nigeria. Presently, LNG is not adequately available for the domestic market, as the bulk of the remaining associated and non-associated gas (that which is not used domestically or flared) is liquified by Nigerian Liquefied Natural Gas Company and exported. Small captive power plants belonging to players in the C&I market, like large power plants, need feedstock, and the majority of current feedstock is diesel. The combination of currently flared associated gas and available demand from local power plants provides ample foundation anchoring the economic feasibility of the Project.

3. Project Alternatives

For any given project, multiple alternatives can be considered. In selecting alternatives, due consideration is given to relevant criteria, such as cost-effectiveness, environmental friendliness, social acceptability, and suitability for the particular project area. Alternatives considered for the Project were the “no-action” alternative, design alternatives, and site alternatives.

No-Action Alternative

The No-Action Alternative refers to terminating the planned project. Not implementing the Project is expected to result in continued gas flaring and associated environmental and human health impacts, maintaining the status quo of using diesel as a source of fuel by potential C&I customers, loss of the financial benefits from the Project, and loss of job opportunities, development, and other secondary benefits.

Design Alternatives

Although there are limited designs and methods available for CNG plants, the multistage compressors, dispensers, and decompression stations were chosen based on their proven track records for performance. The Mini-LNG design is still in planning, but similar criteria is being employed in its development to favor proven technologies.

Site Alternatives

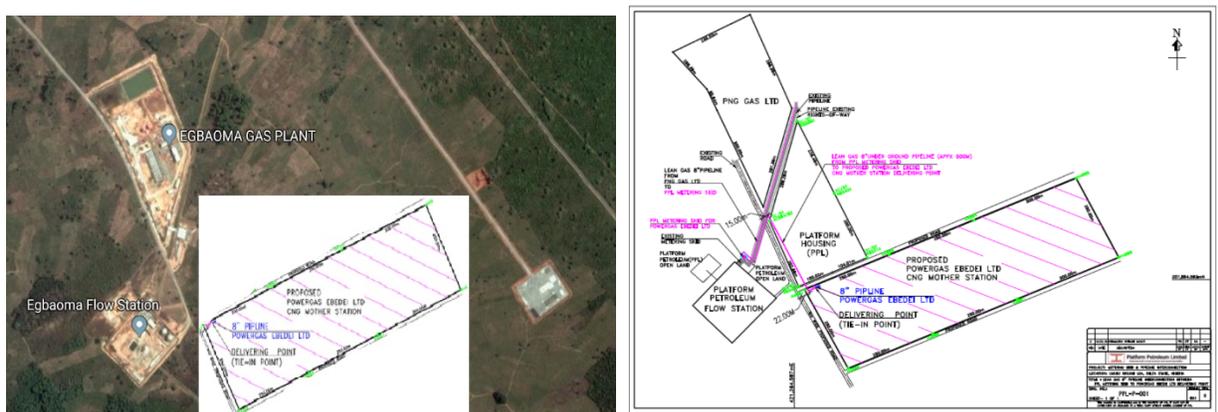
The Ebedei site was chosen due to the close proximity to the PNGT gas field, from which the Project’s supply of gas is expected to be sourced. This site was also attractive from an environmental impact perspective, given that it consists of modified (previously farmed) habitat located in an already industrialized area.

¹ Department of Petroleum Resources (DPR), Nigerian Gas – Second Quarter Edition 2017.



4. Project Description

The Project consists of the construction and operation of a CNG production facility, a Mini-LNG production facility, and associated support facilities (such as water supply and treatment, fire-fighting system, nitrogen supply, and power generation). The Project also includes the transportation of materials, workers, and equipment to and from the site during construction, as well as the trucking of CNG and LNG from the site during operations. The Project Site is approximately 65km from Warri on the Eku-Agbor road, adjacent to the existing operational Egbaoma Marginal Field (“OML 38”), which is operated by PNGT. The Project is expected to be located south of the existing PNGT LPG / propane gas processing facility and east of the oil and gas flow station, as shown below.



The Project is expected to be developed and constructed in phases. Phase I focuses on CNG, though the CNG construction phase is expected to also include early works and construction of LNG equipment foundations. The CNG compressor station is expected to include eight compressors, each with a capacity of 1,600 scm/h. The CNG project is expected to be installed in two sub-phases. Sub-phase 1 will consist of six compressors, and Sub-phase 2 is expected to consist of the two additional compressors. CNG trailer mounted skids is expected to be filled via five dispensers with an additional dispenser available for filling CNG fuelled trucks. The CNG plant is expected to have a natural gas capacity of 12,800 scm/h or 10,848,667 scf/d design capacity (8,916,712 scf/d operational capacity assuming 600 hours operational per month). Phase II of construction focuses on LNG. The mini-LNG plant (one train) is expected to have a natural gas capacity of 68.4 tonnes per day (“TPD”) with an input capacity of 100,800 scm/day or 4,200 scm/hr or ~3.6 MMscf/d).

As per Federal Ministry of Environment (“FMEnv”) guidelines, the Project is classified as a Category I, as it consists of the construction and operation of oil and gas related processing facilities, and as such is subject to a full-scale EIA. Based on IFC standards, the Project has been classified as a Category B project with applicable Environmental, Health, and Safety (“EHS”) Guidelines being the General Guidelines and sector-specific guidelines for LNG facilities.



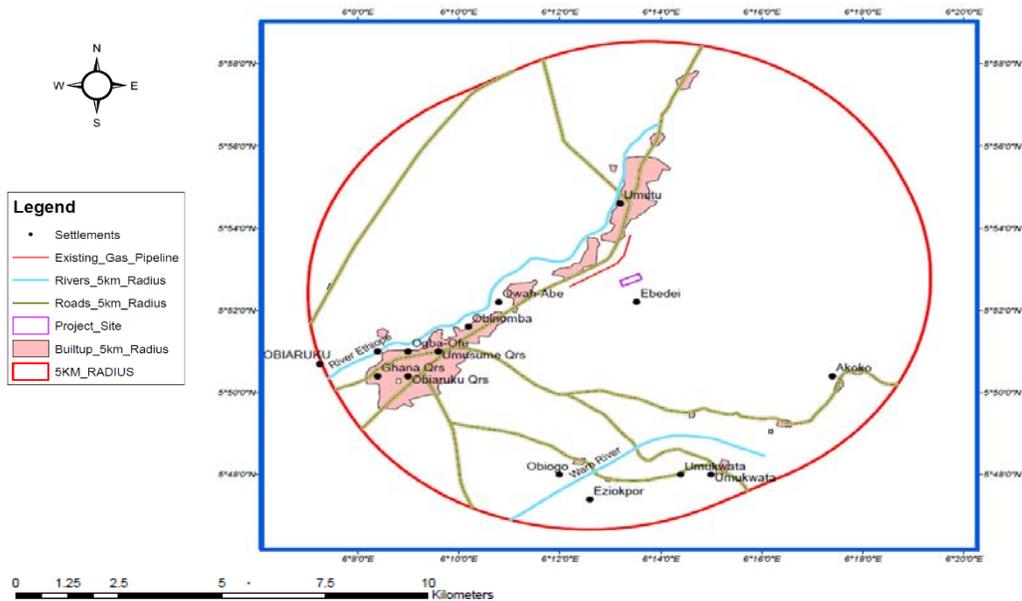
The CNG plant is expected to start construction in the third quarter of 2018 and complete commissioning eight to nine months later. The mini LNG program is scheduled to commence construction in the second quarter of 2020 with commissioning expected to end approximately nine months after start of construction.²

The Project Proponent has committed to develop the Project in-line with IFC Performance Standards and EHS Guidelines and developed a TOR for the ESIA to reflect such standards to be applied.

5. Environmental and Social Baseline Study

The environmental and social conditions in the area were studied to understand potential baseline sensitivities of present media. For each of the topics assessed, a 5km radius (as shown in the figure below and as per national / local standards / custom) around the Project Site was defined as a preliminary area in which to investigate the scope of potential impacts. From this preliminary area, the EIA process confirmed this ~5km radius as the area of potential influence for impacts to the environment and communities – which was labeled the “Project Area.” Because PNGT recently conducted wet season sampling in the Project Area, the FMEnv approved one-season (dry) of sampling for this EIA. The baseline data acquisition process carried out by specialists covered the following topic areas: soil, water quality and hydrobiology, land use, climatology, air quality, vegetation, wildlife (including fisheries), and a preliminary assessment of socio-economics (including health and culture).

² At the time of writing this non-technical summary, the updated construction timing for the first phase of the CNG plant is third quarter of 2018, while the updated timing for the construction of the mini-LNG plant is second quarter of 2020.



6. Evaluation of Impacts

Air Quality

Air quality sampled in the Project Area measured gaseous pollutants to be, in general, within Department of Petroleum Resources (“DPR”) limits. While daily SO₂ was within the daily DPR limit in all the sampling locations where detected, they breached the FME_{env} limit in five (5) locations. Similarly, NH₃, breached FME_{env} limit in three (3) locations. All other detected parameters were within their daily limits of DPR and FME_{env}. Particulate matter samples also confirmed the non-degradation of the proposed Project Site and surrounding areas, as results were all within the mean 10.4µg/m³ for PM_{2.5} grade particles in the previously reported PNGT EIA (2017).

Impacts to air quality can come from multiple sources – such as mobile emissions from transportation activities, generation of dust from earthworks on site, fugitive emissions from project facilities during operations, and dust generation from the removal of structures during decommissioning. Significant impacts during construction (from mobilization activities) and operations (from CNG/Mini-LNG production and transportation activities, as well as improper waste management) are assessed as having minor impact significance with all mitigation measures in place.

Air quality mitigations are expected to include, but not be limited to:

- Meeting all applicable regulatory standards related to air quality
- Making sure that all contractor vehicles and equipment are regularly serviced and maintained
- Assessing opportunities to use lower pollutant spec vehicles
- Turning off equipment while not in use



- Minimizing engine idling during on-loading and offloading activities
- Spraying areas to be cleared during site preparation with water to reduce dust generation
- Prohibiting open burning of any kind

Noise

Observed associated background noise levels of 37.1 – 58.8 dB(A) in the Project Area during the study breached the sleep disturbance limit of 45 dB(A) in six (6) of the monitored locations and breached the WHO's limit of 55 dB(A) for ambient environment in three (3) locations. However, the 70 dB(A) World Bank industrial area limit and 90 dB(A) FMEnv shopfloor 8-hour limit were not breached by the background noise levels in any of the locations during the study. They were all within the 68.32 dB(A) mean ambient noise earlier reported in the area in the previous PNGT EIA.

Impacts to noise quality during the construction phase is expected to come predominately from heavy-duty trucks entering and leaving the construction site, earth moving equipment, and pile driving operations. Pile driving is likely to be the noisiest type of construction activity associated with the proposed Project (101 dBA at 15 meters). Main operational phase noise sources are expected to be compressors, generating sets and trucks, vehicular traffic, as well as miscellaneous noise associated with traffic within the Project Site (such as vehicle back-up alarms). Throughout the Project (construction, operations and decommissioning), noise impacts are assessed as having minor or minimal significance with the implementation of all planned mitigation measures.

Noise mitigations are expected to include, but not be limited to:

- Meeting all applicable regulatory standards related to noise
- Carrying out noise intense activities (such as piling) during the daytime to minimize nuisance to nearby communities
- Performing visual checks for mammals with 500m of noise producing activities and allowing adequate time to elapse from the sighting of mammals to beginning of piling operations
- Fitting combustion engines with silencers
- Making sure that machinery covers and panels are always closed and well fitted
- Making sure that bolts and fasteners are adequately tightened to avoid excessive rattling
- Providing hearing protection to all workers and visitors onsite

Soil and Groundwater

Baseline soil and groundwater conditions in the Project Area showed typical contaminant levels (anions, cations, and heavy metals) predominately within DPR limits. There were however soil samples that showed lead and chromium at levels above DPR limits. Follow-up actions are expected to be undertaken to remediate these areas of contamination as necessary prior to construction.

Impacts to soil and ground water may result from multiple Project activities, such as displacement of surface soil from grading, storage and disposal of operational fuel and oil, or



the disposal of structural waste during decommissioning. Potentially significant impacts during construction (from mobilization and site preparation activities), operations (from CNG/Mini-LNG production and transportation activities, as well as improper waste management), and decommissioning (improper waste management) are assessed as having minor or minimal impact significance with all mitigation measures in place.

Soil and groundwater mitigations are expected to include, but not be limited to:

- General waste management related mitigations, such as:
 - o Good housekeeping, combined with good work practices, shall be enforced to reduce waste generated from construction and operations
 - o Rainwater runoff from solid materials, fuel, and waste piles are expected to be controlled by covering and/or containment to prevent percolation to surface and ground waters
 - o All storm water is expected to be collected and monitored/tested before regulatory compliant discharge
 - o Solid waste generated during construction and operation activities is expected to be disposed of in accordance with regulatory guidelines
 - o Arrangements are expected to be made for the effective collection/disposal of domestic and sewage wastes in accordance with regulatory guidelines
 - o Specific measures are expected to also be put in place for the management of hazardous materials
 - o Opportunities to recycle material are also expected be assessed where feasible
- Strict adherence to institutionalized measures of protecting the immediate and remote environment must be enforced
- Only minimal site clearing (e.g. for studies and fencing) is expected to commence prior to mobilization to minimize the possibility of erosion due to undue exposure of the Project Site after clearing activities
- A dedicated area is expected to be setup for vehicle and equipment repair to minimize and avoid soil and groundwater contamination from spillage
- Use of non-contaminating construction materials
- Use of coarse cement against fine cement to minimize dust
- Proper handling of unusable wastes in appropriate facilities per appropriate standards before disposal
- Prompt cleanup of any chemical or fuel spills, using most appropriate techniques and best available technology ("BAT")
- An effective monitoring and maintenance program is expected to be employed to ensure the effective functioning of all working equipment; moreover only materials of specified quality and performance standards shall be employed
- Appropriate security and safety measures are expected to be integrated into all installations and accessories on site
- A human resources policy is expected to be employed that ensures a high degree of professionalism and collegiality in the skilled workforce

Flora and Fauna



The Project Area is a terrestrial environment covered with secondary vegetation comprised of mainly herbaceous species interspersed with some trees and shrubs. It is an arable land that is utilized for farming, as evidenced by the presence of quite a number of farm plots in the Project Site, and as such the Project Site is largely comprised of modified habitat. No species listed as sensitive or threatened by relevant regulating organizations (e.g. IUCN, CITES) were identified in the Project Area. *Thaumatococcus daniellii* (miracle berry) was observed growing in a cluster covering an area measuring approximately 7 m x 4.5 m within the Project Site. Although not listed as threatened or endangered by IUCN, nor listed as a species for control by CITES, the biodiversity specialist working on this EIA noted this as species of interest for restricted distribution. As a result, the presence of *Thaumatococcus daniellii* is expected to be investigated further as necessary.

Although no threatened or endangered faunal species were identified within the Project Area, one IUCN Near Threatened species (*Turdus olivaceofuscus*, Gulf of Guinea Thrush) and two CITES Appendix II species (*Python sebae*, African rock python, and *Polyboroides typus*, African Harrier Hawk) were identified. Impact to and appropriate protection of these species is expected to be investigated further in follow-on management planning activities. However, it has been recommended by the ESIA consultant that an effort be made to leave trees in the Project Site for the migration of these species.

Significant impacts to flora in the Project Area may come predominately from land clearing activities during site preparation. Grading and clearing are expected to result in the permanent loss of existing terrestrial vegetation, as well as loss or movement of fauna associated with such habitat. Impacts during construction (site preparation), operations (improper waste management), and decommissioning (improper waste management) are assessed as having minor significance with all mitigation measures in place.

Flora and fauna-related mitigations are expected to include, but not be limited to:

- To the extent feasible, site clearing is expected to be done sparingly, clearing only the necessary sites, to minimize impacts to the surrounding environment
- Adequate care is expected to be taken during site clearing/preparation to make sure that foreign vegetation/species are not introduced into the Project Area
- Areas that are cleared but not used are expected to be promptly re-vegetated with fast-growing indigenous species
- Adequate care is expected to be taken to prevent mechanical damage to plants not marked for clearing to avoid predisposing such plants to secondary pathogenic infection
- Solid plant waste, such as cleared vegetal cover, plants and debris generated from clearing activities are expected to be gathered together and disposed of in accordance with regulatory guidelines by a government accredited waste management company
- A detailed waste management plan is expected to be implemented as part of the broader environmental management plan
- The Project is expected to implement a Biodiversity Management Planning ("BMP") activity to further assess and manage the potential for impacts to sensitive flora and fauna prior to mobilization



Land Use

The land on which the Project Site is expected to be located is currently owned by two families. No one currently lives on the land, which is farmed by the owners for secondary income. The families owning the land have previously sold land to oil and gas companies and are familiar with the standard and customary practices being used to acquire the land. They have customary rights to the land, and PEL is working with the government to acquire the land in a way that respects these rights holders, as well as any other land-users.

Although improper waste management during operations and decommissioning has the potential to impact land use, the most significant land use impacts are expected to come from acquiring the land within the Project Site, thereby taking this land out of its current usage and economic production. PEL is undertaking a process aligned with the IFC Performance Standards to negotiate fair compensation with the owners and users of the land in the Project Site. Considering these ongoing management practices, coupled with the other planned management activities (e.g. those related to waste management), the potential impacts related to land use are assessed as having minor significance with all mitigation measures in place.

Land use related mitigations are expected to include, but not be limited to:

- To the extent possible, benefits are expected to be returned to the local communities. This is expected to occur through the "Freedom to Operate" ("FTO" – which is a local customary practice for oil and gas companies acquiring land from communities) and Memorandum of Understanding ("MOU") negotiation processes, which include plans for local hiring and procurement, as well as community development support.
- As much as possible it shall be mandated that appropriate safety and environmental standards of the company are adhered to strictly – this must cover all aspects of the environment, workers and visitors, and it is recommended that there shall be occasional forums on safety, health and professional fitness of the company staff.
- A Community Health and Safety Plan and an Emergency Response Plan are expected to be developed to avoid (where possible) and manage impacts to communities by implementing best management practices.
- To minimize accidents and disturbance via transportation and conveyance of goods and personnel, basic traffic rules, signs and regulation on roads as agreed by respective agencies shall be implemented.
- To avoid scuffles and related social disputes on property ownership and administration in the area, efforts shall be made to foster close ties between the operators, their service companies, and the stakeholders.
- Security personnel are expected to be trained in best practices in human rights.
- A detailed waste management plan is expected to be implemented as part of the broader environmental management plan.
- A detailed stakeholder engagement (including a Stakeholder Engagement Plan and Grievance Mechanism) and livelihoods restoration planning processes are expected to be engaged to manage potential stakeholder risk related to land use impacts.



Other Human Environment Impacts (Socio-Economics, Transportation, Utilities & Infrastructure, Health, Safety & Crime, Public Services, and Culture & Traditional Values)

The pattern of human settlements in the Project Area is consistent with the general pattern described for the Niger Delta Region, composed mainly of small and scattered hamlets, with a vast majority of settlements comprising largely rural village communities in dispersed village formation. Most of the inhabitants of the area are Ukwuanis, with farming and fishing as their main occupation. The area surrounding the Project Site is rural or industrial versus residential (though the Ebedei community is within 500 meters of the Project Site, Obinorba is about 1 km away, and Obiaruku is about 2 km away). There are no indigenous peoples identified amongst the Project Affected Communities (“PACs”).

All Project phases have the potential to impact the human environment, and specifically the PACs. These include impacts during the construction phase (e.g. related to mobilization, site clearing and preparation, and movement and influx of workers), during operations (e.g. related to CNG/Mini LNG production activities, CNG/Mini LNG transportation activities, and improper waste management), as well as during decommissioning (e.g. from improper waste management). Potential impacts related to the broader human environment are assessed as having minor or minimal significance with all mitigation measures in place.

Human environment-related mitigations are expected to include:

- Provision of accommodation (in existing facilities in nearby towns) for employees to limit worker interaction with host communities.
- Delivering awareness campaigns and information dissemination to employees about the culture and social “don’ts” of the Project’s host communities to discourage anti-social behaviors that can insult the sensibilities or impair the health of the proximate communities.
- Maximizing local employment and procurement to the extent possible.
- Developing and maintaining an Environmental and Social Management system (“ESMS”) in line with IFC Performance Standards and World Bank EHS Guidelines, including but not limited to:
 - o Emergency response plan;
 - o Worker health and safety plan;
 - o Community health and safety plan;
 - o Waste management plan;
 - o Biodiversity management plan;
 - o Cultural heritage management plan;
 - o Stakeholder engagement plan and grievance mechanism; and,
 - o Internal and external monitoring plans.

It is important to note also that the impacts to the human environment include multiple significant positive impacts, such as those related to commencement of the FTO during construction, commencement of the MOU during operations, and the operations related reduction in flared gas volume.



It should also be noted that the Project Proponents continue to collect additional social baseline data following the ESIA's submission to the FMEnv, but prior to construction, in order to address various aspects of IFC Performance Standards. Summaries of the outcomes of these studies are expected to be shared in ongoing stakeholder consultations and engagement prior to construction.

7. Environmental and Social Management & Monitoring Plan

An Environmental and Social Management Plan ("ESMP") framework was prepared to guide the management of the mitigation commitments housed in the EIA. The aim of the ESMP framework is to provide guidance for the Project to plan for implementing the mitigations in the EIA. Thus, the ESMP proposes a plan for mitigations in each phase of the Project. The ESMP framework also provides guidance for monitoring the Project's compliance with relevant standards. It makes specific reference to the rules and responsibilities for every aspect of the Project subject to mitigation measures and lists the entities responsible and expected timing for mitigation and monitoring during all Project phases.

In addition, the ESMP framework also provides essential terms and guidance for resource specific procedures, including biodiversity management, traffic/transport management, cultural heritage management, stakeholder engagement, and livelihoods restoration.

8. Conclusions

The EIA demonstrates that the environmental and social impacts associated with the Project can be managed within reasonable and acceptable limits by applying all identified mitigation measures delineated in the report. These manageable negative impacts, coupled with the significant environmental and economic opportunities (previously identified positive impacts), together provide justification for the Project from an environmental and social perspective.