



1. INTRODUCTION AND BACKGROUND

1.1 Preamble

In May 2003, Ecosphere Nigeria Ltd and Babsal and Company Ltd. were commissioned by Nigeria LNG Limited (NLNG), under the direction of NLNG's Technical Advisor to write an Environmental Impact Assessment (EIA) of the proposed Nigeria LNG **Six** project.

This proposed Nigeria Liquefied Natural Gas project (NLNG **Six**) pertains to the design, engineering, construction, start-up and operation of an air cooled gas liquefaction process train and associated facilities, and a slug catcher at the existing NLNG site located on Bonny Island, in the Niger Delta, south eastern Nigeria.

On this site a 3-train gas liquefaction plant is already in operation (actually resulting from the NLNG **Base** and **Expansion** projects) and the fourth and fifth trains (the NLNG **Plus** project) are currently under construction and scheduled to start up in the second half of 2005.

The **Base** project comprised construction of the original two-train LNG plant and a gas transmission system (GTS) of pipelines to transport natural gas from the gas fields throughout the Niger Delta to the liquefaction complex. The **Base** project was completed in 1999. The overall LNG project envisaged a phased expansion of the liquefaction capacity through a staged addition of further process trains, scheduled to take place over the subsequent 10 years. The first step in this phased expansion was the addition of a third train – the **Expansion** project - which was started up in November 2002.

The Nigeria LNG plant is located on the western coast of Bonny Island, approximately 40 km south of Port Harcourt, Rivers State, Nigeria. The plant site is situated between Bonny Crude Oil Terminal (BCOT) and the Mobil LPG site. In addition to the plant itself, there is a permanent residential area, providing accommodation for the plant's workforce situated approximately 3 km away on the southern coast of Bonny Island.

The construction and operation of the sixth train is considered an extension to the current NLNG **Plus** project and this impact assessment, undertaken for the NLNG **Six** project, uses as much as possible the information collected and assessed for the **Plus** project. This impact assessment covers in an integrated manner the environmental, social and health aspects of the proposed activity. That's why also the title "Environmental, Social and Health (impact) Assessment" (ESHA) is used. This report contains the actual impact assessment, i.e. a summarizing description of the baseline situation with its sensitivities, a description and assessment of the potential impacts of the project on the environmental, social and health aspects of the surroundings, the identification of mitigation measures and a programme of environmental, social and health management and monitoring. Further details of the baseline are described in the Baseline Report for NLNG **Plus**, whereas additional baseline information is reported in the Appendices to this report.



1.2 Nigeria: Rivers State

The Nigeria LNG project is located in Rivers State, southern Nigeria (see Figure 1.1). Rivers State covers approximately 50,000 km² and includes about one third of the Niger Delta. Approximately 75% of the state is riverine and seasonally flooded.

Rivers State experiences two distinct seasons, the wet season from April to October and the dry season from November to March. Rainfall is very high, as well as average temperatures and humidity. The geology and soils of Rivers State are dominated by the sedimentary nature of the Delta, consisting of sedimentary deposits overlain by mainly sandy soils. The hydrology of the Delta is complex and there are major seasonal differences. In the wet season, freshwater drainage dominates the system and much of the Delta, and hence Rivers State, is flooded. In the dry season, the influence of tidal waters becomes more significant.

Four main ecological zones can be identified in Rivers State: coastal sand ridge barriers, mangroves, freshwater swamp forests and lowland rainforests. The boundaries between these systems are fluid and vary according to freshwater flow and tidal influences.

The population of Rivers State is estimated to be 2.8 million, approximately 70% lives in rural communities. The main centre of population is Port Harcourt, the state capital. Most people have low annual incomes and unemployment is estimated at 30%. Infrastructure in both urban and rural areas, including housing, transport, power and water supplies and sanitation, is poor. Communities are traditionally led by a Council of Chiefs, advised by elders. Traditional authority systems have also declined in recent years in the same way as ethnic distinctions.

Agricultural land covers an estimated 278,000 ha in Rivers State and is one of the main sources of employment. The main crops are cassava, rice, yams, bananas, maize and vegetables. Oil palm plantations are also a major feature of the agricultural sector in the state. Traditionally, farmland was managed as a communal resource. Agriculture is concentrated in the lowland rainforest zone and drier parts of the freshwater swamp forests. Livestock keeping is not a major agricultural activity, but chickens, goats and pigs are the main livestock animals kept.

Fishing is as important as agriculture for employment in Rivers State. Fishing takes place both along the coast and in the rivers, creeks and ponds of the Delta. Artisanal fishermen mainly use traditional methods of catching and curing fish. The industrial fishing fleet is very small and facilities for freezing fish are very minimal.

Mangrove and freshwater swamp forests are exploited for a range of timber and non-timber products, such as firewood, wood for tools and building, food (fruits, nuts and bush meat), ropes, dyes and medicines.

The petroleum sector dominates the Nigerian economy and industry in Rivers State. Other industries in Rivers State are based mainly in the Port Harcourt area, especially on the Trans Amadi industrial estate.



Figure 1.1. The NLNG site is situated 40 kms south of Port Harcourt, Rivers State Nigeria



1.3 Background to the Nigeria LNG operations and projects

The LNG history in southern Nigeria goes back to 1969, when the first project was conceived, but it was not until the 1980s that Phillips Petroleum developed proposals for an LNG complex based at Bonny Island. The proposed plant site and residential area were cleared in the early 1980s. The project was not pursued further at that time. However, the project also entailed the relocation of Finima village to the current New Finima. This was conducted by the Nigerian government, through the Nigerian National Petroleum Corporation (NNPC). A purpose-built town to accommodate the residents of old Finima was provided and the relocation was completed early in 1991 (see Figure 1.2).

The Nigeria LNG project was established in March 1985 with the establishment of a LNG working committee involving the Federal Government of Nigeria, Shell Gas BV, Nigerian Agip Oil Company (NAOC) and Elf Nigeria Ltd. (ENL) to exploit the substantial gas reserves in Nigeria. The company Nigeria LNG Ltd. was incorporated under Nigerian Law in May 1989. The Federal Government of Nigeria's stake in the project is being managed by the Nigeria National Petroleum Corporation (NNPC). For more information see NLNG's web site (www.nigerialng.com).



Figure 1.2. Looking from east to west over Bonny Island to Bonny River with the situation of the NLNG site along the west coast of Bonny Island, its residential area and the location of New Finima. This aerial photograph was taken in April 2003.

In 1986/87 these consortia inherited many aspects from the previous project proposals. Nigeria LNG Ltd was formed in June 1989 to develop and operate the project and was assigned the previously cleared LNG plant site and residential area by the Nigerian Government. There was no opportunity to consider alternative sites. In 1991, NLNG covered the plant site and the residential



area with hydraulic fill to raise the sites to the correct levels for construction. Since then industrial developments have taken place in the area, which have resulted in the current state as shown in Figure 1.2.

1.4 Nigeria LNG Ltd. – the proposing company

The founding partners of Nigeria Liquefied Natural Gas Ltd. have a wealth of experience in developing oil and gas projects world-wide and are well-known in the crude and gas businesses. The NLNG partners form a strong team as they have won their spurs in sound environmental protection in design, construction and operation of large resource development projects.

NLNG wishes to develop the NLNGSix project in full compliance with:

- Applicable Nigerian statutory requirements
- NLNG's own policy statements on Health, Safety and Environment (HSE) and Sustainable Development; see Appendices 2 and 3
- Project specific standards, the so-called HSE Premises; see Appendix 4.
- Policies and principles of NLNG's shareholders
- Applicable international 'grey laws' (international conventions, treaties and agreements)
- International standards, including World Bank / IFC / WHO / etc. and international industry / branch organisations.

The Shell Group has issued a range of Health, Safety and Environment (HSE) and Sustainable Development (SD) related documents, such as principles, policies, guidelines, position papers, etc. Particular reference is made to:

- Group HSE Commitment and Policy
- Group Procedure for an HSE Management System
- Group Global Environmental standards
- Group Minimum Health Management Standards
- Group Commitment on Climate Change
- Group Biodiversity Standard
- Group Standard on Animal Testing
- Group Statement on Sustainable Development



Figure 1.3. The seven Sustainable Development principles

All the above standards have been adopted by the NLNGSix project and are reflected in the **HSE Premises** - the minimum standards applicable to the design and operation of the plant – and the



environmental, social and health protection measures for the design, construction and operation of the project (see Appendices 4 and 5).

In line with above statements, NLNG aims to contribute to Sustainable Development (see Appendix 2 and 3). This means that a strategy will be followed that integrates economic, social, health and environmental considerations in all project decisions and actions, and reflects the contribution to be made under each of the seven sustainability principles (see Figure 1.3).

This implies that NLNG is committed to carry out a full Environmental, Social and Health (Impact) Assessment (ESHA), parallel to and as part of the development of the **Six** project. This process was started as early as possible and in such a way that any implications resulting from the assessment could be included in the design and operation. The current report reflects the outcome of this ESHA process and takes into account the natural environmental, human health and social aspects, and any trans-boundary and global environmental aspects in an integrated way. The sustainability principle “engage and work with stakeholders” entails that NLNG, during the ESHA, consults project-affected groups, local non-governmental organisations (NGOs) and any other group of stakeholders about the project’s environmental and social aspects and takes their views into account.

1.5 Environmental, social and health studies carried out for the Nigeria LNG projects

In January 1992, the Environmental Advisory Unit Ltd (EAU) (which later became SGS United Kingdom Ltd Environment Division [SGS Environment now Casella Science & Environment Limited]) was commissioned to undertake a detailed environmental appraisal of the Nigeria LNG **Base** project, incorporating both the 2-train LNG plant and associated developments and the Gas Transmission System (GTS-1). This appraisal included a review of all the environmental studies undertaken at that time for the project together with other information derived from published literature and a preliminary assessment of the environmental impacts of the project. An important element of the appraisal was to identify gaps in the available environmental information.

The Environmental Appraisal, published in April 1992 [1], identified a few areas where additional environmental work was required [2, 3, 4]. All these areas were addressed in the subsequent baseline reports and environmental impact assessments for the GTS route and **Base** project [7, 8, 9, 10]. On the basis of the two Impact Assessments (IA) and Baseline Reports (BR), an environmental permit was issued for the whole project, i.e. the LNG plant at Bonny Island and the entire GTS route (from the gas fields to the LNG plant) by the Federal Environmental Protection Agency (FEPA) in November 1995.

During 1995, NLNG decided that the GTS route should be revised and further environmental studies were undertaken [11]. For the revised route (GTSRR) a new environmental impact assessment was conducted and the draft IA was submitted to FEPA in September 1996. During the subsequent legally required public display and expert review procedures, amendments and comments were received. This led to additional baseline studies being carried out by Ecosphere Nigeria Ltd., which were incorporated into a new BR and IA for the GTSRR [12, 13]. These reports covered only the revised section of the GTS route, i.e. 86 km of the total 200 km of the GTS. On the basis of the new IA and BR, an environmental permit for the GTSRR was issued by the Nigerian Federal Environmental Protection Agency (FEPA). The construction of the GTS was completed in 1998 and of the **Base** project in September 1999. Figure 1.4 shows the first train in operation.

For the **Expansion** project – Train 3 – which includes facilities to separate heavier hydrocarbons from Non-Associated Gas (NAG) and to produce Liquefied Petroleum Gas (LPG), an Environmental Impact Assessment was completed in January 2002 [5, 6]. The provision of the fourth and fifth liquefaction trains in the LNG plant area was the next stage of the LNG developments. The Impact Assessment (IA) for the NLNG**Plus** project presents the assessment of the environmental, social and health impacts project [14]. The EIA report has been prepared using the baseline information (Environment, Social and Health) contained in the Baseline Report [14]. For the NLNG**Plus** project external financing was required and several international banks



and Export Credit Agencies (ECAs) were involved. They also required full compliance with the World Bank (WB) standards and guidelines.



Figure 1.4. The first LNG train in operation; seen from the shoreline of Bonny River. Dimensions: 300x140x30 m (LxWxH).

1.6 NLNGSix project justification

The combination of Nigeria's considerable under-utilised, low-cost, natural gas reserves, and projections of a growing demand for imported natural gas in the industrialised countries around the Atlantic basin provided opportunities to investigate the feasibility of the original LNG project. The justification for the **Base** project became obvious when the national economic benefits from the production and export of LNG had been established. Despite the **Base** project LNG plant, the third train **Expansion** project and the **Plus** project, considerable opportunity remains for exploiting Nigeria's gas reserves and thereby increasing the economic benefits of the LNG project through the construction of the sixth train.

The production of LNG is also an issue with global environmental significance. Part of the feed gas to the LNG plant will increasingly consist of associated gas that is currently flared during the production of crude oil in the Niger Delta. Flaring of gas does not accord with the principle of sustainable development – because of its effect on global warming - and, for this reason, measures to minimise flaring are urgently needed. In addition, implementation of Agenda 21 of the 1992 Rio Conference further required the reduction of flaring. The **Expansion** and **Plus** projects will significantly increase the amount of associated gas that can be taken and processed by the LNG plant. This diversion of currently flared gas into processing represents the harnessing of a large proportion of the natural gas reserves currently lost. It will also reduce the current CO₂ emissions from flaring (see Figure 1.5). The environmental and social benefits of this extension also closely fit into the World Bank / IFC activities, where they have launched a Global Gas Flaring Reduction Partnership (GGFR) – in which Nigeria participates – that will help to mitigate global warming and reduce its impacts on human health, water systems, agriculture and fishing (See www.worldbank.org/ogmc/global_gas) So, the NLNGSix project is part of the Nigerian ongoing long-term strategy for reduction and eventual phasing out the flaring of gas and instigating utilisation of the resource instead.

The construction of the sixth train in addition to the trains constructed for the **Expansion** and **Plus** projects, is also a response to the opportunity for the production of liquid petroleum gas (LPG) products for the international market. The first two trains did not have facilities for processing LPG products derived from the use of associated gas.



The NLNG*Six* project also has the potential to continue the improvement in the level of industrialisation in the Niger Delta. The ongoing development of professional skills, on-the-job training, social and health programmes, etc. is an investment in the longer term.

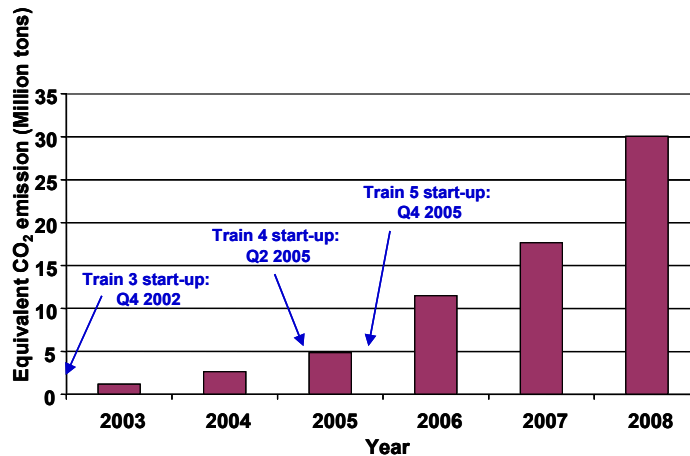


Figure 1.5. Foreseen reduction of CO₂ emissions currently originating from flaring in the Niger Delta.

1.7 Applicable environmental, social and health standards

The basis of this impact assessment is NLNG's commitment to sustainable development. It is deemed important that the NLNG*Six* project, along with its predecessors, the *Base*, *Expansion* and *Plus* projects, will be developed and will operate in a sustainable manner.

NLNG adopts the generally accepted definition of Sustainable Development: 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' [15]. Sustainable development comprises the three areas of attention: economic development, environmental protection and social responsibility that are closely linked.

For NLNG, Sustainable Development is the way of doing business, a code of conduct, the 'way of life'. This means that in all NLNG's business activities and in all decision making in projects and processes, continuous attention is given to strike a balance between economic development, environmental protection and social responsibility. In that context, NLNG wants to ensure a minimum impact on the natural, social and cultural surroundings. The project will therefore be implemented to the highest social and environmental standards. The philosophy of NLNG is, wherever possible to prevent and repress adverse environmental effects. However, NLNG acknowledges that there are occasions when adverse effects cannot be prevented and there is a need for compensation. This includes payments of fair compensation to those that need to relocate, as well as setting up development projects to mitigate for disruption to any traditional income generating activities.

At the same time NLNG seeks to enhance the potential benefits to local communities in such areas as employment and the supply of local products and services. Where appropriate this will include provision of training and skills transfer to future potential employees.

Finally, in recognition of the fact that not everyone will be able to benefit directly from the project and that many communities could be affected by the long-term presence of NLNG, the company supports a number of activities and programs that enable enduring community benefit. This is not to say that the company will donate money or support large-scale projects. Rather the focus will



be on local capacity development, i.e. the ability and capacity of community and regional actors to identify, plan and implement appropriate responses to the development needs of the local people.

Many of the above mentioned items have already been put in place during the development of earlier projects and through the current operations. NLNG has a Community and Public Relations Department which has the role to inform people about the activities of NLNG and to implement a community relations programme. At the same time, rolling management plans as a result of impact assessments carried out for the earlier projects, ensure that continuing attention is paid to environmental, social and health aspects and that these are a tool to achieve continuous improvement.

1.7.1 Best available technology

As stated above, the philosophy of NLNG is, wherever possible to prevent and repress adverse environmental effects. The use of best available technology for the project is an important element of this approach. Chapter 2 of this report provides details of the project design which incorporates these engineering design measures.

The basic design contains features which are required to ensure high standards in usage of resources, pollution abatement and environmental control. The basic design also contains extensive provisions for enhancing safety and integrity of the LNG plant, so as to minimise the probability of any failure during operations and to limit the undesirable consequences in the event of their occurrence.

❖ *Design philosophy*

The overall philosophy is that the design of the NLNG project provides for safety, reliability, flexibility and efficiency, in that order. As such, the highest standards as currently recognised by the international oil&gas industry have been applied for the design of the NLNGSix project.

❖ *Design standards*

The design, engineering, procurement and construction of project facilities are in accordance with sound, professional engineering practices throughout. It has been based on stipulations laid down in Shell Design and Engineering Practices in conjunction with relevant applicable international codes and standards, and governing or limiting Nigerian Government legislations, regulations, codes and standards.

1.7.2 Health, safety and environmental management

NLNG has adopted an integrated approach to Health, Safety and Environmental (HSE) management. This is standard practice for the oil and gas industry. To achieve uniform standards across the entire company a structured approach is used based upon a HSE Management System (HSE-MS). The HSE-MS is defined as a structured set of controls for managing HSE in the business to ensure and to demonstrate that HSE objectives are met; see Figure 1.6.

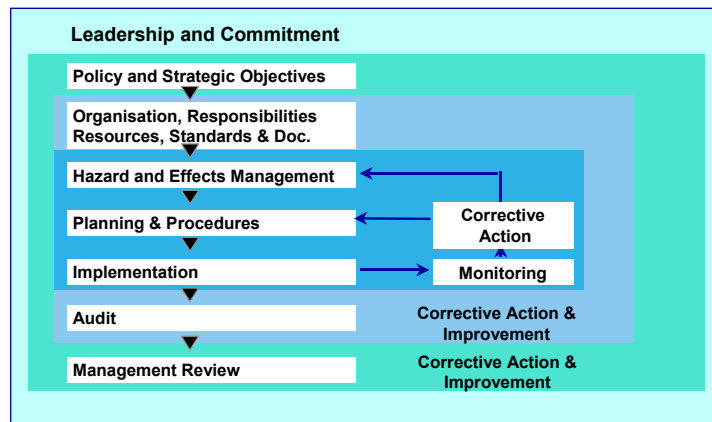


Figure 1.6. The (elements of the) Health, Safety and Environmental Management System (HSE-MS).

The key parts of the NLNG HSE-MS are:

- NLNG HSE Commitment and Policy Statement
- NLNG HSE Manuals and plans
- HEMP and HSE design processes (see also section 1.7.3)
- HSE risk assessment, management processes and audits
- Contractor HSE Management systems
- Emergency Response system and plans.

1.7.3 HSE risk assessment and management process

NLNG and its contractors use a range of specialist tools to ensure safety in design. A key tool is HEMP, which stands for Hazards and Effects Management Process. It is a structured process used for safety, health and environmental analysis and for predicting and management of hazards and impacts. In summary of the process:

- The potential hazards or events are identified via a range of assessments
- The consequences are then evaluated in detail; and
- The entire chain of event and consequence is re-assessed to determine safeguarding (prevention) and recovery solutions to eliminate the hazard and/or limit the consequences.

Other specialist Safety related tools used in ensuring a safe design include:

- Hazard Identification, HAZID
- Process Hazards & Operability, HAZOP
- Fire Protection Analysis, FIREPRAN
- Escape Evacuation & Rescue Analysis, EERA
- Layout Methodology review
- Instrumented Protective Function, IPF
- Electrical Safety & Operability, SAFOP
- Fire and Explosion Analysis, FEA
- Physical Effects Modelling, PEM
- Quantitative Risk Assessment, QRA.

The assessment part of HEMP (see above) will normally be qualitative but in selected cases quantitative risks associated with each hazard are assessed at a certain 'risk level', which is then compared with tolerability criteria. One of the key qualitative measures of risk tolerability is the Risk Assessment Matrix. The risk matrix is used in two modes:

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- To assess actual risk levels with specific or established controls in place and functioning. This provides an indication of risk tolerability and ALARP.
- To assess the potential risk levels on the basis that controls are weak - this provides an indication of the priority to be given to managing risk reduction.

If identified risks are subject to risk reduction accordingly to the ALARP principle "As Low As Reasonably Practical", this entails searching for and selecting practical and achievable options that lower the previously identified risks.

1.7.4 Quality assurance

Over 95% by value of the work managed by Nigeria LNG is carried out by contractors. Accordingly appropriate management of HSE by NLNG contractors is a fundamental part of the company HSE Management System.

The overall objective is to ensure that the company HSE standards are always met or exceeded by the contractors working on behalf of the company. The system in place to achieve this includes:

- Clear HSE criteria and performance targets that contractors must meet prior to tendering and during work for NLNG.
- A pre-qualification and screening process designed to check on the HSE performance and abilities of contractors before they are allowed to work for the company.
- Systematic management overview of contractor operations, including site supervision where appropriate, to monitor performance and enforce adherence to agreed standards.
- Assistance where appropriate in training and capacity building in order to generate improvements in HSE performance and abilities, thereby allowing more firms, particularly small and local firms, to participate in NLNG projects.

Quality assurance and control will be strictly enforced upon the contractors, sub-contractors and suppliers for the EPC (Engineering, Procurement and Construction) and start-up phases of the project using the concepts of ISO 9000 & ISO 9001. Quality assurance and control objectives during the implementation stage will, as a minimum, address:

- Quality Management during project implementation and start-up
- Project objectives, risk, cost and benefit considerations
- Quality in design and specification for:
 - Statutory requirements
 - Performance requirements
 - Safety requirements
 - Operability and maintainability
 - Compatibility and interfaces with other facilities
- Auditing of the construction contractor on HSE aspects (against an agreed HSE plan).

NLNG has achieved high performance standards on HSE and SD through:

- Certification against the ISO 14001 Environmental Management System standard which:
 - gives an internationally accepted accreditation of Company's environmental management
 - is a public display of NLNG's environmental awareness
 - requires continual environmental improvement by NLNG
- The setting-up of a Sustainable Development Coordination Committee (SDCC), that – amongst others – monitors the implementation of management plans resulting from earlier impact assessments.

1.8 Nigerian regulatory framework

The continued developments in the oil&gas industry in Nigeria created the need for a framework and strategies within which adequate planning and protection of the environment should take



place. Compliance with regulatory requirements and protection of people and the environment in all its activities and operations continue to be a priority for NLNG. This is in line with NLNG's policy on health, safety and environment, which states that NLNG is committed to protecting the environment and ensuring a safe and healthy working environment. It is also within this framework and in compliance with DPR (Department of Petroleum Resources), FMEnv (Federal Ministry of Environment) regulations and the Rivers State Environmental Protection Agency (RISEPA) edicts, that NLNG has undertaken this study.

In Nigeria, the operations of the oil industry are extensively regulated. The numerous legislations form the framework in which planning decisions are made. A range of legal arrangements exist. Two of the main statutes relevant to the NLNG project are discussed briefly below.

Regulating the operations of the upstream oil industry sector commenced with the *Oil in Navigable Waters Act, 1968*. Shortly after, the *Petroleum (Drilling and Production) Regulations Act, 1969* and subsequent regulations made there under pursuant to the Section 9(1) b(iii) (CAP 350, LFN 1991) of the Act empowered the Minister of Petroleum Resources to make regulations for the conservation of the ecosystems by the prevention of pollution. These regulations require an operator to conduct its operations with a commitment to adopt all practicable precautions to prevent pollution. In fact, to obtain a licence for any proposed drilling and production operations, all applicants (operators) for exploration, prospecting, exploitation, transportation, etc., of the petroleum resources must undertake "to take, adapt practical precautions and/or all steps practicable to prevent pollution, cause as little damage as possible to the area of operation, avoid interference with works of public utility etc....."

1.8.1 Environmental control authorities

❖ *The Ministry of Environment*

Nigeria has evolved a National Policy on the Environment and had established the Federal Environmental Protection Agency (FEPA) through the *FEPA Act - Decree No. 58 of 1988*. The Federal Ministry of Environment (FMEnv) which now has FEPA incorporated into it is charged with promulgating policies, guidelines, standards and the overall development of a framework for the protection of the environment of the nation. In fulfilment of its mandate, FMEnv since inception is responsible for the protection, restoration and preservation of the ecosystems of the country. Key responsibilities include management of the Environmental Impact Assessment (EIA) review procedure and environmental permitting requirements, through the EIA Secretariat. In this way legal instruments for environmental protection include regulations to integrate environmental concerns into economic considerations for both oil industry and non-oil industry operators.

❖ *Department of Petroleum Resources (DPR)*

The Ministry of Petroleum Resources is licensing authority for oil&gas exploration and production operations. The Department of Petroleum Resources (DPR), which operates under the *Petroleum (Drilling and Production) (Amendment) Regulations, 1988* is responsible for the issuance of permits and licences for petroleum exploration, production and exploitation activities.

DPR are responsible for the construction & operating licences for the Project. The construction licence has to be processed before the commencement of construction and will be issued by Director of Department of Petroleum Resources. The operating licence is to be issued by the Minister of Petroleum Resources.

The DPR is required to be involved in the engineering and construction of tanks: i.e. to participate in the tank (LNG, LPG & Condensate) calibration, physically during the construction and in the designing phase.

The DPR is not involved in the ESHA (approval) process.



❖ *Rivers State Environmental Protection Agency Edict*

State Environmental Protection Agencies (SEPAs) such as the River State Environmental Protection Agency (RISEPA) have a part to play in the overall EIA process. In line with this principle, the edict setting up RISEPA; Edict No.2 of 1994 - Rivers State Environmental Protection Agency (RISEPA) Edict, 1997, outlines the primary responsibilities of the agency, which is to protect and develop the general environment of Rivers State. The following are some of the duties of RISEPA:

- i. Monitor the implementation of EIA and Environmental Audit (EA) guidelines and procedures on all development policies and projects within the State.
- ii. Be responsible for general environmental matters in the State including the negative effects of soil degradation due to oil and mineral exploitation and exploration.
- iii. The establishment and implementation of the numerous strategies of the National Policy on the Environment towards achieving sustainable development.
- iv. Implementation of applicable existing edicts on activities related to the environment.

1.8.2 Statutory requirements

❖ *Environmental Impact Assessment Process*

The legislative framework for EIAs for all industries is provided by *Decree No. 58/88* (Article 5g and 5h) and *Decree No. 86/92*, which gives specific powers to the Federal Ministry of Environment to mandate an EIA on every development project, whether in the private or public sector of the economy. The Act (Decree) stipulates that no project proponent, either in the public or private sector, shall undertake or embark or authorise projects or activities without prior consideration, at an early stage, of their environmental effects.

Following the promulgation of the Decree, FEPA (now merged with FMEnv) has also developed a *National EIA Procedure, 1994*, which indicates the various stages to be followed for EIA in Nigeria and the steps to be followed from project conception to planning and commissioning (and all stages in the life cycle) in order to ensure that the project is implemented with maximum consideration for the environment. The possible technical activities expected for a proposed project include screening, full or partial EIA Study, Review, Decision-making, Monitoring, Auditing and Decommissioning / Remediation post-closure.

In addition, in 1995, Sectoral Guidelines For the Oil and Gas Industry projects have been prepared by FEPA (FMEnv). These Sectoral Guidelines provide assistance and a checklist towards conducting a proper and detailed EIA in accordance with the 1992 EIA Decree for proposed projects in the sub-sector.

These enactments are complemented by the guidelines of the Department of Petroleum Resources (DPR) outlined above in section 1.8.1. Also, more recent enactments of DPR published in the Guidelines for the Establishment of a Petroleum Refinery, Petrochemicals and Gas Processing Plants in Nigeria of July 1993, stipulate that EIA shall be completed for all new projects before construction starts.

With special reference to gas utilisation projects, effluent limitations, standards and adequate monitoring systems for exploration and development operations in the oil and gas industry that have been in place from the Department of Petroleum Resources (DPR) have now been further emphasised by the FMEnv regulations and standards.



❖ *National environmental legislation*

The body of national legislation includes conservation laws, relating to both protected areas and protected species, land management laws and pollution control and prevention laws.

In addition to national conservation legislation, specific Forestry Ordinances and Wild Animals Preservation Laws apply in different regions or states.

Within Nigeria, environmental legislation is in a continuing process of development. Legislation with respect to EIA has already been mentioned and there is a wide variety of legislation relating to the environment, which are of potential importance for this project. The legislative provisions for protection of the environment are listed below.

1968	Act No. 34	i) Oil in Navigable Waters Act ii) Oil in Navigable Waters Regulations
1969	Decree No. 51	Petroleum Drilling and Production Decree
1969		Petroleum (Drilling and Production) Regulations
1978	Act No. 6	Land-use Act
1985	Act No. 25	Endangered Species (Control of International Trade and Traffic) Act
1988	Decree No. 58	Federal Environmental Protection Agency Decree
1988	Decree No. 42	Harmful Wastes (Special Criminal Provisions etc.)
1991		National Environmental Protection (Effluent Limitations) Regulations
1991		National Environmental Protection (Pollution Abatement in industries and Facilities Producing Waste) Regulations
1991		National Environmental Protection (Management of Solid Hazardous Wastes) Regulations
1991		National Guidelines and Standards for Environmental Pollution Control in Nigeria
1991		Environmental Guidelines and standards for the Petroleum Industry in Nigeria – Dept. of Petroleum Resources
1992	Decree No. 59	Federal Environmental Protection Agency (Amendment) Decree
1992	Decree No. 86	Environmental Impact Assessments Decree
1993	Decree No. 101	Water Resources Decree
1993		Guidelines for Establishment of a Petroleum Refinery, Petrochemicals and Gas Processing Plants in Nigeria
1994		Environmental Impact Assessment Procedure for Nigeria
1995		Petroleum (Drilling and Production) (Amendment) Regulations
1995		Sectoral Guidelines for Oil and Gas Industry Projects (oil and gas exploration and production – onshore)
1995		Sectoral Guidelines for Oil and Gas Industry Projects (oil and gas exploration and production – offshore)
1995		Sectoral Guidelines for Oil and Gas Industry Projects (oil and gas pipelines – onshore and offshore)
1996	Decree No. 8	Oil and Gas Free Export Zone Decree.
2002		Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN). Department of Petroleum Resources

Tables 1.1 to 1.3 provide an overview of specific Nigerian environmental quality standards and discharge limits. Nigerian standards relevant to the NLNGSix project have been included in the HSE Premises (see Appendices 4 and 5).

Parameters	Units in milligram per liter (mg/l) unless otherwise stated	
	Limits for discharge into surface water	Limits for land application
Temperature	Less than 40°C within 15 meter of outfall	Less than 40°C
Colour (Lovibond Units)	7	-
pH	6 - 9	6 - 9



Parameters	Units in milligram per liter (mg/l) unless otherwise stated	
	Limits for discharge into surface water	Limits for land application
BOD ₅ at 20°C	50	500
Total suspended solids	30	-
Total dissolved solids	2,000	2,000
Chloride (as Cl)	600	600
Sulphate (as SO ₄ ²⁻)	500	1,000
Sulphate (as S ₂)	0.2	-
Cyanide (As CN ⁻)	0.1	-
Detergents (liner alkylate sulphonate as methylene blue active substance)	15	15
Oil and grease	10	30
Nitrate (as NO ₃) NO ₃	20	-
Phosphate (as PO ₄ ²⁻)	5	10
Arsenic (as As)	0.1	-
Barium (as Ba)	5	5
Tin (as Sn)	10	10
Iron (as Fe)	20	-
Manganese (as Mn)	5	-
Phenolic compounds (as phenol)	0.2	-
Chlorine (free)	1.0	-
Cadmium, Cd	Less than 1	-
Chromium (trivalent and hexavalent)	Less than 1	-
Copper	Less than 1	-
Lead	Less than 1	-
Mercury	0.05	-
Nickel	Less than 1	-
Selenium	Less than 1	-
Silver	0.1	-
Zinc	Less than 1	-
Total metals	3	-
Calcium (as Ca ²⁺)	200	-
Magnesium (as Mg ²⁺)	200	-
Boron (as B)	5	5
Alkyl mercury compounds	Not detectable	Not detectable
Polychlorinated Biphenyls (PCBs)	0.003	0.003
Pesticides (Total)	Less than 0.01	Less than 0.01
Alpha emitters, uc/ml	10 ⁻⁷	-
Beta emitters, uc/ml	10 ⁻⁶	-
Coliforms (daily average)	400 MPN/100ml	500 MPN/100ml
Suspended fibre	-	-

Table 1.1. Interim effluent limitation guidelines in Nigeria for all categories of industry (FEPA, 1991)

Substance	Limits (mg/m ³ , unless otherwise stated)
Acid gases	200-9,000
Aldehydes	20
Ammonia	3 kg/hour
Antimony	20-100
Arsenic	20-100
Asbestos fibre	NS
Benzene	24.0 kg/hour
Benyllium	0.1
Cadmium	1.0-40
Carbon	50-250
Carbon dioxide	10% by volume
Carbon disulphide	100-500
Chlorine	3.0-200



Substance	Limits (mg/m ³ , unless otherwise stated)
Copper	20
Formaldehyde	0.5 kg/hour
Fluorine	1.0-100
Fluorine compounds	20-50
Heavy metals (Total)	10.0
Hydrocarbon	50
Hydrochloric acid	100
Hydrofluoric acid	100
Hydrogen fluoride	1.0230
Hydrogen sulphide	5-1,500
Lead	10-100
Manganese	0.1 kg/hour
Mercury	1.0-230
Nickel	20
Nickel carbonyl	0.5
Nitric acid	500-4,000
Nitrogen oxides	350-100
Organic compounds	50
Sulphur dioxide	30-3,000
Sulphuric acid	5.0-1,000
Sulphuric trioxide	100-200
Sulphur trioxide and sulphuric acid mist	0.8 kg/ton acid
Vinyl chloride	10-200 ppm

Table 1.2. Emission limits for specific pollutants from stationary sources (FEPA, 1991)

Pollutants	Time of Average	Limit
Particulates	Daily average of daily values 1 hour	250 ug/m ³
		*600 ug/m ³
Sulphur oxides (Sulphur dioxide)	Daily average of hourly values 1 hour	0.01 ppm (26 ug/m ³)
		0.1 ppm (260 ug/m ³)
Non-methane hydrocarbon	Daily average of 3 hourly values	160 ug/m ³
Carbon monoxide	Daily average of hourly values 8-hourly average	10 ppm (11.4 ug/m ³)
		20 ppm (22.8 ug/m ³)
Nitrogen oxides (Nitrogen dioxide)	Daily average of hourly values (range)	0.04 ppm-0.06 ppm
		(75.0 ug/m ³ -113 ug/m ³)
Photochemical oxidant	Hourly values	0.06 ppm

* Concentration not to be exceeded for more than once a year

Table 1.3. Nigerian ambient air quality standards (FEPA, 1991)

❖ *International conventions signed by Nigeria*

Nigeria is a signatory to the following international conventions on the environment, mainly relating to conservation and pollution control.

- 1948 Convention of the Intergovernmental Maritime Consultative Organisation (IMCO)
- 1954 Convention for the Prevention of Pollution of the Sea by Oil.
- 1958 Convention on Fishing and Conservation of Living Resources of the High Sea.
(note: came into force in 1966)
- 1958 Convention on the High Seas
- 1958 Convention on the Continental Shelf
- 1958 Convention on the Territorial Sea and Contiguous Zone
- 1969 Convention on Civil Liability for Oil Pollution Damage
- 1972 Convention Concerning Protection of the World Cultural and Natural Heritage
- 1972 Convention on Prevention of Marine Pollution by Dumping Wastes and other Matter
- 1973 Convention to Regulate international trade in Endangered species of Fauna and Flora (CITES)
- 1974 International Convention for the Safety of Life at Sea



1979	Convention on Conservation of Migratory Species of Wild Animals
1982	Convention on Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Regions
1985	Vienna Convention for the Protection of the Ozone Layer
1987	Montreal Protocol on Substances That Deplete the Ozone Layer
1989	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
1990	Convention on Oil Pollution Preparedness, Response and Co-operation
1992	United Nations Framework Convention on Biological Diversity
1994	United Nations Framework Convention on Climate Change
1994	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa
2001	Stockholm Convention on Persistent Organic Pollutants

The most recently signed (February, 2001) international convention is the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention). This is relevant given the importance of the Niger Delta, which undoubtedly qualifies as a wetland of international importance under the Ramsar Convention.

❖ *Biodiversity policy and regulations in Nigeria*

There are two **international conventions** which concern biological diversity in the Delta region. These are the Convention on Biological Diversity (CBD) which came into force on 23rd December 1993 and the United Nations Convention on the Law of the Sea (UNCLOS) which came into force on 16th November 1994.

Nigeria was one of the over 100 countries that signed the CBD at the UN Conference on the Environment and Development in Rio de Janeiro, in June 1992. Nigeria ratified the CBD in 1994. During the 2nd Conference of Parties to the CBD in Jakarta (1995) there was an invitation to major international bodies to improve their existing activities and develop new actions which promote the conservation and sustainable use of marine and coastal biodiversity.

Nigeria ratified the UNCLOS 14th August 1986. UNCLOS is a comprehensive framework agreement governing the uses of the ocean. Both conventions emphasise the importance of taking national action to protect (also through legislation) the biodiversity of the Niger Delta as an essential component of the marine and coastal resources of Nigeria.

Currently there are several laws and regulations associated with protected areas and wildlife protection. The legislative framework for **protected areas** is provided by the *Forestry Ordinance - Northern Region 1960* and *National Parks Decree 1991*. The former was enacted to provide a dual system of land tenure and forest reservation involving both governmental and the local communities in the northern half of the country. The ordinance also provides the legal framework for the establishment of different categories of protected areas. The *National Parks Decree 1991* (which effectively implements the regional *African Convention on the Conservation of Nature and Natural Resources*) provides for the establishment of another category of protected area and regulates administration and management of National Parks through the establishment of the national Park Governing Board and the National Park Management Committees.

Competent authorities: at national level, the mandate for wildlife conservation and protected area management is the responsibility of the Federal Department of Forestry, within which the National Park Governing Board is responsible for advising both the federal and State governments on the development and presentation of National Parks. The National Park Management Committees are responsible for ensuring that the provisions of the *National Parks Decree* are carried out.

Each State Department of Forestry is responsible for the creation and management of Forest Reserves, Game Reserves and Strict Nature Reserves. The National Resources Conservation



Council, although not directly involved in protected area management, is responsible for the promotion of National Conservation Policy.

Wildlife protection is enacted through a number of legislative instruments, firstly *Decree No 11/74* was adopted for the purposes of ratifying the *CITES Convention 1973*. The *National Parks Decree 1991* provides for the establishment of a class of protected area where a number of defined activities are prohibited without authorisation. Indirect protection for wildlife is provided through the EIA requirements specified in *Decree No. 86/92*. Finally, protection for wildlife is also provided through legislation issued at State level. For example, in Game Reserves hunting is strictly regulated, habitat is protected and wildlife is conserved, managed and protected.

Apart from the *Endangered Species (Control of International Trade and Traffic) Act*, there is currently no legislation in Nigeria on **threatened species**; the *IUCN Red Lists* shall be applied.

In 1991-1992 a country-wide study on biological diversity was carried. It has produced a report: *Biological Diversity in Nigeria*. The study addressed the full range of biological diversity conservation problems and has already resulted in a checklist of Nigeria's flora and aquatic fauna.

1.9 Environmental, Social and Health (Impact) Assessment (ESHA) for the NLNGSix project

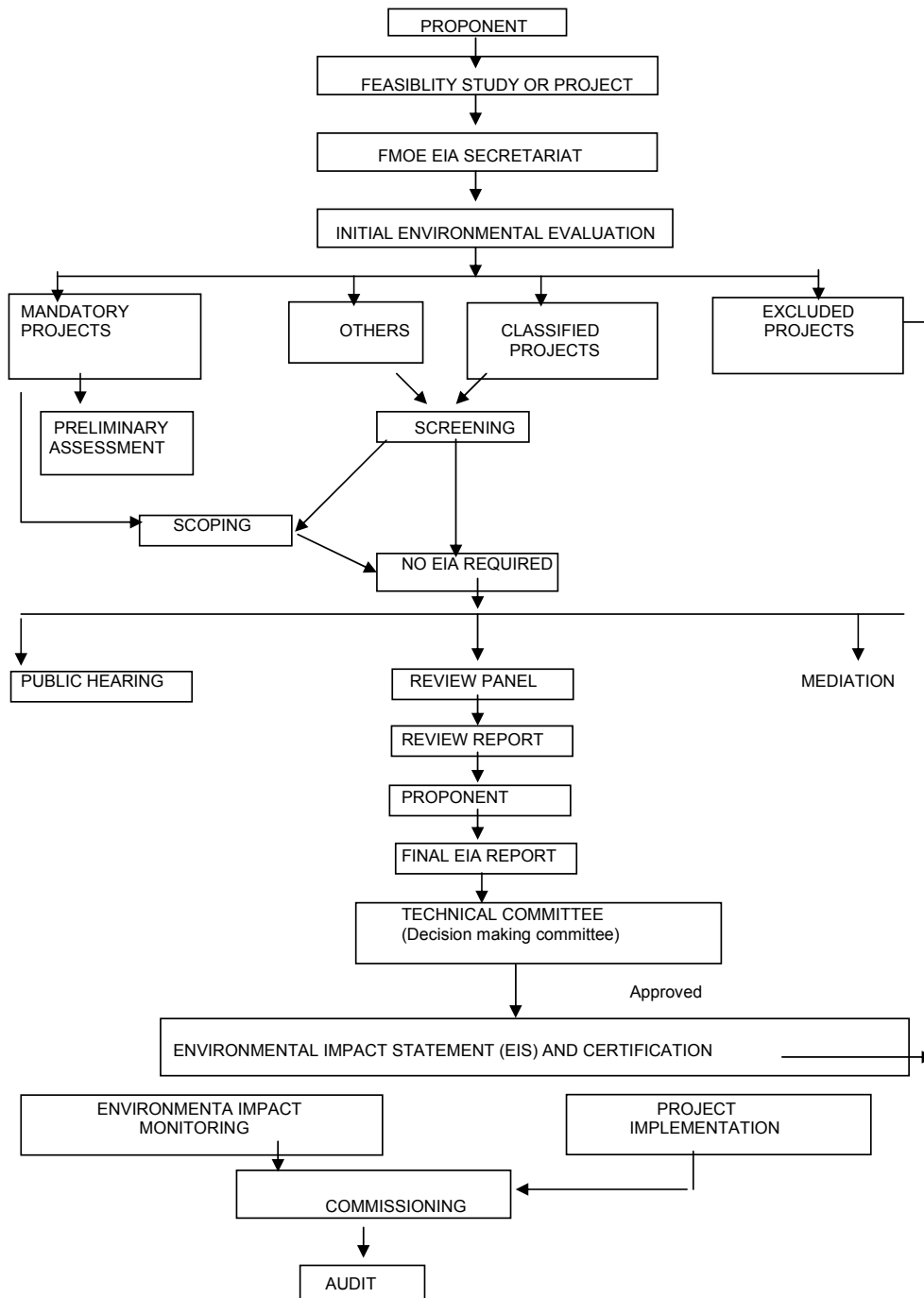
As already stated in section 1.6, NLNG wishes to develop the NLNGSix project fully in line with its own policy statements on HSE, policies and guidelines issued by NLNG shareholders including Shell, national Nigerian legislative requirements and international, including World Bank / IFC, standards. In the following sections details on the guidelines and standards will be further explained as well as the actual ESHA methodology applied.

1.9.1 The formal EIA approval process in Nigeria

The Federal Ministry of Environment (FMEnv) is statutorily responsible for processing and approval of EIA reports. The EIA Decree stipulates that no major project shall be undertaken without prior consideration, at early stages, of their environmental effects. Appropriate mitigation measures for potential significant impacts shall be stated before the commencement of the project.

The formal approval process follows the normal procedures (see the EIA flowchart of FMEnv below), and for the NLNGSix project involves the following steps:

- Finalisation of the baseline and environmental impact studies.
- Management of NLNG informs the communities about the extent and processes of the project.
- Comments from the community to be recorded during a public forum, to be attached as appendix in the final EIA report.
- NLNG submits 25 copies of the EIA report to the Federal Ministry of Environment (FMEnv) for assessment as required by EIA procedure.
- FMEnv appoints an independent review panel, comprising academicians and professionals to review the NLNG EIA report.
- FMEnv distributes the NLNG EIA report to the review panel members, Rivers State and Bonny Local Governments three months before the public hearing.
- FMEnv publicly displays the EIA report in Abuja, Lagos and Port Harcourt to enable any interested members of the public to read and comment upon.
- FMEnv places advertisement in some National Dailies to inform the public about the display of NLNG EIA report.
- FMEnv convenes a public hearing in Port Harcourt three months after the display of the EIA reports, which is backed by statewide radio announcement in Radio Rivers.
- NLNG gives a presentation to the public at the review session giving details about the project and its environmental management, followed by a questions and answers session.



The FMEEnv Flowchart for EIA process



- The review panel members, Rivers State and Bonny Local Government representatives present their comments on the EIA report.
- NLNG responds to all comments and takes note of the public and panel member's observations for incorporation in to the final EIA report.
- Having fulfilled the environmental requirements, provisional approval is jointly recommended by the review panel members, Rivers State and Bonny Local Government's representatives for the NLNGSix EIA report.

FMEEnv communicates the granting of a provisional approval to NLNG and requests the incorporation of the panel's comments within six months before a final approval of the NLNGSix EIA report. After that the permit will be granted.

1.9.2 Applicable World Bank and IFC standards for environmental and social impact assessment

The environmental and social requirements for project funding from financial institutions have become more stringent due to rising expectations amongst society. There is a variety of financial institutions, public and private, and although the private ones are not all aligned and not all have guidelines for funding, it seems that there is a trend for producing those. The leader on producing policies and guidelines is the World Bank (WB) and most of the other Institutions follow the requirements of WB.

The WB has several Operational Policies and Directives that outline the requirements that borrowers have to comply for receiving project funds. The most applicable ones are: Environmental Assessment Operational Policy (OP 4.01 January 1999) and Natural Habitats Operational Policy (OP 4.04 September 1995). Apart from these there are Operational Policy on Forestry (OP 4.36), Indigenous People (Operational Directive 4.20; is being reviewed), Involuntary Resettlement (Operational Directive 4.30).

Apart from Operational Policies which can be considered as a first category type of documents on its degree of importance, there are Operational Directives (many of them have been further trespassed to Operational Policies), and Good Practises such as *Involving NGOs in Bank Supported Activities* (GP 14.70)

An overview of Operational Policies can be found on:

<http://wbIn0018.worldbank.org/institutional/manuals/opmanual.nsf/OPolw?OpenView>

An overview of Bank Procedures can be found on:

<http://wbIn0018.worldbank.org/institutional/manuals/opmanual.nsf/BProw?OpenView>

An overview of Operational Directives can be found on:

<http://wbIn0018.worldbank.org/institutional/manuals/opmanual.nsf/ODirw?OpenView>

❖ *Environmental Assessment*

<http://wbIn0018.worldbank.org/Institutional/Manuals/OpManual.nsf/OPolw/9367A2A9D9DAEED38525672C007D0972?OpenDocument>

- The WB requires Environmental Assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable.
- The WB undertakes environmental screening of each proposed project to determine the appropriate extent of EA.
- The WB has 4 Categories (A, B, C and FI) of projects according to the type, location, sensitivity and scale of the project and the nature and magnitude of its potential environmental impact.
- Environmental Assessment (EA) takes into account: natural environment, human health and safety, social aspects and transboundary and global environmental aspects. EA considers natural and social aspects in an integrated way.
- EA is initiated as early as possible in project development and is integrated closely with economic, financial, institutional, social and technical analyses of the proposed project.



- The borrower should normally engage an advisory panel of independent, internationally recognised environmental and social specialists to advise on all aspects of the project relevant to the EA.
- The WB follows its Pollution Prevention and Abatement Handbook (PPAH) for discharge levels and abatement measures that are normally acceptable for the Bank.
- Environmental Impact Assessment, regional or sectorial EA, environmental audit, hazard or risk assessment and Environmental Management Plan (EMP) are all instruments of an EA. When the project is likely to have sectorial or regional impacts, sectorial or regional EA is required.
- The borrower, during the EA process, must consult project-affected groups and local non-governmental organisations (NGOs) about the project's environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible.
- During project construction and implementation, the borrower reports on compliance with measures agreed with the Bank on the basis of the findings and results of the EA, including implementation of any EMP, as set out in the project documents.

Another relevant document is the World Bank Guidelines for Environmental Assessment as detailed in the Environmental Assessment Sourcebook (1991) and their updates [16, 17, 18].

<http://lnweb18.worldbank.org/ESSD/envext.nsf/47ByDocName/ToolsEnvironmentalAssessmentSourcebookandUpdates>

❖ *Construction and operational environmental performance standards*

Part III of the World Bank' *Pollution Prevention and Abatement Handbook (1998)* provides detailed guidelines to be applied in the preparation of WB projects. The guidelines, which cover almost 40 industrial sectors, represent state-of-the-art thinking on how to reduce pollution emissions from the production process.

<http://lnweb18.worldbank.org/ESSD/envext.nsf/51ByDocName/PollutionPreventionandAbatementHandbook>

1.9.3 Nigeria LNG Ltd approach to Environmental, Social and Health Assessment (ESHA)

The objective of the impact assessment process is to integrate environmental, social and health considerations into the development, design, construction and operation of the NLNG project. That's why the term Environmental, Social and Health Assessment (ESHA) is used. The assessment process aids in the identification of the likely impacts of project and assists in the design of mechanisms to control those impacts through mitigation measures where necessary. As such, the ESHA is an important and fundamental planning and design tool. The ESHA provides the mechanisms to ensure that the project is in line with stipulated requirements.

❖ *Scope of the ESHA*

The NLNG plant is currently in the process of constructing the fourth and fifth LNG train facilities – known as the NLNG**Plus** project. The addition of a sixth LNG train and associated infrastructure is the proposed project (known as NLNG**Six**) and is actually an extension to the current NLNG**Plus** project. This new (sixth) liquefaction train is a carbon copy of trains four and five. In the document *Nigeria LNG**Six** Project - Notice of Environmental Impact Assessment* of May 2003 (see Appendix 6) NLNG has indicated to the authorities the purpose and dimensions of the ESHA process. In summary, the ESHA for NLNG**Six** is designed to:

- be an addendum to the NLNG**Plus** project
- the ESHA will result in a stand-alone document with a management plan
- assess all aspects and issues related to the onshore development of the sixth train and the slugcatcher, whereas any offshore and marine aspects will be dealt with in the (forthcoming) ESHA for Channel Deepening and Marine Operations



- be a “fast-track” process, as very limited baseline studies are required, which directly follows from the prerequisite of “no additional land take”.

Further discussions with environmental officials have resulted in an extension and further refinement of the arguments for separate ESHAs. These are listed below under the three headings ‘timing’, ‘permitting’ and ‘environmental and social aspects of the ESHAs’.

Timing

- The development schedule for train Six is fully determined by LNG delivery. With a Final Investment Decision (FID) for train 6 in July 2004, the Ready For Start-Up (RFSU) will be end 2007.
- The ESHA for train 6 perfectly fits in the train 6 development schedule, particularly because extensive baseline studies were not required
- The ESHA for Channel Deepening requires almost a year-round baseline study, so that the ESHA proper can only be kicked-off in mid 2004, being actually 1 year later than the start of the train 6 ESHA.
- A combined ESHA for train 6 and Channel Deepening would, therefore, have caused a delay of 1 year for the train 6 ESHA and could have caused a delay in train 6 RFSU, which was considered unacceptable.

Conclusion: a combined ESHA for both projects could have caused an unacceptable delay in train 6 RFSU.

Permitting

- Both projects require the submission of an ESHA as part of the formal approval procedure by FMEnv
- The projects have different “applicants” (“project proponents” or “project owners”), i.e. NLNG for train 6 and the Nigerian Ports Authority for the Channel Deepening
- Formally these projects shall, therefore, be announced to FMEnv with separate Registration / Notification Forms and are, therefore, to be treated as separate projects.

Conclusion: the ESHA notification and approval process require a completely separate impact assessment process.

Environmental and social aspects relevant to the ESHAs

- The projects are situated in completely different types of environment, which are - in addition - spatially segregated: train 6 onshore in an industrial/rural/natural type of system, and the Channel Deepening in an offshore ecosystem with social interests for marine resources (fishing)
- The different types of environment require different types of baseline studies. Apart from that, historical developments in both environments cause a different need for baseline studies: for train 6 onshore almost all baseline information was already available as a consequence of the oil&gas activities in the past on Bonny Island, whereas the offshore situation requires full (2-seasons) baseline surveys.
- The ESHA process for both projects differs significantly: (a) different types of activities and associated potential sources of environmental/social/health effects and (b) different (groups of) stakeholders.
- The different types of environment require completely different types of expertise for the baseline studies and the ESHA proper.

Conclusion: a combination of both projects in a single ESHA would be artificial and without real benefit for the quality of the resulting report and Management Plan.

In the continuing consultation process, the Ministry has been kept informed and involved in the NLNGSix developments and ESHA process. As a result thereof two letters are to be mentioned here:

- FMEnv letter of August 8th, 2003, to NLNG, stating amongst others:
 - there shall be a separate EIA study for the offshore Channel Deepening Project
 - the GTS-2/4 slug catcher shall be included in the train 6 EIA.
- FMEnv letter of May 20th, 2004, to NLNG, stating amongst others:



- the construction of the GTS-2/4 slug catcher may be started in June 2004, prior to the formal review and approval of the train 6 EIA.

❖ *Consultation*

Consultation is a key part of the sustainable development policy and the prime purpose of this ESHA document. It is defined in this project as engagement with people or groups of people (potentially) affected by or interested in the company operations and plans. Such stakeholder groups can include the general public, local industry groups, government authorities and other Non-Governmental Organisations (NGOs).

The NLNG process of consultation has started during the development of the **Base** project and is designed to be continuous; however there will be milestones and peak periods of activity such as the release of this ESHA.

❖ *ESHA methodology*

The methodology of this impact assessment follows the enhanced approach of NLNG's Technical Advisor [19]. This process is visualised in Figure 1.7 and follows in fact the main steps of the Hazards and Effects Management Process (HEMP (see also section 1.7.2):

1. Identify project hazards, issues and environmental/social sensitivities

The project information is translated into "hazards", being the inputs from and outputs to the natural and social environment; the yellow boxes in Figure 1.7. The existing environment of the project area is described in terms of the physical, chemical, biological and social aspects of the environment, including health, cultural and economic aspects. From the baseline description of the environment, the environmental processes and components that are critical for maintaining the integrity of the environment, and protecting its functions are identified and termed "sensitivities"; the blue boxes in Figure 1.7.

An inherent part of the impact assessment process is the involvement of stakeholders. Hence, one of the first steps is the identification and mapping of stakeholders. These stakeholder groups are then linked to the issues that are of main concern to each stakeholder group; the green boxes in Figure 1.7.

2. Assess (the nature and significance of) impacts

In the next step of the ESHA the sensitivities are brought together with the hazards and issues to identify any interactions, where there is a potential for an impact. These impacts are subsequently qualified and quantified as far as possible so that a rating is achieved of the significance of the impacts. This is reflected by the pink boxes in Figure 1.7.

3. Control of hazards and effects through mitigation measures

Where significant adverse effects occur, appropriate mitigation measures are identified. These may be preventive, repressive, curative or compensative. A system for implementing mitigation measures and managing environmental effects on an ongoing basis is an essential element of the enhanced approach; the grey box in Figure 1.7.

In the case of positive effects, opportunities for enhancement measures are identified and maximised.

The key feature of the ESHA process as practiced by NLNG is that it is an iterative (i.e. cyclic and repetitive) process where required. This is illustrated by the loops via the white circles in Figure 1.7. The iterative process is complex but in summary entails going through a cycle of data collection, design, consultation and impact assessment in order to screen and eliminate non-optimal solutions and finally arrive at the preferred single design, construction and operation solution.

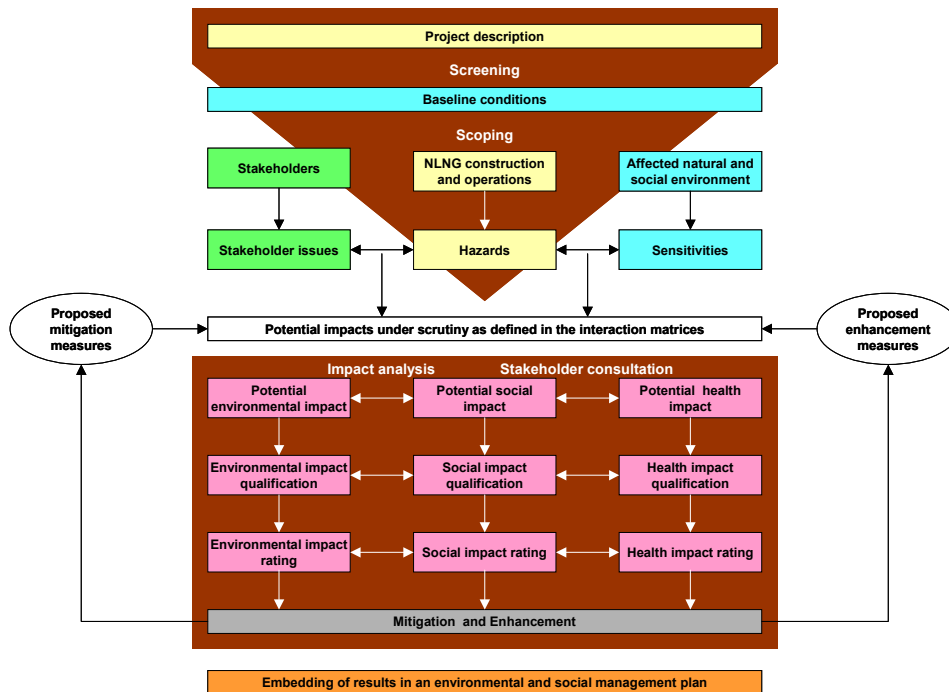


Figure 1.7. The Environmental, Social and Health (impact) Assessment (ESHA) process (see Section 1.9.3).

1.10 The report structure

The report describes the ESHA process with all its details. It's called an EIA report to comply with Nigerian legislative requirements. However, the Nigerian laws also aim at an integrated assessment of both environmental and social aspects, so that the contents do not really depart from what is required by law.

The structure of this report reflects the ESHA process described in section 1.9.3 and illustrated in Figure 1.7:

- A description of the Company and the proposed activities – the Project – with its hazards in chapter 2
- Chapter 3 gives a summary description of the present social and environmental characteristics of the project environment. Details resulting from the few field studies that have been carried out, are provided in the Appendices. The (future) 5-LNG train operations is actually considered the baseline for the sixth train.
- Chapter 4 describes the potential effects of the proposed activities – in terms of hazards and issues - on the environmental and social sensitivities.
- In chapter 5 mitigation measures are presented for each adverse impact and enhancement measures to stimulate positive consequences.
- Chapter 6 describes how these mitigation measures will be implemented through an Environmental, Social and Health Management Plan (ESHMP), as part of NLNG's management systems
- Stakeholder consultation as an integrated part of this ESHA is reported on in chapter 7.