



The Shell Petroleum Development Company of Nigeria Limited

## Security System Enhancement Project

### PROJECT EXECUTION PLAN

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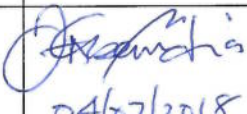
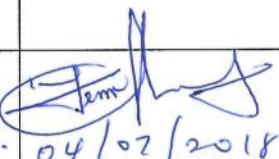
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**Abbreviations**

AACS	Automatic Access Control System
AGC	Automatic Gain Control
ANSI	American National Standard Institute
ANPR	Automatic Number Plate Recognition
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
ATP	Acceptance Test Plan
AWG	American Wire Gauge
BOGT	Bonny Oil and Gas Terminal
BICSI	Building Industry Consulting Services International
CCTV	Closed Circuit Television
CLP	Crude Loading Platform
CP	Consolidation Point
CPU	Central Processing Unit
CSA	COMPANY Software Applications
DC	Direct Current
DSN	Data Source Name
EIA	Electronics Industries Association
EMI	Electromagnetic Interference
EPC	Engineering Procurement and Construction
FOT	Forcados Oil Terminal
FPSO	Floating Production Storage and Offloading
GSM	Global System for Mobile Communications
HVM	Hostile Vehicle Mitigation
IDS	Intrusion Detection System
IA	Industrial Area
IP	Internet Protocol
IPVS	Internet Protocol Video Surveillance
ISA	Instrument Society of America
LAN	Local Area Network
MDF	Media Distribution Frame
MVS	Managed Video Service
NFPA	National Fire Protection Association
NEMA	National Electrical Manufacturers Association
ODBC	Open Database Connectivity
OLE DB	Object Linking and Embedding, Database
OML	Oil Mining License

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O&M	Operation and Maintenance
SMS	Security management System
PLC	Programmable Logic Controller
PBG	Principal Bonding Ground
PID	Perimeter Intrusion Detection
RA	Residential Area
SAN	Storage Area Network
SCP	Security Control Panel
SDK	Software Development Kit
SOA	Service Oriented Architecture
SMS	Simple Message Service
SCR	Security Control Room
SSM	Server Software Module
STP	Shielded Twisted Pair.
TR	Telecommunications Room
UBC	Uniform Building Code
UDP	User Datagram Protocol
UPS	Uninterrupted Power Supply
UTP	Unshielded Twisted Pair
VPN	Virtual Private Network
VMS	Video Management System
WAN	Wide Area Network
WDR	Wide Dynamic Range

## 1. PROJECT PREMISES

### 1.1. Purpose of Project Execution Plan

The purpose of this PEP is to document the key strategic decisions and processes that will guide the project as it moves forward from Select to the Execute phases.

This PEP sets out how the Project Team will achieve the project objectives and requirements. It establishes specific targets and milestones that must be achieved, and strategies, plans, processes and procedures that must be followed by members of the project team. It provides performance requirements that guide the planning and execution of work activities and approaches to be followed for project delivery.

The main purposes are to:

- Document the objectives, priorities and philosophies for the execution of the project.
- Document a project plan from execution through to commissioning and project close out.
- Establish clear targets and document the critical success factors, key risks and opportunities, describe the planned actions to mitigate the risks and capture the opportunities
- Identify critical execution issues and potential constraints.
- Define a plan for the Project Team activities, including responsibilities of the team and interfaces with other groups involved in the Project.
- Inform interfacing teams to enable harmonization of their respective contributions to the overall planning and success of the project.
- Provide a basis against which major project execution changes can be identified and evaluated.

Identify key project risks and providing mitigating measures to address the risks.

### 1.2. Vision & Mission Statement

To deliver the Security System Enhancement Project on schedule, within budget, to the specified quality standards, realizing steady state operational targets before handover to the to the various Asset Managers without compromising SPDC policy on Health, Safety, Environmental, and Security; thus re-establishing SPDC as a partner of choice in the community and meeting the expectations of stakeholders.

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## 2. THE OPPORTUNITY

### 2.1. Opportunity statement

We have the opportunity to implement technical security solutions to detect and delay potential attacks and provide sufficient time to respond effectively. The assets reviewed are all significantly vulnerable to attack. Support and maintenance of security systems is currently poor and needs to be addressed for new systems. The technology needs to be combined with people and process improvements.

### 2.2. Project Locations

The assets within this project scope are the following:

Forcados Oil Terminal (FOT) is located within the western edge of the Niger River delta. It is about 57km south west of Warri, by the Forcados River Estuary, within OML 43. The terminal installation is linked to an offshore crude loading platform (CLP) by a 27km export pipeline. The onshore installations are within a 6km of the fishing communities around. The Forcados area is only accessible by boat or helicopter, and the facility currently boasts of a runway for light planes.

Bonny Oil and Gas Terminal (BOGT) is on the Bonny Island, about 56km south east of Port Harcourt in Rivers State within OML 11. Like FOT, the BOGT has an offshore crude loading platform (CLP) with about 27km of export pipeline linking them. Aside from the Shell installations, Bonny Island also plays host to the Nigerian Liquefied Natural Gas (NLNG), and installations by Mobil Producing Limited. This creates open opportunities for collaboration between these industry players. At the moment, there is no established road from the Port Harcourt main land to Bonny Island, so access the area is either by boat or air. The Bonny communities are relatively established, as certain basic services and amenities are available within the community.

EA field is on the continental shelf, about 37km south-west of Tunu flow station, in OML 79. The field has simple yoke mooring platform (SYMP) to which the Sea Eagle FPSO is moored. Three drilling platforms – DP-A, DP-B and DP-J and one riser platform, RP-A, are installed within 7km of the FPSO. The primary commute of personnel from land is by helicopter, which either lands on the helideck provided on the Sea Eagle FPSO or that on the RP-A when the sea is rough.

The Bonga asset is in the coastal waters of Nigeria, 80km south-west of the River Forcados estuary, in OML 118. The field has multiple subsea installations, with two anchored down surface vessels – the Bonga FPSO and the SPM. The SPM is about 2km north-east of the FPSO. The Bonga FPSO is equipped with a helipad for primary personnel access. Also, the facility consistently has support and security vessels around.

This Shell Industrial Area is located within Port Harcourt metropolis in the Eastern Niger Delta region. It is an SPDC owned facility covers an area of about 845,000m<sup>2</sup>. It is bounded on the North by Old Aba road, south by Trans Amadi Link Road, east by Oginigba/Trans Amadi Road, while in the west by Rumuomasi/Elekahia Road. Major Access/Exit into the SPDC facility is through the Old Aba Road, Rumuomasi. Close to its boundaries are mixed development neighborhoods characterized by densely settled residential houses, supermarkets, restaurants, office buildings etc.

The Shell Residential Area is located within Port Harcourt metropolis in the Eastern Niger Delta region. It is an SPDC owned staff residential camp located along Aba/Port Harcourt Express Road, about 3km from the

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Industrial Area. It is about 1.7square km of land with a 6.5 Km perimeter and consists approximately of 400 buildings which are for either residential or other uses. The camp has a boundary block wall fence to provide additional security and is on lease from 3 major landlord communities- Rumuibekwe, Mgbuesilaru and Rumuokwurushi.

### 3. WORK SCOPE

#### 3.1. Overview of work scope

The scope of work shall include all works (Engineering, Procurement, Construction, Commissioning and Support) at the selected facilities, incidental to achieving the business objectives for security. The scope also includes support for any integration work that SPDC undertakes to hook-up with central systems/services in the company's offices in Port Harcourt and Lagos.

The Work Scope is a combination of physical security barrier upgrades (e.g fencing, gates, turnstiles etc.), and a replacement and extension of the existing electronic security systems, taking advantage of advancements in technology to deliver a robust and efficient integrated security system.

#### 3.2. Facilities

Below is the scope of work for each facility;

##### 3.2.1. FOT

- Construction of Two 30m towers along the onshore Right of Way (RoW) and one 10m tower on the CLP.
- Installation of Citadel fence around each 30m tower and on both sides of the 6km export line RoW (onshore) with crossing points.
- Perimeter Intrusion Detection (PID): Fibre-Optic PID system to be installed on the existing perimeter Citadel fence around Forcados core zone, the new citadel fence on the export line RoW and the tower compound.
- Lighting along Perimeter and 6km onshore Right of Way (RoW) will be installed.
- Wide Area Detection: 360° thermal radar system types, Automatic Identification System (AIS) and X-Band radar, will be mounted on the installed towers.
- Installation of CCTV Cameras around the entire FOT external perimeter, core zone perimeter, gates/entry points and all controlled access points.
- Installation of a Microwave Radio transmission system to backhaul video surveillance images to the control room.
- Installation of an X-ray baggage scanner and Walk-Through-Metal Detector (WTMD) at the new Main Gate.
- Procurement of Handheld/Desktop Explosive Trace Detectors (ETD) at the Effluent Gate and Jetty Gates.
- Installation of Electronic Access Control System (including Biometric Iris Readers) at Main office control building, laboratory building and Air Operations building; and integration of existing Permit-to-Work system with the ACS.
- Installation of Automatic Bi-Folding Speed Gates at Effluent gate (new main gate), old main gate, Core zone/Tank farm gate, Jetty gate and JTF jetty gate.
- Installation of Automatic Crash-rated Sliding Gate: One PAS68 crash rated automatic cantilevered sliding gate installed at the perimeter access gate (Gate 4).
- Automatic PAS68 crash rated V-gate that shall be installed at the main Entry Check Point (ECP) entrance, and specified access points at FOT.
- Full Height Industrial Turnstiles to be installed at all gates located within FOT core zone areas: - Effluent Gate (New Main Gate), Main gate (old), Core zone / tank farm gate, Perimeter access gate, Jetty gate, JTF jetty gate, Landside/ airside gate.
- Installation of Tour Lock Revolving doors at the main entrance of critical buildings within FOT core zone: - Main Office Building, Main Control Building, Laboratory Building.

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- Construction of standard Guard/Gate houses at appropriate perimeter gates/entry points.
- Setting up of a State-of-the-art Security Control Room with Video Wall and appropriate “Command and Control” systems to monitor, investigate and administer all alarms and installed electronic systems on a 24/7 basis.

### 3.2.2. *BOGT*

- Construction of Three 30m towers along the onshore Right of Way (RoW) and one 10m tower on the CLP.
- Installation of citadel fence with Fibre-Optic Perimeter Intrusion Detection System around each 30m tower compound.
- Extension of the existing perimeter citadel fence for BOGT to cover the approximately 200m gap at the waterfront towards the jetty.
- Fiber-Optic Perimeter Intrusion Detection PID system shall be installed on the existing inner Core Zone perimeter security fence.
- Wide Area Detection: 360° thermal radar system types, Automatic Identification System (AIS) and X-Band radar will be mounted on the installed towers.
- Installation of CCTV/ANPR Cameras with motion detection around the entire BOGT external perimeter, core zone perimeter, all gates/entry points and all controlled access points.
- Installation of a Microwave Radio Transmission system to backhaul video surveillance images to the control room
- Installation of X-ray baggage scanner, Walk-Through-Metal Detector (WTMD), and Handheld/Desktop Explosive Trace Detectors (ETD) at the main gate.
- Installation of Electronic Access Control (including Biometric Iris Readers) at Office buildings 1 & 2 and main control building; and integration of existing Permit-to-Work system with the ACS.
- Automatic Bi-Folding Speed Gates to be installed at the Main gate, Core zone/Tank farm gate, Internal gate, Jetty gate and airfield access gate
- Automatic PAS68 crash rated V-gate would be installed at the main Entry Check Point (ECP) entrance and specified access points at BOGT.
- Full Height Industrial Turnstiles to be installed at all gates located within BOGT core zone areas: - Main gate, Core zone/ tank farm gate, internal gate, Helipad access gate, Jetty gate, Airfield access gate.
- Installation of Tour Lock Revolving Doors at the main entrance of critical buildings within BOGT core zone: - Office Building 1, Office Building 2 and Main Control Building.
- Construction of standard Guard/Gate houses at appropriate perimeter gates/entry points.
- Set-up of State-of-the-art Security Control Room with Video Wall and appropriate “Command and Control” systems to monitor, investigate and administer all alarms and installed electronic systems on a 24/7 basis.

### 3.2.3. *EA FIELDS*

- Installation of Ballistic Roller Shutters at the entrance to the EA Control Room, boat landing bay, Security Control Room and safe-haven.
- Installation of an X-Band radar system interfaced with long/medium/short range thermal + optical PTZ cameras on the EA field platforms, the SYMP and Sea Eagle FPSO.
- Installation of additional internal surveillance and ACS throughout. ACS will include biometric iris readers.

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- Set-up of State-of-the-art Security Control Room with Video Wall and appropriate “Command and Control” systems to monitor, investigate and administer all alarms and installed electronic systems on a 24/7 basis.

#### 3.2.4. *BONGA*

- Installation of Ballistic Roller Shutters at the entrance to the Bonga Control Room, boat landing bay, Security Control Room and safe-haven.
- Installation of long-range thermal + optical PTZ cameras on Bonga and interface with the existing X-band radar system.
- Installation of additional internal surveillance and ACS throughout the FPSO. ACS will include biometric iris readers.
- Set-up of State-of-the-art Security Control Room with Video Wall and appropriate “Command and Control” systems to monitor, investigate and administer all alarms and installed electronic systems on a 24/7 basis.

#### 3.2.5. *SPDC RA and LA*

- Set-up of State-of-the-art Security Control Room with Central Servers, Video Wall and appropriate “Command and Control” systems to monitor, investigate and administer all alarms and installed electronic systems on a 24/7 basis.

#### 4. SCHEDULE

Below is the high-level schedule. However a more detailed work plan will be provided; which will include Work Breakdown Structure (WBS), Proposed Milestones and Critical Path. The detailed scope of work, as a minimum, shall propose practicable timelines, and provide where necessary opportunities to accelerate the schedule.

S/N	DESCRIPTION	2018				2019			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Contracting								
2	Detailed Design								
3	Procurement								
4	Construction and Installation Works - FOT								
5	Construction and Installation Works - BOGT								
6	Construction and Installation Works - EA								
7	Construction and Installation Works - BONGA								
8	Construction and Installation Works - IA Central Server								

## 5. COST ESTIMATES & BUDGET

### 5.1. Cost Estimate

The detailed cost estimate will be developed in accordance with Shell Project Guide 3 (PG-3) using a combination of Shell estimating tools and recent contracts rates for similar projects in SPDC. This will be used to evaluate the contractor's commercial quote.

There is an existing high level cost estimate that was developed after the FEED. The planned Estimate and Schedule Assurance Review (ESAR) will however use a combination of commercial quotes from bidders and estimate from CCET.

The high level project cost is recorded separately for confidentiality reasons and is available for authorized persons to view.

### 5.2. Cost Management

Cost controls for the project will be in line with the Shell Project Cost Control processes. The cost engineer maintains frequent contact with the Project Manager and entire project team in order to provide support to the project team for project budget and cost estimating, phasing, monitoring, control and reporting. The budget to be presented for FID will be based on the project specifications, execution strategies, risks, Project Control Schedule, and contract bid prices. This budget will be the basis for measuring project performance /value. Any changes to this approved budget will be subject to change control including revision of the Investment Proposal as required by existing procedures.

Following contract award, the no-change policy will be implemented with the relevant contractor. The only changes that will be allowed will be changes to make the facilities operable or safe. Such changes will only be implemented after due consideration and approval by the SPDC Corporate Change Management Panel (CCMP) and the relevant Tender Board, as the case may be.

The basis for planning on the project will be the Work Breakdown Structure (WBS) integrating the project activities in line with the company guideline. The WBS can be seen from the Project Schedule. Cost management will be via SAP and monthly project spend evaluation.

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## 6. DESIGN

### 6.1. General design basis and philosophy

The work shall be designed in accordance with the contract. The project design philosophy is premised on the use of existing IT and Telecommunications infrastructure where this is feasible, to improve project delivery schedule and reduce cost.

Given the mix of equipment and packages to be installed on this project, a high degree of modularization will be utilized to reduce on-site hook-up and construction duration. In the process, design and execution shall aim to minimize the duration of existing service disruptions required at each project location.

The objective of the safety design measures is to ensure that the design of the work reduces the risk to plant personnel, third parties and the environment to 'As Low As Reasonably Practicable' (ALARP).

The objectives of the engineering phase of the work are:

- To produce Approved for Construction (AFC) drawings and documents.
- To complete all equipment and material requisitions for enquiry and purchase.
- To review and approve Vendor drawings and documents.
- To prepare all test inspection procedures for civil, structural, mechanical, electrical and instrumentation systems.
- To prepare all pre-commissioning and commissioning procedures well in advance of assembly in the fabrication yards.
- To prepare all commissioning, maintenance and operating manuals for all the systems
- To prepare 'as-built' drawings operating envelope documentations and finalized documents to be handed over to SPDC.
- To prepare Preventive and Reactive Maintenance procedures.
- To prepare the Approved for Construction Bills of Quantities.
- To prepare and submit detailed list along with cost of commissioning, insurance, 2 years' operational spares and special tools required for operations and maintenance.

### 6.2. FEED

SPDC has performed FEED to define the basis for the detailed design work. The level of detail contained in the FEED work shall not relieve the EPC contractor of its responsibility of developing the detailed drawings and documents fully in accordance with the requirements and intent as set out in the contract documents.

The engineering and design shall be based upon the documents supplied; including any approved changes to the FEED document as listed in the Design Verification Report.

### 6.3. Detailed Design

The EPC contractors will be fully responsible for the detailed designs of their respective work scopes. The contractors will first verify and accept the FEED performed by SPDC.

It is expected that at least 90% of the detailed design works will be performed in Nigeria as required by the NOGICD Act. International contractors may perform these activities with local engineering companies or

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affiliates as far as efforts for any overseas specialist/advanced engineering studies are coordinated from their design office in Nigeria.

Each contractor's engineering base will have a small SPDC resident team, who will provide project management and essential SPDC/Shell Group inputs to the Contractor's detail design activity without absolving the Contractor of responsibility for his design works. Deployment of the resident teams will closely follow each contractor's work plan and deployment of its own resources. Upon substantial completion of detailed design and materials ordering, the resident teams will demobilize from the contractors' design offices and re-establish in Port Harcourt and at the site offices for construction supports. Where necessary, a few key personnel could remain at the design offices completing all punch-list actions, closing out recommendations arising from design reviews and audits, and concluding any outstanding factory acceptance tests for major equipment and systems.

The construction installation, pre-commissioning, commissioning and performance testing procedures shall be fully developed during the detailed design. The Operational HSE MS and Construction HSE Case shall also be developed during the detailed design, using available conceptual HSE Case templates. The SPDC operations and commissioning team shall be part of the facilities resident team during this phase of the work to ensure that commissioning and operational requirements are properly incorporated into the designs.

The EPC contractor shall ensure that all calculations, back-up documentation, etc. would be produced to demonstrate to SPDC that the Contractor has adequately addressed all issues relating to the work including safety, reliability, efficiency, operability, maintainability and integrity consistent with SPDC's operating objectives. All computer hardware and software, including specially developed spreadsheets, shall be checked and verified by an independent party to be appointed by the Contractor prior to use.

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## 7. PROJECT MANAGEMENT

### 7.1. Introduction

SPDC shall be responsible for the management and control of the work from the effective date of commencement of the contract through to completion. Supervision shall be carried out by resident teams and by scheduled and unscheduled quality audits. There shall be implementation of sound and effective procedures for control, co-ordination and reporting of activities.

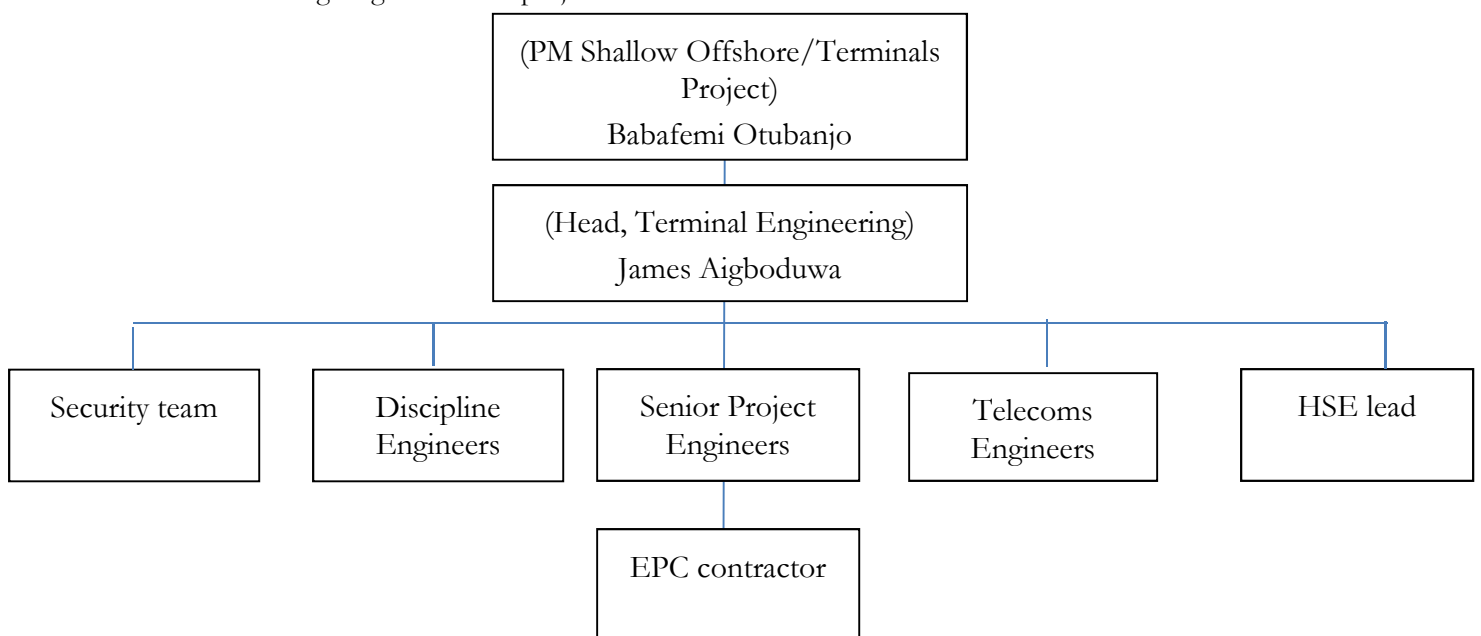
The project management activities shall include, but not be limited to:

- Planning.
- Establishment and implementation of a detailed earned value progress measurement and reporting system.
- Establishment of relevant measures of performance, such as schedules, etc.
- Ongoing appraisal of performance, compared to the planned measures.
- Analysis of trends and deviations and early implementation of corrective actions.
- Realistic forecasting, taking into account performance to date.
- Obtaining all the necessary internal permits, consents and approvals for the work.
- Preparing, implementing and maintaining a Quality Management System.

### 7.2. Project Organization

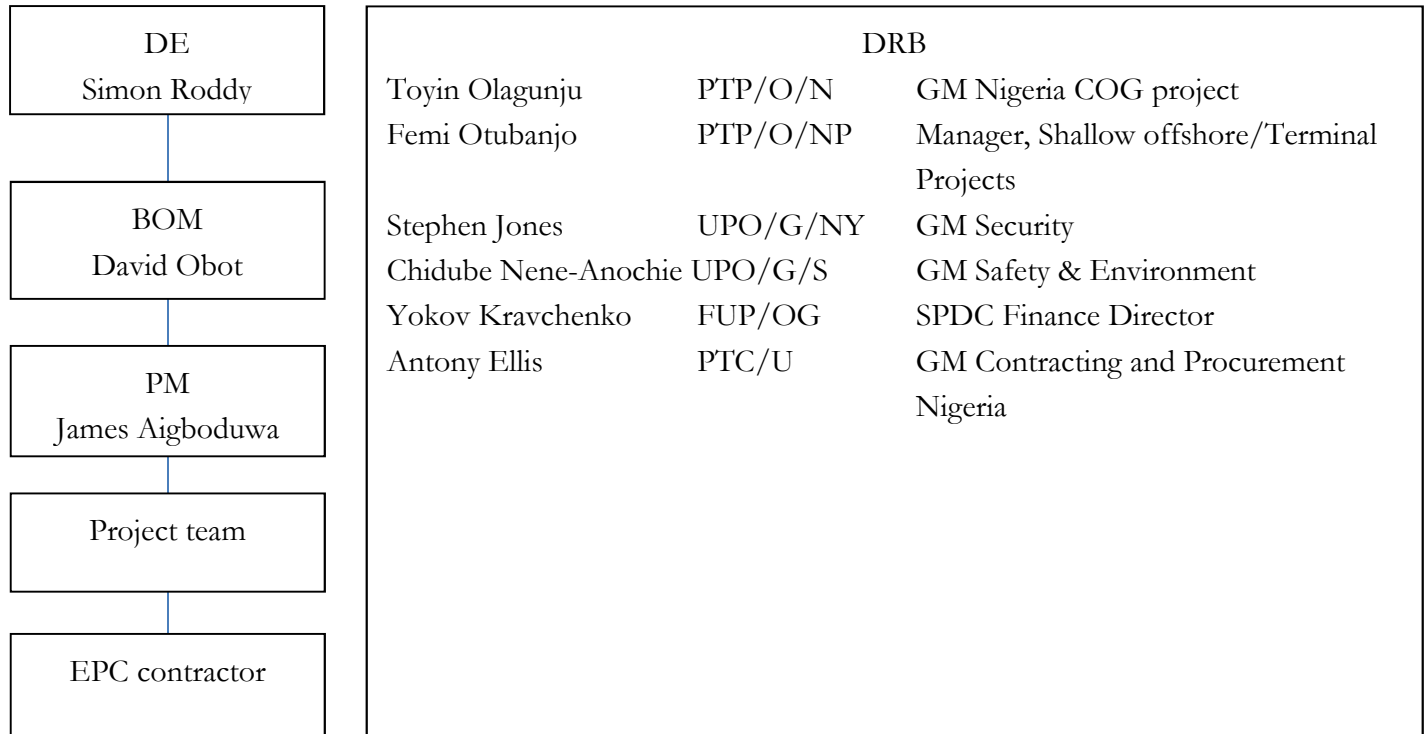
As currently planned, the core team leading into the EXECUTE phase would comprise of a Project manager, Project Leader, Principal Project Engineers, Senior Project Engineers, and discipline Engineers as necessary. This lean core resourcing is premised on support that would be obtained from the base team for Matrix, Major P/L & Corp. Civil Projects, which includes; Project Services, Engineering, QA/QC, Interface management, OR&A, Construction, Commissioning & Start-up, IT/IM, Administration, Logistics, HSSE, Security, SCD, SCM, Survey and Finance.

Below is the organogram for the project



### 7.3. Governance and Assurance Structure

The project Governance is in line with the Shell Opportunity Realization Standards and the structure is as represented below.



### 7.4. General project management

#### 7.4.1. Work Locations

For the purpose of this contract, the following worksites shall be established in order to ensure effective co-ordination and management of the work:

- Base Locations for engineering design, procurement management, fabrication management, information management and project management office during the design, procurement and fabrication phase. This may be located within a larger engineering base operated by the contractor covering multiple projects, but shall be segregated from other activities by dedication of suitable office floor area and facilities;
- Fabrication yard/worksites providing facilities for major fabrication activities, specifically those associated with tower and fence fabrication. Associated office floor area and office equipment shall be segregated as above

#### 7.4.2. Project Calendar

A Project Calendar (work cycle) shall be implemented, which shall be same as normal calendar, to which all documents and reports shall refer.

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#### 7.4.3. *Project Reporting Requirement*

The detailed reporting requirements for the contract including the project close-out report will be described prior to the commencement of the work. The EPC contractor shall comply with these requirements.

#### 7.4.4. *Manpower, resourcing plans, qualifications and key personnel*

Manpower resourcing plans, subdivided by worksites, shall be provided and be broken down into:

- Overall manpower resourcing plan by month for the total work.
- Manpower loading by month for each job category employed, specified by work element and discipline, consistent with the overall manpower resourcing plan.
- Man-hour histograms for the total direct and indirect man-hours, specified by function, discipline and overall.
- Man-hour histograms for management.

The EPC contractor shall provide adequately skilled, qualified and experienced personnel to perform all aspects of the work (including temporary works and all activities associated with the work) and shall ensure that appropriate personnel have, and maintain, certificates and licenses required by applicable laws.

## 8. LOGISTICS

SPDC shall primarily be in charge of logistics and movement of personnel. The EPC contractor for the main construction works shall establish a base/worksites within the facilities or their closest logistics base. The contractor will take care of her transportation, accommodation, messing and other site facilities while on site.

Materials from overseas shall be imported through Onne Port utilising SPDC's pre-release arrangements to fast track deliveries. Transport from Onne/Kidney Island to all sites shall be by barge.

A transportation study to bring all risks associated with the various mode of transportation during construction to "As Low As Reasonable Practicable" shall be carried out prior to site activities.

The EPC contractor shall be fully responsible for obtaining the necessary permits required to facilitate transportation, storage, offloading / installation of project materials, including without being limited to:

- Preparation of all transportation and installation drawings necessary for the performance of the work.
- Import duty on all materials and equipment.

## 9. PRE-COMMISSIONING AND COMMISSIONING

### 9.1. Inspection and testing

Tests and inspections necessary to determine that the permanent work and associated system/facilities meet the requirements of this contract shall be performed. This shall include, but not be limited to:

- Provision of a team of qualified quality control personnel.
- Checking and inspection of construction materials.
- Ensuring that all inspections and tests are carried out in a satisfactory and orderly manner, and are recorded.
- Ensuring that all testing equipment is set up and calibrated in accordance with requirements.
- Ensuring that any re-work is carried out in a satisfactory manner as per approved standards/codes and re-inspected. All re-work shall be properly documented and any deviations to standards/codes shall be immediately brought to the notice of the Owner.

An Inspection and Testing Manual shall include detailed procedures, activity sequences, acceptance forms, checklists, fault correction procedures, etc., for each phase of the work.

All inspection and testing work shall be subject to witnessing and approval by SPDC representatives and all planned inspections and tests shall be carried out at times acceptable to SPDC.

As a minimum, the inspection and testing plans shall cover relevant equipment and packages in accordance with the specifications, tests specifications, data sheets and the Request for Quotation (RFQs).

A Factory Acceptance Testing (FAT) will be carried out on relevant packages and equipment based on the agreed criticality assessment.

### 9.2. Integrated commissioning organization

For the commissioning preparation and execution phases, an organization chart will be developed and deliverables defined for the development of the work scope, completion of commissioning procedures, schedules, identification of temporary requirements and vendor specialist requirements for each phase.

The execution of all commissioning activities is to be managed and performed by the Integrated Commissioning Team consisting of Contractor commissioning engineers, SPDC Commissioning Engineers and vendor specialists. Composition of the integrated team will be defined by SPDC.

### 9.3. Commissioning execution strategy

All mechanical completion, pre-commissioning, commissioning and start-up activities shall be performed strictly in accordance with SPDC Engineering standards, DEPs, Industry Codes and vendor recommendations.

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Commissioning Dossiers shall be developed, incorporating all activities. These must be prepared, ready for population with test results, thirty (30) days prior to the commencement of pre-commissioning activities.

The systems and sub-system activities shall be executed and documented using the above structure. These dossiers for the various systems shall form part of the handover documents to SPDC. Commissioning Dossiers shall be set up in advance from CMS to define the work to be done by system, by node for later population as systems are handed over from Construction.

The administration procedures, strategies, schedules, plans, start-up procedures, test pack dossiers, evaluation and acceptance criteria shall be developed in line with the commissioning requirements as defined above, during detailed design.

The contractor shall provide all tools and test equipment and shall provide to SPDC a listing of all required tools and test equipment necessary to support all the scheduled activities to be located on each node. Test equipment shall comprise a listing of test equipment type, manufacturer, quantity, serial number, test range, calibration date, and recalibration date. The test equipment shall also include bolt tensioning and vibration monitoring equipment.

#### **9.4. Completions processes**

The commissioning processes (pre-commissioning, commissioning, start-up and performance testing) as defined in the Commissioning Process map, will be performed in accordance with company DEPs, commissioning manuals and specifications, industry codes and vendor recommendations. They shall be executed in order to comply with the Flawless Start-Up Key Performance Indicators.

##### *9.4.1. Mechanical Completion*

Mechanical completion tests shall be documented on Check Sheets which will be recorded in the contractor's Completions Management System and retained in handover test pack dossiers to demonstrate installation integrity. Punch lists shall be developed for the check sheets. Category A Punch-lists are items that must be completed before the activities can move to the next stage, while category B punch lists are those that can be cleared as the activities continues; but before the successful completion of the 90 days' reliability run.

On achievement of mechanical completion, and clearing of the Category 'A' Punch-list items, there will be a transfer of responsibility from the contractor's construction team to the contractor's commissioning team.

##### *9.4.2. Pre-commissioning*

Prior to the start of pre-commissioning activities, there shall be a joint walk-through and conformity check for each system, in order to verify that all process items have been completely installed in the system to be commissioned and necessary isolations and other safety barriers are in place. Commissioning team shall also verify that documentation to support Mechanical Completion is in place, so that work will not be repeated.

##### *9.4.3. Commissioning*

Once pre-commissioning has been completed and signed off to the satisfaction of SPDC, the equipment and/or system is considered ready for commissioning.

Commissioning is the energized testing of all systems to demonstrate integrated functionality, and safeguarding prior to placing the system in permanent service. It shall be carried out progressively by

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subsystem by a team of engineers and operations staff and shall be executed in line with pre-prepared procedures required for the operation of the integrated system.

Commissioning shall also include the successful completion of the electromagnetic compatibility study, power system study and the pre-start up audit.

#### *9.4.4. 90 Days Reliability Run and Documentations*

The system reliability during the ninety (90) day reliability run shall be demonstrated. The last phase shall be undertaken with all the systems running simultaneously (as an integrated security system) at their respective design capacities throughout the test period.

Equipment failures shall be logged throughout the duration of the test. Measures to rectify the fault recorded and the total downtime shall also be logged throughout the duration of the test, for overall input into the CMMS to form the basis of the equipment history. Data gathered from this is to be applied in final configuration of intrusion detection systems, and incident calibration for surveillance systems

For spare equipment, any individual item shall be placed on 'standby' for only one (1) week at a time. This shall ensure that each item is in operation and tested for a significant part of the ninety (90) days period. The reliability of each item shall be recorded separately.

If a unit or system is shut down for maintenance or correction of a fault, the Contractor shall immediately effect such maintenance or correction and advise SPDC when the unit or system is re-instated and ready for operation.

The ninety (90) day reliability run shall be accepted provided that the availability percentages are achieved during the specified periods. The percentages below are only a guide. The final availability figures shall be those used to develop the availability model that will aim to achieve the overall system availability target as defined in the Basis for Design.

The ninety (90) day reliability run shall continue until the availability criteria in the above table are met for all equipment. A fault rectified during the ninety (90) day run will be classified as minor, and shall constitute a 'clock-stop' event only without reset to 'zero-time. Occurrence of a substantial fault during the test period shall constitute a failure and a new ninety (90) day reliability run period for each item of equipment shall commence once the fault has been rectified.

#### *9.4.5. Final acceptance*

Subject to the successful completion of the ninety (90) day reliability run, SPDC shall issue within fourteen (14) days after its receipt of the Contractor's request and providing there are no outstanding items, a Final Acceptance Certificate pursuant to which SPDC shall formally accept the contract as being completed.

Notwithstanding the issuance of a Final Acceptance Certificate, the Contractor shall remain obligated under all those provisions of this contract such as but not limited to the Confidentiality, Guarantee, Indemnity and Taxes and Assessments provisions hereof, which expressly or by their nature extend beyond and survive completion or final acceptance.

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## 10. TRAINING

### 10.1. Overview

The objective of the training component of the work is the development of SPDC personnel to a level of competence at which they are able to effectively operate, and carry out maintenance and operations activities on the work from Start-Up. The content and schedule of the training shall facilitate a smooth, flawless start-up and life-cycle of the integrated security systems by SPDC personnel. Qualified professionals shall provide all training in simple English Language.

The training provided by the EPC Contractor shall cater for two primary group requirements

- Systems Operations Training for nominated SPDC security personnel tasked with the daily responsibility of operating the security systems at different levels of authority
- Systems Maintenance Training for nominated SPDC system support personnel. This training shall cover basic functional operations of the system, and detailed emphasis on routine, preventive, and corrective maintenance of each subsystem, and the integrated system

Training shall be delivered in two formats – Formal classroom based training with relevant labs prior to system mechanical completion, and a structured on-the-job training during the 90 days reliability run to better familiarize SPDC personnel with this particular configuration and application.

### 10.2. Class room based trainings

#### 10.2.1. *System Operations Training*

This training, as part of its curricula, is to equip SPDC personnel with a basic understanding on the functionality of the various subsystems, and how they interact to provide the multiple layer security solution. The focus of the training is to provide detailed understanding and know-how of the functions and operations of all the subsystems, including but not limited to;

- Wide Area Surveillance
- Integrated security management system
- VSS and Digital Video Management
- Access Control System
- Credential management
- Vehicle barrier control systems
- Personnel and Vehicle Screening

Training sessions shall include classroom type instruction and 'hands on' instruction and shall be given by the Contractor on site using the completed installations to familiarize trainees with our particular configurations.

#### 10.2.2. *System Maintenance Training*

This training requirement is focused around equipping nominated SPDC personnel to be able to provide first line support for the security systems. The Contractor should schedule training to happen before substantial completion of construction, so trainees can build experience participating in the systems installation, integration and configurations.

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A substantial laboratory shall be provided as part of this training, so as to simulate and resolve various known system error and fault conditions for each of the subsystems. This is to build the necessary confidence to participate in the on-the-job training during the 90 days run.

### **10.3. On-the-job training**

Similar to the Class Room based training, this shall be structured to provide the skill set for the Operations personnel, and the Maintenance personnel. It shall commence as early as possible in the project schedule (preferably after the class room based trainings), and extend throughout the 90 day reliability testing period.

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## 11. CONTRACTING STRATEGY

The primary objective was to develop a C&P strategy that would provide the most commercially cost effective solution to meet quality and schedule requirements and mitigate risks. After due consideration of the key project value drivers & C&P selection criteria, market constraints, risks, NCD considerations and previous experiences on past projects, the EPC – Facility Upgrade Projects (FUP) Contracts was selected as the preferred strategy.

The project contracting quilt is shown below

	Work Area	Project Management	Detailed Design	Procurement		Construction & Installation			Commissioning & Start-up	Operate & Maintain		
				LI	Other Materials	Citadel Fencing/Civil Works	IT, Telecoms & Electrical Works	System Integration				
1	Forcados Terminal	SPDC	EPC Contractor	EPC Contractor	EPC Contractor	EPC Contractor	EPC Contractor	EPC Contractor	SPDC	Security /Asset Team		
2	Bonny Terminal											
3	Bonga						EPC Contractor	EPC Contractor				
4	EA Field											

In Partnership with Foreign Technical Partners

Using Community Sub-contractors

### 11.1. FEED and Detailed Design Engineering Contract Strategy

The FEED has already been done by SPDC. The detailed design and installation scope shall be handled by an EPC contractor under the supervision of SPDC.

### 11.2. Nigerian Content Development and Compliance with NC Law

The Project provides an opportunity to contribute to the development of Nigeria Contractors. The project must ensure compliance to the Nigerian Oil & Gas Industry Content Development Act, whilst seeking regulatory concession from the NCDMB in areas where practical difficulties arise due to insufficient in-country capacity

Majority of the construction crew will be Nigerians. The Nigerian content target is 85%.

### 11.3. Procurement

The contractor's responsibility shall include all activities necessary to provide materials, equipment and whatever else is required to perform the work including but not limited to preparation of requisitions, requests for quotation, evaluation, purchase order placement, final inspection and testing, preservation, transportation, engagement of marine warranty surveyor and certification (as applicable), shipping, insurance, importation, customs clearance, payment of duties, storage if required, and delivery to final destination at site.

SPDC shall make available to the contractor Shell Group Agreements and any local agreements with manufacturers and agents for the purchase and supply of materials and equipment, where they are commercially attractive.

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All long-lead equipment that falls within the critical path of the project (such as the Thermal Radar Sensors), shall be identified and presented within 30 days of effective date of commencement of the contract for approval and for early procurement prior to completion of the Approved for Construction phase.

All critical spare parts shall be identified for all equipment and packages for 3 years operation.

Suitable procurement records will be maintained a clear audit trail will be evident. The contractor shall be responsible for incorporating all Vendor data into the detailed engineering and equipment dossier manuals.

Due consideration shall be given to the requirement of Nigerian Content Development, in the selection of Vendors.

All enquiries shall be prepared by the contractor and shall be sent, complete with relevant documents directly to the selected number of Vendors from the "SHELL Vendor List" for obtaining bids, unless stated otherwise. Where applicable, a priced spare parts bid shall also be obtained together with the original bid. It shall include recommended parts normally required during running-in, starting-up, commissioning and first two years of operation.

SPDC's importation license is non-transferable and all Bills of Lading and other purchase documents shall be consigned to "THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED".

The contractor shall be responsible for receiving, off-loading, handling, inspection, storage and protection of all materials necessary for completion of the work. Immediately upon receipt of materials at worksites, the Contractor shall inspect and verify the condition and contents listing. Inspection shall be undertaken by qualified personnel and shall include verification of dimensional correctness and material certification, and checking for shortages and damage. The contractor would prepare and implement a procedure for tracking materials, from issuance of P.O to delivery to site. The contractor shall employ web based propriety software packages which shall be applied in the monitoring and managing the status of Materials on the project.

The tracking system shall be web based, and shall be open to use by authorized SPDC and Contractor Personnel.

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## 12. HSSE & SCD

HSSE & SP Management is a mandatory requirement of the SPDC HSSE & SP Policy and the Opportunity Realization Manual (ORM). The project shall comply fully to the requirements of the policy and the ORM by following the HSSE & SP Control Framework.

### 12.1. Health

#### HSSE & SP Standards for Health

The project shall as a minimum comply with the Shell Group HSSE & SP Standards which require that:

- Health Risks are systematically identified, assessed and controlled at all stages of the Business lifecycle.
- Fitness to work evaluations are established and applied where there are significant health or safety Risks.
- Policies and programmes are established covering the use of alcohol and Drugs.
- Employees have access to medical services that take account of the Risks associated with the type and location of their work.
- Human factors engineering principles are applied during the design stage of projects.
- The suites of Health Manuals contained in the HSSE & SP Control Framework shall be used for this compliance.

#### Health Impact Assessment on Local Communities

Potential impacts of the project on the health of the neighboring communities shall be identified and assessed in the Health Impact Assessment (HIA) carried out as part of the integrated Environmental, Social and Health Impact Assessment (ESHIA). These will include, for example, local people, imported workers and their (distant) families, locally hired workers and their families, and camp followers. Due consideration shall be given to both the construction and operations phases and potential short-term and long-term impacts.

Where impacts are potentially beneficial, measures to enhance these shall be identified, recommended, and implemented in line with Project Corporate Social Responsibility (CSR) premise. Where potential negative impacts are identified avoidance, mitigation and enhancement and appropriate control measures shall be identified and implemented via the Environmental, Social and Health Management Plan (ESHMP). These may include control measures, which require implementation through changes/amendments of these HSE Premises.

#### Health Risk Assessment

Exposure to health hazards from an activity or process will be controlled by project design to eliminate the hazards, isolate the workers from the hazards and by paying attention to procedures to obviate, as far as possible, the need for controlling exposure by the use of personal protective equipment.

A Health Risk Assessment (HRA) will be carried out for the project to identify and assess in a systematic manner health risks (chemical; physical including noise, vibrations and non-ionizing radiation; biological including potable water quality, exposure to bacteria, catering and food hygiene; ergonomic and psychological health hazards) to personnel involved in future operations so that appropriate exposure controls in terms of design consequences can be recommended. An HRA shall also be carried out covering the construction and commissioning phases of the project to include issues such as Fitness to work, Alcohol and Drugs, HIV/AIDs Employment, Working Hours, Accommodation, Welfare and Recreation during work.

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### Human Factors Engineering

Human Factors Engineering (HFE) shall be employed in all phases of the projects to ensure high levels of operability, maintainability, reliability and overall system usability. HFE activity shall be integrated with related studies (such as plant layout, manual handling, and operability and maintainability studies) to ensure adequate assessment and management of risks to people and technical systems through design of the people-system interface.

## **12.2. Safety**

### Personal Safety

The project shall as a minimum comply with the Shell Group HSSE & SP Standards which require that:

- All hazards associated with the work is identified, assessed, adequate control and recovery measures put in place.
- Procedures and safe working practices are established for tasks with personal safety Risks.
- People understand the Hazards, the work Procedures and the safe working practices for their tasks.
- People use Personal Protective Equipment appropriate to their tasks.
- People performing tasks with safety Risks are supervised appropriately.

The suites of Personal Safety Manuals contained in the HSSE & SP Control Framework shall be used for this compliance.

Safety is a deeply held value in Shell, integral to honesty, integrity and respect for people. The project shall target Goal Zero which means relentlessly pursuing no harm to people and no significant incidents by “doing the right thing”, following the rules, encouraging people to intervene when necessary, and taking responsibility for our own safety and that of our colleagues, every minute of every day.

The Life-Saving Rules (LSRs) shall be enforced. The Life Saving Rules set out clear and simple “dos and don’ts” covering activities with the highest potential safety risk. They help to make sure that rules are followed and people are protected.

### Process Safety

The project shall as a minimum comply with the Shell Group HSSE & SP Standards which require that:

- The design and construction of new Assets and modifications to existing Assets are in accordance with the Shell Design and Engineering Manuals or industry standards in areas outside the scope of these manuals.
- All process safety risks are identified and adequate process in place to demonstrate the risks can be managed to ALARP.
- Technical Authorities are established for the interpretation of the Shell Design and Engineering Manuals
- Each Asset has a nominated Asset Manager with accountability for Process Safety in the operation of that Asset.
- The Technical Integrity of Assets is maintained by systematic inspection, testing, maintenance and Management of Change.
- Assets are operated within established operating limits.

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### 12.3. Security

Security in the Niger Delta is a high risk for the successful execution of the project. There is at present a heightened security situation because of repeated kidnaps and militant attacks specifically targeted at oil and gas personnel and production facilities both in onshore and offshore locations. Security will be managed in line with specific SPDC policies and requirements on security, and the local regulations whilst complying with the Shell Group HSSE & SP Standards which require that:

- Security Risk management is conducted in accordance with national legal requirements and Internationally Recognised Standards, including the Voluntary Principles on Security and Human Rights.
- Armed security is not used unless it is a legal or government requirement or there is no acceptable alternative to manage the Risk. If armed security is used, it is in accordance with the Shell Rules on the Use of Force.
- Payments to host governments for the provision of security forces are approved and recorded.

#### Community Security

Disruptions to company operations are frequent in the Niger Delta, and some locations have more recent and/or frequent history of disruption than others. Disruptions usually arise from perceptions of inequity in the distribution of the “oil wealth” and past operating practices (legacy issues) in projects and normal operation.

Security concerns include pipeline vandalism and the theft of crude oil, which have serious safety and environmental implications.

The SPDC policy regarding these problems is to achieve co-operation and mutual benefits with the local population by means of Sustainable Community Development (SCD) programmes.

#### Physical Security at Facilities

##### During Construction

During construction, a Security Plan that complements the Social Performance Plan shall be developed and maintained live to adjust to security risks on an ongoing basis. Identified security risks shall be reviewed daily and severity-ranked using the ‘traffic-light’ methodology on the Security Risk Exposure Matrix (SREM). The Security Plan shall be designed to ensure that all potential or actual risks in the project environment are proactively assessed and adequate security measures are established to effectively manage those risks.

The main thrust of the security strategy shall be to rely on the Federal Government to extend the services of the Joint Task Force (JTF) to cover all project work areas including transport routes, and peripheral patrols as deterrents to criminal activity. The nature of external security force to be engaged in various activity areas will depend on the nature and level of perceived security threat. These will include:

- Naval patrol of the creeks around the main river transport routes
- The JTF on land to patrol work areas and undertake escort duties.
- The State Security Services to provide proactive intelligence and assist with planning and effective monitoring of security concerns in project areas.

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The project organization shall include full-time Resident Project Security Advisers that will coordinate all security issues affecting the projects and have effective liaison with the relevant government agencies to assure reliable security coverage.

It is policy to ensure segregation of facility staff from security staff (accommodation provision and location) and for access to the facility to be restricted for security staff. This is to reduce the potential for injury of staff due to the accidental discharge of firearms, and reduce the possibility for extortion or collusion between staff and security personnel in acts of theft, etc. this will also be applied to security escort for all personnel movement.

SPDC guidelines based on the Shell CF Security Standard regarding security personnel access to facilities and proximity to operational staff will be applied to the project. Site-specific operational procedures (taking cognizance of the differences between the various locations) will have to be developed for the security personnel, taking account of the double perimeter fencing arrangements.

#### 12.4. Environment

The designs for the Project shall address, as appropriate, usage of resources, emissions to air, discharges to water, solid and semi-solid wastes, and protection of soil and groundwater to ensure compliance to the Shell Group HSSE & SP Standards which require that:

- Energy use and efficiency and Greenhouse Gas emissions are monitored and managed for continuous improvement and the global Greenhouse Gas emission inventory is subject to independent Assurance
- Installations are designed not to flare or vent hydrocarbons continuously as a means of disposal.
- SO<sub>2</sub> and NO<sub>2</sub> emissions, the discharge and disposal of process effluents and produced water, and the transport and disposal of waste are managed in line with Internationally Recognised Standards.
- The Risks of soil and groundwater contamination are assessed and managed.
- In areas of water scarcity, facilities are designed and operated to reduce water use to ALARP.
- Potential Impacts of Shell operations on Biodiversity and ecosystems are assessed and managed

As part of the project, there will be an Environmental Impact Assessment (ESHIA), which will be an assessment of the impact of the project on the surrounding physical environment and the various communities who can be affected by the project (such as local people, imported workers and their (distant) families, locally hired workers and their families, and camp followers). Due consideration shall be given to both construction and operations phases and their short and long term impacts.

EIA is the term used by the Nigerian Authorities; however, the scope of the EIA is broader than physical environment and more consistent with an Integrated Impact Assessment. The Impact Assessment shall be carried out as per Nigerian regulatory requirements (Environmental Impact Assessment Procedure for Nigeria), the Shell Control Framework Manual on Impact Assessment and the relevant modules of the SPDC HSE Reference Manual.

Where impacts are potentially beneficial, measures to enhance these shall be identified and where impacts are assessed as negative, appropriate control measures shall be identified. Identified measures shall be assessed and implemented where shown to be reasonably practicable. Provisional approval of the EIA by the Federal Ministry of Environment will be required before any construction can commence.

#### 12.5. Social Performance

Managing social and community issues and obtaining a License to Operate is critical to the success of any SPDC project, and particularly to the Security Enhancement Project. The project shall comply with the Shell

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Control Framework Manual on Social Performance through the implementation of a Sustainable Community Development (SCD) Programme and a Local Content Plan.

### Sustainable Community Development

The SCD process is designed to support the social License to Operate in the Niger Delta. SCD programmes will be identified through a combination of Participatory Rural Appraisal, Impact Assessment (EIA) and Legacy Issue identification and matched with budget allocation to the community. Identified programmes will be implemented along the lines of Economic Empowerment, Human Capital Development, Community Health and Basic Services. Prior to the implementation of these projects, SPDC and each of the communities will sign a preliminary agreement on the scope of SCD intervention.

Specific objectives of the SCD programme include:

- Ensure mutual beneficial relations to assure minimal non-productive time (NPT) attributable to community action during project execution through collaboration with Government and the communities.
- To rigorously implement all agreements and ensure compliance and enforcement of the tenets of a signed Global Memoranda of Understanding (GMOU) between SPDC, State Governments and the host communities.
- To ensure the timely remittance of agreed development funds per quarter into the jointly owned account for the funding of social interface activities.
- Ensure optimal utilisation of the social funds by the clusters of communities through capacity building effort of SHELL engaged Community Based Organisation(s)
- To establish an interface model acceptable (Project Advisory Committee) to all the stakeholders, this is expected to act as a local management body for the development and relations issues for the project.
- To ensure that all activities are performed in accordance with the tenets of Corporate Social Responsibility and in compliance with local laws.
- Ensure successful implementation of all the ESHIA recommended social mitigation programmes

### **12.6. Contractor's HSSE Management**

The Security Enhancement Project will comply with the Pre-Award and Post Award HSSE Requirements as defined by the Category Management and Contracting Process Framework to ensure that contracts consistently and effectively cover the management of HSSE risks during contracted activities.

#### Pre-Award HSSE Requirements

Prior the award of a contract, the following pre-award requirements will be met:

- Appointment of a Contract Owner and Contract Holder
- Determine a contract's HSSE & SP risks (contract risk level).
- Specify the responsibilities for managing HSSE between Shell and contractor (contract mode).
- Assess contractors' capability and resources to manage HSSE & SP risks for certain contract risk/mode combinations resulting to contractor HSSE banding (red, amber, green).

Only amber and green banded contractors should be invited to bid for contracts. However, if a contract is to be awarded to an amber banded contractor, a specific contract HSSE Improvement plan is required for the

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contractor to close gaps that affect the execution of the contract. The HSSE Improvement Plan will be agreed between the Contractor and SPDC and regularly monitored by the Contract Holder with the banding updated after sustained performance improvement and each gap is demonstrated to be closed.

#### Post Award HSSE Requirements

All contractors shall have in place and comply with a written HSSE & SP Policy compatible with the SPDC HSSE & SP Policy and maintain until contract completion a HSSE & SP Management System (HSSE-MS) which shall comprise the structure, responsibilities, practices, procedures, processes and resources for implementing the systematic management of HSSE & SP.

The contractors shall be required to develop a HSSE & SP Implementation Plan (HSSE Plan) relating to their contract scope of work which will be implemented throughout the life of the contract.

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### 13. QUALITY

It is the project objective to implement the Security System Enhancement Projects to a consistently high quality to meet with the opportunity statement and to comply with applicable codes, standards and regulatory requirements thus ensuring that the project safety, environmental, performance and operability targets are met.

Quality management of all project activities shall be conducted to conform to ISO 9000 Series latest edition. A quality system shall be defined and a quality plan prepared by the project team and maintained to reflect the requirements at all phases of the construction work.

The Environmental Management System of all project activities will be conducted to conform to ISO 14000 Series of Standards. Project management, document control and filing systems shall be derived based on the Opportunity and Project Management Guide EP 2001-5500 to enable the control, access, and retrieval and cross referencing of all project documents.

All quality management activities shall be carried out in an auditable manner and documented to ensure that the required quality is achieved and assured.

#### 13.1. Quality Strategy

The primary quality management functions of the project management include:

- Project definition and specification
- Quality planning and establishment of project procedures
- Criticality assessment
- Bid evaluation and contractor selection
- Internal audit
- Audit and surveillance of contractor performance
- Maintenance of the quality system
- Monitoring the capture of quality records
- Ensuring personnel have appropriate competence for their responsibilities
- Quality inspection of all documents and deliverables
- Maintain and action needs, issues and risk logs

As a major part of the work will be outsourced, with the primary responsibility for quality passing to the Contractor concerned, provision will be made to audit the Contractor project management activities, ensuring that the suppliers and contractors selected have adequate QMS for their scope, and for assessment of the performance of their QMS, by audit and surveillance, together with appropriate verification that their product complies with specified requirements.

Existence of a QMS Compliance with the appropriate part of ISO 9000 may be evidenced by certification by an appropriately accredited third party, or by production of a suitable Quality Manual. Practical confirmation of the current performance of such a system will be sought prior to award, where the scope includes items critical to the project.

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Supplier and Contractor compliance with both project quality requirements, and those of Contractor QMS approved for the Project, will be subject to verification by audit; either external or by observing contractor audits, system surveillance, and/or product sample inspection, as appropriate.

### 13.2. Quality System Documentation

The objectives of the Project, and the governing documents detailing them, form the top level of the Quality System.

Key Quality System documents will be the:

- Opportunity Framing Report
- Standards Register
- Interface Definition Documents
- Project-Specific Specifications
- Quality Plan
- Audit and Review Plan
- Inspection/Verification Plan
- Project Procedures

Source documents defining the requirements for the Project include:

- Nigerian Government Regulations and National Standards
- License and JV Agreements (JOA)
- Field Engineering Management System
- Petroleum Engineering Management System
- Engineering Specifications or DEPs
- Industry Standards

Controlling documents for the Project include:

- PEP (including Organization)
- Operations Philosophy and Asset Reference Plan

### 13.3. Procurement verification

Tendering Suppliers and Contractors shall be required to submit a quality plan for the work. Suitably experienced personnel shall evaluate the quality plan for compliance with the appropriate part of ISO 9000, the tender instructions and applicability to the required scope.

### 13.4. Construction and Commissioning

All site activities are subject to appropriate verification activities to ensure that suitable systems are in-place and control is exercised to achieve compliance with specified requirements. The generic quality requirements for Contractors *are*:

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- Contractor assessment and selection.
- Contractor Quality Plan requirements.
- Determination of intervention requirements and levels.
- Verification, Surveillance, Witness Tests and Product Sample Inspection.

Typical examples of such sample verification activities in construction would include:

- Traceability and certification of materials and work
- Qualification of weld/NDT Procedures and operators/personnel
- Observance of weld procedure and heat-treatment parameters
- Verification of NDT Sentencing
- Installation of electrical equipment in hazardous areas
- Contractor QC Records
- Interface specification details

Terminal Engineering Projects shall resource quality inspectors to support the team and provide assurance that the Contractor adheres to her quality plan.

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#### 14. PLANNING, INFORMATION & COST MANAGEMENT

The basis for planning on the project will be the Work Breakdown Structure (WBS) integrating the project activities in line with the EPBM.

The WBS for the project shall be captured in the SAP.

The Project Services unit within the Matrix, Major Pipelines, Corporate Civil & Terminal Engineering Projects team will provide support to the project execution team. This unit will manage project controls including management of change (MOC) procedures to be applied for all phases of the project, e.g. capital cost estimates; budgeting, cost and commitment control; planning and schedules progress reporting.

Change Management and Deviations Procedures will be managed by the Project Team and Contractors in line with SPDC guidelines.

FEED and Discipline Engineering shall be engaged as required for changes.

Responsibilities will include:

- Management of Change Procedure
- Cost estimates and benchmarking
- Budget management including contingency, forecasting, trending and reporting and financial authorities
- Technical scope and business change management and control, multi-level planning and scheduling development and maintenance
- Progress measurement, performance monitoring, forecasting and reporting
- Project Reports frequency, monthly/quarterly

The Project Accountant from the SPDC finance function will be accountable for managing finance related activities in the project. This will cover the set-up and operations of the SAP systems for contractor's payments, budgeting, cost control and management reporting.

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## 15. RISK MANAGEMENT

One of the key elements of the project has been the drive to identify and assess all risks, uncertainties and opportunities associated with the proposed development to ensure provision of the most robust, economically sound and fit-for-purpose concept. In order to capture and maintain a continuing awareness of risks, opportunities and uncertainties that might affect the project and the ultimate asset value, a risk and opportunity register was put into operation at the outset of the study.

SPDC shall continuously manage the HSSE risks associated with the work by means of a structured methodology following internationally recognised practices in line with HSSE Standards throughout the supply of scope. The risk management activities shall demonstrate that hazards (and associated risks) are identified and where the hazard cannot be eliminated the risks are managed to ALARP (as low as reasonably practicable). The risk management shall include:

- Development of a list of all work activities that will be used as a basis to determine the scope of reviews.
- Development of a list of the HSSE hazards of each identified activity.
- The assessment of the risk associated with each type of work by applying a Risk Assessment Matrix (RAM) aligned with the Company RAM. The Contractor's RAM shall be submitted to Company for review.
- A description of how each hazard will be controlled and shall indicate the need for specific job hazard analysis when the normal procedures and controls are expected to be inadequate.
- Implementation of risk reduction measures to control or mitigate the hazard and its effects.
- Planning for recovery in the event of a loss of control leading to an unacceptable effect

SPDC shall lead and perform the hazard identification and risk assessment which shall include the participation of the contractor's discipline specialists, supervisors and HSSE advisors involved in the relevant work activities. The output shall be the responsibility of the contractor and shall be made readily available to foremen and supervisors and shall be used to determine the appropriate hardware and controls, including supervision and monitoring that will be implemented. The contractor shall record actions and recommendations identified during the risk assessment in a common document available to SPDC. Actions shall be tracked by the contractor and closed prior to start of the work activity execution.

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