APPENDIX 1.1

TERMS OF REFERENCE

FEDERAL MINISTRY OF ENVIRONMENT

Environment House

Independence Way South, Central Business District, Abuja - FCT.
Tel: 09-2911 337 www.environment.gov.ng, ea-environment.org

ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMEnv/EA/EIA/3316/29
13th February, 2015.

The Managing Director,
Fugro Nigeria Limited,
14 Savannah Estate,
David Ejoor Crescent,
Gudu District,
Abuja.

RE: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF THE PROPOSED 125MWP UTILITY SCALE SOLAR PHOTOVOLTAIC (PV) PROJECT, KANKIA LGA, KATSINA STATE BY NOVA SOLAR 5 FARMS LIMITED.

Please refer to your letter dated 30th January, 2015 and our letter ref. No. **FMEnv/EA/EIA/3316/26** on the above stated project.

2. Following the conclusion of the site verification exercise, the Ministry has placed the project in Category One (1) requiring mandatory EIA studies and a panel review process. Please be informed that the Terms of Reference submitted to the Ministry should address all identified issues that are relevant to the project during the scoping workshop.

3. The field data gathering and laboratory analyses of the environmental component of the study which will be two (2) seasons include the followings as minimum, sampling points should be geo-referenced with coordinates in UTM format and tables in spread sheet (excel).

S/N	ENVIRONMENTAL PARAMETERS.	PARAMETER DETAILS	NUMBER OF SAMPLES/DISTRIBUTION	PARAMETERS TO BE MONITORED.
1.	**Climate/Meteorology**	Microclimate/Regional Climatic features	In-situ measurement, secondary data	Temp, rainfall, relative humidity, wind speed and visibility etc.
2.	**Ground water**	Physico-chemical & Microbial	2 Nos. + control samples	Depth to and thickness, hydraulics, recharge and, uses Colour, pH, turbidity, Salinity, hardness, heavy metals - Cu, Pb, Fe, K, Ba, DO, BOD, COD, THC, Electrical conductivity, Phosphate, SO_4, NO_3, TSS
3.	**Soil**	Physical	20 Nos. + controls samples per site	Profile (depth, type) colour, permeability, porosity, bulk density, texture (grain size)
		Chemical	20 Nos. + controls samples per site	Heavy metals (V, Ni, Fe, Pb, Cu, Zn),pH, moisture content, sulphate, nitrate

		Soil Microbiology	20 Nos. + controls samples per site	Total heterogenic bacteria (total hydrocarbon, T. fungi, total hydrocarbon bacteria (THB), faecal coliform.
4.	**Ambient air**		20 Nos. (in-situ @ different elevations) per site	Suspended Particulate matter, NO_x, SO_x, CO_2, CO, VOCs, H_2S.
5.	**Noise**	Noise level	20 Nos. (in-situ) per site	Db
6.	**Ecology**	Vegetation		Flora and Fauna
7.	**Socio-Economic**			Education, culture, distribution of livelihood, land use, etc. with structured questionnaire administration.
8.	**Health Impact Assessment**			Health status and prevalent diseases in the community.

4. You are to facilitate the participation of Ministry officials and also ensure full quality assurance/quality control (QA /QC) measures for the laboratory analyses in line with standard practices. You should notify us in good time to enable us plan our participation in the field work.

5. I am further directed to request you to pay the sum of Five Hundred Thousand Naira **(N500, 000.00)** only in bank draft to the Ministry, as the initial processing fee. Upon completion of the EIA studies, you are to submit Ten (10) hard copies and Two (2) soft copies of the draft EIA report to the Ministry.

6. Thank you for your co-operation.

K. B. Odusanya
For: Honourable Minister

APPENDIX 1.2

NOVA SOLAR 5 FARMS LIMITED SECURITY PLAN

Control Risks

REPORT

SECURITY PLAN

Nova Solar Power

CONFIDENTIAL | 15 FEBRUARY 2015

Control Risks Services (West Africa) Limited | 283A Akin Olugbade Street | Victoria Island | Lagos | Nigeria

T: +234 1271 3940/2931

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INTRODUCTION

Objectives

Nova Solar Power (NSP) has been awarded a Presidential Mandate to be the Lead Developer of a 500 MWp PV based Solar Program in Nigeria (hereinafter "Solar Program"). The Solar Program is based on the implementation of PV power plants with a minimum unitary installed capacity of 30 MWp across several States. The installed capacity for each power plant will be defined by a feasibility study. The first wave of the Solar Program comprises of three projects in:

- Katsina state (minimum 30 MWp)
- Nasarawa state (minimum 30 MWp)
- Ekiti state (minimum 30 MWp)

This document provides the security requirements for the 'first wave' of Nova Solar Power (NSP) projects in Nigeria. This document's objective is to enable adequate planning and implementation of security aspects of the project through the construction and operations phases. The security plan also allows for the monitoring of progress against security objectives.

NSP project overview

NSP is a project developer specialized in the design, development, management coordination and financing of renewable projects and more specifically utility-scale solar photovoltaic (PV) projects in Sub-Saharan African markets.

NSP has secured the support of TOTAL as a co-developer and lead investor for the Projects, as well as DFIs (Development Finance Institutes) over the Solar Program as a whole, which translates into commitments over the First Wave on the financing of Feasibility Studies, Development activities and Construction.

NSP, based in Abuja, is coordinating the development process of the Projects with a scheduled duration of 12 to 18 months for each Project. The construction phase should end at the end of 2016 and the Operations & Maintenance Phase will last 25 years more.

NSP and SUNPOWER have partnered for the purposes of the implementation of the Solar Program. SUNPOWER will be the technology provider. All the Projects will be designed and built with SUNPOWER technology (Module and Single Axis Tracking System).

Scope

This security plan is a NSP-specific document that provides a description of how security risks associated with the project can be reduced to as low as reasonably practicable (ALARP). It also provides a reference of the information relevant to security engineering controls (i.e. physical, electronic and technical security arrangements) that shall form part of each operational asset.

This plan is to be maintained and kept current through the life cycle of the construction phase. It shall then be archived and be replaced with a plan focussed on requirements in operations. The scope includes, but is not limited to identifying security hazards and identifying, assessing and outlining security arrangements for:

- NSP offices;
- EPC' facilities, including yards and offices in construction, commissioning and Operation and Maintenance (O&M) phases;
- Securing the operational phase of the project through effective design.

In particular, this plan ensures that:

- The security plan will be the basis for more detailed procedures, which shall be developed by various contractors for site-specific work activities;
- Relevant constraints and requirements for security management will be appropriately considered and where necessary incorporated into security arrangements.

Based on risk assessment, this plan covers the following areas:

- Security policy
- Project site security requirements
- Minimum security standards for construction and commissioning
- Requirements for security design

The scope of this plan excludes:

- Detailed security design and engineering.

ABBREVIATIONS AND DEFINITIONS

Table 1: Abbreviations and definitions

Abbreviation / Word	Definition
CCTV	Closed Circuit Television
Code of Conduct Manual	Manual dedicated to the Security Guard Force as a guide to perform duties with professionalism and ethics.
Emergency Response	Response to an emergency which is an unplanned incident, which brings about a lack of control and/or has a potential for escalation. The response is ensured by the implementation of guidelines, procedures and suitable means
EPC	Engineering, Procurement and Construction
ERT	Emergency Response Team
HSSE	Health Safety Security Environment
Information Security	Preservation of Confidentiality, integrity and availability of information and know-how
Information Security Policy	Set of policies issued by an organization to ensure that all information technology users within the domain of the organization or its networks comply with rules and guidelines related to the security of the information
IR	Infra-red
IT Security	Security of Information Systems and Technologies
NSP	Nova Solar Power (responsible for Development phase)
O&M	Operations & Maintenance
Owner	Project Special Purpose Vehicle (SPV). All the security Actions during the Construction and O&M to be shifted from NSP to the Owner. The role of NSP is limited to the Development phase. During the Construction phase, the Site will be managed by the EPC Contractor. During the O&M phase, the site will be managed by the O&M Contractor.
POC	Point of contact
POB	Personnel on Board
Security Level System	System for assigning a grade or level to areas where Solar Projects operate in order to identify the overall level of danger in that area
Security Plan	Document developed by the EPC Contractor, during the Construction phase, or by the O&M Contractor during the Operations & Maintenance phase. This document must be accepted by the Owner. It will detail all the security measures implemented to ensure the protection of people, personnel and information.
Security Services Provider	Private security company providing guard force and security services

Abbreviation / Word	Definition
Site Security Manager	Security manager contracted by the EPC Contractor, during the Construction phase, or by the O&M Contractor during the Operations & Maintenance phase. He is responsible for security on site and manages the security guard force.
SPV	Special Purpose Vehicle
Solar Program Security Advisor	Security Advisor contracted by the Owner to Control Risks
Subcontractor	Any third party subcontractor engaged by Contractor in connection with the work
TUCN	Total Upstream Companies Nigeria
VPSHR	Voluntary Principles on Security and Human Rights. The Voluntary Principles (VP) were created to "guide Companies in maintaining the safety and the security of their operations within an operating framework that ensures respect for the human rights and fundamental freedoms". The VP recognize that maintaining security while upholding human rights is the joint responsibility of communities, companies and governments

SECURITY POLICY

Objective

The objective is to ensure that Solar Program's security policy and procedures for risk assessment and loss prevention provide protection for personnel, assets, and information commensurate with industry best practice.

This implies that actions must be taken to ensure that a suitable organization exists to identify and manage security risks in a responsible manner, that all people who work for Solar Program are made aware of these issues, that they are trained to adopt adequate conduct, and that security forces which act to protect Solar Program's assets are familiar with the security principles.

This security plan provides specifications to develop and implement a security management system for the projected photovoltaic power plants in the States of Katsina, Nasarawa, Ekiti, and other sites, and for headquarters in Abuja.

The security services shall be:

- Safeguarding employees;
- Maintaining the integrity and effectiveness of operations;

- Reducing litigation risk, insurance costs, and theft;
- Improving the companies' reputation;
- Reducing the risk of vandalism and sabotage by employees and nonemployees;
- Protecting trade secrets;
- Improving relationships with local authorities and surrounding communities;
- Reporting all matters and incidents related to the security of people and integrity of goods;
- Periodic reporting to the management;
- Providing a mechanism for personnel control and accounting in case of emergency.

Security principles

The complexity of socio-economic conditions in Nigeria require Solar Projects to take necessary steps and measures to ensure the protection of its personnel, reputation, material, and non-material assets by combining the effectiveness of actions undertaken with the full compliance of local laws and respect for human rights, international standards, and customs of the communities in which it operates.

Security is a shared responsibility and, as such, all employees must adopt a positive attitude in support of Solar Program's security policy:

- The business process must include assessment of all security risks that can endanger Solar Program personnel, assets, information, and reputation, their consequences and protective measures.
- Each manager shall consider security risk prevention as an integral part of management and business activities.
- Security issues shall be managed in compliance with Nigerian and International law enforcement standards and respect for the Voluntary Principles on Security and Human Rights, Solar Program rules and regulations, Social Responsibility Principles, and Code of Conduct.
- EPC and O&M Contractor shall diligently endeavour to resolve tensions and disputes in the operating area, which may threaten its security by maintaining coordination with other operators and dialogue with government authorities. Dialogue shall also be maintained with the local communities through identified personnel responsible for external relations.

- EPC and O&M Contractor shall take all reasonable measures to promote observance of the above- mentioned standards and principles.

Duty to comply

The measures set out in this document. All directors, managers, staff and contractors are expected to comply with the measures set out herein. However, it is recognised that it may not be practical for all elements to be implemented in all cases; some measures may not be appropriate. In these cases site managers may seek temporary waivers to allow time to implement measures or permanent exemptions. Waivers or exemptions must be documented by project or country managers.

Exemptions and waivers

Exemptions are permanent derogations. They are not to be sought to provide wholesale exemption from this plan and the standards contained herein. Exemptions from specific minimum standards may be appropriate, but only where prescribed security procedures and measures are considered to be unnecessary.

Waivers are temporary derogations and may be granted to allow time to implement standards.

All requests for exemptions or waivers must be communicated in writing to the [position to be defined] who will confirm the granting of any such exemptions or waivers with the [position to be defined]. Evidence of any exemption or waiver approval must be retained for audit.

Exemptions to or waivers from the minimum standards will not be granted as a matter of routine. As such, while an exemption or waiver may be time-consuming to execute, they should not be commonplace. In the even the project finds that exemptions or waivers are being granted for the same matters or a regular basis, consideration should be given to revising this plan, after due consideration of current risks.

Exemptions or waivers may be made:

- If the results of a security risk assessment demonstrate that a waiver or exemption is more appropriate than the requirements imposed by the standards laid out in this plan.
- Where there are extenuating circumstances that make implementation of a security requirement impossible, impractical or not in the best interest of Owner (SPV).
- In the event of an emergency, the lessons learn will be an opportunity to review and eventually to re-adapt the security measures implemented. The Security Adviser will provide its expertise to advice countermeasures.

SECURITY RISKS

Threat And Risk Management

The guiding principle of the security management of the personnel and the facilities is of deterrent and protection whilst avoiding confrontation. Security risks will be identified and documented for all key activities.

Security threats can come from internal or external adversaries. Internal threats include disgruntled employees and/or contractors, employees forced into cooperation by threat of extortion or violence. External sources include criminals, extremists or terrorists.

The following security threats have been identified and are captured in the security risk register:

- International terrorism and Islamist militancy;
- Civil unrest, political and ethno-religious violence;
- Organised crime, including kidnap-and-ransom;
- Petty crime, theft of equipment;
- Community unrest;
- Labour unrest due to disgruntled employees;
- Theft of confidential information.

As environmental extremists threat is insignificant for such a Solar Program site, this threat is not included in the present assessment.

The main assets taken in account are as follows:

- Personnel and business visitors (Nationals and Expatriates, including TOTAL employees);
- Site facilities and offices in Abuja;
- Equipment;
- Information (IT / Communications systems and data).

While the likelihood of a threat is arguable, in particular for terrorist threat, the consequences for a company aside from the obvious losses could be quite harsh. Firstly, any significant emergency response effort due to an attack or a major incident would become a news media

event. This guarantees high visibility. Secondly, if it were learned that the company had completely ignored the security risk and was unprepared, there would be a public outcry.

That is why, at the very least, understanding the security risk is a necessity to implement suitable counter-measures in order to reduce or manage the risk exposure. Those measures are mainly based on “deter, detect, and delay” mechanisms incorporated into internal policies/procedures, perimeter security systems, rapid robust response, etc., as proposed in the present document.

Most of the security measures shall be applied on all the sites. Nevertheless, according to the local risk level, some measures can be reduced or reinforced, by keeping in mind that anticipation is a necessity.

The main vulnerabilities, on which it is difficult to act, are as follows:

- The levels of efficiency and professionalism of law enforcement and security forces;
- The protection of personnel on the roads during transit. In spite of attenuation measures, such as Mopol escort vehicle, the “risk zero” does not exist.

The implementation of suitable security measures will permit to reduce or at least to manage the risk exposure by acting on the likelihood, attractiveness and/or consequences.

Threat assessment and security vulnerability assessment (see additional document) shall be updated on regular basis and when relevant.

Control Risks notes that the Security Vulnerability Assessment (SVA) shall be performed again for each site prior starting of each phase, in order to be in line with the real security situation at this time. Then, the SVA shall be updated when necessary.

SECURITY MANAGEMENT SYSTEM

The security plan has been developed to align with the structure of the Exploration & Production (E&P) forum's Guidelines for the Development and Application of HSE Management Systems. The elements are summarised below.

Table 2: Guidelines for the development and application of HSE management systems

HSE-MS element	Addressing
Leadership and commitment	Top-down commitment and company culture, essential to the success of the system
Policy and strategic objectives	Corporate intentions, principles of action and aspiration with respect to health, safety and environment
Organisation, resources and documentation	Organisation of people, resources and documentation for sound HSE performance
Evaluation and risk management	Identification and evaluation of HSE risks, for activities, products and services, and development of risk reduction measures
Planning	Planning the conduct of work activities, including planning for changes and emergency response
Implementation and monitoring	Performance and monitoring of activities, and how corrective action is to be taken when necessary
Auditing and reviewing	Periodic assessment of system performance, effectiveness and fundamental suitability.

E&P Forum

Leadership and commitment

Line management within the project will be responsible for the application and implementation of the security plan and the standards contained in it at various levels with relevant advice from the project security advisor or his/her representatives in the project structure. The ultimate responsibility for security of the project's assets and personnel rests with the project manager. Project management shall ensure that sufficient competent resources are supplied so as to assure that the security objectives in this document are met. The project commits to reviewing project-specific security requirements to ensure dissemination of essential elements of this plan.

Every person in the project leadership team has the responsibility for delivery of security requirements in their respective areas of the project, including the following responsibilities:

- Implementing the security plan;
- Maintaining relevant security performance indicators;

- Conducting or actively inputting in the security activities;
- Reviewing EPC and O&M Contractors' security plans and monitoring implementation for their task or area as defined in the contract agreement with NSP;
- Encouraging personnel to identify security threats, participate in security inspections and incident investigations, as required.

A relevant HSSE reporting tool will be used to report security incidents and security near misses. The project shall also participate in any incident investigation, including liaison with the relevant authorities. Project members involved in project activities at non-EPC sites (e.g. ports and marshalling yards, rail termini, etc.) will support and participate in any security incident investigation requirements specified by that site's management.

Policy and objectives

Consistent with this commitment and Owner's guiding principles, to ensure that personnel are secure, the company will:

- Seek to identify security risks - recognising that risks may emanate from political, economic, labour or social factors - and take appropriate measures to minimise them;
- Assess whether the actions of the company, its contractors or its employees heighten risk and act appropriately to address such actions;
- Promote personal accountability for security by encouraging best practices and, where necessary, taking corrective and/or disciplinary action against personnel breaking the law or endangering lives or company property;
- Comply fully with national and international security-related legislation and strive to achieve industry best practice as a responsible corporate citizen, recognising that such actions contribute to the company's standing and performance;
- Work with law enforcement authorities, including regulatory and standards bodies, to ensure appropriate responses to security incidents involving personnel or assets;
- Investigate security incidents and grievances that may be raised by employees, subcontractors or affected communities and take necessary action to minimise the probability of recurrence.

Administration, organisation and responsibilities

The ultimate responsibility for security of the development, construction, operation and protection of operating asset shall rest with the Project Manager. The project manager, with assistance from an appropriately qualified security advisor, shall be responsible for assessing and managing security risk on the project in accordance with the standards in this document and the appropriate legal requirements. All security activities for the project shall be performed under the framework provided for in this document.

Solar Program security advisor

The Project Manager – with advice from the security advisor – has overall responsibility for ensuring that security issues are considered in the execution and design of the project facilities.

Package managers are responsible for ensuring that security is addressed for all activities associated with the delivery of their package.

Security advisory shall be sought by Owner (SPV), EPC and O&M Contractors to guarantee technical input into security plans and system design.

All security deliverables produced shall be reviewed and approved by TOTAL Security representative and Project Manager. The Project Manager shall be responsible for providing competent and adequate levels of resources (internal as well as external, as necessary) for implementing, monitoring and administering this security plan and appropriately design technical security measures for the operational phase of the project.

EPC and O&M Contractors' security plan

NSP shall reach an agreement on the type or security measures and procedures that will be included in the design of each phase of work. The agreement will outline who has responsibility for providing security measures.

Owner shall be fully responsible for the management of their own security through the specification and inclusion of security clause(s) within their contracts. Owner's responsibilities and accountabilities for security and areas where assistance will be provided by NSP shall be contained in the contract.

Contractors shall develop their own security plan detailing how they will handle security issues relating to their work. Owner shall ensure that appropriate security measures will be in place at all project work locations. These will aim to minimise risk to personnel and facilities from the consequences of wilful or accidental breaches in security. Each site location for the project will have its own criteria to fulfil the needs for that particular area.

EPC and O&M Contractor's security plans must include:

- A security threat assessment and risk assessment. This should consider the risks to Owner and EPC or O&M Contractors, and the overall success of the project that could result from threats such as:
  - Terrorist attack
  - Infiltration by terrorists for purposes of reconnaissance
  - Protest
  - Violent crime against project personnel during construction
- A schedule of security plan audits by Owner and EPC or O&M Contractors internal and external auditors;
- The procedure for conducting a security plan audit including process for selecting auditors who are independent of the program being audited;
- The procedure for conducting security in design review including a process for consultation during the review activity.

Modifying and updating security design by EPC and O&M Contractors

EPC and O&M Contractors shall provide for in their plans and associated procedures provision for:

- A means to modify security designs to correct deficiencies or take into account changes in technology;
- A mechanism to ensure appropriate and timely modification and updating of the security design either due to identified deficiencies in planning to that point, or a change in the environment;
- Communicating any modifications and updates to all affected parties.

EPC and O&M Contractors' security responsibilities

EPC and O&M Contractors shall:

- Provide onside security and / or internal security in sufficient numbers to mitigate security risks;
- Install and maintain physical security measures as defined in the contract agreement with NSP;
- Comply with relevant security for building and fire codes;

- Comply with relevant security standards as detailed in annexes.

EPC and O&M Contractors' project site locations

Each site location will have its own site specific security procedure which will take due consideration of all relevant local, national and international laws, regulations and standards with the objective of protecting personnel and securing Owner, EPC and O&M Contractors' assets. These measures shall meet the minimum standards as detailed in annexes.

Security risk management

The assessment of risks is a management tool to assist in identifying the appropriate security measures to put in place at any given site or for any project. A security risk assessment is a systematic process that evaluates the likelihood that a threat against a site or a project will be successful and considers the potential severity or impact of the threat event should it eventuate.

Risks to the Owner personnel and assets on site

Construction

The Construction phase security risks have been identified, analysed and evaluated prior to the development of this plan. They inform the security operational requirements for the construction phase.

The highest rated risks in construction phase involve: terrorist attack (various locations and assets); infiltration by terrorists of the construction project for purposes of reconnaissance; protest (various locations); and violent crime against the person (various types).

Key areas of focus for successful management of risk in the construction-phase are:

- Robust threat monitoring and journey management planning;
- Implementation of a site-level focus to mitigate the wider range of risks, many of which are focussed on specific locations and will evolve over time, as the project develops and the threat landscape evolves. EPC Contractor shall have documented plans to ensure this objective is achieved;
- A focus on operational elements, as opposed to construction or electronic elements. Security measures should take in account the activities constraints.

Operations

The operations-phase security risks have been identified, analysed and evaluated prior to the development of this plan and inform the operational requirements for design elements for the project.

O&M Contractor shall ensure that there is sufficient consideration of design elements into the design. These shall include the elements at **Annex C**.

Threat monitoring

NSP shall use third-party sources of information to monitor the national and local-level threat environments across all areas relevant to the project. This shall include consideration of:

- Local communities
- Ethnic groups
- Protest groups
- Labour force
- Private security companies
- Government security forces
- Petty criminals
- Extremist groups
- Organised crime groups
- Terrorist groups

Risks to CONTRACTOR

Requirement for CONTRACTOR risk assessment

EPC and O&M Contractors shall complete a security risk assessment for their planned activity, using a recognised methodology. The scope of such risk assessments shall consider the risk to Owner and EPC and O&M Contractors, and note the minimum standards in this plan. Owner shall ensure that any deviation from the minimum standards in this plan is covered by an appropriate waiver or exemption.

Planning, records and documentation

NSP's minimum standards for security are provided in the annexes of this document. The construction and operations phases of the project shall comply with these standards.

Construction and commissioning

The risk assessment and the NSP's minimum standards shall inform the development of specific security plans, which shall be subject to approval, review and audit.

Design

EPC and O&M Contractors shall apply the operational requirements and guidelines for security. These shall be incorporated in the detailed design an appropriately qualified body and shall be subject to review by the Owner.

Requirements

EPC and O&M Contractors shall abide by the requirements of the Owner partners and funders when required to do so.

Such requirements, however, should not be viewed as the single, absolute source for security risk management relating to the specific asset or to the wider business. Therefore, EPC and O&M Contractors shall abide by the standards in this plan in addition to any external requirements.

In the event of conflict with external requirements

In the event the Owner deems the requirements of this plan are in conflict with the requirements, an exemption or waiver shall be sought according to the procedure dictated in this plan.

Implementation and monitoring

The Project Manager shall ensure that the standards described in this document are implemented. This shall be aided by use of a relevant HSSE tracking tool.

All security incidents will be investigated as per requirements and recorded for statistical purposes.

The EPC and O&M Contractors leadership team, guided by the security advisor, will be responsible for periodically reviewing the progress of implementation of the security plan, taking appropriate action to improve performance. The Project Manager shall have overall responsibility of ensuring that the security plan is being implemented. However, EPC and O&M Contractors will be responsible for day-to-day implementation of the security measures outlined in the plan, and shall devise means to monitor the local, national and regional threat environment in order to facilitate continuous improvement in security service delivery.

A relevant manager, designated by the Project Manager, shall ensure that contractors adhere to guidelines stipulated in the contractors' approved security plans. Key performance indicators are as follows:

- 95% monthly report on HSSE issues related to the delivery of security project work;
- 95% weekly and monthly reports on security in design progress work;

- 100% completion of security awareness briefings (can be part of wider induction programme) within one week of arrival on the project;
- 100% monthly NSP/contractor forum to focus on security issues (can be covered under wider HSSE forum);
- 75% weekly report of the general security situation in the location.

Security meetings

Each site shall have a designated representative who is responsible for security. This person shall participate in weekly security meetings. Meeting records shall be kept, with any security incidents, issues or areas of concern allocated with relevant actions clearly assigned.

Additionally, there shall also be monthly meetings between the security advisor and the project team to allow for effective integration of security into the project activities.

Travel security

Owner's personnel

Owner has a duty of care to ensure the safety of staff travelling on company business.

The project shall ensure that accurate and timely information on travel risks is provided in order to enable staff to apprise themselves of potentially dangerous environments prior to and during travel.

EPC and O&M Contractors' personnel

EPC and O&M Contractors shall ensure that all personnel, including subcontractors, are covered by a risk based travel security programme that clearly outlines how travel and deployment is authorised; how people are briefed; how personnel are monitored; how personnel are located, alerted and updated following incidents, should they occur; provision of a 24-hour response service in the event they are involved in an incident; and provide to management a provide a post-incident audit trail. This requirement is summarised below.

Table 3: Traveller security requirements

Requirement		Description
PRE-TRAVEL	ASSESS	The risks prior to deploying personnel to ensure informed decision-making.
	AUTHORISE	A clear and robust mechanism for authorising travel to project sites
	BRIEF & TRAIN	The personnel being deployed overseas, so that they can take responsibility for themselves and act appropriately.
	IMPLEMENT	Measures necessary to safeguard employees while abroad, such as journey management, insurance and incident response.

Requirement		Description	
DURING TRAVEL	MONITOR	Events in the project area or in the travel itinerary (either directly related to the project or more macro-level issues (e.g. political disturbance).	
	TRACK	Employees as they travel to and from the project.	
IN AN INCIDENT	ALERT	Employees who may be affected by events in the project area or in the travel itinerary.	
	RESPOND	At management level	Mechanism to ensure a swift response to an incident – emergency response etc.
		To employees	Practical security assistance and advice 24x7.

Security of journeys

EPC and O&M Contractors are to ensure that local travel arrangements are incorporated in security plans including, if appropriate, restrictions on areas to which personnel may travel and on times of travel, and travel planning and communications procedures to ensure that the whereabouts and safety of personnel travelling can be adequately monitored.

EPC and O&M Contractors must adopt a journey management standard that is adhered to. This should include, but not be limited to:

- Auditing contracted vehicles
- Use of MOPOL
- Communications (phones, GPS vehicle tracking system)
- Travel rules (authorizations and restrictions rules, including in case of night driving if any)

Security awareness briefing

Responsibility of the EPC and O&M Contractors

Each employee and EPC and O&M Contractors are responsible for contributing to their own personal security by practising basic security awareness and, if tensions are higher, adhering to personal security guidelines issued for that specific location (as detailed in security plan).

Each individual is capable of contributing significantly to their own personal safety. By practising basic security awareness and adhering to personal security guidelines it is possible to reduce security risks significantly.

Staff, contractors and visitors must accept responsibility for their own property whilst on a site.

EPC and O&M Contractors shall make available a set of personal security guidelines. Staff shall read the guidelines before embarking on their trip and follow them.

The adequacy of Owner security plans shall be reviewed and assessed. All overarching plans by EPC and O&M Contractors shall include a comprehensive programme to ensure their international and local personnel have access to security information and assistance.

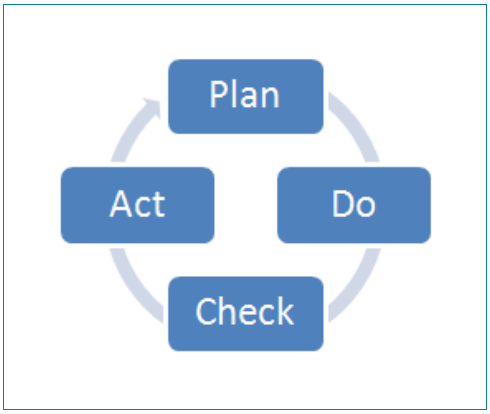
Auditing and reviewing systems and equipment

Quality approach

The Solar Program Security Management System shall be based on a quality approach including the PDCA (Plan–Do–Check–Act or Plan–Do–Check–Adjust) cycle for the control and continuous improvement of security processes and services.

The four steps Plan, Do, Check and Act/Adjust (PDCA) should be repeated over time to ensure continuous learning and improvements in a function, service or process.

Figure 1: PDCA cycle



- **Plan stage:** Establish the management system policy, objectives, processes and procedures to managing risk and reduce risk exposure, and to deliver results in accordance with the expected output (the target or goals).
- **Do stage**: Implement and operate the management system policy, controls, processes and procedures.
- **Check stage**: Study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. Look for deviation in implementation from the plan and also look for the appropriateness and completeness of the plan to enable the execution.

- **Act/Adjust stage**: Request corrective actions on significant differences between actual and planned results. Analyse the differences to determine their root causes. Determine where to apply changes that will include improvement of the process or product. When a pass through these four steps does not result in the need to improve, the scope to which PDCA is applied may be refined to plan and improve with more detail in the next iteration of the cycle, or attention needs to be placed in a different stage of the process.

The performance of the Solar Program Security Management System shall be monitored, measured and analysed in order to evaluate the effectiveness of the system, during Construction phase and then during Operations & Maintenance phase.

The Contractor during the Construction phase and Solar Program during the Operations & Maintenance phase shall establish, implement and maintain procedures to monitor, measure and evaluate the effectiveness of security systems and controls including:

- Evaluation of the suitability of the security policy, objectives and targets;
- Operational and performance evaluation, both on regular basis and after disruptive event;
- Communication and information systems;
- Application of findings of the Security management audit.

Contractor and Solar Program shall plan and conduct inspections and internal audits on regular basis and after disruptive event or major change in the risk assessment. Indication of any non-conformances, instructions or recommendations for corrective action will be identified.

According to the conclusions of the inspections and audits, EPC and O&M Contractors shall take preventive and corrective action.

Nonconformities shall be investigated by determining their causes. Needs for actions to prevent nonconformities shall be evaluated and actions shall be taken in order to avoid their recurrence.

Responsible persons to complete each action shall be assigned and the results of corrective and preventive actions taken shall be recorded. The effectiveness of corrective and preventive actions taken will be reviewed during next inspection or audit.

Security inspections

Security inspections consist of a general inspection and a scheduled (formal) inspection, whatever the Solar Projects phases.

General inspection means the habitual observation of on-going work practices and working conditions and activities by Security Manager and supervisors.

Scheduled inspection means a periodic or specific inspection, which is set up by the Site Security Manager. The Site Security Manager shall decide a scheduled inspection program including participants, areas to be inspected, frequency of inspections, etc.

The inspection will focus on evaluating the routine effectiveness of physical and technical, operational and procedural security measures at the site, particularly:

- Quality of guarding, including duties, performance management and training;
- Security equipment control and maintenance;
- Subcontractor facilities and security measures;
- Status of preventive or corrective actions taken.

During inspections, particular attention is paid to discovering any breaches, hazards or unsafe activities.

Any breaches, situation or practices, which are not complying with the security rules and standards, are directly notified to the parties or personnel concerned. The details of the non-conformance investigation and the instructions for corrective action shall be reported by the Site Security Manager to the Security Supervisors or to the Subcontractor Management and Security Correspondent (during Construction phase).

Security audits

EPC and O&M Contractors shall establish, implement and maintain a procedure to conduct audits at planned intervals and non-periodic basis or following a major disruptive event.

This audit procedure shall:

- Define responsibilities and requirements for planning and conducting audits, reporting results, and retaining associated records;
- Define audit criteria, scope, competencies, accountabilities, responsibilities, frequency and methods;
- Ensure that the results of the internal audits are reported to the management responsible for the site being audited and at the headquarter level, according to the “need to know” principle;
- Retain relevant documented information as evidence of the results.

Audits shall be conducted in a manner which provides objectivity and which demonstrates impartiality of the audit process.

The audit will focus on evaluating the effectiveness of the security management system, including physical and technical, operational and procedural security measures at the site, particularly:

- Security management and planning;
- Security vulnerability assessment;
- Staff training and awareness;
- Results from exercises and testing;
- Incidents records and treatment;
- Response procedures, including the preparedness and response capability of security and other personnel at the site;
- Perimeter and building security, access control system;
- CCTV systems;
- Quality of guarding, including duties, procedures, performance management and training;
- Security equipment control and maintenance;
- Status of preventive or corrective actions taken;
- Documentation management;
- Follow-up actions from previous reviews;
- Opportunities for improvement.

Full review findings and recommendations will be reproduced in the report.

EPC and O&M Contractors security assurance

Contracts shall include specific clauses to allow audits and reviews of the security plan implementation of EPC and O&M Contractors at its offices, yards and integration sites.

Design elements relevant to the operations phase of the project shall be subject to review by NSP.

Each EPC and O&M Contractors security plans shall include:

- A schedule of security plan audits by EPC and O&M Contractors internal and external auditors that will include Owner HSSE leadership or their nominated representative;
- The procedure for conducting a security plan audit including the process for selecting auditors who are independent of the security programme being audited;
- The procedure for conducting security design review including a process for consultation during the review.

EPC and O&M Contractors shall have emergency response plans that cater for security emergencies.

Internal to project

Internal reviews shall be conducted to monitor EPC and O&M Contractors' activities (and deliverables). This will be to:

- Ensure that the work meets the operational requirements as defined in project security risk assessment;
- Verify the progress of the activities against the security plan (i.e. in the construction phase);

Work shall be subject to review to ensure that the requirements of the project are being met, consistent with broader objectives.

External

The project manager shall ensure that external reviews are conducted twice per year to assure its effectiveness. The project manager shall also assure that the security plan in line with the threat situation and project phase to ensure it remains appropriate and relevant.

Security plan amendments and management of change

In high-risk environment, the security plan, which is a is a "living document", shall be reviewed more than annually to ensure that it reflects prevailing risks, and that the information it contains is up to date.

When to review

- When there are significant changes in the external context, especially as a result of the actions of the major protagonists.
- When another company has been affected by a major incident, especially in or near the same operational zone.

- When someone else is affected by an incident that in its nature or intensity appears to introduce a new element into the original risk assessment.

What to review

Virtually everything can be a potential candidate for review:

- Wider context and situational analysis
- Threat assessment
- Security vulnerability assessment
- Security strategy
- Contingency plans and procedures
- Physical and/or travel security measures
- External arrangements or agreements
- Etc.

If the review suggests a significant deterioration in security, a risk committee may be organized. Staff involved in security and operations matters would be assembled and briefed on the new assessment of the situation. What realistically can be done to mitigate the risks would be decided.

The Owner Security Manager is responsible for screening changes and modifications to facilitate ongoing revisions to keep the security plans current.

Significant changes in facility design, organisation, staffing, procedures, or operations, which are able to impact security of people and/or site, shall require a security risk assessment as part of the evaluation process.

Management of change during Construction phase

During the construction phase, changes that may impact security matters shall be directed to the EPC Contractor Site Security Manager, who shall be responsible to evaluate their impact on security and obtain the Owner's approval or rejection of them.

The implementation of changes in security people, equipment and procedures will be documented, approved by the Owner and controlled during a following audit performed by a security representative designated by the Owner.

The security vulnerability assessment shall be review by including the news changes.

Management of change during Operations & Maintenance phase

The Owner shall ensure that any external or internal changes that impact the organization are reviewed in relation to the Security Management System. O&M Contractor shall ensure that any changes are made and shall continually improve the effectiveness of the system through the use of the security management policies, objectives, audit results, analysis of monitored events, corrective and preventive actions, and management review.

External evaluation and approval

Security Plans will be evaluated by the relevant internal stakeholders, when their personnel will be under the responsibility of EPC or O&M Contractors for their security.

During all the phases, Security plans will be approved by EPC or O&M Contractors management at the headquarters level and site procedures by the EPC or O&M Contractors site manager.

Physical Security approach

The Security Management System shall be based on the “defence in depth” approach in order to mitigate the security risks. Defence in depth is the coordinated use of multiple security countermeasures to protect the integrity of the assets. The strategy is based on the military principle that it is more difficult for an enemy to defeat a complex and multi-layered defence system than to penetrate a single barrier. Then, defence in depth minimizes the probability that the efforts of malicious persons will succeed.

Combined defences are implemented to deter, detect, delay and deny an attacker. In the military context, delay the advance of an attacker relies on the assumption that an attack will lose momentum over a period of time, and time will allow those being attacked to respond appropriately.

These different defences are physical, technological, human and organisational barriers.

The implementation of the “defence in depth” strategy requires process controls to be established in three key areas:

- Protecting against the threats and mitigating the vulnerabilities;
- Detecting security incidents in a timely and effective manner;
- Reacting to these incidents in a manner that minimises impact on business operations.

In addition to these three key areas, there is also an ongoing requirement to revise the implemented processes and controls over time. Key to all the following procedural control elements is the need for these to be documented and communicated, and to be assessed.

Security Guard Force: General considerations

Security guard force coverage

The Security coverage is ensured on duty 24 hours a day, 7 days a week including holidays.

During night shift the main access gates will be manned and security guards will carry out foot and vehicle patrols on site.

Qualification

All the security guards shall have a police or a military back ground with security related work experience. They shall be persons with good character and have to be able to write a basic report.

They have to be well motivated in order to ensure the full commitments of their duties and ready to work in a multicultural environment.

The Security Services Provider shall provide the complete identity details and evidence of no previous criminal record for all security personnel assigned on Solar Program Projects.

Working time

The guards shall be on duty for shifts of 12 hours on 24 hours. Each shift has to be in accordance of the duty roster made by the Site Security Manager.

Sufficient guards shall be employed to ensure that all work is carried out in compliance with Nigeria labour laws and regulations.

Day off

Each guard should receive at least one day off per week. All security personnel must have at least eight (8) hours rest before assuming their duties.

Customer care

Security personnel are most of the time the first employees to be in contact with visitors and customers. They have to be in permanence on both day and night shifts always clean, shaved and tidy.

Sound security policies and proficiency in the execution of guard duties will vanish in the mind of management and employees if a guard is arrogant, surly, curt, discourteous, overbearing or slovenly in appearance.

Occasions will inevitably arise when a guard must prevent or call attention to a violation of Solar Program / Contractor rules and regulations. In the interest of good relations and to protect dignity of the offender, such situations will be handled with maximum tact and

diplomacy.

Confidentiality

All Security personnel shall not disclose any information regarding the security organization of the Site. This includes the security measures, emergency procedures and training and information on Solar Projects, and Owner and EPC or O&M Contractors personnel as well.

On the other hand all Security personnel shall not disclose any technical information or provide any documentation. This includes all hard copies of letters, drawings, etc. found in garbage and also all information captured on any software supports.

Any guards found in breach with these security regulations will be liable for criminal prosecution.

Code of conduct

A Code of Conduct Manual shall be issued. The EPC and O&M Contractors Site Security Manager will ensure the good understanding of the Code of Conduct by all security personnel. The contents of this Code of Conduct could be as follows:

- Responsibilities to our partners and others
- General rules of conduct
- Maintain a human, safe and secure working environment
- Health, Safety & Environment considerations
- Preserve the image and reputation of Solar Program
- Appearance, uniform and equipment of Security Guards
- Rules for the use of force
- Ethics considerations
- Compliance with the laws
- Anti-corruption, prohibiting bribery and corrupt payments
- Confidentiality

Equipment and uniform

The Security Services Provider will provide all necessary equipment for their personnel to complete the duties as described in the scope of works.

All personnel provided by the Security Services Provider shall be dressed in a clearly recognizable uniform provided by the Security Services Provider and clearly displaying the Solar Program's logo.

The uniform will be functional and permit the delivery of the designated services in the threat environment faced. It will be appropriate to the climatic conditions.

Training program

It is essential that the guards employed on either the offices, the construction site or the site during Operations & Maintenance phase have received the required level of training prior to commencing security duties for Solar Projects.

The Security Services Provider management shall provide the internal training program and the record of the training sessions performed by the Security Guards and Administrators selected and working on site.

During the Construction phase, a specific training program, adapted to the site security activity, will be issued by the EPC Contractor with the support of the Solar Program Security Advisor.

During the Operations & Maintenance phase, the O&M Contractor Site Security Manager will implement and control a specific training program in coordination with the Solar Program Security Advisor.

These training programs will be base on practical and theoretical approaches. Visual aids shall be used as much as possible during the training sessions. Written and practical examinations shall be organized.

The security guards will be trained on regular basis according to a planning defined with the Solar Program Security Advisor. The security guards that do not have the ability to perform their duties will be replaced.

The training program will consist of different modules grouped as follows:

- General training program including:
  - Code of conduct
  - Site rules and regulations
  - Main security principles
  - Threat identification
  - Access control and searching procedures

  - Surveillance and patrolling
  - HSE, Fire Prevention, Detection & Response
  - Communications means
  - Recording and reporting
  - Emergency response
  - Use of common security equipment
  - Maintain a good image, interacting with people
- Specific training modules such as:
  - Security management
  - Contingency plans (threat bomb, crime scene protection, civil or labour unrest, any event requiring emergency response on site)
  - Access control system
  - CCTV system
  - Preventing violence and dealing with seriously disruptive behaviour (violent incident, strike, riot)
  - Crowd management
  - Control room procedures
  - Emergency Response System
  - Testing of security equipment and systems, and maintenance process

Feedback from the participants is essential for continuing improvement.

Selection of security services providers

The following Security Services Providers are recommended to EPC and O&M Contractors:

Proton Security Services Ltd

Head office: 10, Jibowu Street, Yaba, Lagos

www.protonsecurity.com

Halogen Security Company Ltd

Head Office: 19B Mobolaji Bank Anthony Way, Behind Leventis Bus Stop, Maryland, Lagos

Offices in Abuja, Kano and Port-Harcourt

www.halogensecurity.com

Edinburgh International West Africa Ltd

Head office: 20 Taslim Elias Close, Victoria Island, Lagos

www.ei-westafrica.com.ng

Lifeguards Ltd

Head office: No 6; Bacita Close, Area 2, Section 2, Garki Abuja

www.lifeguardsltd.com

Employment Background Investigations

Prospective employees and contractors involved in security matters shall be required to undergo a successful pre-employment background investigation prior to hiring or assignment. Such background enquiries shall be done in accordance with guidelines issued by Human Resources and Contracting and Procurement.

Employment background investigations are not limited to security personnel only. EPC and O&M Contractors' employees involved in security matters shall be required also to undergo this type of screening.

Control Risks will be available to provide assistance upon request.

The results of pre-employment backgrounds shall be classified and dissemination limited to a "need-to-know".

ANNEX A. MINIMUM STANDARDS – DEVELOPMENT PHASE

During the Development phase, the following actions shall be performed:

- Implement and maintain a security network with the relevant local security authorities, security officials, embassies and all stakeholders' personnel involved in security matters;
- Implement a security plan and draft security documentation for the Development phase by focusing on:
    - Training programme to educate all personnel on personal security awareness, ensuring they are briefed on and trained to carry out their individual security responsibilities;
    - Communications;
    - Improvement of the physical security of the offices in Abuja (such as repair the razor wire on the top of the perimeter wall, review and improve the guarding procedures for access control, include a small window on the external door to check outside before opening, implement a key control management by using a security box to store the keys);
    - Implementation of the travel security measures;
    - Drafting of the evacuation plan;
    - Implementation of the Information Security policy, to classify and protect sensitive information.
- Assess the political and security situation on permanent basis and re-evaluate the risk level if necessary;
- Provide instructions and recommendations according to the security situation and the movements of personnel where NSP is involved;
- Prepare the Construction phase by assisting the EPC Contractor in:
    - Preparing contracting of the companies in charge of ensuring security services;

- Preparing the terms of references (ToRs) and technical specifications, and contributing in the selection of the qualified partners for each project phase and site.

During the Development phase, security issues will be part of the management meetings. For specific security issues, a security meeting shall be organized involving all relevant parties, including internal and external stakeholders.

NSP offices and accommodation are located in Maitama (see map here below) that is an area in Abuja with a relative low risk level area. The closest neighbours do not constitute a threat for NSP facility.

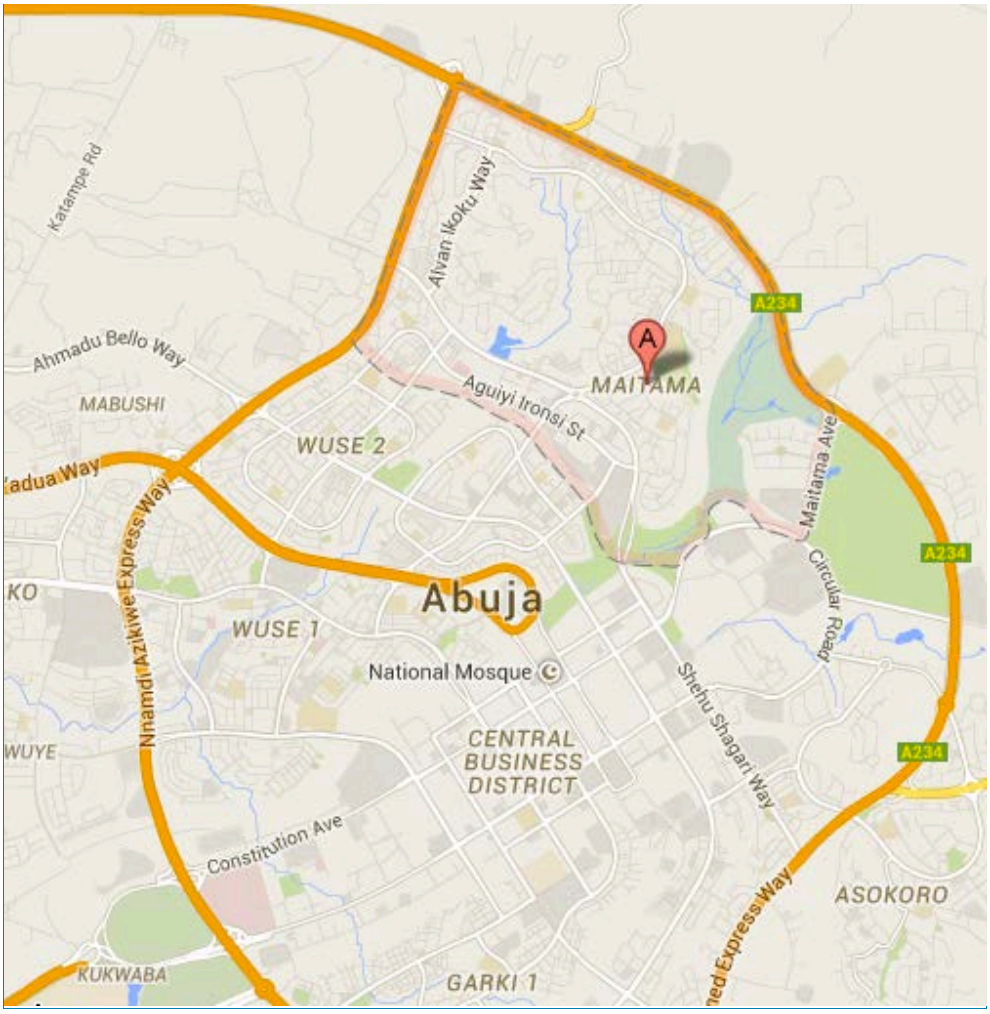
Hotels with an acceptable level of security measures are closed to NSP facility.

For the Development phase, a simple Emergency Response system shall be implemented according to the following considerations:

- Draft an Emergency Response Plan including:
  - Emergency and contact details of personnel, internal and external stakeholders, embassies, clinic, external emergency services, etc.
  - Notification charts and checklists according to the nature of the incident;
  - Medical response and evacuation procedure;
  - Incident notification, reporting and investigation procedure.
- Be able to setup a crisis room in Abuja headquarter with telecommunications means and relevant documentation.
- Organize training of the management with theoretical and practical approach.
- Provide a key contacts and emergency card.
- Draft an evacuation plan.

In case of incident or crisis liaisons and regular reporting shall be established with the internal stakeholders' emergency response structures involved.

Figure 2: Abuja city - Maitama



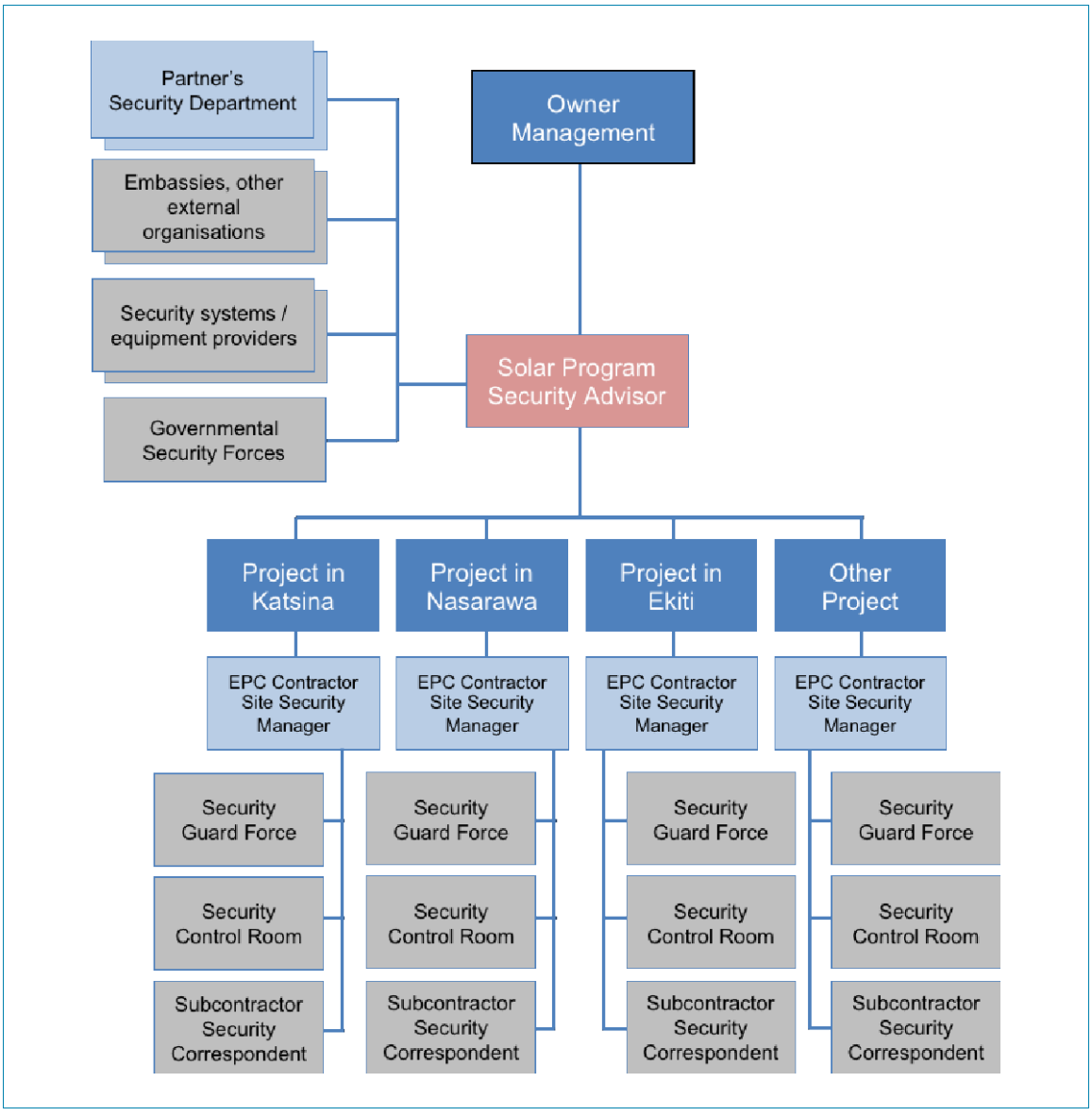
Source: Google maps

ANNEX B. MINIMUM STANDARDS – CONSTRUCTION AND COMMISSIONING

Security administration & organisation

An organisation chart for the construction and commissioning phase security organisation is below.

Figure 3: Construction and commissioning security organisation chart



Roles and responsibilities

During the Construction phase, the Owner and EPC Contractor will be responsible for:

- The security of their personnel in Abuja and in transit to the different locations;
- The management of their own personnel movements to and from the working sites, including headquarters;
- The Meet & Greet in Abuja and Lagos for international and domestic flights;
- The protection of the assets in Abuja headquarters;
- The liaison with local authorities, official organisations and partners' security department;
- Requesting the deployment of armed personnel through Government Security Forces to protect the integrity of the Site perimeter in Katsina, Nasarawa and Ekiti and to react to any armed violent threats for all Site activities.

On site (Katsina, Nasarawa and Ekiti), EPC Contractor will be responsible for:

- All security within the Site, also providing security for Project persons required to work on the Site and for other partners' persons visiting the site;
- The security of their personnel outside the Site perimeter;
- The management and control of the security guard force;
- The management of the access control and other security systems such as communications, CCTV, etc.
- The induction of all personnel arriving on site;
- The implementation and control of the security measures as defined by the Solar Program Security Advisor.

Subcontractors will be responsible for:

- The security of their personnel outside the construction site;
- The security of their material / equipment on their working sites;
- The security of their workshops;
- The disclosure of the security information and awareness to their own personnel;

- The implementation and control of the security instructions provided by the EPC Contractor Site Security Manager.

Job descriptions

Job descriptions for the security advisor and contractor site security manager are provided below.

SOLAR PROGRAM SECURITY ADVISOR – JOB DESCRIPTION

During the Construction phase Solar Program shall appoint a Security Advisor on permanent basis (i.e. 365-days-a-year coverage to assist Solar Program). S/he will report directly to Solar Program Manager in Nigeria and will be based in Abuja Headquarters and on the different sites. He will perform the following actions:

- Maintain liaison with the partners and the local authorities, in particular governmental security forces;
- In coordination with Total Upstream Companies Nigeria (TUCN) security department, ensure that the security measures implemented for Total personnel (local and expatriate) travelling to Solar Program sites, are in line with Total security requirements and standards;
- Continuously assess the political and security situation and the level of risk in areas where Solar Program is involved;
- Maintain up to date the risk assessment;
- Advise on the Security alert level in coordination with the local authorities and embassies;
- Follow-up of the full Personnel-on-Board (POB) and transmit to Owner and EPC Contractor management;
- Define, control and implement the security plan through the specialized selected companies;
- Support in the development and update of the security instructions, to ensure constant security for people and integrity of goods and facilities;
- Monitor the Performance of the selected security companies;
- Organize and perform security training for guard force personnel and project personnel involved in security issues;
- Follow-up and update the EPC Contractor emergency response and crisis plans, the evacuation plan, and organize training and crisis exercises;
- Define and control the execution of the missions allowing to ensure the security of the people and the integrity of goods by means of specialized service companies (security guarding, security of supply chain, Meet & Greet, security systems);
- Follow-up the compliance with the Group security instructions, in particular by the contractors;
- Manage security communication matters;
- Ensure that journey management and travel security procedures are effective and movement restrictions are applied in proper way;
- Perform security survey or audits of the installations (construction sites, offices, accommodation) and propose recommendations and corrective actions;
- Provide a monthly security report to Solar Program management relating all security activities;
- Provide security incident and investigation reports, and corrective actions to avoid the occurrence of such incidents in the future;

EPC CONTRACTOR SITE SECURITY MANAGER – JOB DESCRIPTION

The EPC Contractor will contract a selected security services provider to ensure the protection of the personnel, equipment and facilities on site. The security guard force will be managed by a EPC Contractor Site Security Manager, based on site on permanent basis, who will report to the EPC Contractor Site Manager and the Solar Program Security Advisor.

The Contractor Site Security Manager will perform the following actions:

- Manage and control the security guard force;
- Perform regular inspections on site and provide conclusions to the Solar Program Security Advisor;
- Follow-up the planning of inductions, training, tests and maintenance of security equipment;
- Provide a weekly security report to Solar Program Security Advisor and EPC Contractor Management;
- Provide incident and investigation reports to Solar Program Security Advisor and Solar Program Management;
- Record all security information as required by the Solar Program Security Advisor in a security database;
- Implement security plans, procedures and instructions provided by the Solar Program Security Advisor;
- Participate to management and security meetings;
- Maintain the onsite security network with the subcontractors' security correspondents and ensure the subcontractors apply properly the security instructions provided by the Contractor in coordination with the Solar Program Security Advisor;
- Ensure the correct disclosure of security information and awareness to the personnel on site,
- Maintain the POB and transmit on daily basis to the Solar Program Security Advisor and to the site management.

Guard forces

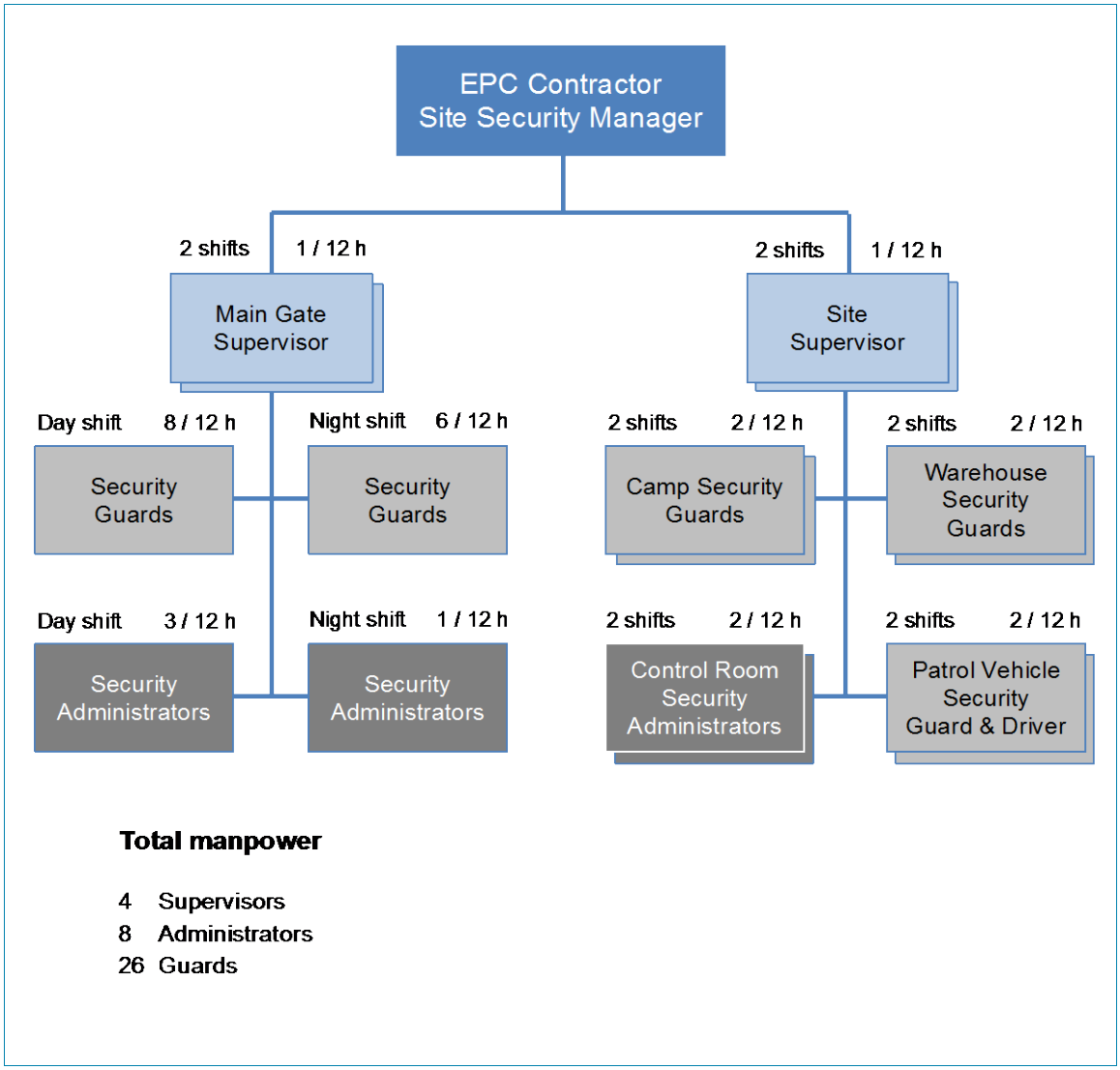
EPC Contractor shall manage and control an appropriately trained and qualified guard force supplied through a security Subcontractor to ensure the security of the Site. Contractor will be assisted by the Solar Program Security Advisor.

The contractor shall have:

- Security supervisors
- Security guards
- Security administrators

An organisation chart is provided below. Their roles are described overleaf.

Figure 4: Guarding organisation chart



The number of guards proposed here above is a minimum. The number of guards will depend on the project size, the evolution of the phase and the risk level reassessed.

Roles and responsibilities

Security supervisors

The Security Supervisors shall:

- Report directly to the EPC Contractor Site Security Manager;

- Supervise and direct the security guards and ensure they report daily routine jobs as well as any security matters observed;
- Make every security guard fully aware of any orders or instructions given by the EPC Contractor Site Security Manager and ensure their thorough observance and their continuous training;
- Report promptly any security incident to the security control room and EPC Contractor Site Security Manager. A written report shall be followed without delay, including the immediate measures taken;
- Maintain the control system of locks and keys;
- Conduct patrols themselves at least twice a day to check the activities of the security guards;
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team;
- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the EPC Contractor rules and regulations regarding security;
- Maintain a firm, calm and courteous behaviour, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the EPC Contractor Site Security Manager.

Security guards

The Security Guards shall:

- Report directly to the Guard Force Security Supervisors;
- Check conformance to requirements concerning security passes, in relation to both personnel and vehicles at the access to the site and restricted areas;
- Ensure that all personnel are checked in and out using the electronic badges readers;
- Patrol and observe those areas to which they have been assigned;
- Check the integrity of buildings, sensitive areas and fence lines during and after regular working hours throughout the period of their working shift;

- Assist in the control of traffic and supervise smooth ingress and egress of personnel to and from site;
- Conduct searches of all vehicles entering and exiting the Site as per instructions received from the Security Supervisors;
- Check the Material Gate Passes and the Waste Manifests against contents in the vehicle;
- Respond to alarm signals (fire alarms or other dangers signals);
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team;
- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the Solar Program / Contractor rules and regulations regarding security;
- Maintain a firm, calm and courteous behavior, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the EPC Contractor Site Security Manager.

Security administrators

- Report directly to the Guard Force Security Supervisors;
- Explain all applicable rules to the visitors;
- Inform applicable persons or offices of the arrival of a visitor, vehicle and/or equipment and issue a temporary pass upon acceptance;
- Keep records of all visitors, vehicles or equipment daily and submit to the Security Supervisors;
- Manage the access control system and issue the badges to access to the site;
- Manage the CCTV system at the main gate;
- Manage the security control room;
- Prepare the POB;
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team.

- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the EPC Contractor rules and regulations regarding security;
- Maintain a firm, calm and courteous behaviour, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the EPC Contractor Site Security Manager.

Documentation and records

Security documents and records will be developed including notably the following documents, which shall be adapted for different phases of work.

RESPONSIBILITY FOR SECURITY DOCUMENTATION AND CONTROL IN CONSTRUCTION PHASE

The EPC Contractor Site Security Manager will be responsible for the management and the control of security documentation and control during construction phase.

Documentation and records will be centralized in the Security Manager office and in the security control room.

Applications for delivering ID badges will be stored for a minimum time in the Badging office. Then the paper documents will be archived in the Security Manager Office and destroyed after a time to be defined.

Security guarding

Documentation dedicated to the guarding force will be the following:

- Guarding management plan
- Duties of guards
- Posting orders for guards
- Code of conduct manual
- Screening and recruitment of security guards procedure

Security plans and procedures

Security plans, procedures and manuals will be notably the following:

- Security policy
- Master security plan
- Site security plans
- Travel security plan
- Access control procedures
- Surveillance and patrolling planning plan
- Security ops room procedures
- Use and monitoring of CCTV
- Communications plan
- Control and maintenance of technical security equipment manual
- Key control procedure
- Incident notification, investigation and reporting procedure
- Emergency response and crisis management plan
- Contingency plans:
  - Bomb threat / explosion
  - Civil / community unrest
  - Strike / labour unrest
  - Kidnap-and-ransom
  - Car accident
  - Carjacking, hijacking
  - Body discovery and crime scene protection
- Evacuation plans (Headquarters in Abuja and sites)
- Documentation and confidentiality management plan

- Information security plan

Awareness and training program

Documentation dedicated to awareness and training will be notably the following:

- Pre-departure induction
- Nigeria personal handbook
- Information security handbook
- Basic in-country security induction (new employee and visitor) including one version dedicated to expatriate
- Security guards training program
- Technical security equipment manuals
- Emergency response training
- Specific security trainings for personnel involved in security matters
- Security flashes

Security assessment and risk levels

Documentation dedicated to security assessment will be notably the following:

- Updates of the Security Vulnerability Assessment
- Re-evaluation of the security risks levels records
- Security risk assessments

Security quality management

A security quality management system shall be implemented and the following documentation issued and kept:

- Security quality management plan
- Security inspection reports
- Security audit reports

Records

Records kept will be as follows:

- Security situation reports (SITREP)
- Risk assessment
- POB on daily basis
- Security manpower planning
- Security incidents and breaches records and reports
- Badge application forms
- Loss or theft of badges
- Exit/entry of site records
- Travel requests
- Inspections and audits planning
- Inspection and maintenance of security equipment or system log
- Crisis exercises planning
- Weekly security activity reports
- Security committee reports
- Minutes of meeting
- Key contacts details
- Maps and drawings

Security meetings and communications

Meetings

During the Construction phase, the Site Security Manager shall attend the management meetings to discuss about security issues. Different type of security meetings shall be also organized as follows:

- **Monthly Security Committee meeting**. Designated personnel and external organisations representatives (Police, Community leaders, etc.) involved in security matters will be invited to attend this Security Committee meeting at the site level (Katsina, Nasarawa and Ekiti). The main objectives of this meeting are:

- Assess the current security situation and debate on the last security incidents in the area;
- Discuss security topics and any problems observed or anticipated;
- Maintain strong relationships with external parties, such as governmental security forces, community leaders, etc.
- Communicate on the project to external relevant parties.

- **Weekly Security Meeting**. EPC Contractor Site Security manager and Subcontractors Security Correspondents will attend this meeting. The main objectives of this meeting are:
  - Assess the current security situation and debate on the last security incidents in the area and on site;
  - On irregular basis, conduct a security inspection patrol of the site prior to the meeting. Debate at the meeting the findings observed during the security patrol;
  - Discuss security topics and any problems observed or anticipated,
  - Have each security report on the status and performance of security activities including security training program;
  - Report on recent incidents and on follow-up action;
  - Confirm the result of the follow-up actions pointed out at the previous meeting;
  - Provide and explain new security programs, procedures or training to be implemented by the Subcontractors Security Correspondents;
  - Verify that security information has cascaded throughout the work force.
- **Exceptional Security Meeting**. A specific security meeting can be organized following a critical change in the Risk Assessment or a security incident requiring immediate counter-measures.
- **Daily Security Meeting**. During the change of shift, the EPC Contractor Site Security Manager will brief the new shift before starting activities and debrief the previous shift.

Communications

Communication will be the most important factor of all security on Site and needs to be ready and operational during all the phases. Good communication equipment shall be implemented in order to have an effective and permanent communication system. This will include:

- Mobile GSM network capabilities;
- Satellite phone, Iridium network;
- Telephone and fax line capabilities;
- High Internet capability;
- GPS/GSM tracking system;
- Radio systems (UHF, VHF, Motorola type) for security guard force (personnel, vehicles and control room). According to the site, a repeater could be installed to improve the range. At least three channels shall be available.

The redundancy is essential to avoid resilience on a single operator or method of communication.

Communication charts shall be developed within the framework of the Emergency Response and Crisis Management System, including the key contacts details of the stakeholders. For example, if one personnel of Total Upstream Companies Nigeria (TUCN) is on Site, under the responsibility of the Contractor, during Construction phase, or Solar Program, during Operations & Maintenance phase, the Security Manager will be in direct liaison with TUCN Security Department for reporting, providing POS, etc.

A **warning group SMS system** shall be implemented to provide security awareness to all personnel or specific groups of personnel during all the phases.

During all the phases, a security bulletin called "**Security Flash**" will be provided to the personnel by mail and/or hard paper copy in order to inform on security issues such as security risks levels, change in procedures to be applied, instructions, recommendations, etc.

During Construction and Operations & Maintenance phases, a **Security Control Room** shall be implemented in all sites in order to:

The Security Control Room shall notably be equipped with:

- Mobile GSM network capabilities;
- Satellite phone, Iridium network;
- High Internet capability;
- GPS/GSM tracking system if applicable on site;
- Radio systems (UHF, VHF, Motorola type);

- Computer and printer;
- Security documentation and specific procedures and checklists dedicated to the communications and emergencies management.

The control room will be used also as a **crisis room** in case of major incident.

Security reports

Different types of security reports will be issued on regular basis or according to the needs or the events in the security situation.

Monthly Security Report

The Monthly Security Report will be drafted by the **Solar Program Security Advisor** and transmitted to Solar Program management. This detailed report will relate all the security activities by summarising the different weekly security reports (see contents here below) and adding personal comments and analysis. It will be sent to the management on the basis of the "need to know" principle. This report will be classified "internal confidential". Recipients within other internal stakeholder's organizations shall be clearly identified.

Weekly Security Report

The Weekly Security Report will be drafted by each **EPC Contractor Site Security Manager** during the Construction and Operations & Maintenance phases in coordination with the Security Advisor. This report will be sent to the management on the basis of the "need to know" principle. This report will be classified "internal confidential". Recipients within other internal stakeholder's organizations shall be clearly identified.

The weekly report will focus on the following issues:

- Summary of the key points;
- Country and local risk levels;
- General assessment of the political and security situation in the area;
- Security incidents and corrective measures. The references of the incident and investigation reports will be provided;
- Security measures implemented, action taken, procedures issued during the week and status;
- Actions planned for the following weeks;
- Training, exercises and testing performed;

- Comments, needs for improvement.

Security Situation Report (SITREP)

The Security Situation Report will be drafted by the Site Security Manager and sent to the management on the basis of the “need to know” principle. This report will be classified “internal confidential”. Recipients within other internal stakeholder’s organizations shall be clearly identified.

The SITREP will be drafted to inform about the ongoing political and security situation in the country or in a specific area or to alert about potential evolution of the situation that could impact the project.

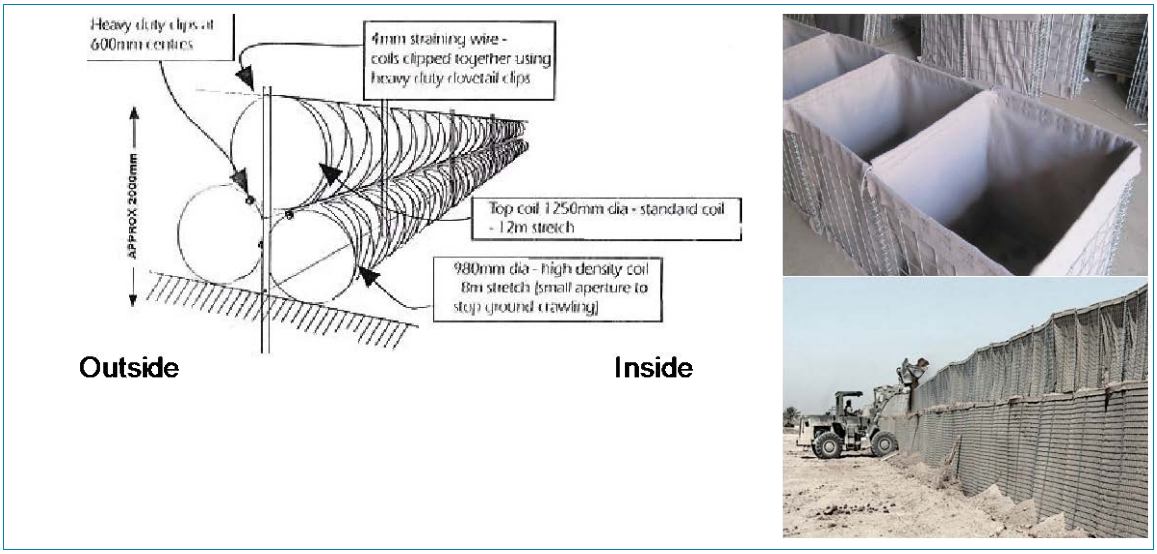
The contents of the SITREP should be as follows:

- Executive summary
- Overview
- Analysis
- Comments, potential impact on the activities, instructions or recommendations
- Attachments

Physical security

During the construction phase, fencing shall be a priority in order to delimitate physically the different areas and to protect people, material and equipment, and facilities.

Figure 5: Perimeter treatment



The security layout of the construction site may be organized as follows:

- External surrounding area protected by governmental security forces;
- External perimeter including final fence (built at the beginning of the Construction phase) and temporary fence in the vicinity of the temporary main gate. The two fences will be connected together;
- Restricted areas, such as camps, laydown area and warehouse, with suitable fencing;
- Restricted areas inside areas here above and buildings, such as security control room, critical assets storage container, power supply, etc.

External perimeter

The external perimeter shall be equipped with:

- At the beginning of the construction phase, the external perimeter can be made by ditch and barbered wires. Then the external perimeter will be made by a fence (potentially a double fence according to the risk level) with barbered wires / razor (and intrusion detection system only for the O&M phase). The main gate will be reinforced with bastion walls / concrete blocks;
- Mobile lighting in critical areas;
- Clear zones;

- Signage (Restricted area).

Main gate

The security main gate shall be equipped with:

- Security forces checkpoint
- Stand-off areas
- Signage (Security checkpoint, visitor access, searching area, weapons not authorized, etc.)
- Corridor for vehicles fenced with bastion walls
- Speed bumps
- Chicane with concrete blocks, jersey barriers or bastion walls linked with chains
- Security guard posts
- Security observation tower
- Portal or rolling gate
- Manual barriers (entry and exit)
- Manual tire shredder
- Corridor for pedestrians
- Mobile turnstiles
- CCTV (fixed camera to check the access)
- Visitors and suppliers registration room, including 1 computer, 1 printer, UPS, AC, bars on the windows, robust locking system
- Badging room including bars on the window, robust locking system, AC, access control system (see here below)
- Sanitary
- VHF radios
- Hand held metal detector and vehicle search mirror
- Window bars

- Lighting

Figure 6: Example treatment measures

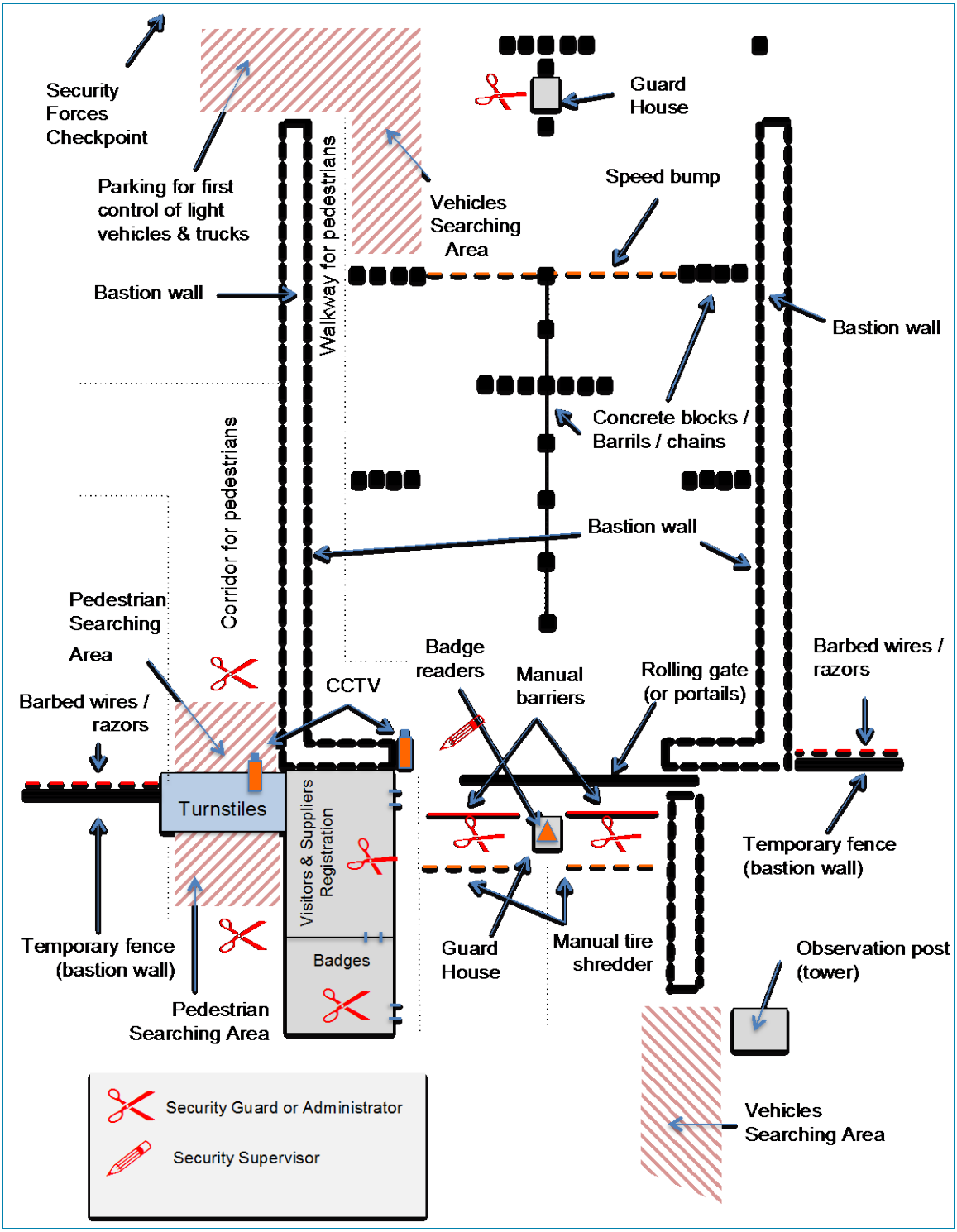
Picture: Jersey barrier

Picture: Tire shredder

Figure 7: Example treatment measures

Picture: Mobile turnstiles (source unknown)

Figure 8: Example gate (construction phase)



Emergency gate

The emergency gate shall be implemented with:

- Design and protection considerations (chicane, robust padlocks);
- Procedure to manage the emergency gate.

Access control system

An electronic access control system shall be implemented at the main gate for the following reasons:

- **Security issue**: restricted access for authorized persons only;
- **Safety issue**: identification of persons on site in case of emergency;
- **Operations issue**: manpower control per company and category and working time control.

The access control system will include:

- Central unit
- UPS
- Software
- Badge printer
- Camera
- Badge readers (x2) for vehicle access
- Turnstiles with badge readers
- Data back-up on daily basis

Administration offices

The administration offices shall be implemented with:

- Locking of external doors at night
- Bars on the windows
- Key control procedure
- Security box

- Documentation control management
- Shredding machine
- Information security systems

Owner and Contractor camp

The company and contractor camp shall be a restricted area implemented with:

- Fencing with bastion walls and barber wires / razors
- Portal
- Chicane
- Lighting
- Manual access control performed by Security Guards
- Guarding and patrolling
- Security ops room and crisis room
- Alarm horn (siren)
- Safe haven in the canteen (reinforcement with bastion walls)

Warehouse and laydown area

The warehouse and laydown area shall be a restricted area implemented with:

- Fencing
- Lighting
- Key control procedure
- Storage and exit material management
- Guarding

Other key points to be fenced

Protective measures shall be implemented for other facilities such as:

- Fuel storage tankers if any
- Power supply units (Electrical HV substation)

- Other critical facility or equipment if any

Surveillance and patrolling

A surveillance and patrolling program shall be implemented by including:

- Security mapping
- Serial numbers along the external fence
- Observation posts (if applicable)
- Foot and vehicle patrols
- Patrolling with dog
- Patrol planning and procedure
- Communication means (VHS radios Motorola type)

Access control procedures

Before activation of the electronic access control system, the Security Guards will maintain log registers at the entrance and the exit of the site for expatriates, until the badge readers are operational.

Employees, visitors and regular suppliers shall carry their badge on permanent basis.

Entrance control

- Vehicles and personnel seeking access to the site are subjected to the prior ID control and, according to the security situation, preventive search in order to deny the smuggling of illegal substances (e.g. drugs) and/or prohibited or potentially harmful materials (e.g. weapons, explosives) in the site.
- According to the security level, searches of vehicles, bags, luggage, etc. will be performed occasionally, regularly or permanently. Security Guards will be able to use a trained dog for explosive, hand held metal detector, vehicle search mirror.
- Employees already registered and carrying a badge are allowed to enter through the turnstiles by using the corridor for pedestrians.
- Employees already registered and carrying a badge are allowed to enter with their vehicle only if the vehicle is authorized to enter. All personnel on board will use the badge reader (when it will be operational) with the assistance of the Security Guard. Before the badge readers are operational, the entry of authorized employees will be registered on a log register at the main gate.

- Visitors will be registered and escorted. A “Visitor Pass” will be delivered to the security main gate by the company’s management responsible for allowing entrance. A visitor badge will be provided and basic rules and regulations will be explained to the visitors. Visitors must be escorted at all times on site by a representative of the department visited.
- The visitor badge must be visibly displayed at all times while he is in the facility and worksite. The visitor as any employee must produce that badge for inspection upon request by any other badge holder on site. Never allow any other person to use visitor badge or the badge of another employee.
- In case of an unexpected visit, Contractor Security Control must contact the visited person and require the issuance of a visitor pass and then follow the relevant procedure.
- The new employees will follow a security and safety induction. A badge will be provided in exchange of proof of employment and “Application Form” provided by the employer. The time to follow the arrival process, the new employee may have a visitor badge.
- The regular suppliers will have a specific badge. The irregular suppliers will be considered as visitors.
- The entry of material and plant equipment will be possible against the authorization of the Material Manager or his representative, responsible for escorting the truck(s) to the laydown area.
- The portal will be closed at night and opened in case of arrival of vehicle authorized to enter.
- A colour code on personal badge and sticker for vehicles (clearly displayed and visible at all time on the windscreen) will allow entrance into a restricted area.

Exit control

- National employees carrying a badge will be authorized to exit according to the working times defined by the Contractor management.
- Search of vehicle, bags and luggage shall be performed in order to deny the theft of plant equipment.
- The visitor badge remains the property of EPC Contractor Security Department and must be surrendered on completion of the visit on site. When leaving the site, the visitor badge must be returned to the EPC Contractor Security Department.
- Expatriates will not be allowed to exit without provision of a Mopol escort vehicle.

- The exit of any employee will be registered in a log register at the main gate by waiting for operational badge readers. It will not be allowed for an expatriate to exit the site from a defined time and more generally at dark.
- Plant equipment, materials and tools (with specific identification marks) are allowed to be taken away the site by an authorization (gate pass exit) signed by the Subcontractor Project Manager and approved by the EPC Contractor Management (if required).
- EPC Contractor Site Security Manager and Solar Program Security Advisor keep the possibility to control, at random, the correct implementation of this procedure.

Other considerations

It will be mentioned in the terms of conditions for the subcontractors and regular suppliers that any lost or theft badge will be charged to the subcontractor or the supplier. The damage or the loss shall be immediately declared to the EPC Contractor.

Employee, visitor and supplier badges will have a specific mark to recognize them easily.

The information contained in the database for issuing a badge (except visitor badge) will be as follows:

- ID picture
- Full name details
- Date of birth
- Nationality
- ID card or Passport number
- Company name (employer)
- Category: Owner, EPC Contractor, Subcontractor, External Supplier
- Job title
- Estimated date of final departure
- Areas where the employee is allowed to access

This information will be provided through the “Application Form” signed by the employer. Only the following information will be visible on the badge:

- ID picture

- Full name
- Company name (employer)
- Job title
- Colour code for restricted areas

This information contained in the database and on the application forms will be classified "Personnel Confidential" and will be stored and used according to the confidentiality rules.

The computers and back-up systems will be protected and access restricted. Security personnel allowed to use these IT systems will be subject to a security screening.

Security forces liaison and support

A Memorandum of Understanding (MoU) with reference to these Voluntary Principles on Security and Human Rights (VPSHR) shall be mentioned in the letter to the local security authorities. Particular attention should be given to knowledge of and adherence to Voluntary Principles on Security and Human Rights.

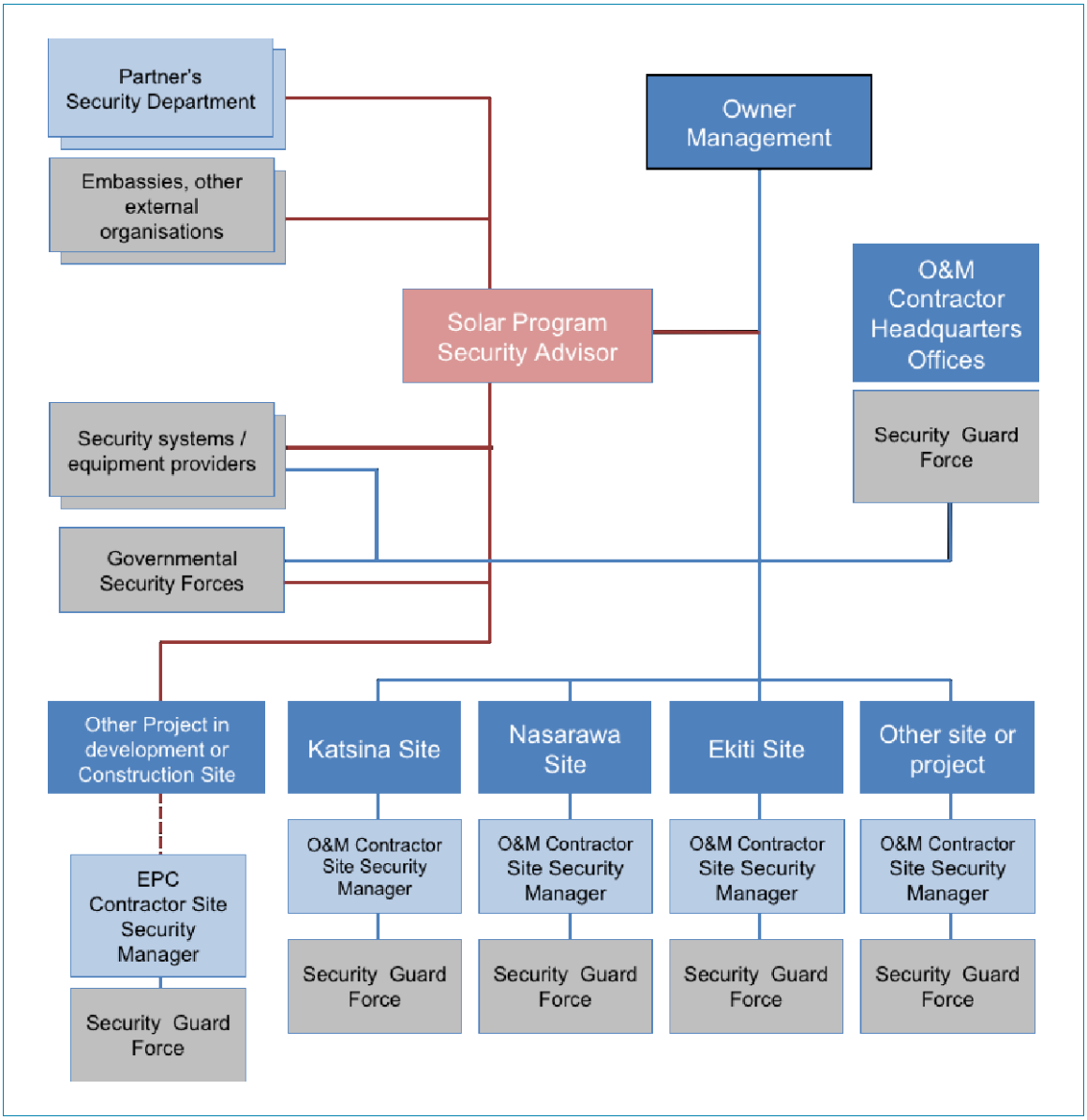
- Solar Program Security Advisor and EPC Contractor Site Security Manager will maintain close relationships with the government's security forces and a direct liaison with the local security authorities.
- Solar Program recognises that ultimate responsibility for the armed defence and external security of the Solar Program facilities rests with the Government of the state or with federal authorities. Solar Program therefore recognises the need for close cooperation, liaison and coordination with the relevant state forces of law and order to ensure the security of the Solar Program sites.
- Security forces checkpoints shall be implemented on the access roads to the site. The security forces shall therefore perform patrolling in the vicinity of the site and provide escort vehicle with armed personnel onboard for expatriate(s) in transit or travelling in the area.
- Arms on board Contractor and Solar Program's vehicles will not be unauthorized.
- In case of collapse of the local security situation due to a labour unrest, EPC Contractor would be able to request assistance from the government's security services. Nevertheless, EPC Contractor site management shall remind to the local security authorities that any application of force is done so in a proportionate, ethical and restrained manner commensurate with Solar Projects security approach.

ANNEX C. MINIMUM STANDARDS – OPERATIONS & MAINTENANCE

Security administration & organisation

An organisation chart for the operations and maintenance phase security organisation is below.

Figure 9: Operations and maintenance phase security organisation



Roles and responsibilities

During the Operations & Maintenance phase, the O&M Contractor will be responsible for:

- The security of their personnel and in transit to the different sites;
- The management of their own personnel movements to and from the working sites, including headquarters;
- The Meet & Greet during transit to Katsina for partner's visitors;
- The protection of the assets in Abuja Solar Program's headquarters as the case may be;
- The liaison with local authorities, official organisations and partners' security department;
- All security within the Site, also providing security for other partners' persons visiting the site;
- Requesting the deployment of armed personnel through Government Security Forces to protect the integrity of the Site perimeter and to react to any armed violent threats for all Site activities.
- The management and control of the security guard force;
- The management of the access control and other security systems such as communications, CCTV, etc.
- The control and maintenance of security systems and equipment;
- The implementation and control of the security measures as defined by the Solar Program Security Advisor;
- The Coordination with TOTAL security system.

Job descriptions

Job descriptions for the security advisor and site security managers are provided below.

SOLAR PROGRAM SECURITY ADVISOR – JOB DESCRIPTION

During the Operations & Maintenance phase, Owner will contract a Security Advisor to assist Solar Program in security matters, maintain the security management system, and perform regular audits and provide corrective actions. He will report directly to Solar Project Manager in Nigeria and will be based in Abuja Headquarters and on the different sites. Therefore, he will perform punctual missions to assist in the development of other projects and to organise and provide security training.

A permanent presence in Nigeria is required. The following options are proposed:

- Rotation system but reducing to a Profile B
- Residential expatriate

The Security Advisor will perform the following actions:

- Maintain liaison with the partners and the local authorities, in particular governmental security forces;
- In coordination with Total Upstream Companies Nigeria (TUCN) security department, ensure that the security measures implemented for Total personnel (local and expatriate) travelling to Solar Program sites, are in line with Total security requirements and standards;
- Re-assess the political and security situation and the level of risk in areas where Solar Program is involved and update the risk assessment;
- Advise on the Security alert level in coordination with the local authorities;
- Perform security audits on site and define corrective actions;
- Perform security survey of new sites, offices, accommodation, etc.
- Control and update the security instructions, to ensure constant security for people and integrity of goods and facilities;
- Monitor the performance of the selected security companies;
- Organize and perform security training for guard force personnel and project personnel involved in security issues;
- Control and update the O&M Contractor emergency response and crisis plans, and organize training and crisis exercises;
- Control the execution of the missions allowing to ensure the security of the people and the integrity of goods by means of specialized service companies (security guarding, security of supply chain, Meet & Greet, security systems);

SOLAR PROGRAM SECURITY ADVISOR (SUITE)

- Ensure that journey management and travel security procedures are effective and movement restrictions are applied in proper way;
- Perform security survey or audits of the installations (existing sites and other potential sites, offices, accommodation) and propose recommendations and corrective actions;
- Provide a security report to Owner management relating all activities of the Security Advisor;
- Provide security incident and investigation reports, and corrective actions to avoid the occurrence of such incidents in the future;
- Assist Solar Program in the development of other projects in other States.

O&M CONTRACTOR SITE SECURITY MANAGERS – JOB DESCRIPTION

O&M Contractor will contract a Site Security Manager to manage and control the security services provider's duties. A security guard force will ensure the protection of the personnel, equipment and facilities on site. The Site Security Manager, based on site on permanent basis, will report to the Site Manager and the Solar Program Security Advisor.

The Site Security Manager will perform the following actions:

- Manage and control the security guard force;
- Perform regular inspections on site and provide conclusions to the Solar Program Security Manager;
- Follow-up the planning of inductions, training, tests and maintenance of security equipment;
- Provide a weekly security report to O&M Contractor Management;
- Provide incident and investigation reports to O&M Contractor Management;
- Record all security information as required by the Solar Program Security Advisor in a security database;
- Implement and control the corrective actions decided by O&M Contractor management on the recommendations of the Solar Program Security Advisor;
- Participate to management and security meetings at the site level and to security committee meetings;
- Ensure the correct disclosure of security information and awareness to all personnel on site,
- Maintain the POB and transmit to the site management and O&M Contractor Management.

Guard forces

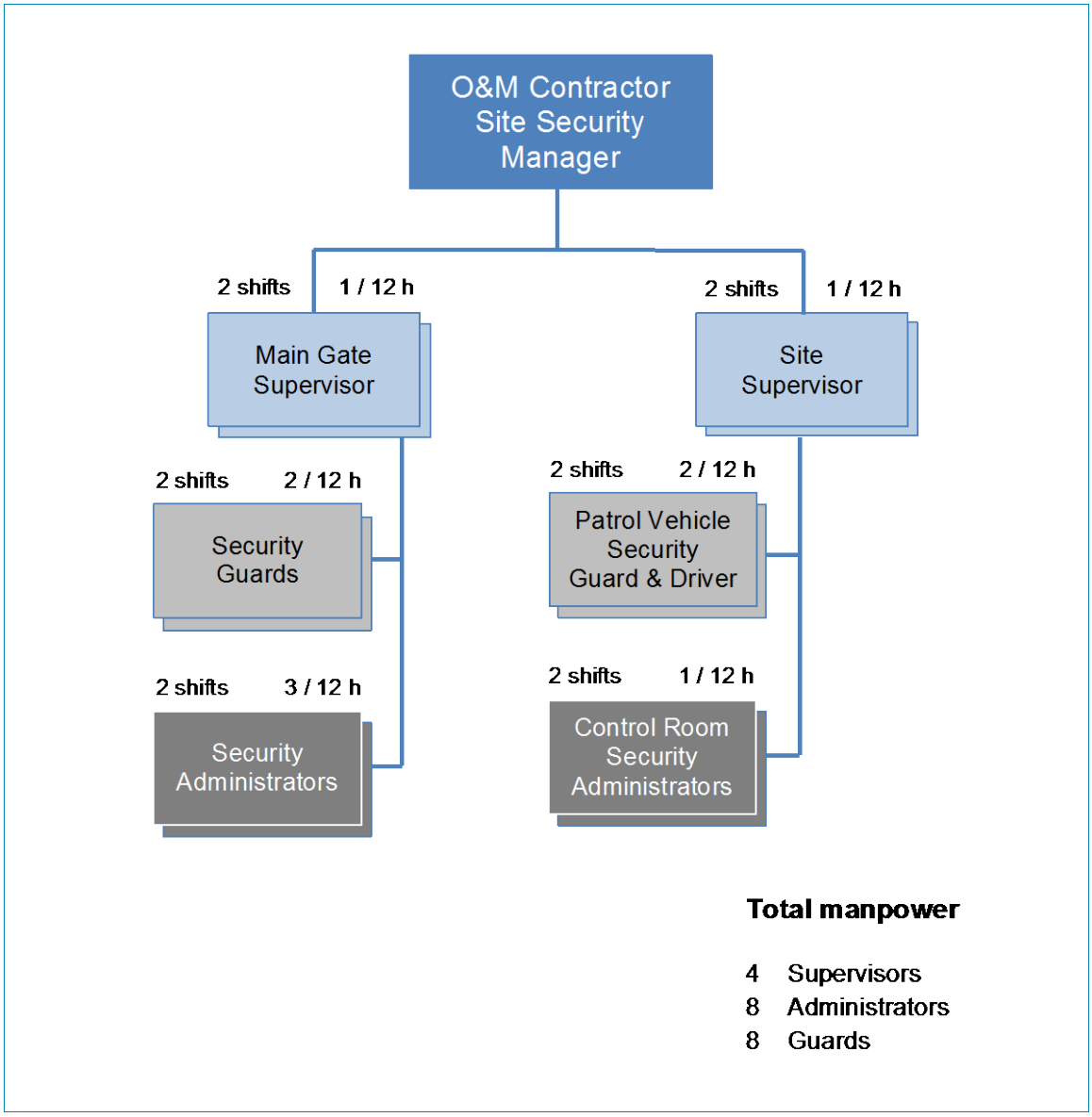
The Owner shall manage and control an appropriately trained and qualified guard force supplied through a security Subcontractor to ensure the security of the Site. The Site Security Manager will be assisted by the Solar Program Security Advisor.

It is expected that O&M Contractor will require:

- Security supervisors
- Security guards
- Security administrators

An organisation chart is show below and roles described overleaf.

Figure 10: O&M phase guarding organisation chart



Roles and responsibilities

Security Supervisors

The Security Supervisors shall:

- Report directly to the O&M Contractor Site Security Manager;
- Supervise and direct the security guards and ensure they report daily routine jobs as well as any security matters observed;
- Make every security guard fully aware of any orders or instructions given by the Site Security Manager and ensure their thorough observance and their continuous training;
- Report promptly any security incident to the security control room and Site Security Manager. A written report shall be followed without delay, including the immediate measures taken;
- Maintain the control system of locks and keys;
- Conduct patrols themselves at least twice a day to check the activities of the security guards;
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team;
- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the O&M Contractor rules and regulations regarding security;
- Maintain a firm, calm and courteous behaviour, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the Site Security Manager.

Security guards

The Security Guards shall:

- Report directly to the Guard Force Security Supervisors;

- Check conformance to requirements concerning security passes, in relation to both personnel and vehicles at the access to the site and restricted areas;
- Ensure that all personnel are checked in and out using the electronic badges readers;
- Patrol and observe those areas to which they have been assigned;
- Check the integrity of buildings, sensitive areas and fence lines during and after regular working hours throughout the period of their working shift;
- Conduct searches of all vehicles entering and exiting the Site as per instructions received from the Security Supervisors;
- Check the Material Gate Passes and the Waste Manifests against contents in the vehicle;
- Respond to alarm signals (fire alarms or other dangers signals);
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team;
- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the Solar Program rules and regulations regarding security;
- Maintain a firm, calm and courteous behavior, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the Site Security Manager.

Security administrators

- Report directly to the Guard Force Security Supervisors;
- Explain all applicable rules to the visitors;
- Inform applicable persons or offices of the arrival of a visitor, vehicle and/or equipment and issue a temporary pass upon acceptance;
- Keep records of all visitors, vehicles or equipment daily and submit to the Security Supervisors;
- Manage the access control system and issue the badges to access to the site;
- Manage the CCTV system at the main gate and at the security room;

- Manage the security control room;
- Participate in the Emergency Response procedures and Emergency Response Team training and activities. Assist the Emergency Response Team;
- Communicate adequately with the shift oncoming to ensure smooth turn over and to facilitate execution of the duties;
- Enforce the Solar Program rules and regulations regarding security;
- Maintain a firm, calm and courteous behavior, never resort to violence to solve any problems;
- Never alter their work-timing roster unless so authorized by the Site Security Manager.

Documentation and records

Security documents and records will be developed according to the listing in the construction phase annex (above). These shall be adapted for Operations & Maintenance.

RESPONSIBILITY FOR SECURITY DOCUMENTATION AND CONTROL IN O&M PHASE

The Solar Program Site Security Manager will be responsible for the management and the control of security documentation and control during construction phase.

Documentation and records will be centralized in the Security Manager office and in the security control room.

Applications for delivering ID badges will be stored for a minimum time in the badging office. Then the paper documents will be archived in the Security Manager Office and destroyed after a time to be defined.

Security meetings and communications

Meetings

During the Operations & Maintenance phase, the Security Manager shall attend the management meetings to discuss about security issues. Different type of security meetings shall be also organized as follows:

- **Monthly Security Committee meeting**. Designated personnel and external organisations representatives (Police, Community leaders, etc.) involved in security matters will be invited to attend this Security Committee meeting at the site level (Katsina, Nasarawa and Ekiti). The main objectives of this meeting are:
  - Assess the current security situation and debate on the last security incidents in the area;
  - Discuss security topics and any problems observed or anticipated;
  - Maintain strong relationships with external parties, such as governmental security forces, community leaders, etc.
  - Communicate on Solar Program to external relevant parties.
- **Weekly Security Meeting**. O&M Contractor Site Security Manager, Administrators and Supervisors will attend this meeting. Other personnel involved in security matters will be invited to attend this meeting. The main objectives of this meeting are:
  - Assess the current security situation and debate on the last security incidents on site;
  - On irregular basis, conduct a security inspection patrol of the site prior to the meeting. Debate at the meeting the findings observed during the security patrol;
  - Discuss security topics and any problems observed or anticipated,
  - Have each security report on the status and performance of security activities including security training program;
  - Report on recent incidents and on follow-up action;
  - Confirm the result of the follow-up actions pointed out at the previous meeting;
  - Provide and explain new security programs, procedures or training to be implemented;
  - Verify that security information has cascaded throughout the work force.
- **Exceptional Security Meeting**. A specific security meeting can be organized following a critical change in the Risk Assessment or a security incident requiring immediate counter-measures.
- **Daily Security Meeting**. During each change of shift, the O&M Contractor Site Security Manager will brief the new shift before starting activities and debrief the previous shift.

Communications

The principles of good communications as an essential part of a sound security strategy shall apply in Operations & Maintenance phase as in Construction phase.

Security reports

Reporting in Operations & Maintenance phase shall be similar to that in construction phase, i.e. by using monthly and weekly reports, in addition to SITREPs in a more adhoc manner.

Physical security

Perimeter

The external perimeter shall be equipped with:

- Perimeter fencing (with serial number plates on the fence)
- Lighting
- Clear zones
- Signage (Restricted area – No trespassing)
- Patrolling
- Observation posts (if applicable)
- Intrusion detection system (fibber optic)
- CCVT: Fixed cameras along the fence and / or cameras dome in specific spots. Weather proof, day and night vision cameras using infrared (IR) technology.

Figure 11: Site external security fence

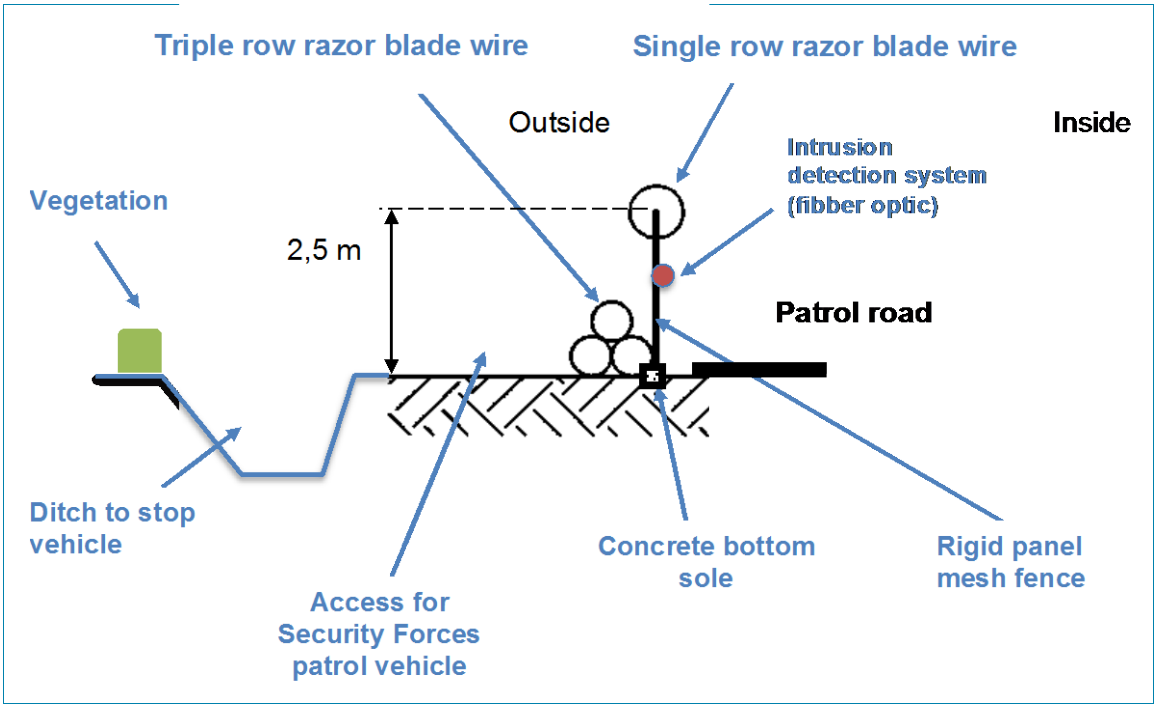


Figure 12: Fixed camera and camera dome

Security main gate

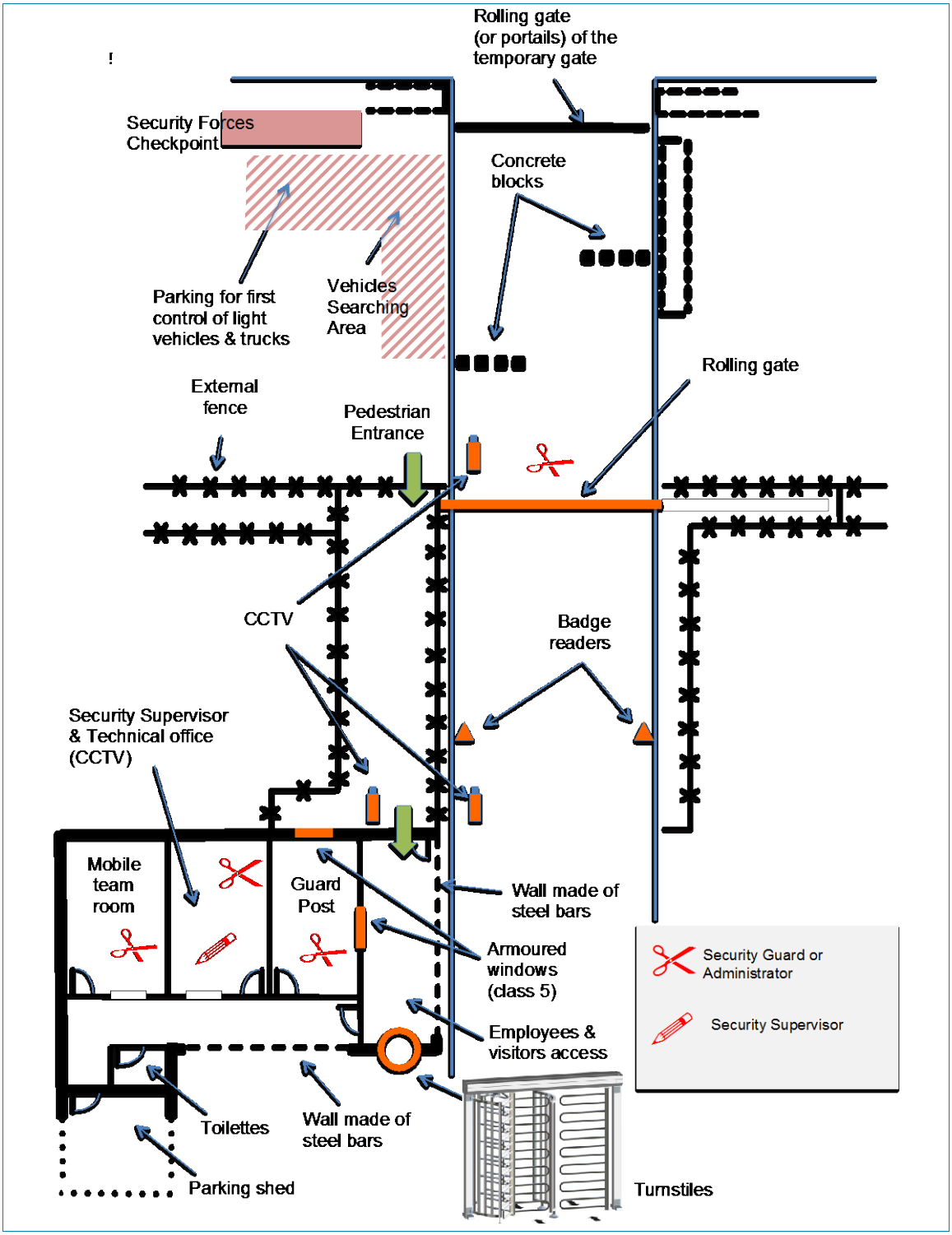
The security main gate shall be equipped with:

- Security forces checkpoint
- Stand-off area, parking and vehicle searching area
- First access control (using temporary main gate installations)
- Signage (Security checkpoint, visitor access, searching area, weapons not authorized, etc.)

- Chicane with concrete blocks
- Rolling gate
- Security building
- Turnstiles and badge readers
- Access control system
- CCTV
- Lighting
- VHF radios Motorola type
- Hand held metal detector and vehicle search mirror
- Bullet proof windows (see armoured windows on Figure 13)

Figure 13: Example turnstile

Figure 14: Example gate (operations and maintenance phase)



Emergency gate

The emergency gate shall be implemented with:

- Design and protection considerations (chicane, robust padlocks);
- Procedure to manage the emergency gate.

Access control procedures

An electronic access control system will be implemented at the main gate and manned by the Security Guards. Badges will be provided to employees, visitors and regular suppliers. They shall carry their badge on permanent basis.

Entrance control

- Vehicles and personnel seeking access to the site are subjected to the prior ID control and, according to the security situation, preventive search in order to deny the smuggling of illegal substances (e.g. drugs) and/or prohibited or potentially harmful materials (e.g. weapons, explosives) in the site.
- According to the security level, searches of vehicles, bags, luggage, etc. will be performed occasionally, regularly or permanently. Security Guards will be able to use a trained dog for explosive, hand held metal detector, vehicle search mirror.
- Employees already registered and carrying a badge are allowed to enter through the turnstiles by using the corridor for pedestrians.
- Employees already registered and carrying a badge are allowed to enter with their vehicle only if the vehicle is authorized to enter. All personnel on board will use the badge reader with the assistance of the Security Guard.
- Visitors will be registered and escorted. A “Visitor Pass” will be delivered to the security main gate by the management responsible for allowing entrance. A visitor badge will be provided and basic rules and regulations will be explained to the visitors. Visitors must be escorted at all times on site by a representative of the department visited.
- The visitor badge must be visibly displayed at all times while he is in the facility and worksite. The visitor as any employee must produce that badge for inspection upon request by any other badge holder on site. Never allow any other person to use visitor badge or the badge of another employee.

- In case of an unexpected visit, Security Control must contact the visited person and require the issuance of a visitor pass and then follow the relevant procedure.
- The new employees and visitors will follow a security and safety induction. A badge will be provided in exchange of proof of employment and “Application Form” provided by the employer. The time to follow the arrival process, the new employee may have a visitor badge.
- The regular suppliers will have a specific badge. The irregular suppliers will be considered as visitors.
- The entry of material and plant equipment will be possible against the authorization of the designated persons, responsible for escorting the truck(s) to the laydown area or warehouse.
- A colour code on personal badge will allow entrance into a restricted area.

Exit control

- National employees carrying a badge will be authorized to exit according to the working times defined by the Operations & Maintenance’s Contractor management.
- Search of vehicle, bags and luggage shall be performed occasionally or on regular basis in order to deny the theft of equipment.
- The visitor badge remains the property of Security Department and must be surrendered on completion of the visit on site. When leaving the site, the visitor badge must be returned to the Security Department.
- Expatriates will not be allowed to exit without provision of a Mopol escort vehicle.
- It will not be allowed for an expatriate to exit the site from a defined time and more generally at dark.
- Plant equipment, materials and tools (with specific identification marks) are allowed to be taken away the site by an authorization (gate pass exit) signed by the authorized management.

Other considerations

It will be mentioned in the terms of conditions for the regular suppliers that any lost or theft badge will be charged to the supplier.

Employee, visitor and supplier badges will have a specific mark to recognize them easily.

The information contained in the database for issuing a badge (except visitor badge) will be as follows:

- ID picture
- Full name details
- Date of birth
- Nationality
- ID card or Passport number
- Company name (employer)
- Category: permanent employee, contracted employee, TCN, external supplier, other
- Job title
- Estimated date of final departure
- Areas where the employee is allowed to access

This information will be provided through the “Application Form” signed by the employer. Only the following information will be visible on the badge:

- ID picture
- Full name
- Company name (employer)
- Job title
- Colour code for restricted areas

This information contained in the database and on the application forms will be classified “Personnel Confidential” and will be stored and used according to the confidentiality rules.

The computers and back-up systems will be protected and access restricted. Security personnel allowed to use these IT systems will be subject to a security screening.

The emergency gate will be closed on permanent basis and opened only for emergency. A Security Team will be present at the gate the time of opening.

CCTV surveillance systems/electronic detection systems

CCTV systems shall comply with local law, regulations and applicable codes of practice. Infra-red (IR) capability shall be implemented to ensure effectiveness of the system in all conditions (day and night).

Monitoring and playback of recordings will take place in a secure environment, such as the Control Room in the offices. CCTV recording systems shall have the following minimum functionality:

- A capacity of at least 60 days of good quality recordings;
- Be capable of securing pictures for review or export at a later date;
- Incorporate suitable playback software.

A preventative maintenance program shall be developed and implemented for all CCTV systems. Repairs shall be made promptly to insure installed systems operate as designed.

Signs shall be prominently posted on all entrances to the facilities advising that such systems are in use.

Administration offices & control rooms security

The administration offices shall be implemented with:

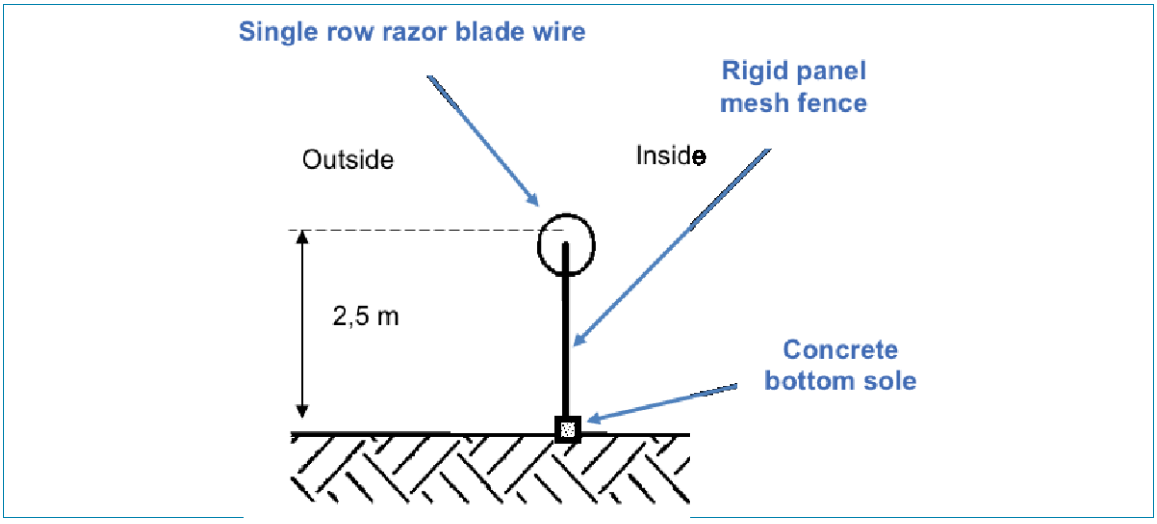
- Locking system and electronic access control system for critical areas (IT room, 1st floor, operations control room, security control room);
- Bars and anti-blast film protector on the windows;
- Key control procedure;
- Documentation control management;
- Shredding machine;
- Information security systems;
- First floor:
  - Robust door and locking system;
  - Operations control room: restricted area with electronic access control system;
  - Security control room (CCTV monitoring and communication means): restricted area with electronic access control.

Substation security

The high voltage (HV) substation is the interface between the plant and the grid. It will be a restricted area may be operated by TCN. The following security measures shall be implemented:

- Restricted access;
- Signage (Restricted Area, Authorized Personnel Only);
- Fencing with barbered wires / razor on the top;
- Lighting;
- Access control system;
- Portals with robust padlocks;
- Key management procedure;
- CCTV.

Figure 15: Site internal security fence



Medium voltage switchgears

The medium voltage (MV) switchgears (building with electrical equipment inside) will be closed with robust padlocks and under the surveillance of the CCTV system. The access will be restricted and a key management procedure implemented.

The main MV switchgear building installed near the HV substation will be fenced and under access control system and the surveillance of the CCTV system. The access will be restricted to personnel authorized only.

Warehouse & garage

The warehouse will be a restricted area. The gates will be equipped with robust locking systems. Critical equipment shall be stored in a restricted area inside the warehouse. This specific area will be fenced and the exit of equipment managed by a dedicated procedure.

A key management procedure shall be implemented and the keys stored in a security box.

The access to the warehouse and the garage will be covered by the CCTV system.

Other key assets

The **Outdoor MV/HV transformers** that connect the plant to the grid will be locked and protected by concrete blocks against vehicle accident.

The **low and Medium voltage cables** are buried and do not need any special care except when they are crossing a road of another Row where duct works shall be installed for a better protection.

Surveillance and patrolling

The surveillance and patrolling program shall be implemented as follows:

- External patrolling performed by the Mopols
- Observation posts in critical areas (if applicable)
- Mobile patrolling at day and night time
- Dog patrolling at night time
- CCTV on permanent basis

Alarm horn (siren)

An alarm horn will be implemented in the centre of the site for emergency or security warning.

ANNEX D. SECURITY CONDITIONS AND POTENTIAL RESPONSE MEASURES

Country and local risks levels

A security level system will be implemented as a system for assigning a grade or level to areas where Solar Program operates in order to identify the overall level of danger in that area. The security level system is a tool for security management to:

- More accurately identify and measure the level of security threat that exists in a geographic location;
- Produce a Security Level for that location;
- Give an overall impression to staff and managers of how the security environment in one area/location compares with another.

The policy will be applicable to all individuals covered by Solar Program and Contractor management system.

The Security Level System is an integral part of the Security Risk Management process and is designed to accurately describe the security environment that exists in an area or location ("Security Level Area") in which Projects' personnel operates.

The Security Level System is based on threat and not risk. The Security Level System describes the general, threat-based security environment. Because security measures must be designed to solve specific security problems, the Security Level System is not used to make specific security decisions. The Security Level System objectively describes the threat environment and uses this objective evaluation to inform the Security Risk Assessment, from which security decisions are made.

A security level is determined using the threat assessment. The threat assessment evaluates different categories: Islamist and Niger delta militancy, petty and organised crime, kidnap, political unrest, ethnic-religious unrest, etc. Each category is evaluated using a point system, and the combination of these separate evaluations will determine the security level. The security level will indicate the level of danger that would exist in the country and defined area or location and the evacuation planning phase.

To be reliable, the threat assessment must have a clearly defined geographical area of analysis. It is rare for threats and hazards to be the same throughout an entire country, therefore most countries require more than one "security level area".

The threat assessment is updated anytime there is a significant change in the security environment, either an improvement or a worsening of the situation. The security level system provides security decision makers with a very important snapshot of the existing threat-based environment in the defined area or location in which they need to operate. All threat assessments are conducted in the same way, so security decision makers receive the added value of being able to compare their locations with other locations in the world.

The security level is on a scale of 0 to 4 levels, as here below.

Security levels overview

Security level	Situation	Security posture	Impact on activity
INSIGNIFICANT - 0	No threat	No particular measure	Normal activity
LOW – 1	No crisis	Normal levels of vigilance	Normal activity
MEDIUM – 2	Low to medium criminality Intermittent political or social disturbances Ethnic-religious tensions Kidnap Islamist or Niger delta militancy	Take every measure to actively prepare for the next security posture Travels approved by the security management	Normal activity
HIGH – 3	Deterioration of the situation Unrest Major threat and high risk	Travels approved by the country management Possibly evacuate or move to safety non-essential staff	Reduce or partially stop activities
EXTREME - 4	Very high risk	Evacuate or move to safety all personnel	Stop all activities

Check list per security level for Construction phase

Security level	Checklist
INSIGNIFICANT - 0	No particular measure. Not applicable in Nigeria.
LOW - 1	▪ Monitor the political and security situation in the country and in particular where Solar Projects personnel are travelling. ▪ Establish a Security Network with internal and external stakeholders. ▪ Implement a Security Plan for each Site and an Emergency Response Bridging Document. ▪ Provide security induction to all personnel. Include a specific module for expatriates. ▪ Test communication means and phone numbers on monthly basis. ▪ Update POB when expatriates are travelling. ▪ Audit Offices, Sites and accommodation and implement corrective actions. ▪ Setup a crisis room in each Site and in Abuja Offices ready to be activated (telecommunications means, procedures, small equipment, etc.). Test the telecommunications means and the emergency phone numbers on monthly basis. ▪ Draft an evacuation plan and define list of things each expatriate must take in the event of a crisis: emergency contact numbers, identity documents, family documents, banking documents, insurance documents, medical documents, house keys, etc. ▪ Benchmark Subsidiary/Site security measures against other operators. ▪ No travel restrictions. ▪ Access control on site: perform irregular searches of vehicles and personnel (bags, luggage).
MEDIUM - 2	▪ Ensure the measures in level 1 have been implemented and applied. ▪ Raise staff awareness by issuing a note outlining how the situation is evolving and the need for greater vigilance. ▪ Test crisis telecommunications equipment on monthly basis. ▪ Review the evacuation plan and inform embassies of measures taken to evacuate staff and/or move national staff to safety; ▪ Monitor the risks closely; ▪ All travel must be approved by Security Management in coordination with the Security Advisor. ▪ All expatriate travelling by road outside Abuja must be escorted by an escort vehicle with armed Mopol onboard. ▪ Update the POB when expatriates are travelling. ▪ Access control on site: perform regular searches of vehicles and personnel (bags, luggage). ▪ Perform inspections of security duties and security equipment and systems on regular basis.
HIGH - 3	▪ Prepare the evacuation plan: review of notification charts, routes, vehicles and equipment evaluable, cash money, etc. (see chapter dedicated to the Evacuation Plan). ▪ Send a note to all staff when the situation is upgraded to Red classification. ▪ Test crisis telecommunications equipment on weekly basis. ▪ Update the POB and send to Solar Projects management before and after

Security level	Checklist
	an evacuation and/or action taken to move non-essential staff to safety. ▪ All travel of EPC Contractor personnel (expatriates and nationals - to be identified) must be approved by EPC Contractor Country Manager in Nigeria, in coordination with the Security Management and Security Advisor. o The crisis cells in each Site and Offices in Abuja will remain in constant operation in case of deterioration of the situation to: o Maintain contact with Solar Projects Headquarters regardless of the circumstances; o Check that crisis measures have been applied and report regularly to Solar Program Headquarters' Representatives; o Inform embassies of measures taken to evacuate staff and/or move national staff to safety; o Monitor the risks closely; o Monitor all travel approved by the EPC Contractor Country Manager; o Identify the safest route to the evacuation point and/or departure point for moving staff to safety + secure the transport to be used to reach it; o Reinforce the protection around the Offices / Accommodation, and/ or sites; o Reduce activity of nationals if necessary; o Group and evacuate and/or move to safety all non-essential staff. Restrict luggage to an absolute minimum, ensure personal effects are locked away, do not speak to the media (on departure or arrival). ▪ Access control on site: perform irregular searches of vehicles, personnel (bags, luggage) and delivery. ▪ Increase of presence and patrols of Governmental Security Forces in the vicinity of the Site in case of deterioration of the situation. ▪ Increase inspections of security duties and security equipment and systems. ▪ Review the Security Management System, in particular the risk and vulnerability assessments in regular basis and in case of deterioration of the security conditions. ▪ Maintain regular training of Security Guards and Personnel involved in security matters, in particular on Emergency Response and contingency plans (such as bomb threat, civil unrest, attack at the main gate, etc.). ▪ Deploy additional mobile lighting on site in case of deterioration of the situation. ▪ Test siren / alarm and sheltering procedure.
EXTREME - 4	▪ Daily monitor the security situation. ▪ Send the POB to relevant parts before and after an evacuation and/or action taken to move staff to safety. ▪ Send a note to all staff when the situation is upgraded to an Extreme classification to inform them how the situation has evolved. ▪ Restrict all travel for evacuation purpose only with adequate armed protection. ▪ Test crisis telecommunications resources on daily basis.

Security level	Checklist
	▪ The crisis cells on Site and Offices in Abuja will remain in constant operation to: ○ Maintain contact with Owner Headquarters and EPC Contractor Headquarter regardless of the circumstances; ○ Check that crisis measures have be applied and report regularly to Owner Headquarters and EPC Contractor Security Departments; ○ Inform embassies of measures taken to evacuate staff and/or move national staff to safety; ○ Monitor the risk closely; ○ Back-up or destroy all industrial, commercial and sensitive data and if possible introduce measures to protect offices and facilities; ○ Identify the safest route to the evacuation point and/or departure point for moving staff to safety + secure the transport to be used to reach it; ○ Maintain permanent contact with the crisis cells; ○ Reinforce the protection around the Sites and/or Offices in Abuja; ○ Totally stop all operations; ○ Group and evacuate and/or move to safety all remaining essential staff (see chapter dedicated to the Evacuation Plan). ▪ Access control on site: perform systematic searches of vehicles and personnel (bags, luggage, body). The perimeter gates of the site are opened for access only, otherwise they are maintained closed. ▪ Increase of presence and patrols of Governmental Security Forces in the vicinity of the Site. ▪ No visitors authorized without authorization of the Site Management in coordination with Security Department. ▪ Increase the number of Security Guards to compensate potential desertion of other Guards, who want to support their family. ▪ Increase the presence of Security Guards on duty at night. ▪ Increase patrols of Security Guards on Site and mobile lighting around the external perimeter. ▪ Increase the cash, fuel, water, food, etc. available on Site. ▪ Prior to evacuation, perform inventory of equipment and confinement.

Check list per security level for Operations & Maintenance phase

Security level	Checklist
INSIGNIFICANT - 0	No particular measure. Not applicable in Nigeria.
LOW - 1	▪ Monitor the political and security situation in the country and in particular where Solar Projects personnel are working or travelling. ▪ Establish a Security Network with internal and external stakeholders. ▪ Implement a Security Plan for each Site and an Emergency Response Bridging Document. ▪ Provide security induction to all personnel, including a specific module for expatriate employee (if any) or business visitor. ▪ Test communication means and phone numbers on monthly basis.

Security level	Checklist
	▪ Maintain POB on Site through access control system. ▪ Audit O&M Contractor Offices and Sites and implement corrective actions. ▪ Setup a security control room / crisis room in each Site and a crisis room in Abuja Offices ready to be activated (telecommunications means, procedures, small equipment, etc.). Test the telecommunications means and the emergency phone numbers on monthly basis. ▪ Draft an evacuation and business continuity plans for each Site. ▪ No travel restrictions. ▪ Access control on site: perform irregular searches of vehicles and personnel (bags, luggage).
MEDIUM - 2	▪ Ensure the measures in level 1 have been implemented and applied. ▪ Raise staff awareness by issuing a note outlining how the situation is evolving and the need for greater vigilance. ▪ Test crisis telecommunications equipment on monthly basis. ▪ Review the evacuation plan and inform embassies of measures taken to evacuate expatriate staff; ▪ Monitor the risks closely; ▪ All travel of expatriate employee or identified national staff must be approved by Security Management. ▪ All expatriate travelling by road outside Abuja must be escorted by an escort vehicle with armed Mopol onboard. ▪ Maintain the POB up-to-date for each Site and when expatriates are in Offices in Abuja or are travelling. ▪ Access control on site: perform regular searches of vehicles and personnel (bags, luggage). ▪ Perform inspections of security duties and security equipment and systems on regular basis.
HIGH - 3	▪ Prepare the evacuation plan: review of notification charts, routes, vehicles and equipment evaluable, cash money, etc. (see chapter dedicated to the Evacuation Plan). ▪ Send a note to all staff when the situation is upgraded to Red classification. ▪ Test crisis telecommunications equipment on weekly basis. ▪ All travel of O&M Contractor personnel (expatriates and national staff – to be identified) must be approved by O&M Contractor Country Manager in Nigeria, in coordination with the Security Management. ▪ The crisis cells in each Site and Offices in Abuja will remain in constant operation in case of deterioration of the situation to: ○ Maintain contact with Partners' Headquarters regardless of the circumstances; ○ Check that crisis measures have been applied and report regularly to Solar Project Partners' Security Departments; ○ Inform embassies of measures taken to evacuate staff and/or move national staff to safety; ○ Monitor the risks closely; ○ Monitor all travel approved by the O&M Contractor Country Manager; ○ Identify the safest route to the evacuation point and/or departure point for moving staff to safety + secure the transport to be used to

Security level	Checklist
	reach it; ○ Reinforce the protection around the Offices, Accommodation, or sites; ○ Reduce activity if necessary; ○ Group and evacuate and/or move to safety all non-essential staff. Restrict luggage to an absolute minimum, ensure personal effects are locked away, do not speak to the media (on departure or arrival). ▪ Access control on site: perform irregular searches of vehicles, personnel (bags, luggage) and delivery. ▪ Increase of presence and patrols of Governmental Security Forces in the vicinity of the Site in case of deterioration of the situation. ▪ Increase inspections of security duties and security equipment and systems. ▪ Review the Security Management System, in particular the risk and vulnerability assessments in regular basis and in case of deterioration of the security conditions. ▪ Maintain regular training of Security Guards and Personnel involved in security matters, in particular on Emergency Response and contingency plans (such as bomb threat, civil unrest, attack at the main gate, etc.). ▪ Deploy additional mobile lighting on site in case of deterioration of the situation. ▪ Test siren / alarm and sheltering procedure.
EXTREME - 4	▪ Daily monitor the security situation. ▪ Send the POB to relevant parts before and after an evacuation and/or action taken to move staff to safety. ▪ Send a note to all staff when the situation is upgraded to an Extreme classification to inform them how the situation has evolved. ▪ Restrict all travel for evacuation purpose only with adequate armed protection. ▪ Test crisis telecommunications resources on daily basis. ▪ The crisis cells on Site and in Offices in Abuja will remain in constant operation to: ○ Maintain contact with Project Sites and Headquarters, and other Partners regardless of the circumstances; ○ Check that crisis measures have be applied and report regularly to O&M Contractor Headquarters and other Partners' Security Departments; ○ Inform embassies of measures taken to evacuate staff and/or move national staff to safety; ○ Monitor the risk closely; ○ Back-up or destroy all industrial, commercial and sensitive data and if possible introduce measures to protect offices and facilities; ○ Identify the safest route to the evacuation point and/or departure point for moving staff to safety + secure the transport to be used to reach it; ○ Maintain permanent contact with the crisis cells; ○ Reinforce the protection around the Sites and/or Offices in Abuja; ○ Totally stop all operations; ○ Group and evacuate and/or move to safety all remaining essential

Security level	Checklist
	staff (see chapter dedicated to the Evacuation Plan). ▪ Access control on site: perform systematic searches of vehicles and personnel (bags, luggage, body). The perimeter gates of the site are opened for access only, otherwise they are maintained closed. ▪ Increase of presence and patrols of Governmental Security Forces in the vicinity of the Site. ▪ No visitors authorized without authorization of the Site Management in coordination with Security Department. ▪ Increase the number of Security Guards to compensate potential desertion of other Guards, who want to support their family. ▪ Increase the presence of Security Guards on duty at night. ▪ Increase patrols of Security Guards on Site and mobile lighting around the external perimeter. ▪ Increase the cash, fuel, water, food, etc. available on Site. ▪ Prior to evacuation, perform inventory of Solar Program and Constructor equipment and confinement.

ANNEX E. SECURITY AWARENESS TRAINING

EPC Contractor and O&M Contractor shall develop a security induction / training program.

General training

All new employees (national and expatriate) shall be inducted within the 24 hours of their arrival.

All expatriate employee or business visitor travelling to Nigeria, and under the responsibility of EPC Contractor or O&M Contractor, shall receive the relevant travel documentation prior departure, and will be inducted within the 24 hours of his arrival.

During the Construction phase, participation in this program will be a prerequisite for all personnel before being allowed to work at the Site. Business visitors staying on site more than one day will be also inducted.

Security induction will be provided to the Subcontractors, which will organize their own induction sessions. The Subcontractor Security Correspondent will provide to the EPC Contractor Site Security Manager the proof the personnel was inducted.

The pre-departure documentation (Traveller Handbook) will contain the following issues:

- General information on the country;
- What the traveller must carry (official documents and copy, phone number and police number of the assistance repatriation provider, international vaccination booklet, etc.);
- Health and safety rules and recommendations;
- Security rules and recommendations, including for the protection of the information;
- Procedure of arrival and departure in Abuja and Lagos airports, Meet & Greet;
- Information on authorized hotels;
- Useful and emergency primary contacts details;
- What to do in case of specific incidents.

Different modules of the security induction will be issued as follows:

- Module for business visitors (national and expatriate);
- Module for nationals;
- Module for expatriates.

The issues contained in these modules would be as follows:

- Site rules and regulations;
- What are Security and Safety;
- Security and safety rules;
- Security threats and recommendations;
- Basic emergency procedures in case of incident or alarm (muster points, emergency number, incident notification, etc.).

A training program on the protection of the information shall be developed and a specific booklet will be provided to the personnel working in offices at the headquarters and on site.

Specific training

Specific trainings will be developed such as:

- Emergency Response training;
- Crisis communication training;
- Defensive driving training.

Lists of personnel attending the training courses will be defined with the Site Management.

Induction and other training attendance records will be documented and maintained.

ANNEX F. INFORMATION SECURITY

To ensure the confidentiality of sensitive information related to the Solar Program protect sensitive information during all the phases, an information security program shall be developed on the basis of the International Organization for Standardization (ISO) ISO/IEC 27001:2005 dedicated to Information Security Management.

The objectives of such a program are:

- Preserving the confidentiality of the information and know-how: only authorized individuals, processes, or systems should have access to information, on a need-to-know basis.
- Guaranteeing the integrity: information should be protected from intentional, unauthorized or accidental changes. Information stored within IT systems (files, databases, networks) must be able to be relied upon to accurately process transactions and provide accurate information for business decision-making.
- Ensuring the availability: the information must be accessible by the users, when needed.
- In general, the target is to ensure appropriate and secure flow of information within the Solar Program's projects and avoidance of any "uncontrolled" loss of information following Owner and EPC or O&M Contractors' security and confidentiality requirements, and contractual agreements between stakeholders (e.g. partners, licensors, engineering subcontractors, vendors / suppliers, etc.).

An Information Security Management Plan shall be issued.

Information security principles

The main key principles in terms of information control are:

- Evaluation of the value of information and what may be at stake for Owner, the EPC and O&M Contractors or any third party;
- Classification, making it possible to have the document distributed with appropriate protective measures. Classification levels shall be defined (e.g. Restricted, Confidential, Internal confidential, Personnel Confidential) according to the classification rules implemented within the Partners' companies;
- Non-Disclosure Agreements (NDAs) and Professionally Secrecy Agreements;
- "Need To Know" And "Role-Based Access" principles;
    - Protection:

- Limitation of distribution to what is strictly necessary which implies carefully selected addressees;
- Selection of the appropriate distribution method particularly when it concerns a computerized method;
- Storage of the information in an appropriate manner;
- Destruction, bearing in mind that all non-essential documents must be shredded.

Inventory of the information and value analysis

An inventory of the type of information shall be issued in order to identify the type of information to be protected. Then, a classification level must be assigned to each document identified in the previous step.

- The valuation may be based upon such factors as:
- The value of criticality and/or sensitivity of the information;
- The destination of the document or people allowed having the information.

It is generally the Originator's responsibility to classify a document in accordance with classification levels defined inside this procedure.

Classification Levels

The distinction between sensitive and non-sensitive information is made using a classification.

This classification allows protecting the confidentiality of certain information while allowing under certain conditions, their treatment by authorized persons.

The Access to information or protected supports is restricted to authorized persons, according to the following conditions:

- Are aware of the relevant Non-Disclosure Agreement or Professionally Secrecy Agreement;
- Have the need to know. No one should have access to sensitive information, if he / she does not need this information for performing his / her job, even if he / she is qualified;
- The choice of a classification level must imply the enforcement of the relevant protection rules provided to avoid any flaw or weakness that would encourage leaks of sensitive information.

The classification being only a link in the protection of data, it is advisable to stay up also in:

- Adapting the means of storage of the information according to the level of its sensibility (for example any confidential document must be electronically or physically locked, situated in a directory or a database, which accesses are restricted and checked, etc.);
- Adapting the means of transmission of the information at the level of its sensibility (for example any confidential information has to pass in transit via the secure e-mail of Solar Program and not a personal e-mail, a secure envelope, do not use his mobile phone, etc.);
- Reproducing the sensitive documents in secure conditions, e.g. photocopy machines inside EPC and O&M Contractors' offices only;
- Destroying documents containing confidential information, when they are not any more used;
- Respecting the rules of Security during movements.

The confidentiality statement must be mentioned in the front page and the "header or footer" of every page of the document.

"Need To Know" principle

Basic principles apply as per general conditions of a contract and especially as per articles dedicated to "Intellectual Property Rights" and "Professionally Secrecy".

Breaches in security can occur when employees share sensitive information unnecessarily with colleagues. Naturally, employees require some knowledge in order to fulfil their role. However the "need to know" principle enables to reduce the risk posed by each staff member by restricting knowledge to only those who require it. This principle also makes it more obvious, if someone is inappropriately probing for information.

The physical and electronic equivalent of "need to know" is "role-based access", which limits a staff member's access according to their function and role.

Security measures

Some working sites will be equipped with an electronic access control system and some offices or areas will be considered as restricted areas where access is allowed for authorized personnel only.

The following security rules shall be applied:

- Staff members shall wear their ID Badge on permanent basis, where applicable, and escort the visitors;

- Confidential Information is stored in a secure place (restricted database) with relevant electronic locking systems and access restriction;
- An anti-theft device can be directly attached to the computer (PC and laptop) and a fixed part of the desk, the key being permanently out of sight;
- In "open space" layouts, the laptops should be as much as possible stored away in a cupboard with an appropriate locking mechanism;
- During an extended absence (particularly at meal times and in the evening), it is necessary to make sure that the office door(s) are locked;
- Personnel have to be careful when using laptop in public places and transportations.

Security management of documentation

The following main principles shall be applied:

Personnel shall receive/retain access to sensitive and engineering data (either in hard copy or electronic form) strictly on a “need-to-know / role-based access” basis. Access privileges shall be determined by the distribution matrix established within the electronic document management system.

Data shall be kept confined within the working area to the maximum reasonable extent.

Control of information detained by EPC and O&M Contractors

Access to Solar Projects’ information shall require Owner’s and EPC and O&M Contractors’ team members having an “appropriate access certificate” on their computer protected by an Electronic Document Management System (EDMS) used to store, distribute, and manage business and engineering documents. Full control of the documentation is given through the access rights on the databases.

Printing and plotting

All sensitive documentation copies used by EPC and O&M Contractors shall be produced within EPC and O&M Contractors organizations.

Distribution

As a general rule, copied, duplicate, reproducible, and reference prints of Solar Projects’ documentation shall be made on a “need-to-know” basis and according to the classification levels restrictions.

Completion / Archives

Upon completion, all Solar Projects documentation shall be archived as per specific rules in the relevant databases and confidentiality rules shall apply appropriately.

Destruction

Working copies, documents/drawing when no longer used / required by EPC and O&M Contractors and any other document liable to be destroyed, shall be shredded using designated equipment.

Check that no confidential document has been left in the printer, fax machine, scanner and meeting rooms. If it is the case, they must be destroyed.

Photography

Cameras, digital cameras, video cameras, camcorders, can be prohibited or controlled during visits and meetings within EPC and O&M Contractors facilities.

Discretion and caution in public areas / Travelling rules

EPC and O&M Contractors personnel shall apply the security rules and recommendations that will be detailed during training and in the booklet dedicated to the protection of the information.

More generally, EPC and O&M Contractors personnel shall be careful when reading or speaking in public areas (airport, hotel, restaurant, etc.) or in the aircraft. It is also recommended to only take documents, which are strictly necessary.

Security awareness and training

Information Security rules and recommendations will be reminded through the “Security Flashes”.

A specific booklet dedicated to the protection of the information will be issued.

A specific training dedicated to the protection of the information and the documentation management will be organized.

Incident reporting

All information relevant to security incidents or security breaches must be notified and reported to the management immediately.

Inspections and audits

Information security will be included in the inspections and audits planning to check the accurate implementation of the security measures, verify compliance with the Information Security Management Plan and identify potential areas of improvement.

ANNEX G. TRAVEL SECURITY MANAGEMENT

Journey management

For Construction and Operations & Maintenance phases, a Journey Management Plan shall be issued for each phase outlining the policies and procedures for all staff travelling to and within Nigeria, under the responsibility of EPC and O&M Contractors.

Specific forms will be issued, such as “Travel Request Form” and “Ground Transportation Request Form” dedicated to the drivers.

Prior to departure to Nigeria

Prior to departure the following information should be prepared for staff, under the responsibility of EPC and O&M Contractors, and given to each employee being deployed in Nigeria or for business visit:

- A security brief – updated to include a country overview and city briefs as appropriate;
- All relevant contact details;
- A point of contact (POC) at home office and in Nigeria, if delays occur en route (for example, missed flights);
- A contact name and cell phone number, of the protocol officer assigned to receive incoming passengers;
- A description of the exact location where the rendezvous will takes place;
- Instructions on actions to be taken if no contact with the protocol officer is established;
- Accommodation details – This refers to the hotel or place of residence for arriving personnel;
- Travellers to Nigeria MUST have a valid Yellow Fever vaccine and corresponding WHO approved Yellow Vaccination Book, and a copy of all official travel documentation (Passport, visa, LOI, etc.);
- All travellers shall keep with them the “Travellers Handbook” and a key contact card that will be provided prior to departure.

A “Travel Request Form” shall be filled in the home office and sent to personnel responsible for travel coordination in Nigeria and to security management. This document will contain all travel and personal details to organise the travel arrangements in safe and secure conditions.

EPC and O&M Contractors management in Nigeria will approve or not the “Travel Request” depending on the local security conditions.

Initial arrival

EPC and O&M Contractors staff will arrive at Abuja or Lagos International Airport. Security inside these airports is adequate but subject to lapses.

The protocol officer will collect arriving passengers after the Customs in the hall of the airport. He will be easily identified. If physical contact is not made immediately, the Protocol officer will call the passenger.

Once contact has been made the Protocol officer will escort the passenger to the vehicle outside the terminal.

Employees should avoid engaging in conversation with the many locals waiting outside.

It is more suitable to have International travellers arrive during day time hours.

Missed contact procedure

If the meeting procedure fails the following steps should be taken in the order given below:

Visitor

- Stay inside the airport (as directed on arrivals brief schematic);
- Call the Protocol Officer on the number given (No response);
- Call Travel coordinator, Security Manager or other emergency contact.

Protocol Officer

- Call visitor’s mobile phone;
- Inform Security Manager;
- Ask airport authorities for help to search arrivals hall;
- Ask airline to confirm visitor travelled;
- Keep security manager updated – Security manager to confirm with home office or airline.

Solar Program or Contractor Security management

- Call visitors Mobile number;
- Call Protocol Officer & Escort Commander;

- Call travel agency support;
- Coordinate search for the traveller;
- Deploy to the airport.

Secure transportation

Secure transportation shall be organized for EPC and O&M Contractors expatriates and identified Nationals during transit by road, and also for both expatriates and nationals belonging to TUCN.

A Mopol (Mobile Police) escort team will accompany the passenger vehicle.

Mopol team consists of one or two (depending on the number of passengers) armed policemen, a driver and commander, travelling in their own support vehicle as escorts.

In the event of any incident during the journey, passengers shall follow any instructions given by the Mopol officer.

The Mopol officer will be in command of the vehicle convoy, and responsible for safety and security. Passengers shall make it known if they feel the vehicle is being driven unsafely. What we consider (as Internationals) unsafe, a Nigerian national will not.

The driver will be responsible for monitoring the situation on the ground and deciding on any alternative routes to be used. General procedures as outlined below such as the wearing of seat belts, apply to all journeys. The security department will monitor local risk events that may alter travel arrangements.

Note that expatriate personnel are not to travel in the same vehicle as armed Mopol officers. The programme drivers will be aware of the following policy:

- Obey any commands given the Mopol officer;
- Whilst in transit, do not exit the vehicle unless directed to do so by a member of the Journey Management team;
- Keep doors and windows locked at all times and do not buy from street vendors or hawkers;
- Do not place or leave attractive items on the seat or in view to passers-by (Laptops, phones, handbags);
- Remain alert and aware of your current surroundings at all times.

Expatriates mobilized in Nigeria will not be allowed to drive by themselves. They shall use a Nigerian driver.

In Abuja, only expatriates already used to drive in local conditions of traffic and in possession of a valid NDL, may be given an exceptional authorization by the country management, for short distance driving. Nevertheless, it is always recommended to have a local driver.

Expatriate visitors will not be able to drive by themselves in all locations.

Public transport of any kind must not be used.

Passengers shall have communications means and key contact details with them on permanent basis.

The Travel Coordinator and the Security Manager shall be informed of travel plans and destinations.

Accommodation / Hotels

Personnel staff will be staying at one of the security approved hotels or accommodation (residence, flat). These accommodations shall offer suitable levels of security. Nevertheless, general rules and recommendations will be reminded to the personnel staff, notably through the “Traveller Handbook”, pre-departure brief or training.

Information for accommodation booking will be mentioned in the Travel Request Form (for both international and national flights).

Movements’ authorizations and restrictions

Movements

Movements within main urban centres such as Abuja and Lagos will be authorized, restricted or forbidden according to the security conditions in each area.

In Lagos, road journeys from Lagos International or Domestic airports to Ikoyi, Victoria Island or Lekki (recommended areas) will be conducted with one passenger vehicle (depending on numbers) and one Mopol escort chase vehicle (in support). However, the security environment may change and EPC and O&M Contractors staff will be briefed on arrival on the security situation, as such, regular reviews will be conducted. See here below the travel advises applying for expatriates according to the location.

Location	Travel Advise / Restrictions
Ikoyi, Victoria Island and Lekki between 0600 hrs – 2359 hrs	Normal day-to-day travel for business and leisure, no restrictions imposed. However staff should not forget the basic principles of Personal Security.
Ikoyi, Victoria Island and Lekki between 2359 hrs – 0600 hrs	Employees must inform the security manager of any movement and route between these hours and obtain permission for the journey.
Mainland including Appa, Ikeja, Maryland, Mushin, Surulere between 0700 hrs – 1900 hrs	Employees must inform the security manager of any movement and route between these hours and obtain permission for the journey.
Mainland including Appa, Ikeja, Maryland, Mushin, Surulere between 1900 hrs - 0700 hrs	All travel must have a Security Escort at all times.

In Abuja, road journeys from International or Domestic airports to Abuja urban centre will be conducted with one passenger vehicle (depending on numbers) and one Mopol escort chase vehicle (in support) according to the travel schedule and the security conditions.

However, the security environment will may change and EPC and O&M Contractors staff will be briefed on arrival on the security situation, as such, regular reviews will be conducted. See here below the travel advises applying for expatriates according to the location.

Location	Travel Advise / Restrictions
Abuja between 0600 hrs – 2359 hrs	Normal day-to-day travel for business and leisure, no restrictions imposed. However staff should not forget the basic principles of Personal Security.
Abuja between 2359 hrs – 0600 hrs	Employees must inform the security manager of any movement and route between these hours and obtain permission for the journey.
From Abuja urban centre to International or Domestic airports between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. He will advise security measures required, such as Mopol Security Escort, according to the traffic and security conditions.

From Abuja urban centre to International or Domestic airports between 1900 hrs - 0700 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times.

In Kano, personnel staff in transit will not be allowed to leave the hotel. The driver will avoid as much as possible the sensitive areas where a bomb attack would occur (State's buildings, school and university, Mosque, Church, market, etc.).

See here below the travel advises applying for expatriates in Kano.

Location	Travel Advise / Restrictions
Kano between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times.
Kano urban centre between 1900 hrs – 0600 hrs	Movement between these hours is not allowed. Nevertheless, in case of emergency, travellers can obtain derogation of the Country Manager and travel must have a Mopol Security Escort at all times.
From Kano urban centre to Domestic airport between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times.
From Kano urban centre to Domestic airport between 1900 hrs - 0700 hrs	Movement between these hours is not allowed. Nevertheless, in case of emergency, travellers can obtain derogation of the Country Manager and travel must have a Mopol Security Escort at all times.

Departing Nigeria

EPC and O&M Contractors staffs will be requested to inform the office manager and security manager at least 24 hours in advance of their departure dates, in order to confirm transportation and escort support are in place. Departing staff shall arrive at the International airport at least two hours before flight departure in order to clear immigration and security.

Travels to and around the Sites

Travels to the sites from Abuja, Lagos or another site shall be organized through a "Travel Request Form" and approved by the security manager, in Area Security Level 2 and 3, and by the country manager in Area Security Level 4. See here below a reminder of the security levels.

Security level	Situation	Security posture	Impact on activity
INSIGNIFICANT - 0	No threat	No particular measure	Normal activity
LOW - 1	No crisis	Normal levels of vigilance	Normal activity
MEDIUM - 2	Low to medium criminality Intermittent political or social disturbances Ethnic-religious tensions Kidnap Islamist or Niger delta militancy	Take every measure to actively prepare for the next security posture Travels approved by the security management	Normal activity
HIGH - 3	Deterioration of the situation Unrest Major threat and high risk	Travels approved by the country management Possibly evacuate or move to safety non essential staff	Reduce or partially stop activities
EXTREME - 4	Very high risk	Evacuate or move to safety all personnel	Stop all activities

In general, security requirements will be adapted to the local security conditions and to the risk of deterioration in a short time.

Route and alternative routes will be reviewed by the Security Manager and included in the Journey Management Plan to be updated.

Preparatory actions

Travel or logistics department and security department will be responsible for inspecting all EPC or O&M Contractors' vehicles, drivers and the attached Mopol officers in advance of any move. This will not be always feasible therefore any adjustments will be made when necessary. All vehicle checks (first and last parade), work tickets/logs and servicing records shall be in order and all requisite licences, permits and stickers held in the vehicle. Vehicles shall be fully fuelled prior to the commencement of a task and the following emergency and breakdown equipment stored in the vehicles.

Communications means, key contact details and bottles of water are required for all travels.

Emergency and breakdown equipment

- First aid equipment
- 1 x Spare tyre in good condition
- Tow rope
- 1 x fire extinguisher
- 1 x complete jack and wheel spanner
- 1 x Warning Triangle
- 1 x Tool kit
- Jump Leads

Travel to and around Katsina / Kankiya

Normally, to reach Katsina / Kankiya, travellers will go first to Kano by aircraft, spend one night in a secure and approved hotel, then to Katsina / Kankiya by road.

Travels by road from Abuja or another site to Katsina / Kankiya shall be exceptional and will required the permission of the country manager after a review of the security situation along the route.

Travel to Katsina from Abuja, Kano or another site shall not be conducted between 1900 – 0700 hours due to the increased threat of armed robbery / hijack and road traffic collision.

See here below an overview of the requirements according to the security conditions for expatriates.

Location	Travel Advise / Restrictions
From Kano to Katsina / Kankiya between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times. Regular updates will be provided to the Travel Coordinator along the route by SMS.
From Kano to Katsina / Kankiya between 1900 hrs – 0600 hrs	Movement between these hours is not allowed. Nevertheless, in case of emergency, travellers can obtain derogation of the Country Manager and travel must have a Mopol Security Escort at all times.
From Abuja or another site to Katsina / Kankiya	Security manager must be informed of any movement by road from Abuja or another site is possible only with the permission of the Country Manager and after a review of the security situation along the road.
Katsina city between 1900 hrs – 0600 hrs	Movement between these hours is allowed with a Mopol Security Escort at all times. Travellers shall spend the night in Katsina if dark without authorization to exit the hotel.
Around Kankiya Site between 0700 hrs – 1900 hrs	Movement between these hours is allowed with a Mopol Security Escort at all times.
Around Kankiya Site between 1900 hrs - 0700 hrs	Movement between these hours are not allowed, except in case of emergency with reinforced security escort.

Travel to and around Nasarawa / Lafia

Travel by road to Nasarawa / Lafia from Abuja or another site shall not be conducted between 1900 – 0700 hours due to the increased threat of armed robbery / hijack and road traffic collision. Travel must have a Mopol Security Escort at all times.

See here below an overview of the requirements according to the security conditions for expatriates.

Location	Travel Advise / Restrictions
From Abuja to Nasarawa / Lafia between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times. Regular updates will be provided to the Travel Coordinator along the route by SMS.
From Abuja to Nasarawa / Lafia between 1900 hrs – 0600 hrs	Movement between these hours is not allowed. Nevertheless, in case of emergency, travellers can obtain derogation of the Country Manager and travel must have a Mopol Security Escort at all times.
Around Lafia Site between 0700 hrs – 1900 hrs	Movement between these hours is allowed with a Mopol Security Escort at all times.
Around Lafia Site between 1900 hrs - 0700 hrs	Movement between these hours are not allowed, except in case of emergency with reinforced security escort.

Travel to and around Ado Ekiti

Travel by road to Ado Ekiti from Abuja, Lagos or another site shall not be conducted between 1900 – 0700 hours due to the increased threat of armed robbery / hijack and road traffic collision. Travel must have a Mopol Security Escort at all times during transit to or from Ado Ekiti.

See here below an overview of the requirements according to the security conditions for expatriates.

Location	Travel Advise / Restrictions
From Abuja or Lagos to Ado Ekiti between 0700 hrs – 1900 hrs	Security manager must be informed of any movement between these hours. All travel must have a Mopol Security Escort at all times. Regular updates will be provided to the Travel Coordinator along the route by SMS.
From Abuja or Lagos to Ado Ekiti between 1900 hrs – 0600 hrs	Movement between these hours is not allowed. Nevertheless, in case of emergency, travellers can obtain derogation of the Country Manager and travel must have a Mopol Security Escort at all times.

Around Lafia Site between 0700 hrs – 1900 hrs in Security Level 2	Movement between these hours is allowed in Security Level 2 without a Mopol Security Escort at all times, depending on the appreciation of the Security Manager. Travel of TUCN personnel (national as expatriate) must have a Mopol Security Escort at all times.
Around Lafia Site between 0700 hrs – 1900 hrs in Security Levels 3 and 4	Movement between these hours is allowed in Security Levels 3 and 4 and must have a Mopol Security Escort at all times.
Around Lafia Site between 1900 hrs - 0700 hrs	Movement between these hours are not allowed, except in case of emergency with a Mopol Security Escort at all times.

Transportation of workers by buses

Transportation of local workers shall be organized including safety and security considerations. In case of implementation of buses convoys, security escorts shall be provided.

Contingency plans

During all the phases, contingency plans shall be developed and personnel responsible for Travel shall be trained. Find here below an overview of these contingency plans.

Actions on vehicle hijack/robbery

- If it is safe to do so, and you have the time, alert others to your situation by radio or mobile phone.
- Stay calm and do not resist. Give up the keys of the vehicle if that is what is being demanded.
- Do not attempt a high speed getaway.
- Do not show any signs of resistance.
- Respond to instructions calmly and promptly without question.
- Never make sudden physical movements.
- Keep your hands visible.
- Exit the vehicle leaving everything behind, including the ignition keys.

- Avoid eye contact.
- Do not antagonise the hijackers/ robbers in any way.
- When it is safe to do so, inform Solar Program or Contractor management and the security manager (if not already present with you).

Actions on Road Traffic Accident (RTA)

Road travel in Nigeria is hazardous and accidents are frequent. Road conditions tend to be poor especially outside of the main urban areas and many roads within the rural areas remain largely undeveloped. Main highways are often not maintained and therefore are full of potholes and uneven road surfaces. The standard of driving is poor and vehicles are not maintained to a high standard. Therefore a combination of poor road conditions, poor and fast driving habits can result in serious accidents occurring.

- The situation following a vehicle accident can deteriorate very quickly. Speed of thought and action is therefore vital.
- Assess the security situation quickly. Remember, the “accident” may be a ruse to stop the vehicle.
- Those not directly involved in the accident should leave the scene with Mopol and either continue their journey or move to the nearest safe haven.
- The vehicle involved in the accident should remain with the driver and Mopol and resolve the incident.
- Immediately send to the control room or your management, by radio or mobile phone, the following information:
  - Who you are
  - Where you are
  - What has happened?
  - Casualties
  - Damage to vehicle - is it driveable?
  - Damage to third party property
  - What you are doing now.
- Treat casualties when it is safe to do so. Remember, an area may be calm now but the situation can quickly deteriorate.

- Should there be casualties, coordinate a CASEVAC with the country security department.
- Do not discuss or accept liability.

Action on hostile crowd/demonstration

Drivers should avoid any planned demonstrations en route. Please liaise with the country security department for any updates in specific areas of Nigeria.

Being caught in a hostile crowd can be both dangerous and frightening. Large crowds can be volatile and can readily turn violent. Escalations are usually sudden without warning.

If you find yourself in a vehicle in a potentially hostile crowd then attempt the following:

- Ensure vehicle doors are locked and windows up.
- Look for the first available road to exit the area.
- Avoid leaving your vehicle as this may offer you some physical security.
- If you cannot leave the crowd:
  - Avoid eye contact;
  - “Go with the flow” until an opportunity presents itself to escape;
  - Contact security management and inform them of the situation.

Action at Police / Military Checkpoints:

Drivers:

- Police roadblocks & checkpoints are poorly lit at night. Don’t drive through - drivers must always stop unless waved on.
- At night, turn on the interior car light as you approach.
- Politely defuse any pressure for “dash”. Do not pay bribes.
- Should the officer demand to see any documents, co-operate fully with them. Keep the doors locked and only roll the window down enough to pass the documents out. If insistent, exit your vehicle ensuring you take your phone with you.
- Be polite and calm throughout. A smiling open face and polite demeanour reaps rewards.

- If you are held, cooperate, but inform, or ask your passenger to inform security of your location and the situation immediately.

Passengers:

- Allow your driver to handle any pressure for “dash”.
- Do not argue with police or Security Forces personnel.
- Be polite and calm throughout. A smiling open face and polite demeanour reaps rewards.
- If you are held, cooperate, but inform security of your location and the situation immediately.

ANNEX H. TRAVEL REQUEST FORM TEMPLATE

NIGERIA TRAVEL REQUEST FORM

TRAVELLER DETAILS			
Surname		Company	
First Name		Traveler's Email	
Job Title		Travel Coord. Email	
Nationality		Work Phone	
Sex	Male Female *(delete)*	Mobile Phone	
EMERGENCY CONTACT			
Surname		Phone Num. 1	
First Name		Phone Num. 2	
Relation			

TRAVEL INFORMATION			
Purpose		Departure Date	
Arrival Airport		Departure Airport	
Arrival Date	09 JAN 15	Departure Time	
Arrival Time	15:00	Departure Flight Number	
Arrival Flight Number		Departure to	
Arriving From		First Time Visitor	Yes No *(delete)*

VISAS / PASSPORT DETAILS			
Passport Number		Visa Number	
Expiration Date		Visa Type	Business / TWP / STR / etc. *(delete)*
Country of Issue		Expiration Date	
Place of Issue		Issue Date	
Issue Date			

TRAVEL ITINERARY					
Date	**Time**	**Departure Location**	**Arrival Location**	**Accommodation?**	**Transportation?**
10 JAN 15	15:00			Yes No *(delete)*	Yes No *(delete)*
				Yes No *(delete)*	Yes No *(delete)*
				Yes No *(delete)*	Yes No *(delete)*
				Yes No *(delete)*	Yes No *(delete)*

SPECIAL COMMENTS
Please type any special comments related to your trip:

TRAVEL DOCUMENTATION / CERTIFICATES			
Traveler Handbook Provided?	Yes No *(delete)*	Key Contacts Card Provided?	Yes No *(delete)*

SEND TRAVEL REQUEST FORM AND SUBSEQUENT ITINERARY CHANGES AS FOLLOWS	
Travel Coordinator: *email address* Copy to: *security management email address*	*Travel & Emergency Phone Numbers*

ANNEX I. INCIDENT REPORT TEMPLATE

Solar Program / Security

Date of issue	
Classification	INTERNAL CONFIDENTIAL
Ref. number:	

SECURITY INCIDENT INVESTIGATION AND REPORTING FORM

ORIGIN a) Name: b) Phone number: c) Email address:
COUNTRY / INCIDENT LOCATION: NIGERIA / Abuja
INCIDENT DESCRIPTION
WHAT (Kind of event): quick as appropriate Kidnapping Riot Murder Attack with violence Theft Sabotage Bomb threat Strike with violence Other:
WHO (Identity of the originators of the incident: insiders / outsiders?):
WHEN (Date and estimated time of occurrence):
WHERE (Exact location: office, on site area and which one, outside premises, etc.):
CASUALTIES / DAMAGES:
HOW (Operational mode, the way the incident has been committed / occurred):
CONSEQUENCES / IMPACT (on people, equipment, facility, information, activity, etc.):

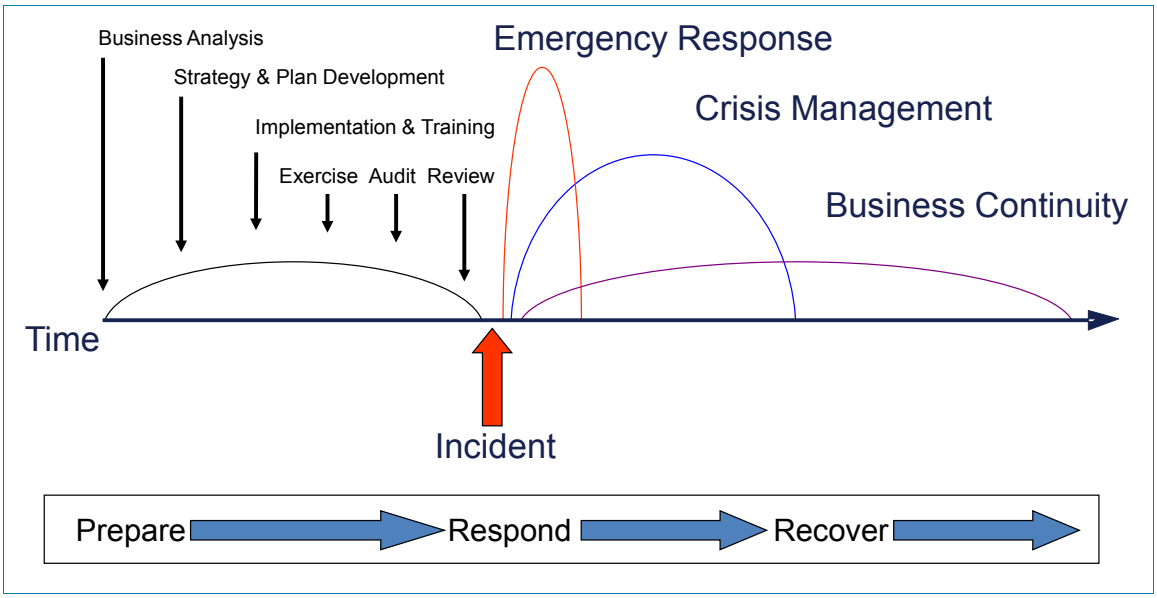
EMERGENCY RESPONSE ACTIONS & SECURITY CORRECTIVE MEASURES TAKEN
NOTIFICATION TO EXTERNAL ENTITIES YES NO Details:
OTHER ORGANIZATION INVOLVED YES NO Details:
OBSERVATIONS
FOLLOW-UP **RESERVED TO SECURITY MANAGEMENT** Release of Incident Report to:
ATTACHMENTS
ORIGINATOR SIGNATURE AND APPROVAL

ANNEX J. EMERGENCY RESPONSE AND CRISIS MANAGEMENT

Emergency Response structure and methodology

The objective of emergency response planning is to develop, implement and maintain a management system, including plans, procedures, training, exercises, audit, etc. The activation of the plans in any emergency situation will minimise the harmful effects on human life and health, environment, assets, reputation and assist in the return to normal and safe operations. This is by its nature a cross-discipline activity with numerous mitigations common to several hazards.

Figure 16: Emergency response and crisis management process



A three level system is generally implemented for the emergency response and crisis management, as follows:

Level 1: Project / Site Level (operational role)

The role of the onsite Emergency Response Team is to:

- Effectively manage an incident so that it is brought under control to prevent the loss of life, a major business impact and to protect the assets;
- Notify immediately the incident to the relevant persons and organizations;

- Issue an incident report within 24 hours after incident occurred;
- Implement the necessary procedures and actions to minimise the impact of any incident which occurs.

Level 2: Country Level (tactical role)

The role of the Crisis Management Centre has to:

- Ensure the necessary support and technical advice for the incident team onsite;
- Provide logistical support;
- Manage the necessary notifications with relevant stakeholders and statutory authorities;
- Manage Local Media and Relative response for nationals.

Level 3: Corporate Level (strategic role) – Headquarters

The role of the Corporate Crisis Management Team has to:

- Ensure the Business Continuity after a major incident;
- Manage the company's actions regarding stock options (if applicable);
- Manage Media and Public relations issues in coordination with level 2;
- Relative response for expatriates;
- Manage crisis response in case of kidnap-and-ransom in coordination with level 2.

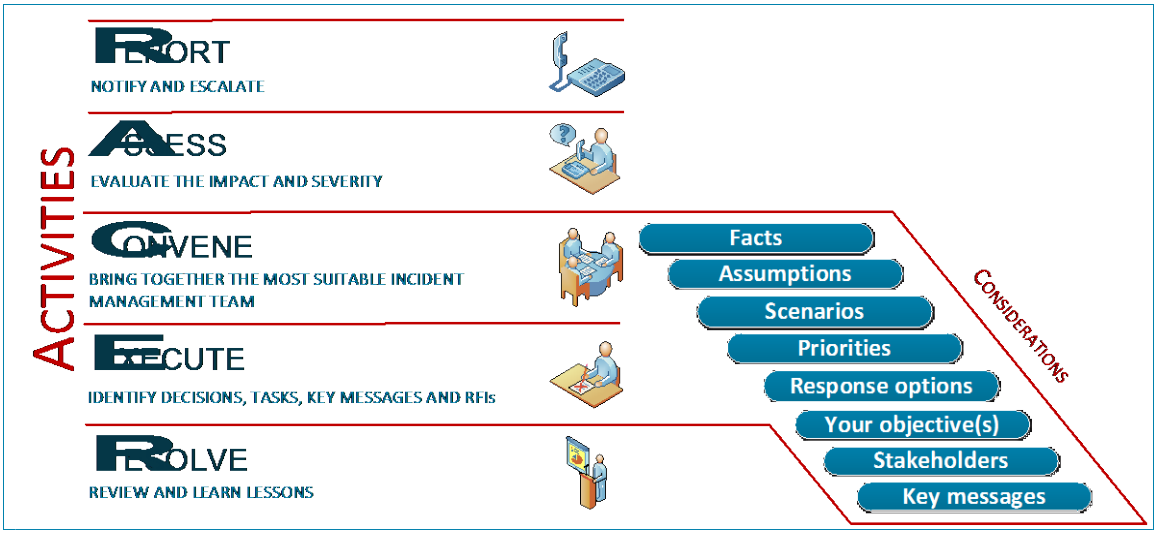
The Emergency Response Team on Site will notably include the Site Manager, Security Manager, HSE Manager, Doctor, Logistics coordinator, etc.

In face of complex and confusing crises, incident management teams often “freeze” due to lack of a clear process. The emergency response organisation shall be well trained to ensure quick and suitable response and to decrease the impact on business activity.

As an example, Control Risks has devised the RACER system (see figure here below). Based on the RACER system, emergency response organisation will be able to perform quickly and in a clear logical manner throughout the life cycle of an incident gathering solid information, making good decisions and efficiently issuing and monitoring tasks.

RACER means Report, Access, Convene, Execute, Resolve.

Figure 17: The Control Risks RACER system and First Response Protocol



<Source Name>

Personnel on Site (POS)

The interest of the POS is to provide an accurate report on the amount of employees on site at any moment. This will notably enable to provide assistance in case of any large incident or crisis situation.

During Construction phase, Owner, EPC Contractor and Subcontractors therefore shall prepare and maintain a daily POS of own personnel. This information would become imperative to:

- Account for all employees at any given moment;
- Manage evacuation means if needed;
- Manage safe haven strategies;
- Ensure support should employees still be off-sites locations or in transit away from site;
- Account for official ID badges printed (to show falsified badges).

The POS will be updated and checked on a daily basis. Each Subcontractor must officially release, through their Security Correspondent, the POS to an official security e-mail address to be provided or a paper copy if Internet is not available.

Any visitor staying on site for the day will be included in the POB, which shall contain as a minimum the following information:

- IN or OUT
- Employer name
- Full name
- Gender
- Nationality
- Job title
- Work location
- Accommodation (for expatriates)
- Contact number

During O&M phase, Owner, O&M Contractor shall prepare and maintain a daily POS of own personnel on Site in the same conditions than during the Construction phase.

Manager on duty and Security Control Room

A Manager-on-Duty roster on each site, including in Headquarters in Abuja, shall be implemented to ensure a reporting line on permanent basis (24/7) in case of emergency. The managers on duty will be trained and a manual will be provided to manage quickly and efficiently all types of emergencies.

On site (Katsina, Nasarawa, Ekiti), the security control room will be the focus point for all emergency calls. The control room operator will contact the local manager on duty in case of emergency.

Safe Havens

Safe havens shall be set up on each site in case of lockdown procedure. A dedicated room in Headquarters in Abuja will be identified and reinforced (armoured door, suitable locking system, mean to have a look out of the room).

On site (Katsina, Nasarawa, Ekiti), during the Construction phase, the safe haven shall be set up in the Camp and reinforced with bastion walls and suitable locking system.

During the Operations and Maintenance phase, the safe haven will be set up in a dedicated room or area within the offices.

Contingency plans

Contingency plans shall be developed including checklists and flowcharts for a better understanding and a quick activation. These contingency plans will notably cover the following events:

- Bomb threat / explosion;
- Civil / community unrest;
- Strike / labour unrest;
- Kidnap-and-ransom;
- Car accident;
- Carjacking, hijacking;
- Body discovery and crime scene protection;
- Personnel missing, etc.

Development phase

For the Development phase, a simple Emergency Response system shall be implemented according to the following considerations:

- Draft an Emergency Response Plan including:
  - Emergency and contact details of personnel, internal and external stakeholders, embassies, clinic, external emergency services, etc.
  - Notification charts and checklists according to the nature of the incident;
  - Medical response and evacuation procedure;
  - Incident notification, reporting and investigation procedure.
- Be able to setup a crisis room in Abuja headquarter with telecommunications means and relevant documentation.
- Organize training of the management with theoretical and practical approach.
- Provide a key contacts and emergency card.

In case of incident or crisis liaisons and regular reporting shall be established with the internal stakeholders' emergency response structures involved.

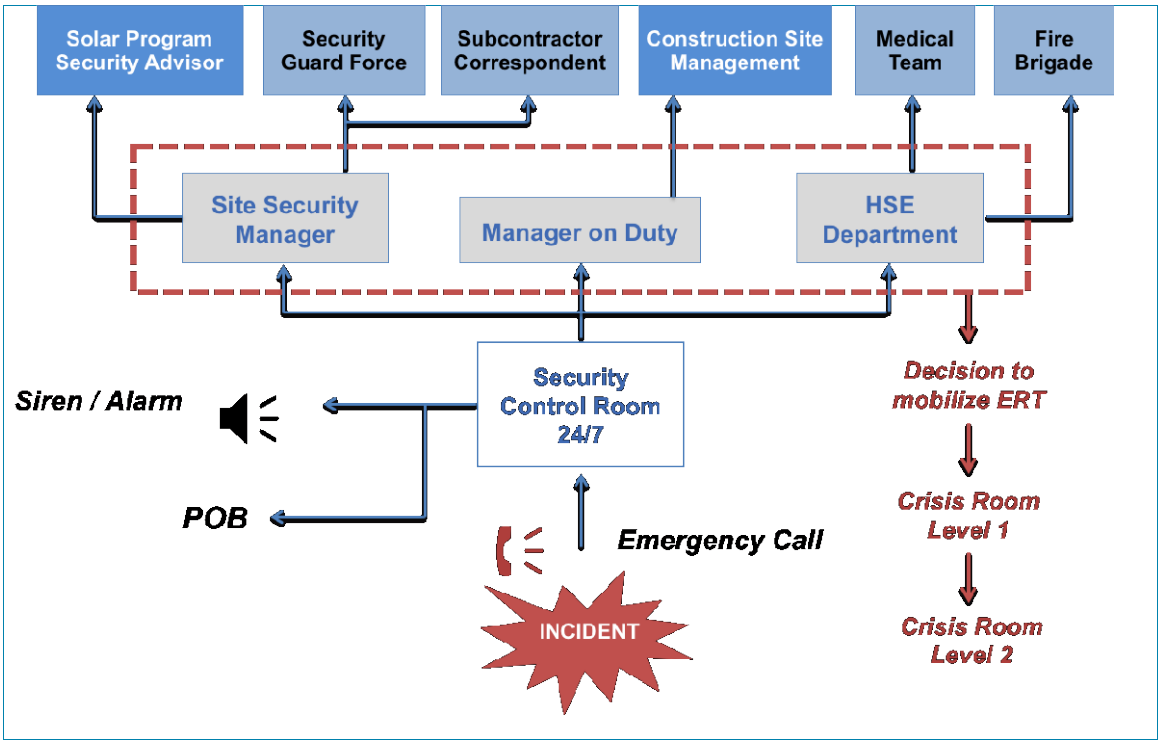
Construction phase

For the Construction phase, an Emergency Response system shall be implemented according to the following considerations:

- Owner and EPC Contractor shall draft an Emergency Response and Crisis Management bridging document including the three levels mentioned here above.
- The emergency response structure of the internal stakeholders will be included in the bridging document.
- Each Project / Site shall have its own Emergency Response Plan (level 1) including:
  - Emergency and contact details of personnel, internal and external stakeholders, clinic, external emergency services, etc.
  - Notification charts and checklists according to the nature of the incident;
  - Medical response and evacuation procedure;
  - Fire response procedure;
  - Emergency evacuation procedure and muster points;
  - Incident notification, reporting and investigation procedure.
- Implement a security control room on site able to manage the alarms, emergency communications and assist the Emergency Response Team (ERT). The security control room will be organized also as a crisis room when necessary.
- Implement a Crisis Management Centre at level 2 (country level) with dedicated documentation and telecommunications means.
- Organize training of the ERT, security guard force, and relevant managers in crisis communication.
- Organize drills, desktop exercises on site and exercise involving level 1 and level 2.
- Test on regular basis the telecommunication means, emergency contact numbers and any equipment for emergency response.
- Review the contingency plans on regular basis and after an incident or a crisis occurred. Implement improvements to crisis management post-event.
- Maintain on daily basis the Personnel on Board (POB) register and send it to the relevant recipients.

- Each subcontractor shall have Security and Safety correspondents to implement and maintain the emergency response system on site.
- The security control room on site will received and dispatch emergency calls on permanent basis, 24/7.
- Include the emergency response and crisis management system in the internal audit planning.

Figure 18: Example emergency response organisation



Operations and Maintenance phase

For the O&M phase, an Emergency Response system shall be implemented according to the following considerations:

- O&M Contractor shall draft an Emergency Response and Crisis Management manual including the three levels as follows:
  - Site or tactical level;
  - Country or strategic level;

  - Corporate level (or executive committee level) for major incident or crisis impacting seriously the business or the reputation of the company.

- A liaison to the emergency response structure of internal stakeholders will be included in the document.
- Each Project / Site shall have its own Emergency Response Plan (level 1) including:
  - Emergency and contact details of personnel, internal and external stakeholders, clinic, external emergency services, etc.
  - Notification charts and checklists according to the nature of the incident;
  - Medical response and evacuation procedure;
  - Fire response procedure;
  - Emergency evacuation procedure and muster points;
  - Incident notification, reporting and investigation procedure.
- The control room on site will be able to manage the alarms, emergency communications and to assist the Emergency Response Team (ERT). The meeting room will be able to be set up as a crisis room when necessary.
- Implement a Crisis Management Centre at level 2 (country level) and level 3 (corporate or Executive Committee level) with dedicated documentation and telecommunications means.
- Organize training of the ERT, security guard force, and relevant managers in crisis communication.
- Organize drills, desktop exercises on site and exercise involving level 1 and level 2.
- Test on regular basis the telecommunications means, emergency contact numbers and any equipment for emergency response.
- Review the contingency plans on regular basis and after an incident or a crisis occurred. Implement improvements to crisis management post-event.
- Maintain on daily basis the Personnel on Board (POB) register through the access control system and send it to the relevant recipients on regular basis and when a major incident occurs.
- The control room on site will received and dispatch emergency calls on permanent basis, 24/7.

- Include the emergency response and crisis management system in the internal audit planning.

ANNEX K. SECURITY INCIDENT NOTIFICATION, INVESTIGATION AND REPORTING

The aim of this part is to ensure that when a security incident occurs, all necessary measures will be taken in accordance with all applicable rules.

A security incident is anything that causes harm to staff or associated people, or loss of or damage to assets. A “near-incident” is something that almost caused such harm, damage or loss. A threatening action can be written, verbal or a physical gesture, as long as it credibly signifies the intent of an actor to cause harm. It is important to include even minor incidents, and to report near-incidents. If in doubt, report it.

Solar Program Security Advisor, EPC or O&M Contractors Site Security Manager and Subcontractors Security Correspondents (during Construction phase only), will ensure that:

- Incidents are properly classified and reported to the Management within the specified timing;
- Incidents are properly investigated at the worksite where they occurred in full cooperation with others parts involved.

All personnel will ensure:

- That all incidents are reported in accordance with local procedures;
- Their participation in investigations as necessary.

It is vitally important to report security incidents, including threats and breaches, for the following main reasons:

- To alert the site office and headquarters, so that they are aware and, if necessary, can provide help;
- To alert the management – and where appropriate the local authorities – so that they can take precautionary action;
- To allow for tracking and trend analysis of incidents to inform security risk assessments, lessons learned and decision-making.

Classification of security incidents

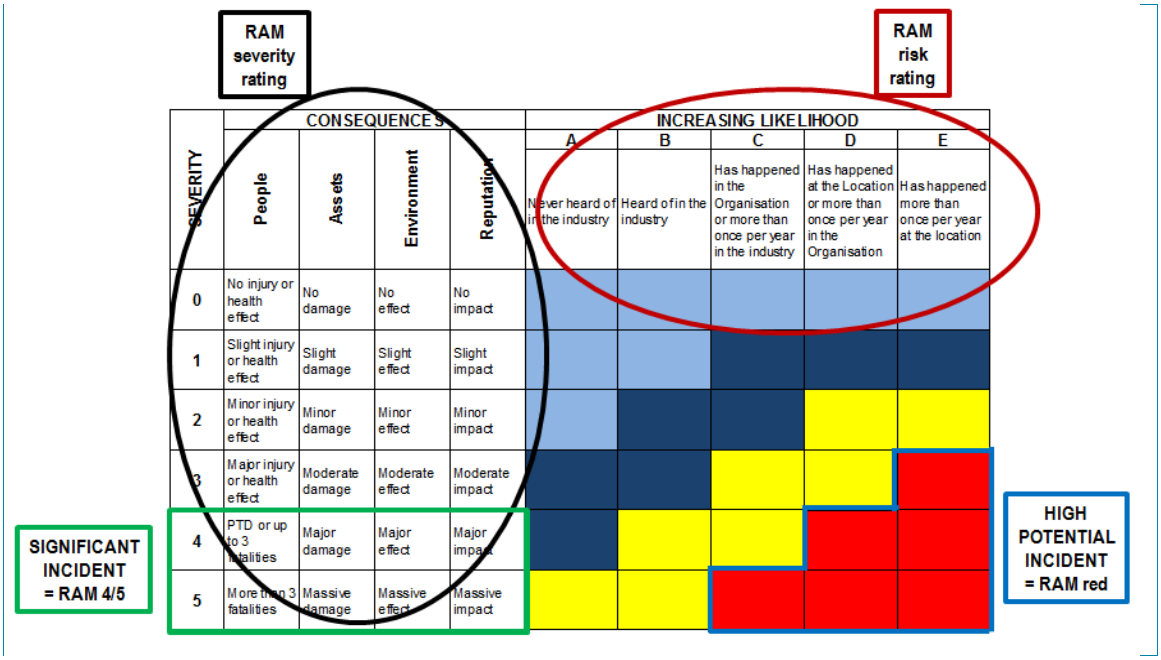
The Security Manager shall make an initial classification of the incident using a Risk Assessment Matrix (RAM), see figure here below. The classification is used to determine how an incident must be notified and investigated, and to determine the Incident owner and the composition of the Investigation Team, see table below.

Table 4: Classification of security incidents

Risk	Incident Owner	Investigation
Low	First line of supervision	Activity/worksite supervisor Local Security Lead
Medium	Site or activity owner	Activity/worksite supervisor Site/activity owner Local Security Lead
High and actual severity 4 or 5	Line Manager with accountability for asset or function	Line Manager Security and HSE Managers Independent specialist (as required) Legal representative (as required) Authority representative (as required)

- Step 1 – Use the Actual Consequences to determine the initial RAM Severity rating: 0-5, for People, Assets, Environment, or Reputation.
- Step 2 – Use the combination of the Potential Consequences Severity rating (0-5) and their Likelihood rating (A-E) to determine the initial RAM Risk rating: Red, Yellow or Blue. With respect the Control Framework and Guide shall apply.

Figure 19: RAM severity rating



According to the severity of the incident, the Site Manager is able to request the mobilization of the Emergency Response Team.

Find here below some examples of security incidents:

- Minor incident
  - Robbery
  - Theft
  - Vandalism or sabotage with low impact
  - Personnel fight
  - Labour demonstration
  - Strike
  - Aggression
  - Trespass on Site by unauthorized people

- Major incident
    - Kidnapping
    - Riot, violent labour unrest
    - Civil unrest, political and/or ethnic-religious tensions in the vicinity of the site
    - Murder
    - Attack with violence
    - Coup
    - Curfew
    - Bomb threat / Terrorist attempt
    - Fraud / Corruption
    - Community unrest

Incident notification and reporting

All personnel shall notify EPC or O&M Contractor security management immediately of any security incident (or potential incident).

EPC and O&M Contractors will implement comprehensive programmes for the reporting of all incidents that result in, or have the potential to result in injury to people, damage to property, or to the reputation of Solar Projects. During the Construction phase, EPC Contractor shall involve the Subcontractors Security Correspondents to ensure incidents involving Subcontractor personnel are reported.

The EPC and O&M Contractors will proactively report all such incidents and support incident reporting requirements. EPC and O&M Contractors will maintain adequate records of all the incidents. The incident reports will be transmitted to Solar Program management.

The immediate incident notification shall provide all available information by answering as much as possible the basic following questions included in the incident report. Then, a detailed report will be transmitted within twenty-four hours.

The incident report

It is important to alert colleagues and associates of an incident as soon as possible after it happens, even if all information has not yet been obtained. A fuller incident report (see template in annex E), however, is usually written up after the incident and the incident response – although for protracted situations (e.g. a kidnapping) a report may be produced

before the incident is over. Incident reports are kept at field level and shared with headquarters.

Solar Projects shall have a standard incident report form, available online for easy access.

The incident report will focus on the basic questions:

- What type of incident? (kidnap, death, assault, theft, car accident, etc.)
- Who was involved?
- When did the incident occur?
- Where (as precisely as possible) did the incident occur?
- How many casualties or damages occurred as a result and how serious are they?
- What emergency response action has been undertaken so far?
- Is additional response requested? If so, what?
- Is the situation ongoing?

It is important to verify all of this information. It may or may not be relevant to add something about the 'why' and 'why Solar Program or a specific stakeholder. Was Solar Project specifically targeted, and if so why? Be sure to indicate the degree of confidence in the answer. Sometimes it is obvious because the perpetrators said so, but in other instances this may just be speculation.

Incident reporting can greatly assist security managers in understanding the operational context and predicting the kind of incidents that may be likely in the future. A reliable overview of reportable incidents, worked through a database, allows for greater security analysis.

Incident reports will be classified "Confidential" or "Internal Confidential" depending on the recipients and stored in appropriate secure place.

Investigation

An incident shall be investigated as soon as practical after it occurred. The Incident owner shall appoint an Incident Investigation Team Leader of a seniority appropriate to the incident.

A fully completed investigation report, including a root cause analysis where appropriate, is to be submitted to the Management.

Any person selected to assist in any internal investigation will be required to fully cooperate with the Site Security Manager or any other designated EPC or O&M Contractor personnel until his services are no longer required.

Persons who are invited for questioning in an investigation that requires the intervention of the Government Security Forces (i.e. an offense which is a punishable offense under Nigerian Law) will be subject to Nigerian law and Nigerian legal procedures.

EPC and O&M Contractors and/or Owner Representatives shall have the right to investigate any of the incidents, wherever they occur, and shall have unrestricted access at all reasonable times to the facilities, equipment, materials, personnel and records of the Subcontractor for this purpose.

During the Construction phase, the Subcontractor shall co-operate fully and participate as necessary with the EPC and O&M Contractors and/or Owner Representatives in any investigation of such incidents and a detailed report shall be sent to Solar Program and Contractor security management as soon as practical.

The investigation report

Incident Investigation Reports shall contain the following:

- Summary
- Place, time and date of incident
- Consequences
- The incident description
- Other information
- Results of investigation
- Conclusions
- Recommendations
- Appendix (to include, where appropriate, maps photographs, documents, including witness statements, certificates etc.).

Investigation reports will be classified “Confidential” or “Internal Confidential” depending on the recipients and stored in appropriate secure place.

ANNEX L. EVACUATION PLANNING

Project area evacuation plans

The development and maintenance of an effective evacuation procedure will be the responsibility of the Operations Manager of the site and developed in accordance with the direction of each internal stakeholder security management. This is a continuous process that must be flexible enough to respond to changing circumstances. The evacuation plan will include the following:

- Context
- Concept and methodology
- Scope
- Distribution list
- Triggers
- Evacuation options
- Administrative organisation and external supports
- Decision making structure

Key Locations and Safe Havens

Suitable assembly areas, routes and destinations to be used in advanced planning phase will be identified.

Planning Options

An overview of the likely integrated evacuation routes available to the extraction planning team will be performed.

Management considerations:

- Record strategic aim and set policy;
- Define decision making structure from corporate to local level – authority to activate;
- Threat monitoring and triggers;
- Establishing roles, responsibilities (including individual) communicating and auditing;
- Preparation: Ensuring the structures and plans are in place in advance to ensure effective and efficient response.

Operational considerations:

- Identify key service providers and alternates (logistics, security, medical, hotels, catering etc.) and ensure that contact details are up to date.
- Assess locations, major routes and alternates:
  - Airports
  - Ports
  - Overland Routes
- Identify suitable:
  - Secure assembly areas (hotel or other accommodation close to point of departure)
  - Point of departure
  - Safe havens en-route
  - Reception on arrival at destination

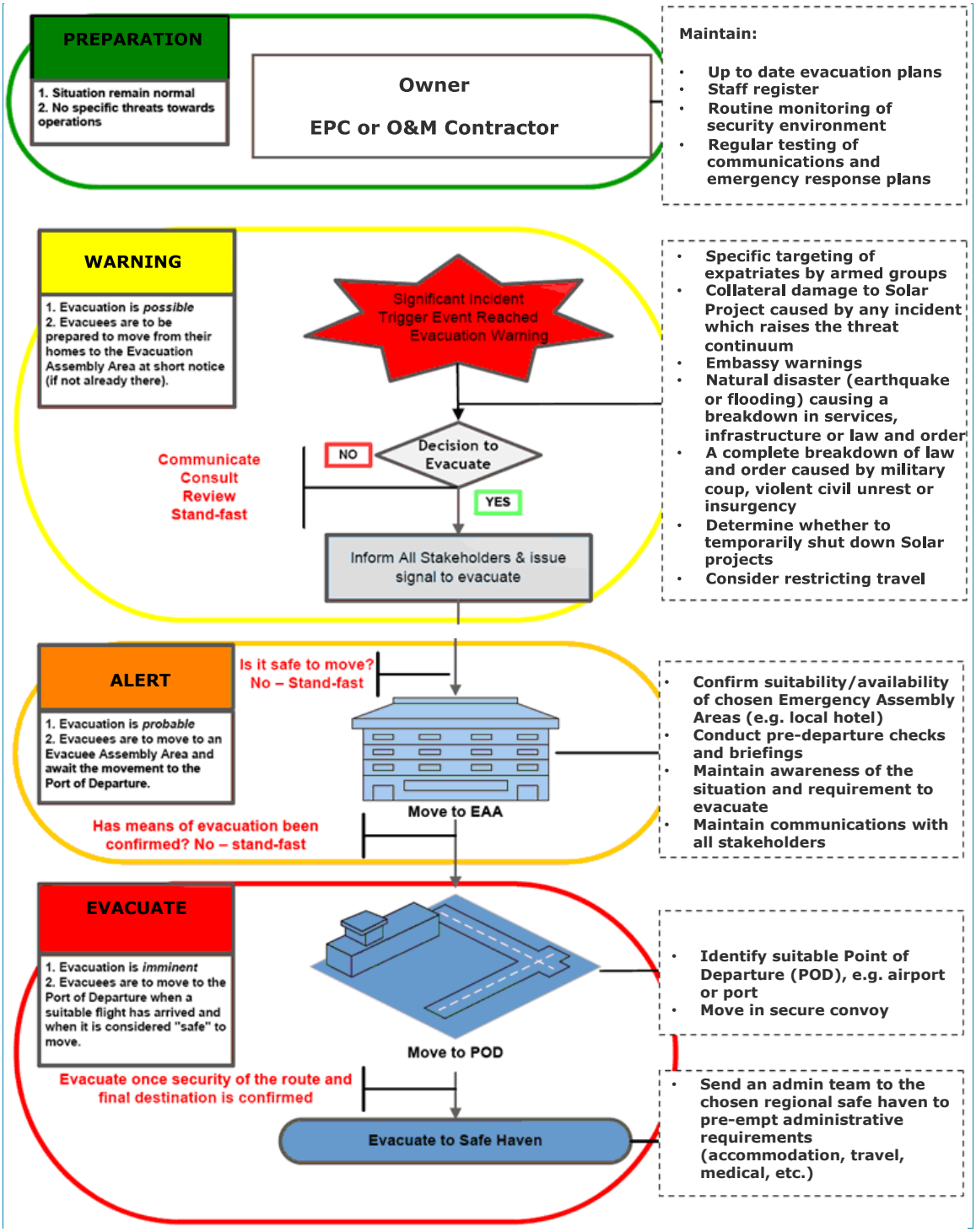
Extraction Constraints

Planning constraints (including potential flashpoints, closed borders, timings, no-go/slow-go zones) will be identified.

Key Triggering Events

A comprehensive table highlighting key threat drivers (civil war, natural disaster, political and ethno-religious tensions, terrorist attacks, etc.) that could trigger a security-driven extraction will be compiled according to the Evacuation Monitor alert levels, outlined as follows.

Figure 20: Evacuation phases



Movement and Logistics

All necessary preparation should be described in details, including, but not limited to:

- Scheduled flights/chartered flights
- Road moves
- No move situations
- Embassy assistance

Coordinating Information

Contact details will be up-to-dated for all extraction participants and miscellaneous supporting planning information.

Command/Control/Communications

Recommended organisational structures and processes required to execute an effective extraction will be outlined.

Key service providers and alternates (logistics, security, medical, hotels, catering etc.) will be identified and contact details up to date.

Finance and Documentation

Potential costs, need for reserve cash funds and contingency visa and passport requirements will be outlined.

Plan maintenance

In order to ensure the maintenance of the evacuation plans, the following actions should be performed:

- Communicate to all relevant parties and ensure that they are aware of their role
- Maintain and review regularly to ensure it is current, correct and relevant
- Audit measures on a regular basis to ensure the plan is real:
  - Practice staff
  - Test operations
  - Validate plans

Keys to success evacuation

- Clearly defined decision-making authority and individual responsibilities
- Timely and accurate situation assessments - information sources
- Access to local support logistics
- Reliable communications and reporting procedures
- Up to date records and contact details
- Pre-planned administrative actions and resources
- Liaison with and understanding of capabilities - diplomatic, host nation, partners
- Cash supply

APPENDIX 1.3

FMENV PUBLIC DISPLAY AND ANNOUNCEMENT LETTERS

FEDERAL MINISTRY OF ENVIRONMENT

Environment House

Independence Way South, Central Business District, Abuja - FCT.
Tel: 09-2911 337 www.environment.gov.ng, ea-environment.org

ENVIRONMENTAL ASSESSMENT DEPARTMENT

Ref: FMEnv/EA/EIA/3316/Vol.1/77
Date: 14th October, 2015.

The Managing Director,
Nova Solar Power,
Off Gana Street, Maitama,
Abuja FCT.

PUBLIC DISPLAY EXERCISE ON THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF THE PROPOSED 125MWP UTILITY SCALE SOLAR PHOTOVOLTAIC (PV) PROJECT IN KANKIA LOCAL GOVERNMENT, KATSINA STATE.

Please refer to your letter dated 7th September, 2015 submitting ten (10) hard copies and Two (2) e-copies of the Draft EIA Report for the above project.

2. I am directed to inform you that the Honourable Minister of Environment has approved the following review process for the Environmental Impact Assessment (EIA) of the project:-

a. 21 Working Days Public Display.
b. Panel Review Meeting.

3. The public display exercise will take place from 19th October to 16th November, 2015. You are please requested to place the enclosed news paper adverts (quarter page) on or before 19th October, 2015 in the following newspapers:-

a. Daily Trust
b. The Leadership
c. The Nation

4. You are further requested under this arrangement to place a radio announcement at prime time on Katsina State Radio for the first and last five (5) days of the display exercise. Samples of the newspaper advert and radio announcements are herewith attached. Evidence of advertisements and radio announcements must be submitted to the Federal Ministry of Environment, Abuja.

5. The date, venue and your company's responsibilities for the Panel Review exercise will be communicated to you in due course.

6. Thank you for your co-operation.

K.A. Ihebinike
For: Honourable Minister.

PUBLIC NOTICE

FEDERAL MINISTRY OF ENVIRONMENT

PUBLIC DISPLAY EXERCISE ON THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF THE PROPOSED 125MWP UTILITY SCALE SOLAR PHOTOVOLTAIC (PV) PROJECT IN KANKIA LOCAL GOVERNMENT, KATSINA STATE BY NOVA SOLAR POWER LTD.

In accordance with the provisions of Environmental Impact Assessment (EIA) Act Cap E12 LFN 2004, which makes it mandatory for proponents of all new major development activities to carry out Environmental Impact Assessment for their proposed projects, the Federal Ministry of Environment hereby announces a twenty-one (21) working days Public Notice for information and comments on the Draft EIA Report of the above named project submitted by Nova Solar Power Ltd.

The Display Centers Are:

- Kankia Local Government Area Headquarters, Kankia, Katsina State.
- Katsina State Ministry of Environment, State Secretariat, Katsina.
- Federal Ministry of Environment office, Katsina, Katsina State.
- Federal Ministry of Environment, Conservation House (Green Building), Plot 444 Aguiyi Ironsi, Maitama, Abuja – FCT.
- Federal Ministry of Environment, Environment House (Brown Building), Independence Way, Central Business District, Abuja – FCT.

Project Description:

The proposed project involves the construction and operation of a 125MWP Utility Scale Solar Power Photovoltaic (PV) project in Kankia Local Government Area, Katsina State.

Duration of Display:

Date: 19th October to 16th November, 2015. Time: 8:00am – 4:00pm Daily.

ALL COMMENTS RECEIVED SHOULD BE FORWARDED TO THE HON. MINISTER, FEDERAL MINISTRY OF ENVIRONMENT ON OR BEFORE 23RD NOVEMBER, 2015.

SIGNED
PERMANENT SECRETARY
FOR: HONOURABLE MINISTER

RADIO ANNOUNCEMENT

FEDERAL MINISTRY OF ENVIRONMENT

PUBLIC DISPLAY EXERCISE ON THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF THE PROPOSED 125MWP UTILITY SCALE SOLAR PHOTOVOLTAIC (PV) PROJECT IN KANKIA LOCAL GOVERNMENT, KATSINA STATE BY NOVA SOLAR POWER LTD

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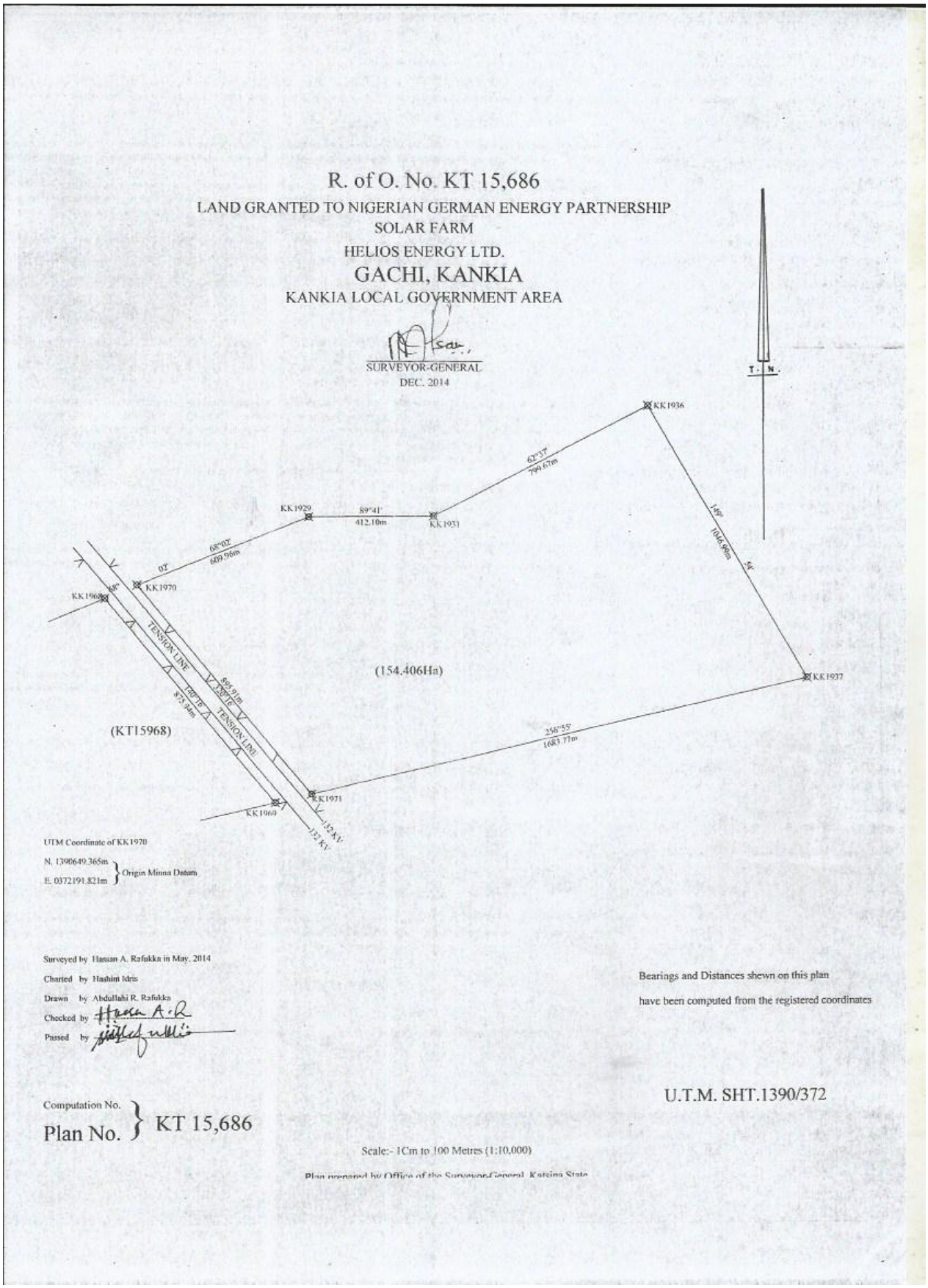
SIGNED
PERMANENT SECRETARY
FOR: HONOURABLE MINISTER

APPENDIX 3.1

NOVA SOLAR 5 FARMS LIMITED SURVEY PLAN

Appendix


R. of O. No. KT15968
LAND GRANTED TO NIGERIAN GERMAN ENERGY PARTNERSHIP
SOLAR FARM
HELIOS ENERGY LTD
GACHI, KANKIA
KANKIA LOCAL GOVERNMENT AREA
SURVEYOR-GENERAL
DEC. 2014
T. N.
KK1970
KK1968
KK1928
KK1971
KK1969
KK1937
TENSION LINE
TENSION LINE
(KT15686)
(35.86Ha)
From Katsina
To Katsina
132 KV
132 KV
UTM Coordinate of KK1928
N. 1390313.5900m
E. 0371730.440m
Origin Minna Datum
Surveyed by Hassan A. Rafukka in May, 2014
Charted by Hashim Idris
Drawn by Abdullahi R. Rafukka
Checked by
Passed by
Bearings and Distances shewn on this plan
have been computed from the registered coordinates
U.T.M. SHT.1390/371
Computation No.
Plan No. KT 15,968
Scale:- 1Cm to 100 Metres (1:10,000)
Plan prepared by Office of the Surveyor-General, Katsina State


R. of O. No. KT 15,686
LAND GRANTED TO NIGERIAN GERMAN ENERGY PARTNERSHIP
SOLAR FARM
HELIOS ENERGY LTD.
GACHI, KANKIA
KANKIA LOCAL GOVERNMENT AREA
SURVEYOR-GENERAL
DEC. 2014
T. N.
KK1936
62°17'
799.67m
KK1929
89°41'
412.10m
KK1931
68°02'
609.96m
KK1970
KK1968
68°
149°
1046.99m
54'
TENSION LINE
330FT
TENSION LINE
(154.406Ha)
(KT15968)
KK1937
256°55'
1683.77m
KK1971
KK1969
132 KV
UTM Coordinate of KK1970
N. 1390649.365m
E. 0372191.821m
Origin Minna Datum
Surveyed by Hassan A. Rafukka in May, 2014
Charted by Hashim Idris
Drawn by Abdullahi R. Rafukka
Checked by
Passed by
Bearings and Distances shewn on this plan
have been computed from the registered coordinates
U.T.M. SHT.1390/372
Computation No.
Plan No. KT 15,686
Scale:- 1Cm to 100 Metres (1:10,000)

APPENDIX 4.1

DATA GATHERING APPROACH

APPENDIX 4.1

DATA GATHERING PROCEDURE

1.1 General

FNL adopted a QHSE management system approach in executing the field data gathering campaign. This approach assured that the required data were collected in accordance with agreed requirements (contractual, scientific and regulatory) using the best available equipment, materials and personnel. The approach also assured that the safety and health of personnel, public, environment and assets were not compromised at any time. The following sections outline the methodology and procedures employed in the ecological data gathering and descriptions of laboratory analytical methods as well as the detection limits for the various parameters analysed. Also presented, is an overview of the general QHSE plan adopted for field data gathering exercise.

1.2 Methodology

The methods employed during the field data gathering campaign was accomplished in line with the requirements of Department of Petroleum Resources (DPR) as outlined in page 38, Appendix 11-4 of EGASPIN (DPR, 1991, revised 2002), and other requirements of various international bodies which include sampling and analysis methods of the American Society for Testing and Materials (ASTM), United States Environmental Protection Agency (USEPA) and American Public Health Association (APHA).

The objective of the field data acquisition is to establish the physical, chemical and biological status of the surface water, groundwater, soil, sediment as well as the air quality/ noise characteristics of the study area through visual observations, on-site measurements and laboratory testing and analyses. Data were also recorded for fishery, vegetation and socio-economic studies.

1.3 Study Team

Field data gathering campaign for the study was carried out for two seasons. The first season (dry) was carried out in February 2015, while the wet season was carried out in August, 2015. The study was approved by Federal Ministry of Environment (FMEnv). The study team comprised of FNL personnel who are experts in areas such as biodiversity and wildlife, socio-economic, chemistry, geology and engineering. Also among the study team were representatives of NOVA Power Limited and FMEnv Regulators. The team members and their responsibilities are presented in **Table 1** on the next page.

Table 1: Study Team Members

Project Management/Reporting

Mr. Esa Odan	Service Line Manager	Project Director/ report Review
Mr. Patrick Agioh	Head, Water Mgt. & Remediation	Report Development/ Project Management
Mr Emeka Okusor	Head, Sustainable Dev. & Mgt. System	Report Review
Mr. David Mbrekpadiaha	Environmental Engineer	GIS/Mapping

Data Collection Team

Mr. Echefu Madugba	Service Line Manager	Laboratory Management
Miss Kate Iwuozor	Technologist	Laboratory Supervision
Mr Emeka Okusor	Ecologist	Biodiversity Profiling
Dr. Pius Adejoh	Sociologist	Socio-economic/health Profiling
Mr. Christopher Green	Economist	Socio-economic/health Profiling
Mrs. Chioma Eze	Head, Biology	Microbiological Analyses
Mr. Patrick Agioh	Head, Water Mgt. & Remediation	Socio-economic/health Profiling
Mr. Chika Ofunne	Head, Data Gathering	Field Sampling/Lab Analyses
Mr. Anto Amboson	Geologist	Field Sampling

KSG Representative

Salihu Kado	Perm Secretary Ministry of Lands
Kabir Labo	Perm Secretary Resource Development
Abdulkadir Halilu	Director Evaluations Lands & Survey

NOVA Power Representatives

Mr. Orezi Emeotu	ESIA Project Manager
Mr. N. Animashaun	Deputy Managing Director
Mr. Yassine Majdallah	Project Manager

Equipment and materials used during the sampling activities are presented in **Table 2** below.

Table 2: Field Data Collection Equipment/ Materials

Equipment/ Materials	Uses
Ecological Sampling Materials	
Digital camera	Photographs
Plastic basins	Collection of sediment samples
Sieve (1.0mm)	Sieving for benthic organisms
WTW Multi-Meter	Measurement of samples pH
Coolers	Storage of samples
Soil /sediment colour chart	Description of sediment/ soil
2L plastic bottles	Collection of water for physico-chemistry
1L glass bottles	Collection of water for hydrocarbon
500ml plastic	Collection of filtered water for zoo/phytoplankton
500ml plastic	Collection of sieved sediment for benthos
200ml glass	Collection of water for microbiology
Sampling bags	Collection of sediment/soil for physico - chemistry/heavy metals
60ml plastic containers	Collection of sediment/soil samples for microbiology
100ml glass containers	Collection of sediment/soil samples for THC
PPE (coverall, hard hat and safety shoe.)	Sampling activities, protection for field personnel
Markers/ masking tapes & serviette	Identification of sample ID
Labels	Identification of sample ID

Table 2: Field Data Collection Equipment/ Materials Cont'd

Equipment/ Materials	Uses
Ecological Sampling Materials	
Notebooks and biros	Data / information logging
Forms (daily project update form, chain of custody form and incident/hazard form)	Quality control
Sulphuric acid	Preservation of samples
Nitric acid	
10% Formaldehyde	
Conductivity /pH /redox standards	Quality control
Aerocet 531 particulate meter	SPM measurement
Pulsar II Digital Sound Level Meter	Noise measurement
Multi RAE IR System	Air quality measurement
Disposable hand gloves	Use when handling chemicals
25ml beaker/250ml beaker	Insitu analysis
100ml volumetric flask, pipettes: 10ml, 5ml	Insitu analysis
Distilled water	Insitu analysis/QC
First aid box	Emergency treatment
Plankton net	Zoo/ Phyto Plankton
Geographic position system (GPS)	Locating sample co-oridnates

1.4 Sampling Design

Field data gathering was designed to cover the project area where the power plant would be positioned as well as the area of influence. Soil sample stations were distributed to ensure major soil types that characterise the area were adequately collected. Surface/ groundwater and sediment were not collected for analyses because the there were none available. Further, socio-economic survey was carried out in Kankiya community, which happens to be host community.

On the whole, the following sample requirements were established based on approved Terms of Reference approved by the Federal Ministry of Environment (FMEnv):

Overall, samples obtained and measured in the two seasons were as follows:

- soil samples - fifteen (15) stations;
- groundwater sample - three (3) points;
- air/ noise quality measurement in eleven (11) stations; and

The sample station codes, co-ordinates, sample types obtained are presented in **Table 3.**

Area of Influence

Wind direction, and sensitive receptors were factors considered in determining sample points distribution. The zone of influence from project site which covers soil, air and noise as well as other receptors covered a 3 km radius. However, soil samples were spread to 10km and 7.5km distances respectively.

Table 3: Sampling Stations, Co-ordinates and Requirements

Sample Code	Sampling Requirement	Co-ordinates		Status
		Long. (E)	Lat. (N)	
SS1	Soil/air quality	7.835032	12.579268	Sampled
SS2	Soil/air quality	7.838441	12.576099	Sampled
SS3	Soil/air quality	7.835386	12.572110	Sampled
SS4	Soil	7.832444	12.574930	Sampled
SS5	Soil/air quality	7.827126	12.577388	Sampled
SS6	Soil/air quality	7.824994	12.573461	Sampled
SS7	Soil/air quality	7.825255	12.570274	Sampled
SS8	Soil	7.819404	12.574976	Sampled
SS9	Soil/air quality	7.826770	12.567271	Sampled
SS10	Soil/air quality	7.819900	12.572129	Sampled
SS11	Soil	7.822565	12.577640	Sampled
SS12 (control)	Soil/air quality	7.822565	12.577640	Sampled
SS13	Soil	7.829408	12.582603	Sampled
SS14	Soil/air quality	7.843538	12.571894	Sampled
SS15 (control)	Soil/air quality	7.814833	12.572286	Sampled
SW1	Surface water	7.836932	12.573867	Not Available
SW2	Surface water	7.832268	12.572534	Not Available
SW3	Surface water	7.829746	12.575663	Not Available
SW4 (control)	Surface water	7.842707	12.577704	Not Available
SW5 (control)	Surface water	7.833531	12.582215	Not Available
BH1	Ground water	7.81714	12.57752	Sampled
BH2	Ground water	7.83406	12.55635	Sampled
BH3	Ground water	7.82140	12.54609	Sampled

1.5 Pre-Mobilisation/QHSE Checks and Mobilisation

In preparation for field sampling, all materials and equipment were assembled and cross-examined by the field sampling team. Appropriate and fit for the job purpose materials were used for the exercise.

1.6 Field Sampling and Data Gathering

Field sampling and data collection was in line with standard procedures and practices for environmental data collection as defined in the work execution plan in agreement with PEL (project proponent) as well as FNL's QHSE policy and standards. Recording of data and field observations were carried out using digital and still photographs as well as taking notes on field notebooks. Such records include observations of vegetation/ wildlife, fish characteristics, insitu measurement of sediment, soil, ground and surface water characteristics, station co-ordinates and sample information (e.g., identification, date and time of collection, etc.). Description of specific field sampling/ survey activities carried out during the field data gathering exercise are discussed in the following sub-sections.

Positioning

Prior to commencement of sampling, the sample point's coordinates were loaded into a hand-held global positioning system (GPS) to serve as waypoints. The GPS assisted in navigation/ driving, location of sample area and positioning at each sample station. Thereafter, the co-ordinates at which sampling actually took place was recorded by the sampling team.

Socio-economic and Health Survey

Primary and secondary data were used for the study. Instruments used to obtain the primary data include household questionnaire, focus group discussions [FGDs], general group discussions [GGDs], key informant interviews and participatory rural appraisal tools.

Secondary data were obtained from published and unpublished documents such as the National Population Commission publication.

A reconnaissance project site visit was carried out to identify the likely impacted communities. This guided planning for the scale of surveys required for the community. For key informant interviews, the leaders of the community were selected. FGDs were conducted with different groups in each of the communities with stakeholders including the traditional chiefs/ elders, community leader, men and women. This ensured that representative sample of groups in the community were consulted.

Target Population and Sample Size
Fifty-five (55) copies of properly completed questionnaire were retrieved and used for analyses. Respondents were chosen from households in Kankiya community. This distribution covered vulnerable groups, all ethnic groups in the community, landlords and migrants, and was a good representation of the key stakeholders directly affected by the project.

Groundwater
Groundwater samples were collected from three (3) existing boreholes within the study area. Water samples were collected in appropriate containers. *In-situ* measurements were carried out to determine parameters with short holding time such as pH, temperature, turbidity, conductivity, total dissolved solids, salinity and dissolved oxygen. Water samples for heavy metal analyses were collected in 2ml plastic bottles and acidified with 10% HNO_3, while those for TPH were acidified with H_2SO_4.

Plate 1: Groundwater Sampling

Surface Water and sediment Samples
There was no surface water body at the study area during the two seasons. Consequently, there were no sediments.

Soil Samples
Using a hand auger (**Plate 2)** soil samples were collected from different sample points for laboratory analysis. In other to ensure optimum result, soil samples of not less than 500g were collected from depths 0-15cm and 15-30cm. The soil samples were obtained from sixteen (15) sampling stations (fifteen points). Samples for physico-chemical analysis were

collected and placed in ziploc bags, those for microbiology analysis where collected in 100ml sterilised plastic bottles, while samples for hydrocarbon analysis were collected in 100ml screw-capped glass bottles.

Plate 2: Soil Collection using Hand Auger

Samples for physico-chemical analyses were collected in polythene bags and stored for the analysis of particle size, total organic matter, trace metals, total phosphorous, total hydrocarbon etc. The sediment samples for microbial analyses were collected in a sterile McCartney bottles. The samples were stored in coolers containing ice block while residual sediment were washed for benthos.

After each sampling, the hand auger was washed thoroughly with water from the river to remove adhering particles prior to each sampling.

Air Quality and Noise Measurements

Measurement of atmospheric gas pollutants (CO, H_2S, NO_x, SO_x, C_xH_y and SPM) and noise levels were carried out in eleven (11) sample stations.

Atmospheric gasses were measured with the aid of Multi RAE IR Gas Monitor. This equipment was calibrated and a sensor connected to the equipment, the equipment was held at arm's length towards the direction of the prevailing wind at every point. The value of the atmospheric concentrations of each gaseous pollutant was read off directly on the equipment screen after 5 - 10 minutes.

The level of suspended particulate matter was established using the Aerocet 53i Particulate Counter. The equipment was switched on and exposed to the atmosphere for about 5 minutes the result obtained was read off from the meter and recorded in a field note book.

Plate 6: Air Quality Measurement

The ambient noise levels were measured with the aid of a Pulsar II Meter. The noise meter was programmed to run for 30 mins at each point. The readings were stored in the memory of the meter from which results were extracted using a computer in the office.

Vegetation and Wildlife

The vegetation and wildlife was studied by dividing the area into transects and each transect studied. Information from the field serves as primary data source. This was augmented by information/ data from secondary sources such as articles, text books, journals etc.

A reconnaissance survey provided insight into the selection of appropriate location, number, size, position and orientation of the transect's surveyed. The study was conducted in 3 belt transects. Transects were established at intervals of approximately 1.5km to 3.5 km, alternating on the west, north and east flanks of the proposed project site.

Within each transect the associated vegetation was characterized using the segmented belt transect techniques (Oosting 1956; Odu et al, 1985; Okpon et al 1998), to ensure maximum chances of finding most of the component species in the area

Laboratory Analytical Methods and Procedures

The following sub-sections presents a synoptic description of the laboratory analytical methods and procedures employed for the various physical, chemical and biological parameters. The equipment detection limits of these parameters in water and soil/ sediment samples are presented in **Table 4** and **Table 5**.

Table 4: Analytical Methods and Detection Limits for Water Samples

Parameters	Unit	Test method	Detection limit
Total Suspended Solids (TSS)	mg/l	APHA 2540D	1.00
Dissolved Oxygen (DO)	Mg/l	APHA 4500-O-G	0.50
Chemical Oxygen Demand	mg O_2/l	APHA 5220B	0.80
Biological Oxygen Demand	mg O_2/l	APHA 5210B	0.50
Vanadium (V)	mg/l	APHA 3111B	0.20
Copper (Cu)	mg/l	APHA 3111B	0.02
Iron (Fe)	mg/l	APHA 3111B	0.03
Lead (Pb)	mg/l	APHA 3111B	0.008
Nickel (Ni)	mg/l	APHA 3111B	0.06
Barium (Ba)	mg/l	ASTM D 3651	0.03
Zinc (Zn)	mg/l	APHA 3111B	0.02
Phosphate (PO_4^{3-})	mg/l	APHA 4500 PO_4^{3-}D	0.02
Sulphate (SO_4^{2-})	mg/l	APHA 4500 SO_4^{2-}E	0.02
pH	-	APHA 4500H^+B	-
Total Hydrocarbons (THC)	mg/l	ASTM D 3921	0.40

Table 5: Analytical Methods and Detection Limits for Soil/ Sediment Samples

Parameters	Unit	Test Methods	Detection limit
pH	-	Electrode	-
Grain size distribution (0.002 – 60 mm) (Sieve + hydrometer)	% weight	BS 1377 part 2 '90	-
Total hydrocarbons (THC)	mg/kg	ASTM D 5765/ASTM D3921	5.0
Copper (Cu)	mg/kg dry weight	USEPA 6200	0.50
Iron (Fe)	mg/kg dry weight	USEPA 6200	0.50
Lead (Pb)	mg/kg dry weight	USEPA 6200	1.00
Nickel (Ni)	mg/kg dry weight	USEPA 6200	0.50
Vanadium (V)	mg/kg dry weight	USEPA 6200	0.50
Zinc (Zn)	mg/kg dry weight	USEPA 6200	0.50
Nitrate (NO_3^-)	mg/kg	CAEM/EPA 352.1	0.02
Nitrite (NO_2^-)	mg/kg	CAEMAPHA 4500 NO_2^-D	0.02
Phosphorus total (P)	mg/kg	CAEMAPHA 4500 PO_4^{3-}D	0.02
Sulphate (SO_4)	mg/kg	APHA 4500	0.02

Analytical Procedures

Conductivity and pH

20.0g of fresh sediment sample was weighed into a 50ml beaker and 20ml of distilled water added to the beaker. The mixture was thoroughly stirred and allowed to stand for 30 minutes and the Multi-Parameter Water Quality Monitor was then used to measure the above parameters directly. The APHA 2510A and APHA 4500H $^+$B (for water) were used for conductivity and pH determinations.

Total Suspended Solid

Total suspended solids content of the water samples was determined with a membrane filter apparatus, in accordance with APHA 25400. A 100ml aliquot of the water sample was filtered through dried pre-weighed 0.45f.lm filter paper, through which clean distilled water not less than 100ml and subsequently passed to remove salt. The filter was then oven dried at 105 ± 5°C for one hour. After drying, the filter paper was cooled and weighed. The difference in filter weights before and after filtering was used to calculate the TSS.
The TSS content was calculated as follows:

TSS (mg/l) = (A - B)

---------- x 1000
Sample volume (ml)

Where A = weight of filter paper (mg) + residue (mg)
B = weight of filter paper (mg)

Chemical Oxygen Demand
Chemical oxygen demand (COD) of surface water was determined titrimetrically according to CAEM. In this method, organic matter was oxidized to carbon dioxide using acid dichromate as the oxidizing agent and its consumption which is equivalent to COD concentration was measured by titrating against a standard ferrous ammonium sulphate solution.

The chemical oxygen demand was calculated as follow:

COD (mgll) = B - S(ml) x titrant molarity x 8 x 1000

Volume of sample

B =Titre for Blank
S =Titre for Sample
8 =Atomic mass of Oxygen
1000 =Conversion to litre

Biological Oxygen Demand
BOD_5 of surface water was determined in accordance with APHA 5210B. This was done electro metrically with the OxiTOP BOD instrument in the presence of sodium hydroxide. Each sample was allowed to attain a temperature of within 2°C of its incubation temperature (20°C). 95ml of the samples were measured into BOD Trak sample bottles with channel num!1er tags and magnetic stirrers inserted in each sample bottle. Test duration of 5 days for the sample was selected from the channel key. The test was initiated by pressing the channel number and selecting the BOD range required. The analysis results at the expiration of the set period were reported in mg/1. At the end of 5 days incubation, the readings were taken from the BOD device and multiplied by a factor of 20.

Total Petroleum Hydrocarbon
Infra-red spectrophotometry, as described in ASTM 03921, was used to determine the TPH in sediment/water samples. The method of extraction was calculated as follows.

TPH in water samples is calculated thus:

Actual TPH (mg/l) = Instrument reading (mg/l) x Volume of extractant (ml)

Volume of Sample (ml)

TPH in sediment samples is calculated:

Actual TPH (mg/g) = Instrument reading (mg/l) x Volume of extract (ml)

Weight of Sample (g)

Total Organic Carbon in Sediment Samples
TOC was determined following BS 1377 method.

TOC is calculated thus:

$$\text{Organic Carbon (g/kg)} = \frac{(\text{meq } K_2Cr_2O_7 - \text{meg } FeSO_4) \times 0.003 \times 1000 \times 1.3}{\text{Weight of water free sample (g)}}$$

Total Organic Matter (g/kg) = Total organic carbon (g/kg) x 1.729

Where,

meq K_2CrO_7	=	1N x 10ml
meq $FeSO_4$	=	0.5N x volume of titrant in ml
0.003	=	milliequivalent weight of carbon
1.30	=	Correction factor
1000	=	Conversion factor to kg

Phosphate - Phosphorus

The test method for Phosphate - phosphorus in sediment samples was based on APHA 4500-PD/CAEM. The Stannous Chloride Reduction Method, based on the method described in the Chemical Analyses of Ecological Materials (2nd edition), was applied. Phosphate - phosphorus content of sediment samples was calculated as follows.

$$\text{Phosphate - phosphorus (mg/kg)} = \frac{\text{C (mg/l) x Solution Volume (l) x 1000}}{\text{Aliquot x Sample weight (g)}}$$

Where C = mg phosphate obtained from calibration graph using the UV/Visible spectrometer and Vision software version 3

$$\text{Aliquot} = \frac{\text{Volume (ml) of extract used for analyses}}{\text{Volume (ml) of extractant used for the extraction}}$$

1000 = conversion factor to kg

Nitrate

The USEPA 3521 in combination with the Chemical Analysis of Ecological Matter (second edition) test methods were used to determine the nitrate content of sediment samples. N was calculated as follows.

$$\text{N (mg/kg)} = \frac{\text{mg (N) from calibration graph}}{\text{Aliquot (ml) x Sample weight (g)}} \times 1000$$

Where the 1000 is the conversion factor to kg

Aliquot = volume of extract used/volume of extractant.

Exchangeable Cations

Exchangeable cations (Mg, Ca, K, and Na) were determined as described by APHA 20th edition 3111 Band ASTM D3561. The concentrations were calculated thus:

$$\text{Concentration (mg/l)} = C \times \frac{C \times Y}{X}$$

Where C=concentration of cation determined from calibration curve

Y=final volume. Ml

X=volume of sample, ml

Cd, Zn, Mn, Cu, Cr, Ni and: APHA 3111 B (20th edition)
Ba: ASTM D3651
V: APHA 3111 D (20th edition)
Hg APHA 3112B

$$\text{Metal concentration of water samples (mg/l)} = \frac{C \times Y}{X}$$

Where C=concentration of cation determined from calibration curve
Y =Final volume made-up (ml)
X = Sample of volume (ml)

Hg is determined using' APHA 3112B 20ed test method

$$\text{Hg concentration, ug/l} = \frac{(A-B)}{D}$$

Where A = concentration of mercury in sample, µg/l as determined by AAS (Instrument Reading)
B = concentration of mercury found in blank, µg/l.
D =. Volume of sample in litres

Heavy Metals in Sediment Samples

Heav'y metal content of sediment samples was determined using Perkin Elmer Atomic Absorption Spectrophotometer, Model Analyst 200. The sample digestion/ preparation procedure followed is described in ASTM D5198/D3974. AAS measurement of heavy metal content sediment samples was done following the procedures indicated below.

Cd, Zn, Mn, Fe, Cu, Cr, Ni and: APHA 20th edition 3111 B
Ba: ASTM D3651
V: APHA 20th edition 3111 D

$$\text{Metal concentration of sediment samples (mg/kg)} = \frac{(A - B) \times C}{D}$$

Where A =Concentration of metal in sample (mg/l) as determined by AAS
B =Concentration of the metal found in blank (mg/l)
C=Volume of extract (ml)
D = Weight of dry sample (g)

Hg: APHA 3112B & ASTM D3223

Mercury (Hg) concentration is determined thus, µg/g = (A - B) C D

Where A = concentration of mercury in sample, µg/ml as determined by AAS (Instrument reading)
B = concentration of mercury found in blank, µg/ml (Procedural blank)
C = volume of extract, (ml)

D = weight of dry sample, (g)

Particle Size Distribution

The test method is based on the BS1377 (Part 2; 1990) which is in accordance with the Dutch RAW and the American ASTM D422. PSD was determined using the hydrometer method followed by sieving recommended for sediment samples containing more than 35% fine particles, i.e., clays and silts.

Total Microbial Count (Water and Sediment Samples)

Indirect cell count on sediment and water samples was carried out to determine the total viable microbial populations. The test methods used are the ASTM D5465 - 93:

Determining Microbial Colony Counts from Water Analysed by Plating Methods, and APHA 907: Standard Plate Count.

Total microbial colonies were calculated as follows:

$$\text{Plate Count (cfu/ml)} = \text{Vol plated} \times \text{Number of cells} \times \frac{(1)}{\text{dilution}} \times \text{dilution factor}$$

Faecal Coliform

Faecal coliform were determined using the multiple tube technique in accordance with ASTM D5392-93. 10ml of sample was inoculated into five tubes containing 10ml of double strength presumptive broth (Mac Conkey broth). The tubes were shaken to distribute the sample evenly. The tubes were inoculated at 35°C - 37°C for 24hours. At the end of 24hrs each tube was checked for gas or any effervescence (streams of tiny bubbles), then the numbers of positive tubes were recorded after 24hrs. Negative tubes were re-incubated for another 24hrs and the numbers of positive after 48hrs were also recorded.

A confirmatory test was carried out by transferring one or two drops from each presumptive positive tube to a corresponding sterile confirmative 10ml tube containing BGB broth. Gas presence in the subculture tubes after 24hrs at 44 ± 5°C confirms the presence of faecal coliforms.

The number of positive findings (either presumptive or confirmed) is computed in terms of the Most Probable Number (MPN). The MPN was estimated by Thomas' simple formula:

$$\text{MPN/100ml} = \frac{\text{No. of positive tubes} \times 100}{\sqrt{\text{ml sample in negative tubes} \times \text{ml sample in all tubes}}}$$

1.7 Quality, Health, Safety and Environment Plan

All aspects of the study were carried out in accordance to FNL Quality, Health, Safety and Environment (QHSE) plan and procedures. This covered the study execution and includes sample collection, handling, laboratory analysis and data (results) management as well as personnel health, safety and environmental protection.

The survey was carried out in a manner that ensured the health and safety of personnel and assets as well as the preservation of the integrity of the ecosystem. This involved carrying out safety briefings prior to commencement of sampling. All personnel wore personal protective equipment during sampling activities. All preservations and tests were carried in the field.

Laboratory Analyses

Quality Assurance and Quality Control (QA/ QC) measures adopted for laboratory analysis were in line with standard practices and included collection and analysis of duplicate samples to establish analytical precision. Other QA/ QC measures adopted include:

- Only adequately trained personnel were used at all phases of the study;
- Written analytical standard operating procedures were followed during analyses;
- Routine auditing and checking of analyses results, were introduced into every batch or five samples collected.

Data Management

Standard data spreadsheets were used for recording and transmitting analytical results. Presentation of results was carried out following written standard operating procedures. Final results were issued only after a general QA/ QC check and validation has been carried out.

APPENDIX 4.2

SOIL PHYSICO-CHEMICAL CHARACTERISTICS

Table 1: Soil Physico-chemical Results – Dry Season

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 3 (0-15cm)	SS 3 (15-30cm)	SS 4 (0-15cm)	SS 4 (15-30cm)
Co-ordinates			N: 12.572110 E: 7.835386		N: 12.574930 E: 7.832444	
Colour	APHA 2120	07/02/15	Pale Brown	Pale Brown	Pale Brown	Pale Brown
pH (H_2O) @ 29.6°C	ASTM D 4972	17/02/15	7.30	7.92	6.09	6.33
Moisture Content (%)	ASTM D2216	10/02/15	0.16	0.60	<0.10	0.58
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	2.00	3.00	2.00	2.00
Silt (%)			12.0	17.0	13.0	16.0
Sand (%)			86.0	80.0	85.0	82.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	12/02/15	8.56	14.4	0.29	1.71
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	108	17.5	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	0.90	<0.02	<0.02
Total Iron (mg/kg)	USEPA 6200	16/02/15	10,520	18,570	6,110	6,145
Copper (mg/kg)	USEPA 6200	16/02/15	<0.50	5.70	2.70	0.90
Lead (mg/kg)	USEPA 6200	16/02/15	30.4	32.4	34.2	33.3
Nickel (mg/kg)	USEPA 6200	16/02/15	18.6	23.5	14.9	19.6
Zinc (mg/kg)	USEPA 6200	16/02/15	13.3	29.2	28.1	21.2
Vanadium (mg/kg)	USEPA 6200	16/02/15	<1.00	<1.00	2.40	<1.00

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 5 (0-15cm)	SS 5 (15-30cm)	SS 6 (0-15cm)	SS 6 (15-30cm)
Co-ordinates			N: 12.577388 E: 7.827126		N: 12.593461 E: 7.824994	
Colour	APHA 2120	07/02/15	Pale Brown	Pale Brown	Reddish Yellow	Reddish Yellow
pH (H_2O) @ 29.5°C	ASTM D 4972	17/02/15	5.85	4.95	5.46	5.11
Moisture Content (%)	ASTM D2216	10/02/15	<0.10	0.24	<0.10	0.58
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD	ASTM D 422	25/02/15				
Clay (%)			6.00	5.00	2.00	3.00
Silt (%)			28.0	29.0	19.0	11.0
Sand (%)			66.0	66.0	79.0	86.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	2.99	9.47	4.60	6.26
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	105	97.5	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	<0.02	<0.02	<0.02
Total Iron (mg/kg)	USEPA 6200	16/02/15	8,546	6,611	6,849	7,461
Copper (mg/kg)	USEPA 6200	16/02/15	6.00	2.80	2.50	1.80
Lead (mg/kg)	USEPA 6200	16/02/15	16.4	37.0	4.70	32.2
Nickel (mg/kg)	USEPA 6200	16/02/15	27.3	23.2	29.2	21.1
Zinc (mg/kg)	USEPA 6200	16/02/15	20.4	18.9	17.4	16.8
Vanadium (mg/kg)	USEPA 6200	16/02/15	<1.00	2.40	2.70	<1.00

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 7 (0-15cm)	SS 7 (15-30cm)	SS 8 (0-15cm)	SS 8 (15-30cm)
Co-ordinates			N: 12.570274 E: 7.825255		N: 12.574976 E: 7.819404	
Colour	APHA 2120	07/02/15	Light Yellow Brown	Light Yellowish Brown	Reddish Brown	Reddish Yellow
pH (H_2O) @ 28.9°C	ASTM D 4972	17/02/15	5.63	5.80	5.74	5.59
Moisture Content (%)	ASTM D2216	10/02/15	0.58	0.55	0.10	0.15
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	3.00	3.00	1.00	1.00
Silt (%)			11.0	30.0	23.0	42.0
Sand (%)			86.0	67.0	76.0	57.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	1.57	1.60	2.29	1.02
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	<2.00	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	<0.02	<0.02	<0.02
Total Iron (mg/kg)	USEPA 6200	17/02/15	8,031	4,443	8,031	8,240
Copper (mg/kg)	USEPA 6200	17/02/15	7.80	9.60	7.80	7.30
Lead (mg/kg)	USEPA 6200	17/02/15	12.4	12.5	12.4	15.8
Nickel (mg/kg)	USEPA 6200	17/02/15	6.30	2.50	6.30	3.00
Zinc (mg/kg)	USEPA 6200	17/02/15	17.4	10.8	17.4	12.7
Vanadium (mg/kg)	USEPA 6200	17/02/15	13.4	7.20	13.4	17.8

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 7 (0-15cm)	SS 7 (15-30cm)	SS 8 (0-15cm)	SS 8 (15-30cm)
Co-ordinates			N: 12.570274 E: 7.825255		N: 12.574976 E: 7.819404	
Colour	APHA 2120	07/02/15	Light Yellow Brown	Light Yellowish Brown	Reddish Brown	Reddish Yellow
pH (H_2O) @ 28.9°C	ASTM D 4972	17/02/15	5.63	5.80	5.74	5.59
Moisture Content (%)	ASTM D2216	10/02/15	0.58	0.55	0.10	0.15
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	3.00	3.00	1.00	1.00
Silt (%)			11.0	30.0	23.0	42.0
Sand (%)			86.0	67.0	76.0	57.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	1.57	1.60	2.29	1.02
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	<2.00	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	<0.02	<0.02	<0.02
Total Iron (mg/kg)	USEPA 6200	17/02/15	8,031	4,443	8,031	8,240
Copper (mg/kg)	USEPA 6200	17/02/15	7.80	9.60	7.80	7.30
Lead (mg/kg)	USEPA 6200	17/02/15	12.4	12.5	12.4	15.8
Nickel (mg/kg)	USEPA 6200	17/02/15	6.30	2.50	6.30	3.00
Zinc (mg/kg)	USEPA 6200	17/02/15	17.4	10.8	17.4	12.7
Vanadium (mg/kg)	USEPA 6200	17/02/15	13.4	7.20	13.4	17.8

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 9 (0-15cm)	SS 9 (15-30cm)	SS 10 (0-15cm)	SS 10 (15-30cm)
Co-ordinates			N: 12.567271 E: 7.826770		N: 12.572129 E: 7.819900	
Colour	APHA 2120	07/02/15	Reddish Yellow	Reddish Yellow	Strong Brown	Strong Brown
pH (H_2O) @ 29.9°C	ASTM D 4972	17/02/15	5.36	5.20	5.69	5.74
Moisture Content (%)	ASTM D2216	10/02/15	2.38	3.37	1.51	3.67
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	21.0	21.0	21.0	4.00
Silt (%)			33.0	34.0	20.0	12.0
Sand (%)			46.0	45.0	59.0	84.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	2.05	1.97	2.49	3.41
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	<2.00	12.5	12.5	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	<0.02	<0.02	1.78
Total Iron (mg/kg)	USEPA 6200	16/02/15	19,440	36,365	33,910	26,350
Copper (mg/kg)	USEPA 6200	16/02/15	9.40	16.6	9.10	12.9
Lead (mg/kg)	USEPA 6200	16/02/15	36.2	49.4	58.4	33.6
Nickel (mg/kg)	USEPA 6200	16/02/15	75.3	31.0	37.0	29.7
Zinc (mg/kg)	USEPA 6200	16/02/15	18.6	21.6	29.0	30.8
Vanadium (mg/kg)	USEPA 6200	16/02/15	30.5	63.5	84.9	79.3

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 11 (0-15cm)	SS 11 (15-30cm)	SS 12 (0-15cm)	SS 12 (15-30cm)
Co-ordinates			N: 12.577640 E: 7.822565		N: 12.577640 E: 7.822565	
Colour	APHA 2120	07-08/02/15	Reddish Yellow	Reddish Yellow	Light Brown	Reddish Yellow
pH (H_2O) @ 29.2°C	ASTM D 4972	17/02/15	5.83	6.02	5.29	5.17
Moisture Content (%)	ASTM D2216	10/02/15	1.03	0.38	1.03	2.23
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	12.0	7.00	11.0	13.0
Silt (%)			25.0	20.0	16.0	18.0
Sand (%)			63.0	73.0	73.0	69.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	0.33	0.39	1.06	0.69
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	<2.00	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	<0.02	0.56	<0.02	<0.02
Total Iron (mg/kg)	USEPA 6200	16/02/15	6,560	6,323	5,629	6,267
Copper (mg/kg)	USEPA 6200	16/02/15	5.50	11.4	7.80	4.20
Lead (mg/kg)	USEPA 6200	16/02/15	7.10	10.7	10.4	<1.00
Nickel (mg/kg)	USEPA 6200	16/02/15	11.6	15.9	10.9	23.1
Zinc (mg/kg)	USEPA 6200	16/02/15	11.2	20.0	9.30	6.60
Vanadium (mg/kg)	USEPA 6200	16/02/15	12.0	7.60	21.1	<1.00

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 13 (0-15cm)	SS 13 (15-30cm)	SS 14 (0-15cm)	SS 14 (15-30cm)
Co-ordinates			N: 12.582603 E: 7.829408		N: 12.571894 E: 7.843538	
Colour	APHA 2120	07-08/02/15	Pale Brown	Pale Brown	Pale Brown	Pale Brown
pH (H_2O) @ 29.3°C	ASTM D 4972	17/02/15	6.66	6.61	7.85	9.59
Moisture Content (%)	ASTM D2216	10/02/15	<0.10	<0.10	<0.10	1.46
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	25/02/15	2.00	2.00	3.00	2.00
Silt (%)			27.0	28.0	29.0	30.0
Sand (%)			71.0	70.0	68.0	68.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	0.46	1.38	1.23	0.97
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	<2.00	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	0.38	0.75	<0.02	0.79
Total Iron (mg/kg)	USEPA 6200	16/02/15	6,013	5,715	6,942	6,321
Copper (mg/kg)	USEPA 6200	16/02/15	1.20	<0.50	5.50	10.9
Lead (mg/kg)	USEPA 6200	16/02/15	32.3	37.5	33.8	10.6
Nickel (mg/kg)	USEPA 6200	16/02/15	26.2	22.9	24.1	17.0
Zinc (mg/kg)	USEPA 6200	16/02/15	17.9	16.7	23.8	18.4
Vanadium (mg/kg)	USEPA 6200	16/02/15	<1.00	<1.00	<1.00	<1.00

Table 1: Soil Physico-chemical Results – Dry Season – cont'd

Parameter	Method	Date of Analysis	Sample Station Result	
			SS 15 (0-15cm)	SS 15 (15-30cm)
Co-ordinates			N: 12.572286 E: 7.814833	
Colour	APHA 2120	08/02/15	Very Pale Brown	Reddish Yellow
pH (H_2O) @ 29.3°C	ASTM D 4972	17/02/15	4.72	4.64
Moisture Content (%)	ASTM D2216	10/02/15	0.32	2.72
TRHC (mg/kg)	USEPA 8440	13/02/15	<5.00	<5.00
PSD				
Clay (%)	ASTM D 422	25/02/15	2.00	8.00
Silt (%)			28.0	30.0
Sand (%)			70.0	62.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	17/02/15	9.58	23.1
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	16/02/15	2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	17/02/15	18.3	<0.02
Total Iron (mg/kg)	USEPA 6200	17/02/15	6,695	6,849
Copper (mg/kg)	USEPA 6200	17/02/15	2.90	2.50
Lead (mg/kg)	USEPA 6200	17/02/15	8.00	4.70
Nickel (mg/kg)	USEPA 6200	17/02/15	30.8	29.2
Zinc (mg/kg)	USEPA 6200	17/02/15	8.60	7.40
Vanadium (mg/kg)	USEPA 6200	17/02/15	2.90	2.70

Table 1: Soil Physico-chemical Results – Wet Season

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 1 (0-15cm)	SS 1 (15-30cm)	SS 2 (0-15cm)	SS 2 (15-30cm)
Co-ordinates			N: 12.579268 E: 7.835032		N: 12.576099 E: 7.838441	
Colour	APHA 2120	04/8/15	Brown	Brown	Light yellowish brown	Light yellowish brown
pH (H_2O) @ 25.4°C	ASTM D 4972	11/8/15	6.01	6.68	6.06	5.81
Moisture Content (%)	ASTM D2216	7/8/15	15.1	12.9	15.9	16.9
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD	ASTM D 422	12-14/8/15				
Clay (%)			-	-	-	-
Silt (%)			13.0	16.0	10.0	11.0
Sand (%)			87.0	84.0	90.0	89.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.09	0.13	0.21	0.23
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	90.0	50.0	20.0	60.0
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	95.8	11.0	6.75	8.13
Total Iron (mg/kg)	USEPA 6200	14/8/15	7,871	9,558	8,295	9,986
Copper (mg/kg)	USEPA 6200	14/8/15	9.20	6.50	6.50	7.40
Lead (mg/kg)	USEPA 6200	14/8/15	4.20	2.70	1.40	10.2
Nickel (mg/kg)	USEPA 6200	14/8/15	12.9	17.5	5.90	5.60
Zinc (mg/kg)	USEPA 6200	14/8/15	28.9	17.1	12.3	8.90
Vanadium (mg/kg)	USEPA 6200	14/8/15	20.3	16.7	21.7	16.7

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 3 (0-15cm)	SS 3 (15-30cm)	SS 4 (0-15cm)	SS 4 (15-30cm)
Co-ordinates			N: 12.572110 E: 7.835386		N: 12.574930 E: 7.832444	
Colour	APHA 2120	05/8/15	Pale brown	Pale brown	Pale brown	Brown
pH (H_2O) @ 25.5°C	ASTM D 4972	11/8/15	5.60	5.55	5.43	5.11
Moisture Content (%)	ASTM D2216	7/8/15	14.2	13.9	12.9	15.1
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD Clay (%)	ASTM D 422	12-14/8/15	-	-	-	-
Silt (%)			15.0	13.0	12.0	16.0
Sand (%)			85.0	87.0	88.0	84.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.22	0.24	0.19	0.19
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	20.0	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	6.38	0.63	3.50	4.63
Total Iron (mg/kg)	USEPA 6200	13/8/15	6,703	7,465	9,087	7,647
Copper (mg/kg)	USEPA 6200	13/8/15	1.60	8.70	5.30	5.50
Lead (mg/kg)	USEPA 6200	13/8/15	<1.00	1.50	8.70	9.70
Nickel (mg/kg)	USEPA 6200	13/8/15	7.20	3.90	9.70	4.70
Zinc (mg/kg)	USEPA 6200	13/8/15	10.7	11.3	13.4	13.6
Vanadium (mg/kg)	USEPA 6200	13/8/15	13.0	4.40	15.3	2.80

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 5 (0-15cm)	SS 5 (15-30cm)	SS 6 (0-15cm)	SS 6 (15-30cm)
Co-ordinates			N: 12.577388 E: 7.827126		N: 12.593461 E: 7.824994	
Colour	APHA 2120	05/8/15	Pale brown	Pale brown	Reddish yellow	Reddish yellow
pH (H_2O) @ 25.4°C	ASTM D 4972	11/8/15	5.81	5.98	5.28	5.51
Moisture Content (%)	ASTM D2216	7/8/15	144	17.7	15.4	12.7
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD	ASTM D 422	12-14/8/15				
Clay (%)			-	-	-	-
Silt (%)			16.0	11.0	15.0	15.0
Sand (%)			84.0	79.0	85.0	85.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.45	0.24	0.10	0.28
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	<2.00	82.5	140	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	4.88	3.50	4.63	4.88
Total Iron (mg/kg)	USEPA 6200	13/8/15	4,835	6,147	5,906	6,545
Copper (mg/kg)	USEPA 6200	13/8/15	3.70	<3.00	5.10	3.90
Lead (mg/kg)	USEPA 6200	13/8/15	2.60	6.20	5.40	6.20
Nickel (mg/kg)	USEPA 6200	13/8/15	2.10	4.20	4.50	5.10
Zinc (mg/kg)	USEPA 6200	13/8/15	5.90	5.60	7.00	5.90
Vanadium (mg/kg)	USEPA 6200	13/8/15	14.4	2.20	2.20	22.7

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 7 (0-15cm)	SS 7 (15-30cm)	SS 8 (0-15cm)	SS 8 (15-30cm)
Co-ordinates			N: 12.570274 E: 7.825255		N: 12.574976 E: 7.819404	
Colour	APHA 2120	05/8/15	Strong brown	Strong brown	Reddish yellow	Strong brown
pH (H_2O) @ 25.4°C	ASTM D 4972	11/8/15	5.36	5.61	5.91	5.66
Moisture Content (%)	ASTM D2216	7/8/15	14.3	11.7	12.4	15.7
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD Clay (%)	ASTM D 422	12-14/8/15	-	-	-	-
Silt (%)			20.0	19.0	17.0	18.0
Sand (%)			80.0	81.0	83.0	79.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.39	0.39	0.17	0.29
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	10.0	<2.00	55.0	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	7.25	9.88	50.3	15.5
Total Iron (mg/kg)	USEPA 6200	13/8/15	8,769	10,510	13,630	16,550
Copper (mg/kg)	USEPA 6200	13/8/15	1.40	2.20	4.60	6.60
Lead (mg/kg)	USEPA 6200	13/8/15	11.7	12.2	15.1	18.2
Nickel (mg/kg)	USEPA 6200	13/8/15	6.40	8.90	9.80	10.8
Zinc (mg/kg)	USEPA 6200	13/8/15	10.8	10.3	17.5	29.2
Vanadium (mg/kg)	USEPA 6200	13/8/15	18.7	16.5	15.7	29.1

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 9 (0-15cm)	SS 9 (15-30cm)	SS 10 (0-15cm)	SS 10 (15-30cm)
Co-ordinates			N: 12.567271 E: 7.826770		N: 12.572129 E: 7.819900	
Colour	APHA 2120	04/8/15	Reddish brown	Reddish brown	Strong brown	Red
pH (H_2O) @ 25.5°C	ASTM D 4972	11/8/15	6.09	6.62	5.36	5.34
Moisture Content (%)	ASTM D2216	7/8/15	14.6	11.9	16.6	14.5
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD	ASTM D 422	12-14/8/15				
Clay (%)			-	-	3.00	2.00
Silt (%)			12.0	15.0	26.0	27.0
Sand (%)			88.0	85.0	71.0	71.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.14	0.36	0.15	0.32
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	<2.00	60.0	<2.00	95.0
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	47.4	21.5	7.50	2.50
Total Iron (mg/kg)	USEPA 6200	14/8/15	6,161	7,750	10,480	6,984
Copper (mg/kg)	USEPA 6200	14/8/15	9.60	3.30	12.4	10.5
Lead (mg/kg)	USEPA 6200	14/8/15	2.20	17.5	68.8	36.6
Nickel (mg/kg)	USEPA 6200	14/8/15	6.20	7.00	14.6	22.7
Zinc (mg/kg)	USEPA 6200	14/8/15	12.0	8.90	11.7	13.8
Vanadium (mg/kg)	USEPA 6200	14/8/15	4.70	28.2	19.8	12.8

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 11 (0-15cm)	SS 11 (15-30cm)	SS 12 (0-15cm)	SS 12 (15-30cm)
Co-ordinates			N: 12.577640 E: 7.822565		N: 12.577640 E: 7.822565	
Colour	APHA 2120	04/8/15	Reddish yellow	Reddish yellow	Strong brown	Strong brown
pH (H_2O) @ 25.6°C	ASTM D 4972	11/8/15	5.63	5.43	5.84	5.77
Moisture Content (%)	ASTM D2216	7/8/15	13.9	11.9	14.7	17.2
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	12-14/8/15	-	-	-	-
Silt (%)			9.00	19.0	14.0	18.0
Sand (%)			91.0	81.0	86.0	82.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.11	0.18	0.19	0.14
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	20.0	<2.00	<2.00	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	10.5	7.25	33.4	9.00
Total Iron (mg/kg)	USEPA 6200	14/8/15	4,257	8,756	5,813	7,944
Copper (mg/kg)	USEPA 6200	14/8/15	2.40	3.80	2.60	2.40
Lead (mg/kg)	USEPA 6200	14/8/15	<1.00	3.40	8.60	13.8
Nickel (mg/kg)	USEPA 6200	14/8/15	6.90	8.10	4.70	6.40
Zinc (mg/kg)	USEPA 6200	14/8/15	6.10	9.10	6.40	10.2
Vanadium (mg/kg)	USEPA 6200	14/8/15	3.90	<1.00	10.0	3.90

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result			
			SS 13 (0-15cm)	SS 13 (15-30cm)	SS 14 (0-15cm)	SS 14 (15-30cm)
Co-ordinates			N: 12.582603 E: 7.829408		N: 12.571894 E: 7.843538	
Colour	APHA 2120	04/8/15	Dark brown	Dark brown	Dark brown	Dark brown
pH (H_2O) @ 26.8°C	ASTM D 4972	11/8/15	5.89	5.95	6.09	6.99
Moisture Content (%)	ASTM D2216	7/8/15	16.8	16.3	12.4	13.7
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00	<5.00	<5.00
PSD						
Clay (%)	ASTM D 422	12-14/8/15	-	2.00	-	1.00
Silt (%)			22.0	21.0	14.0	18.0
Sand (%)			78.0	77.0	86.0	81.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.15	0.17	0.28	0.19
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	200	15.0	155	95.0
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	26.3	9.63	43.4	17.5
Total Iron (mg/kg)	USEPA 6200	17/8/15	7,121	8,725	8,577	10,560
Copper (mg/kg)	USEPA 6200	17/8/15	2.70	8.20	11.6	16.6
Lead (mg/kg)	USEPA 6200	17/8/15	7.90	11.0	3.40	6.60
Nickel (mg/kg)	USEPA 6200	17/8/15	4.10	11.1	3.60	4.30
Zinc (mg/kg)	USEPA 6200	17/8/15	12.6	10.2	13.6	19.0
Vanadium (mg/kg)	USEPA 6200	17/8/15	7.00	13.5	15.0	14.0

Table 1: Soil Physico-chemical Results – Wet Season cnt'd.

Parameter	Method	Date of Analysis	Sample Station Result	
			SS 15 (0-15cm)	SS 15 (15-30cm)
Co-ordinates			N: 12.572286 E: 7.814833	
Colour	APHA 2120	04/8/15	Yellowish brown	Strong brown
pH (H_2O) @ 25.7°C	ASTM D 4972	11/8/15	5.14	6.27
Moisture Content (%)	ASTM D2216	7/8/15	10.1	11.5
TRHC (mg/kg)	USEPA 8440	12/8/15	<5.00	<5.00
PSD	ASTM D 422	12-14/8/15		
Clay (%)			1.00	2.00
Silt (%)			21.0	27.0
Sand (%)			78.0	71.0
Ext. Nitrate (mg/kg)	CAEM/EPA 3521	10/8/15	0.19	0.25
Ext. Sulphate (mg/kg)	CAEM/APHA 4500-SO_4	11/8/15	70.0	<2.00
Ext. Phosphate (mg/kg)	CAEM/APHA 4500-PO_4	11/8/15	10.4	3.13
Total Iron (mg/kg)	USEPA 6200	13/8/15	9,010	10,240
Copper (mg/kg)	USEPA 6200	13/8/15	5.00	6.90
Lead (mg/kg)	USEPA 6200	13/8/15	5.00	6.40
Nickel (mg/kg)	USEPA 6200	13/8/15	4.80	9.80
Zinc (mg/kg)	USEPA 6200	13/8/15	9.70	13.3
Vanadium (mg/kg)	USEPA 6200	13/8/15	5.10	11.9

Table 2: Soil Microbiology Results- Dry Season

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 1 (0-15m)	17-26/02/15	Bacillus sp. Pseudomonas sp Proteus sp Micrococcus sp Staphylococcus sp Citrobacter sp Actinobacillus sp	$1.44x10^5$	Pseudomonas sp Micrococcus sp Bacillus sp Staphylococcus sp	$5.10x10^4$	Aspergillus sp Penicillium sp Mucor sp Candida sp Geotrichum sp	$4.80x10^3$	Aspergillus sp Penicillium sp Mucor sp Geotrichum sp	$3.80x10^2$
SS 1 (15-30m)		Bacillus sp Pseudomonas sp Proteus sp Citrobacter sp Actinobacillus sp Micrococcus sp	$1.07x10^5$	Pseudomonas sp Bacillus sp Micrococcus sp	$3.00x10^4$	Aspergillus sp Mucor sp Penicillium sp Geotrichum sp Candida sp	$3.90x10^2$	Aspergillus sp Mucor sp Penicillium sp	$3.40x10^2$
SS 2 (0-15m)		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp Micrococcus sp Alcaligenes sp	$2.00x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp Alcaligenes sp Micrococcus sp	$3.50x10^4$	Aspergillus sp Penicillium sp Mucor sp Paecilomyces sp	$5.20x10^2$	Aspergillus sp Mucor sp	$4.60x10^2$
SS 2 (15-30m)		Pseudomonas sp Proteus sp Bacillus sp Micrococcus sp	$9.20x10^4$	Pseudomonas sp Bacillus sp Micrococcus sp	$6.20x10^3$	Aspergillus sp Penicillium sp Mucor sp Paecilomyces sp	$3.50x10^2$	Aspergillus sp Mucor sp	$3.20x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 3 (0-15m)	17-26/02/15	Staphylococcus sp Pseudomonas sp Proteus sp Bacillus sp Citrobacter sp Micrococcus sp	$1.80x10^5$	Staphylococcus sp Pseudomonas sp Bacillus sp Micrococcus sp	$4.70x10^3$	Candida sp Aspergillus sp Penicillium sp Mucor sp	$7.30x10^2$	Candida sp Aspergillus sp Penicillium sp Mucor sp	$6.00x10^2$
SS 3 (15-30m)		Staphylococcus sp Pseudomonas sp Proteus sp Bacillus sp Micrococcus sp	$4.50x10^4$	Staphylococcus sp Pseudomonas sp Bacillus sp Micrococcus sp	$3.00x10^3$	Aspergillus sp Penicillium sp Mucor sp Candida sp	$4.00x10^2$	Aspergillus sp Mucor sp Candida sp	$1.00x10^2$
SS 4 (0-15m)		Proteus sp Actinomyces sp Pseudomonas sp Bacillus sp Micrococcus sp Staphylococcus sp	$2.46x10^5$	Pseudomonas sp Staphylococcus sp Bacillus sp Micrococcus sp	$4.00x10^3$	Aspergillus sp Penicillium sp Rhizopus sp Mucor sp	$1.50x10^3$	Aspergillus sp Mucor sp Rhizopus sp	$1.06x10^3$
SS 4 (15-30m)		Proteus sp Actinomyces sp Pseudomonas sp Bacillus sp Micrococcus sp Staphylococcus sp	$1.06x10^5$	Pseudomonas sp Staphylococcus sp Bacillus sp Micrococcus sp	$2.10x10^4$	Aspergillus sp Penicillium sp Rhizopus sp Mucor sp	$5.70x10^2$	Aspergillus sp Mucor sp Rhizopus sp	$4.20x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 5 (0-15m)	17-26/02/15	Proteus sp Micrococcus sp Pseudomonas sp Bacillus sp Staphylococcus sp	$1.50x10^5$	Pseudomonas sp Micrococcus sp Staphylococcus sp Bacillus sp	$2.81x10^4$	Penicillium sp Aspergillus sp Mucor sp	$3.00x10^2$	Mucor sp Aspergillus sp	$2.40x10^2$
SS 5 (15-30m)		Pseudomonas sp Bacillus sp	$2.50x10^4$	Pseudomonas sp Bacillus sp	$1.40x10^3$	Penicillium sp Trychophyton sp Mucor sp Aspergillus sp	$2.50x10^2$	Mucor sp Aspergillus sp	$2.00x10^2$
SS 6 (0-15m)		Pseudomonas sp Bacillus sp Staphylococcus sp Actinomyces sp Proteus sp Micrococcus sp	$7.00x10^4$	Pseudomonas sp Bacillus sp Staphylococcus sp Micrococcus sp	$6.00x10^3$	Penicillium sp Aspergillus sp Mucor sp	$5.80x10^2$	Mucor sp Aspergillus sp	$1.40x10^2$
SS 6 (15-30m)		Pseudomonas sp Bacillus sp Staphylococcus sp Actinomyces sp Proteus sp Micrococcus sp	$1.00x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp Micrococcus sp	$3.40x10^3$	Penicillium sp Aspergillus sp Mucor sp	$6.40x10^2$	Mucor sp Aspergillus sp	$2.40x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 7 (0-15m)	17-26/02/15	Bacillus sp Proteus sp Micrococcus sp Pseudomonas sp Staphylococcus sp	$2.45x10^5$	Micrococcus sp Pseudomonas sp Bacillus sp Staphylococcus sp	$9.20x10^3$	Cladosporium sp Penicillium sp Epicoccum sp Aspergillus sp Mucor sp	$2.40x10^2$	Cladosporium sp Penicillium sp Aspergillus sp Mucor sp	$1.60x10^2$
SS 7 (15-30m)		Bacillus sp Proteus sp Micrococcus sp Pseudomonas sp Staphylococcus sp	$1.61x10^5$	Micrococcus sp Pseudomonas sp Bacillus sp Staphylococcus sp	1.1.1. 7.7 $0x10^3$	Cladosporium sp Aspergillus sp Penicillium sp Mucor sp	$2.20x10^2$	Aspergillus sp Penicillium sp Mucor sp	$1.90x10^2$
SS 8 (0-15m)		Bacillus sp Proteus sp Micrococcus sp Pseudomonas sp Staphylococcus sp	$1.60x10^5$	Micrococcus sp Pseudomonas sp Bacillus sp Staphylococcus sp	$7.00x10^3$	Geotrichum sp Aspergillus sp Penicillium sp Trychophyton sp Mucor sp	$1.40x10^2$	Aspergillus sp Geotrichum sp Penicillium sp Mucor sp	$1.00x10^2$
SS 8 (15-30m)		Bacillus sp Proteus sp Pseudomonas sp Micrococcus sp Klebsiella sp	$1.37x10^5$	Pseudomonas sp Bacillus sp	$5.60x10^3$	Aspergillus sp Penicillium sp Mucor sp	$1.10x10^2$	Aspergillus sp Penicillium sp Mucor sp	80

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 9 (0-15m)	17-26/2/15	Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp	$6.40x10^4$	Pseudomonas sp Staphylococcus sp Bacillus sp	$9.00x10^3$	Aspergillus sp Penicillium sp Mucor sp Cladosporium sp Rhizopus sp	$4.00x10^2$	Aspergillus sp Penicillium sp Rhizopus sp	$3.60x10^2$
SS 9 (15-30m)		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp	$3.00x10^4$	Pseudomonas sp Staphylococcus sp Bacillus sp	$7.20x10^3$	Penicillium sp Aspergillus sp Mucor sp	$3.60x10^2$	Aspergillus sp Mucor sp	$2.20x10^2$
SS 10 (0-15m)		Pseudomonas sp Micrococcus sp Bacillus sp Proteus sp Citrobacter sp	$1.30x10^5$	Pseudomonas sp Bacillus sp	$7.00x10^4$	Aspergillus sp Penicillium sp Mucor sp Fusarium sp	$3.00x10^2$	Aspergillus sp Mucor sp Fusarium sp	$2.0x10^2$
SS 10 (15-30m)		Pseudomonas sp Bacillus sp Proteus sp	$6.10x10^4$	Pseudomonas sp Bacillus sp	$4.00x10^3$	Aspergillus sp Penicillium sp Mucor sp Fusarium sp	$1.60x10^2$	Aspergillus sp Mucor sp Fusarium sp	$1.10x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 11 (0-15m)	19-28/02/15	Pseudomonas sp Bacillus sp Staphylococcus sp Flavobacterium sp Proteus sp	$6.40x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp Flavobacterium sp	$8.00x10^4$	Aspergillus sp Epicoccum sp Cladosporium sp Mucor sp Penicillium sp	$2.00x10^3$	Aspergillus sp Mucor sp Penicillium sp	$5.50x10^2$
SS 11 (15-30m)		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp	$5.00x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp	$6.00x10^4$	Aspergillus sp Penicillium sp Mucor sp	$1.80x10^3$	Aspergillus sp Mucor sp Penicillium sp	$4.80x10^2$
SS 12 (0-15m)		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp Actinomyces sp Micrococcus sp	$1.00x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp	$8.60x10^3$	Aspergillus sp Penicillium sp Mucor sp Fusarium sp	$5.00x10^2$	Aspergillus sp Mucor sp Penicillium sp	$4.20x10^2$
SS 12 (15-30m)		Pseudomonas sp Bacillus sp Micrococcus sp Proteus sp Actinomyces sp Klebsiella sp	$5.20x10^5$	Pseudomonas sp Bacillus sp	$9.50x10^3$	Aspergillus sp Penicillium sp Mucor sp Rhodotorula sp	$2.60x10^2$	Aspergillus sp Mucor sp	$2.30x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 13 (0-15m)	19-28/02/15	Bacillus sp Pseudomonas sp Proteus sp	$4.20x10^5$	Pseudomonas sp Bacillus sp	$5.40x10^4$	Aspergillus sp Mucor sp Penicillium sp Fusarium sp	$2.00x10^2$	Aspergillus sp Mucor sp Penicillium sp	$1.50x10^2$
SS 13 (15-30m)		Bacillus sp Pseudomonas sp Proteus sp	$3.60x10^5$	Pseudomonas sp Bacillus sp	$4.60x10^4$	Aspergillus sp Mucor sp Penicillium sp Fusarium sp	$4.00x10^2$	Aspergillus sp Mucor sp	70
SS 14 (0-15m)		Bacillus sp Pseudomonas sp Proteus sp Micrococcus sp Staphylococcus sp Actinomyces sp	$2.20x10^5$	Pseudomonas sp Bacillus sp Micrococcus sp	$3.30x10^4$	Aspergillus sp Rhizopus sp Mucor sp Cladosporium sp Penicillium sp	$4.00x10^2$	Aspergillus sp Penicillium sp Mucor sp	$2.00x10^2$
SS 14 (15-30m)		Bacillus sp Pseudomonas sp Proteus sp Micrococcus sp Staphylococcus sp Actinomyces sp	$2.91x10^5$	Pseudomonas sp Bacillus sp Micrococcus sp	$2.09x10^4$	Aspergillus sp Mucor sp Penicillium sp Cladosporium sp	$3.10x10^2$	Aspergillus sp Penicillium sp Mucor sp	$1.50x10^2$

Table 2: Soil Microbiology Results- Dry Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 15 (0-15m)	19-28/02/15	Pseudomonas sp Proteus sp Bacillus sp	$1.10x10^5$	Pseudomonas sp Bacillus sp	$5.70x10^4$	Aspergillus sp Candida sp Penicillium sp Mucor sp Fusarium sp	$2.40x10^2$	Aspergillus sp Fusarium sp Mucor sp Candida sp	$1.70x10^2$
SS 15 (15-30m)		Pseudomonas sp Proteus sp Bacillus sp	$8.60x10^4$	Pseudomonas sp Bacillus sp	$1.90x10^4$	Penicillium sp Aspergillus sp	$5.00x10^2$	Penicillium sp Aspergillus sp	50

Table 2: Soil Microbiology Results- Wet Season

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 1 (0-15m)	7-17/8/15	Staphylococcus sp Pseudomonas sp Bacillus sp Actinobacillus sp Micrococcus sp Proteus sp	$1.02x10^{6}$	Staphylococcus sp Pseudomonas sp Bacillus sp Micrococcus sp Proteus sp	$3.30x10^{4}$	Aspergillus sp Penicillium sp Candida sp Mucor sp Geotrichum sp Rhizopus sp	$4.10x10^{2}$	Aspergillus sp Penicllium sp Candida sp Geotrichum sp Mucor sp	$3.80x10^{2}$
SS 1 (15-30m)		Staphylococcus sp Pseudomonas sp Actinobacillus sp Proteus sp Micrococcus sp Bacillus sp	$7.30x10^{5}$	Staphylococcus sp Pseudomonas sp Bacillus sp Micrococcus sp Proteus sp	$2.37x10^{4}$	Aspergillus sp Penicillium sp Candida sp Mucor sp Geotrichum sp Rhizopus sp	$6.50x10^{2}$	Aspergillus sp Candida sp Mucor sp Penicillium sp	$4.70x10^{2}$
SS 2 (0-15m)		Proteus sp Micrococcus sp Bacillus sp Staphylococcus sp Alcaligenes sp Actinomyces sp	$6.10x10^{5}$	Pseudomonas sp Bacillus sp Proteus sp Alcaligenes sp Micrococcus sp	$2.30x10^{4}$	Paecilomyces sp Aspergillus sp Penicillium sp Mucor sp Epicoccum sp Candida sp	$6.00x10^{2}$	Aspergillus sp Mucor sp Candida sp	$2.10x10^{2}$
SS 2 (15-30m)		Proteus sp Pseudomonas sp Staphylococcus sp Actinomyces sp Bacillus sp	$5.70x10^{5}$	Proteus sp Pseudomonas sp Bacillus sp	$1.89x10^{4}$	Paecilomyces sp Aspergillus sp Penicillium sp Mucor sp Epicoccum sp Candida sp	$6.60x10^{2}$	Aspergillus sp Mucor sp Candida sp	$2.90x10^{2}$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 3 (0-15m)	7-17/8/15	Proteus sp Pseudomonas sp Bacillus sp Micrococcus sp Staphylococcus sp	$1.17x10^6$	Proteus sp Bacillus sp Pseudomonas sp Micrococcus sp Staphylococcus sp	$6.50x10^4$	Aspergillus sp Penicillium sp Mucor sp Candida sp	$1.10x10^2$	Candida sp Mucor sp	60
SS 3 (15-30m)		Proteus sp Pseudomonas sp Bacillus sp Micrococcus sp	$7.40x10^5$	Bacillus sp Pseudomonas sp Micrococcus sp	$4.60x10^4$	Aspergillus sp Penicillium sp Mucor sp Candida sp	$1.12x10^3$	Candida sp Mucor sp Aspergillus sp Penicillium sp	$9.00x10^2$
SS 4 (0-15m)		Bacillus sp Actinomyces sp Proteus sp Pseudomonas sp Streptomyces sp Flavobacterium sp Micrococcus sp	$1.14x10^6$	Pseudomonas sp Flavobacterium sp Bacillus sp Micrococcus sp	$5.00x10^4$	Rhizopus sp Penicillium sp Aspergillus sp Mucor sp Candida sp	$1.85x10^3$	Rhizopus sp Aspergillus sp Mucor sp Candida sp	$1.66x10^3$
SS 4 (15-30m)		Bacillus sp Actinomyces sp Proteus sp Flavobacterium sp Pseudomonas sp Micrococcus sp	$8.40x10^5$	Pseudomonas sp Flavobacterium sp Bacillus sp Micrococcus sp	$2.98x10^4$	Aspergillus sp Penicillium sp Mucor sp Candida sp	$6.40x10^2$	Candida sp Aspergillus sp Mucor sp	$5.10x10^2$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 5 (0-15m)	7-17/8/15	Pseudomonas sp Proteus sp Bacillus sp Actinomyces sp	$3.10x10^5$	Pseudomonas sp Proteus sp Bacillus sp	$7.30x10^3$	Trychophyton sp Penicillium sp Mucor sp Candida sp Aspergillus sp	$1.44x10^3$	Mucor sp Aspergillus sp Penicillium sp	$3.00x10^2$
SS 5 (15-30m)		Pseudomonas sp Proteus sp Bacillus sp Actinomyces sp	$6.70x10^5$	Pseudomonas sp Proteus sp Bacillus sp	$8.10x10^3$	Penicillium sp Aspergillus sp Mucor sp	$6.50x10^2$	Mucor sp Aspergillus sp Penicillium sp	$1.80x10^2$
SS 6 (0-15m)		Pseudomonas sp Proteus sp Bacillus sp Actinomyces sp Micrococcus sp Staphylococcus sp Escherichia sp Citrobacter sp	$5.10x10^5$	Pseudomonas sp Proteus sp Bacillus sp Staphylococcus sp	$2.30x10^3$	Penicillium sp Aspergillus sp Mucor sp	$1.00x10^2$	Mucor sp	40
SS 6 (15-30m)		Pseudomonas sp Bacillus sp Staphylococcus sp Proteus sp Citrobacter sp Escherichia sp	$4.50x10^5$	Pseudomonas sp Proteus sp Bacillus sp Staphylococcus sp	$1.97x10^4$	Penicillium sp Aspergillus sp Mucor sp	80	Mucor sp	20

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 7 (0-15m)	7-17/8/15	Staphylococcus sp Proteus sp Bacillus sp Pseudomonas sp Micrococcus sp Actinomyces sp Arthrobacter sp	$5.50x10^5$	Bacillus sp Pseudomonas sp Staphylococcus sp	$2.50x10^3$	Epicoccum sp Penicillium sp Cladosporium sp Aspergillus sp Mucor sp Candida sp	$7.20x10^2$	Aspergillus sp Penicillium sp Mucor sp	$1.40x10^2$
SS 7 (15-30m)		Staphylococcus sp Proteus sp Bacillus sp Arthrobacter sp Micrococcus sp Pseudomonas sp	$4.60x10^5$	Bacillus sp Pseudomonas sp Staphylococcus sp Proteus sp	1.1.2. 9.80x10³	Aspergillus sp Penicillium sp Mucor sp Candida sp	$1.50x10^3$	Aspergillus sp Penicillium sp Mucor sp Candida sp	$8.00x10^2$
SS 8 (0-15m)		Bacillus sp Proteus sp Micrococcus sp Pseudomonas sp Staphylococcus sp	$6.00x10^5$	Bacillus sp Pseudomonas sp Staphylococcus sp Proteus sp	$1.66x10^4$	Aspergillus sp Penicillium sp Mucor sp Candida sp Geotrichum sp	$1.04x10^3$	Aspergillus sp Penicillium sp Mucor sp Candida sp Geotrichum sp	$9.40x10^2$
SS 8 (15-30m)		Bacillus sp Proteus sp Pseudomonas sp Staphylococcus sp	$3.50x10^5$	Pseudomonas sp Bacillus sp	$7.60x10^3$	Aspergillus sp Penicillium sp Mucor sp Candida sp Geotrichum sp	$8.90x10^2$	*Aspergillus sp* *Penicillium sp* *Mucor sp* *Candida sp* *Geotrichum sp*	$8.60x10^2$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 9 (0-15m)	7-17/8/15	Bacillus sp Pseudomonas sp Staphylococcus sp Micrococcus sp Proteus sp	$5.80x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp	$2.40x10^4$	Penicillium sp Aspergillus sp Candida sp Rhizopus sp Mucor sp Cladosporium sp	$3.60x10^2$	Penicillium sp Aspergillus sp Candida sp Mucor sp Cladosporium sp	$2.20x10^2$
SS 9 (15-30m)		Bacillus sp Pseudomonas sp Staphylococcus sp Micrococcus sp Proteus sp	$9.60x10^5$	Pseudomonas sp Bacillus sp Staphylococcus sp	$3.50x10^4$	Penicillium sp Aspergillus sp Candida sp Rhizopus sp Mucor sp Cladosporium sp	$3.00x10^2$	Candida sp Aspergillus sp Mucor sp	$2.20x10^2$
SS 10 (0-15m)		Proteus sp Bacillus sp Pseudomonas sp Staphylococcus sp	$9.90x10^5$	Proteus sp Bacillus sp Pseudomonas sp Staphylococcus sp	$3.10x10^4$	Candida sp Aspergillus sp Penicillium sp Mucor sp Fusarium sp Epicoccum sp	$1.12x10^3$	Fusarium sp Aspergillus sp Mucor sp Candida sp	$9.30x10^2$
SS 10 (15-30m)		Proteus sp Bacillus sp Pseudomonas sp	$4.00x10^5$	Proteus sp Bacillus sp Pseudomonas sp	$5.20x10^3$	Candida sp Aspergillus sp Penicillium sp Mucor sp Fusarium sp Epicoccum sp	$9.60x10^2$	Fusarium sp Aspergillus sp Mucor sp Candida sp	$8.70x10^2$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 11 (0-15m)	7-17/8/15	Micrococcus sp Pseudomonas sp Proteus sp Bacillus sp Flavobacterium sp	$9.30x10^5$	Pseudomonas sp Flavobacterium sp Bacillus sp Proteus sp	$2.00x10^3$	Epicoccum sp Aspergillus sp Candida sp Mucor sp Penicillium sp	$2.60x10^2$	Aspergillus sp Mucor sp Candida sp Penicillium sp	$1.40x10^2$
SS 11 (15-30m)		Micrococcus sp Pseudomonas sp Bacillus sp Proteus sp	$7.00x10^5$	Pseudomonas sp Bacillus sp Proteus sp	$1.20x10^3$	Aspergillus sp Mucor sp Candida sp Penicillium sp	$2.00x10^2$	Aspergillus sp Mucor sp	$1.00x10^2$
SS 12 (0-15m)		Staphylococcus sp Bacillus sp Proteus sp Pseudomonas sp Micrococcus sp Actinomyces sp	$8.40x10^5$	Staphylococcus sp Bacillus sp Pseudomonas sp Micrococcus sp	$2.45x10^4$	Penicillium sp Aspergillus sp Mucor sp Candida sp	$1.70x10^2$	Aspergillus sp Mucor sp Candida sp	50
SS 12 (15-30m)		Staphylococcus sp Pseudomonas sp Bacillus sp Actinomyces sp Proteus sp	$6.70x10^5$	Staphylococcus sp Bacillus sp Pseudomonas sp	$1.21x10^4$	Mucor sp Candida sp Aspergillus sp	$1.00x10^3$	Aspergillus sp Mucor sp Candida sp	$4.30x10^2$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 13 (0-15m)	7-17/8/15	Bacillus sp Pseudomonas sp Proteus sp Staphylococcus sp	$9.60x10^5$	Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp	$1.66x10^4$	Candida sp Fusarium sp Aspergillus sp Penicillium sp Mucor sp	$2.20x10^2$	Fusarium sp Aspergillus sp Penicillium sp Mucor sp	$1.90x10^2$
SS 13 (15-30m)		Bacillus sp Pseudomonas sp Proteus sp Staphylococcus sp	$6.10x10^5$	Pseudomonas sp Bacillus sp Proteus sp	$1.87x10^4$	Penicillium sp Aspergillus sp Mucor sp	$1.50x10^2$	Aspergillus sp Mucor sp	$1.00x10^2$
SS 14 (0-15m)		Bacillus sp Pseudomonas sp Proteus sp Staphylococcus sp Micrococcus sp	$5.80x10^5$	Bacillus sp Pseudomonas sp Proteus sp Micrococcus sp Staphylococcus sp	$1.74x10^4$	Penicillium sp Aspergillus sp Mucor sp Rhizopus sp	$4.00x10^2$	Aspergillus sp Mucor sp Penicillium sp Rhizopus sp	$3.40x10^2$
SS 14 (15-30m)		Bacillus sp Pseudomonas sp Proteus sp Staphylococcus sp Micrococcus sp	$5.70x10^5$	Bacillus sp Proteus sp Pseudomonas sp Micrococcus sp	$1.48x10^4$	Penicillium sp Aspergillus sp Mucor sp Rhizopus sp	$2.70x10^2$	Aspergillus sp Mucor sp Penicillium sp Rhizopus sp	$2.50x10^2$

Table 2: Soil Microbiology Results- Wet Season cnt'd.

Parameter Sample Station	Date of Analysis	Heterotrophic Bacteria	Count (cfu/g)	Hydrocarbon Utilising Bacteria	Count (cfu/g)	Heterotrophic Fungi	Count (cfu/g)	Hydrocarbon Utilising Fungi	Count (cfu/g)
SS 15 (0-15m)	7-17/8/15	Proteus sp Staphylococcus sp Pseudomonas sp Bacillus sp	$6.40x10^5$	Proteus sp Bacillus sp Pseudomonas sp	$2.28x10^4$	Mucor sp Fusarium sp Aspergillus sp Candida sp Penicillium sp	$5.70x10^2$	Aspergillus sp Fusarium sp Mucor sp Candida sp Penicillium sp	$1.10x10^2$
SS 15 (15-30m)		Proteus sp Bacillus sp Pseudomonas sp Staphylococcus sp	$3.20x10^5$	Proteus sp Bacillus sp Pseudomonas sp	$2.50x10^3$	Penicillium sp Candida sp Aspergillus sp	$1.20x10^2$	Aspergillus sp Penicillium sp Candida sp	70

APPENDIX 4.3

GROUNDWATER PHYSICO-CHEMICAL AND BIOLOGICAL CHARACTERISTICS

Table 1a: Ground Water Physicochemical Characteristics – Dry Season

Parameter	Method	Date of Analysis	1.1.1. Sample Station Result		
			BH 1	BH 2	BH 3
Coordinates					
Colour (Pt-Co)	APHA 2120	08/02/15	27.0	71.0	118
pH	APHA 4500H^+B	08/02/15	6.73	6.80	6.18
Temperature (^oC)	APHA 2110B	08/02/15	27.9	26.7	25.7
Elect. Conductivity (µS/cm)	APHA 2510B	08/02/15	360	634	737
Turbidity (NTU)	APHA 2130B	08/02/15	3.00	21.0	24.0
Salinity (g/L)	APHA 2520	08/02/15	0.26	0.46	0.54
TSS (mg/L)	APHA 2540D	15/02/15	<1.00	<1.00	60.0
Total Hardness (mg/L)	APHA 2340C	12/02/15	92.0	194	106
TRHC (mg/L)	USEPA 8440	15/02/15	<0.30	<0.30	<0.30
DO (mg/L)	APHA 4500-OG	08/02/15	3.64	3.07	4.50
BOD (mg/L)	APHA 5210B	11-16/02/15	<0.50	<0.50	<0.50
COD (mg/L)	APHA 5220D	16/02/15	<0.80	76.2	191
Nitrate (mg/L)	EPA 352.1	11/02/15	43.0	56.9	64.3
Sulphate (mg/L)	APHA 4500 SO_4^{2-}E	11/02/15	10.1	40.1	17.3
Phosphate (mg/L)	APHA4500-P D	11/02/15	0.26	0.24	0.17
Potassium (mg/L)	APHA 3111B/ASTM D3561	11/02/15	4.20	7.88	3.69
Lead (mg/L)	APHA 3111B	11/02/15	<0.008	<0.008	<0.008
Total Iron (mg/L)	APHA 3111B	11/02/15	0.04	0.06	9.22
Copper (mg/L)	APHA 3111B	11/02/15	<0.02	<0.02	<0.02
Barium (mg/L)	ASTM D3651	12/02/15	<0.30	<0.30	<0.30

- ASTM = American Society for Testing and Materials (1999 Edition)

Table 1b: Ground Water Physicochemical Characteristics -Wet Season

Parameter	Method	Date of Analysis	1.1.2. Sample Station Result		
			BH 1	BH 2	BH 3
Coordinates			N:12.57753 E:7.81711	N:12.54609 E:7.82143	N:12.55635 E:7.83408
Colour (Pt-Co)	APHA 2120	05/8/15	32.0	103	64.0
pH	APHA 4500H^+B	05/8/15	5.96	6.26	5.81
Temperature (^oC)	APHA 2110B	05/8/15	24.3	24.3	24.1
Elect. Conductivity (µS/cm)	APHA 2510B	05/8/15	384	242	766
Turbidity (NTU)	APHA 2130B	05/8/15	3.00	12.0	7.00
Salinity (g/L)	APHA 2520	05/8/15	0.25	0.16	0.49
TSS (mg/L)	APHA 2540D	10/8/15	12.0	12.0	34.0
Total Hardness (mg/L)	APHA 2340C	10/8/15	105	58.0	95.0
TRHC (mg/L)	USEPA 8440	12/8/15	<0.30	<0.30	<0.30
DO (mg/L)	APHA 4500-OG	05/8/15	3.37	2.87	3.51
BOD (mg/L)	APHA 5210B	7-12/8/15	<0.50	<0.50	<0.50
COD (mg/L)	APHA 5220D	10/8/15	115	244	39.1
Nitrate (mg/L)	EPA 352.1	7/8/15	0.39	0.07	0.08
Sulphate (mg/L)	APHA 4500 SO_4^{2-}E	7/8/15	10.2	7.39	11.9
Phosphate (mg/L)	APHA4500-P D	7/8/15	0.54	0.10	0.07
Potassium (mg/L)	APHA 3111B/ASTM D3561	19/8/15	4.09	3.84	6.48
Lead (mg/L)	APHA 3111B	10/8/15	<0.008	<0.008	<0.008
Total Iron (mg/L)	APHA 3111B	19/8/15	<0.03	0.84	<0.03
Copper (mg/L)	APHA 3111B	10/8/15	<0.02	<0.02	<0.02
Barium (mg/L)	ASTM D3651	19/8/15	<0.03	<0.03	<0.03

Table 2a: Ground Water Microbiological Characteristics – Dry Season

Parameter Sample Station	Date of Analysis	Total Heterotrophic Bacteria	Count (cfu/ml)	Hydrocarbon Utilising Bacteria	Count (cfu/ml)	Total Heterotrophic Fungi	Count (cfu/ml)	Hydrocarbon Utilising Fungi	Count (cfu/ml)
GW 1	17-26/02/15	Pseudomonas sp Proteus sp	$3.30x10^2$	Pseudomonas sp	1	Mucor sp	1	Mucor sp	1
GW 2		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp	$1.15x10^3$	Pseudomonas sp Bacillus sp	$2.60x10^2$	Candida sp Aspergillus sp	40	Candida sp Aspergillus sp	35
GW 3		Pseudomonas sp Bacillus sp Proteus sp Staphylococcus sp Micrococcus sp	$3.60x10^3$	Pseudomonas sp Bacillus sp Staphylococcus sp Micrococcus sp	$3.00x10^2$	Rhodotorula sp Mucor sp Penicillium sp	18	Mucor sp Penicillium sp	10

Table 2b: Water Microbiological Characteristics -Wet Season

Parameter Sample Station	Date of Analysis	Total Heterotrophic Bacteria	Count (cfu/ml)	Hydrocarbon Utilising Bacteria	Count (cfu/ml)	Total Heterotrophic Fungi	Count (cfu/ml)	Hydrocarbon Utilising Fungi	Count (cfu/ml)
GW 1	7-17/8/15	Micrococcus sp Bacillus sp Proteus sp Pseudomonas sp Enterobacter sp Staphylococcus sp	$3.60x10^3$	Bacillus sp Micrococcus sp Staphylococcus sp Proteus sp Pseudomonas sp	$1.36x10^2$	Candida sp Rhodotorula sp Mucor sp Aspergillus sp Penicillium sp	30	Candida sp Rhodotorula sp Mucor sp Aspergillus sp	21
GW 2		Staphylococcus sp Pseudomonas sp Bacillus sp Chromobacterium sp Micrococcus sp Proteus sp	$6.10x10^3$	Proteus sp Staphylococcus sp Pseudomonas sp Bacillus sp	93	Candida sp Rhodotorula sp Mucor sp Aspergillus sp Penicillium sp	74	Candida sp Rhodotorula sp Mucor sp Aspergillus sp Penicillium sp	60
GW 3		Micrococcus sp Staphylococcus sp Pseudomonas sp Bacillus sp Proteus sp	$1.76x10^3$	Pseudomonas sp Bacillus sp	47	Fusarium sp Penicillium sp Aspergillus sp Rhodotorula sp Mucor sp	7	Penicillium sp Mucor sp	22

APPENDIX 4.4

SOCIO-ECONOMIC & HEALTH IMPACT ASSESSMENT QUESTIONNAIRE

Household Questionnaire

(Questionnaire No. ……) House No. …….

INTRODUCTION

……. has proposed to undertake the …….. project in your community. This study is aimed at generating information and data that will be utilized in developing the Environmental Impact Assessment (EIA) document. We therefore, request your participation in this study by responding to the questions below in a sincere and appropriate manner. Your responses will be treated as confidential. Thank you for your cooperation.

SECTION A: Respondents' Bio-data/Household Characteristics

1. Community…… LGA…… House No. …….
2. Sex: (a) Male (b) Female
3. Age: (a) 15-24years (b) 25-64years (c) 65years and above
4. Marital Status: (a) Single (b) Married (c) Divorced/Separated (d) widow/widower
5. Religion: (a) Christianity (b) Traditional Religion (c) Islam (d) Others
6. How long has the head of your household lived in the community?

   (a) Less than 5 years (b) 5-10 years (c) More than 10 years
7. Age and Sex structure. How many members of your household, including yourself, fall into the following age and sex categories? Please indicate numbers in the Table below.

Age Categories	**Male**	**Female**	**Total**
0-4 years			
5-9 years			
10-14			
15-19			
20-24			
25-29			
30-34			
35-39			
40-44			
45-49			
50-54			
55-59			
60-64			
65 and above			
Total			

SECTION B: Human Capital

8. How many members of your household aged 15-64 years, including yourself, have been continuously unemployed in the last 6 months? Please tick from the following.

Males		**Females**	
15-24 years	**25-64 years**	**15-24 years**	**25-64 years**
0	0	0	0
1-2	1-2	1-2	1-2
3-4	3-4	3-4	3-4
5 and above	5 and above	5 and above	5 and above

9. How many members of your household, including yourself, have acquired training in the following skills? Please indicate number.

Skills	**Males**			**Females**		
	15-24 years	**25-64 years**	**Total**	**15-24 years**	**25-64 years**	**Total**
No Skills						
Carpentry/Furniture making						
Electrical/Electronic installation and repairs						
Plumbing						
Metal works (machining/smiths)						
Welding/Fabrication						
Masonry						
Tailoring/Fashion design/Textile works						
Auto repairs (mechanic, electrical, panel beating, vulcanizing, painting)						
ICT (computer works)						
Catering						
Hat making/bending						
Instrumentation/Calibration						
Safety/Security						
Teaching						
Administration						
Building (architecture, quantity surveying, estate management)						
Engineering						
Land Surveying						
Health services						
Managing micro/small business						
Leadership skills						

10. How many child births have you had in your household in the last 5 years?

    (a) None (b) 1 (c) 2 (d) 3 (e) 4 (f) 5

11. Where did the mothers receive ante-natal care?

    (a) None (b) Traditional birth attendant(TBA) (c) Hospital/Clinic/Health Centre (d) Maternity Home (e) Church/Prayer House

12. Where is the place of child delivery?

    (a) Home (b)TBA (c) Hospital/Clinic/Health Centre (d) Maternity (e) Church/Prayer House

13. Where was the birth registered?

    (a) None (b)Government Agency (c)Community (d)Church

14. How many members of your household aged 0-5years have been immunized?

15. How many deaths occurred in your household in the last one year?

    (a)None (b) 1 (c) 2 (d) 3 (e) 4 (f) 5

16. Do members of your household use any of these against mosquito bites and malaria?

    (a) Ordinary mosquito nets (b) Insecticide treated mosquito nets (c) Preventive drugs

17. In the past four weeks, how often were you sick enough to seek help?

    (a) None (b) 1-2 times (c) 3-4 times (d) 5 times (e) More than 5 times

18. Where did you seek help?

    (a) Hospital/Clinic/Health Centre (b) Drug Store (Chemist) (c) Traditional healers

    (d) Self medication (e) Church/Prayer House (f) nowhere

19. What time does it take for members of your household to get to the nearest health facility to your residence? (a) Less than 30mins. (b) 30mins-1hr. (c) 1-3hrs. (d) More than 3hrs.

20. What is the cost of transportation to your nearest health facility?

    (a) 0-₦50 (b)₦50-₦100 (c) ₦100-₦200 (d) ₦300-₦500 (e) More than ₦500

21. Did any member of your household (including yourself) suffer from any of these symptoms/diseases in the last six months? How frequently, please tick?

Symptoms/Diseases	**Always**	**Sometimes**	**Never**
Cough			
Catarrh			
Malaria			
Typhoid			
Difficulty in breathing			
Diarrhea			
Asthma			
Hypertension			
Diabetes			
Pile			
Impaired vision			
Impaired hearing			
Arthritis			
Rashes			
Epilepsy			
Mental disorder			
Ulcer			
Anemia			
Sleeping disorder			
Sickle cell disease			
Sexually transmitted disease (STDs)			
Miscarriage			
Cancer			
Others (please specify)			

22. How often in the past one year did you have problems satisfying the food needs of your household?

    (a) None (b) Seldom (c) Sometimes (d) Often (e) Always

23. How many meals is your household able to provide daily? Please tick.

    (a) None (b) 1 (c) 2 (d) 3 (e) More than 3

24. What time does it take for members of your household to get to the nearest public school to your residence?

    (a) 0-10 mins. (b) 10-30 mins. (c) 30 mins- 1hr. (d) 1-2hrs. (e) More than 2hrs.

25. What is the cost of transportation to your nearest school?

    (b) 0-₦50 (b)₦50-₦100 (c) ₦100-₦200 (d) ₦300-₦500 (e) More than ₦500

26. Does the school members of your household attend have equipped and functional laboratory?

    (a) Yes (b) No

27. How many members of your household are currently in school? Indicate numbers.

School	Male	Female	Total
Nursery			
Primary			
Secondary			
Vocational/Technical			
Tertiary			
Total			

28. What is the highest level of education attained by all members of your household aged 15 years and above, including yourself? Please indicate numbers in the Table below.

Education Category	Male	Female
No formal education		
Attempted primary school		
Completed primary school		
Attempted secondary school		
Completed secondary school		
Attempted tertiary school		
Completed tertiary school		

29. Estimate the time taken to get to the nearest ICT centre that is nearest to your household?

    (a) Zero (there is in house facility) (b) Less than 10mins. (c) 10-30mins. (d) 30mins.-1hr.

    (e) More than 1hr. (f) No ICT facility in my community

30. How many members of your household are computer literate? Please tick from Table below.

Male	Female
0	0
1-2	1-2
3-4	3-4
5 and above	5 and above

31. Has any member of your household relocated in the last 5 years?
    (a) Yes (b) No
32. Why did they relocate? (a) school/apprenticeship (b) work (c) marriage (d) to join the family.
33. Where did they relocate to? ……..

SECTION C: Social/Political Capital

34. How many members of your household aged 15-64 years are engaged in the following economic activities? Indicate numbers in Table below.

Economic Activity	Males	Females
Farming		
Collection of forest products (fruits, firewood, etc)		
Livestock farming		
Fishing		
Collection of sea products (shell fish, etc)		
Aquaculture (fish ponds)		
Trading (wholesale, distributorship)		
Trading (petty trading)		
Civil/Public Service		
Food Processing (garri, palm oil milling, fish smoking, local gin, etc)		
Hunting		
Lumbering		
Company Employment		
Artisanship (carpentry, canoe carving, welding, etc)		
Handicraft (pottery, weaving, tailoring, etc)		
Contracts		
Apprenticeship/Training		

35. What is the approximate monthly income of your household?

    (a) Less than N1000 (b) N1000-N5000 (c) N5100-N10,000 (d) N10,100-N20,000
    (e) N20,100-N35,000 (f)N35,100-N50,000 (g)N50,100-N100,000 (h) More than N100,000

36. What is your personal monthly income?
    Less than N1000 (b) N1000-N5000 (c) N5100-N10,000 (d) N10,100-N20,000
    (e) N20,100-N35,000 (f)N35,100-N50,000 (g)N50,100-N100,000 (h) More than N100,000

37. Does your household own any of these assets? Please tick from list below (only those working)

Livestock (chicken, goats, pigs, etc) (a) 1-20 (b) 21-50 (c) 51-100 (d) More than 100	Other assets (a) Electric fan (b) Refrigerator/freezer (c) Television (d) Video/DVD (e) Radio (f) Mattress (g) Watch/Clock (h) Sewing machine (i) Bicycle (j) Motor cycle (k) Canoe (l) Speed boat (m) Car/truck (n) Commercial Store
Agric Equipment/Input (a) Fertilizer (b) Improved seedling (c) Fish fingerlings (d) Hooks/Nets (e) Herbicides	

38. Do any NGOs operate in your community? What are their names and what do they do?

    (a) (b)

    (c) (d)

39. Who inherits family assets in your community?

    (a) First male child (b) First female child (c) Male children (d) Female children (e) All children

    (f) Male relatives (g) Female relatives

40. Who is responsible for taking final decisions on household matters in your household?

    (a) Father (b) Mother (c) Parents jointly (d) Children (e)Everybody jointly

41. Who are responsible for taking decisions about the community?

    (a) Traditional Ruler (b) Community Elders (c)Community Development Committee/Trust(e)Men only (f) Women only (g) Youth only (h) All recognized stakeholders/groups

SECTION E: Financial Capital

42. Are there any operational micro credit schemes in your community? (a) Yes (b) No

43. Has any member of your household ever benefited from a micro credit loan? (a) Yes (b) No

44. How many members of your household belong to cooperative societies? (a)None (b) 1 (c)2 (d)3 (e)4 (f)5 and above

SECTION D: Natural Capital

45. How do you dispose your household waste?

    (a) Burning (b) Burying (c) Composting (d) Dumping (gutters, creeks, bush)

    (e) Government refuse collection (f) Private commercial refuse collection

46. How do you dispose your household sewage (Where does your household go to toilet)?

    (a) Bush (b) Covered Pit toilet (c) Open Pit toilet (d) Water closet (e) Pier System(water side)

47. What is your main source of water supply?

    (a) Rain (b) River/pond (c) Covered well (d) Open well (e) Private/commercial bore hole

    (f) Public pipe borne water

48. What is your source of energy for cooking?

    (a) Firewood (b) Kerosene (c) Cooking gas (d) Electricity (e) Coal

49. What is your source of energy for lighting?

    (a) Kerosene lamp (b) Electricity (c) Community generator (d) Private generator

50. Has there been any encroachment on your community reserved forests, farm lands, fishing sites in the last 10years?

    (a) Yes (b) No

51. What two reasons are responsible for this encroachment?

    (a) Housing development (b) Government acquisition for infrastructural development

    (c) Farming (d) Industrial activities (eg oil & gas) (e) Fetching firewood/lumbering

    (f) Environmental factors (erosion, flooding, silting)

52. Estimate the extent of land loss. (a) None (no loss) (b) 1-5% (c) 5-10% (d) 10-20% (d) 20-30% (e) 30-50% (f) More than 50%

53. How is land acquired in your community?(a) Inheritance (b) Purchase (c) Lease/hire

    (d) Pledge/collateral

54. If you farm, how did you acquire your farm land? (a) Inheritance (b) Purchase (c) Lease/hire

    (d) Pledge/collateral

55. Who owns land in your community? (a) The community (b) Families/Individuals (c)Both a & b

56. Who can acquire land in your community? (a) Males only (b) Females only (c) Indigenes only (d)Males/Female (e) Indigenes and none indigenes

57. If you fish where do you carry out your fishing activities? (a)Rivers/Creeks (b) Ponds (c)Wetlands

58. Does your community have any historical/archeological sites? (a) Yes (b)No (c)Do not know

SECTION F: Physical Capital

59. Does your community have any of the following facilities? Please tick. (a)Tarred roads (b)Untarred earth roads (c) Bridges (d) Public primary school (e)Public secondary school (f) Public electricity (g) Public water supply (h)Market (i)Community hall

60. What mode of transport do your household members use for distances more than 3km? (a)Trekking (b)Bicycle (c)Motor cycle (d)Canoe (e)Speed boats (f)Buses/Taxis (g)Private cars

61. What is the travel time by public transport to your LGA headquarters? (a) 1-10mins. (b) 10-30mins. (c) 30mins-1hr. (d) 1-2hrs. (e)More than 2hrs.

62. Which of the following house types do you live in? (a)Bungalow (a) Duplex (c) Tenement (d) Storey building (e) Block of flats.

63. Who owns the house your household lives in? (a)Family house (b)Father (c) Mother (d)Self owned (e)Rented

64. How many bedrooms are in your house? (a)1 (b)2 (c)3 (d)4 (e)5 and above

65. How many people sleep in one room? (a)1 (b)2 (c)3 (d)4 (e)5 and above

66. What is the construction (walling) material? (a)Thatch (b)Plank/Wood /Straw (c)Corrugated iron sheets (zinc) (d)Cement blocks (e)Bricks (f) Mud

67. What is the roofing material? (a)Thatch (b) Asbestos (c)Corrugated iron sheets (zinc) (c)Aluminum (d)Slate

68. How many members of your household have access to telephone lines? (a)None (b)1 (c)2 (d)3 (e)4 (f)5 and above

69. How many telephone services do you receive in your community? (a)None (b)1 (c)2 (d)3 (e)4 (f)5 and above

SECTION G: Perceptions/Expectations

70. What impact do you think the proposed project will have on you and your community?

(a) **……** (b) ……

(c) **……** (d) ……

(e) …… (f) ……

71. What benefits (for yourself and your community)do you expect from the proposed project?

(b) **……** (b) ……

(c) **……** (d) ……

(e) …… (f) ……

72. What enhancement or/and mitigation measures do you expect to from the proposed project?

(c) **……** (b) ……

(c) **……** (d) ……

(e) …… (f) ……

72. Other Comments

QUESTIONS FOR COMMUNITY DISCUSSIONS/INTERVIEWS (SOCIO-ECONOMICS/HEALTH)

1. Name of community:

2. District/LGA where it is located:

3. Ethnic groups/tribes (from most populous to least populous):

4. Language spoken by each ethnic group (from most populous to least populous). Common language(s) used in communication in the community.

5. Religious groups; most common in each group (from most populous to least populous):

6. If there are Christians make a list of some of the denominations.

7. If there are shrines/deities make a list of some and purpose why they are revered (eg deity for war, fertility, etc), particularly those that may be affected by the project.

8. If there are sacred places/forbidden places and bushes, list some of them (especially any that may be affected by the project). If possible, find out punishment for culprits (eg disease, curse, fine, banishment, etc).

9. List food taboos (ie forbidden foods in the community). If possible, find out punishment for culprits (eg disease, curse, fine, banishment, etc).

10. List forbidden/prohibited practices (eg cannibalism, sexual intercourse in the bush/farm) and if possible, punishment for culprits (eg disease, curse, fine, banishment, etc).

11. If the project affects any shrine/prohibited place is there a process by which deities can be appeased?

12. How many villages/quarters/sections/compounds/lineages make up the community? Ask for names.

13. How are the groups related/linked?

14. List immediate neighbouring communities (if possible by location ie East, West etc; also ask if there is ancestral relationship with study community).

15. Brief history of the community. Who are their ancestors and how did they get there (ethnic/ancestral migration).

16. Traditional administrative structure/hierarchy in the community (eg King/Oba/Emir followed by Chiefs/District Head/Village Head; Elders/CDC/Town Union/Women/Youth). Obtain local names for the titles (eg Eze Epara of Elelenwo, Obong of Calabar).

17. Find out eligibility and tenure for each office.

18. Does community traditional ruler report directly to any higher traditional authority and who if there is?

19. Are there socio-cultural groups like age grade/ traditional groups eg Ekpe among Effik males/dance groups-general and gender specific/social groups. Obtain some names and roles of specific groups.

20. What development roles do women and youth play in the community? List and if possible give a few egs.

21. List social vices and indulgent behaviour (eg smoking, drug abuse- including alcohol, prostitution, etc)

22. Have there been conflicts with violent outcomes within the community or between the community and any neighbouring community in the last 5yrs/10 yrs?

23. Who are the members of a typical household (eg father, mother, children, relations, domestic helps)?

24. What types of marriages exist in the community? Give an idea of proportions of polygamous and monogamous marriages in the community (eg 20% polygamy and 80% monogamy).

FACILITIES IN THE COMMUNITY

1. Access Roads (where do they lead to/come from; provider – eg State Govt, SPDC; condition – ie tarred; estimate distance).

2. Internal link Roads/Streets/Lanes (provider – eg State Govt, SPDC; condition – ie tarred; estimate distance).

3. Number of Health facilities in the community (**Type** eg hospital, health centre, maternity; **services provided** eg out patient, in patient, ante natal - which are the ante natal days?, child delivery, immunization – what are the antigens and preservation facility eg solar powered refrigerator?, medical laboratory, treatment of TB, detection/management of HIV/AIDS, surgery, general medical services; **capacity of facilit**y ie number of beds; **Staff strength** ie medical doctors, nurses, community health workers, pharmacist, lab technologist, administrative, security; **available facilities in the premises** ie morgue, water borehole, electricity generator, perimeter fence, ambulance, type of sterilizing equipment; **prevalent diseases** eg malaria, diarrheal diseases, trauma/wound, respiratory tract diseases, diabetes, high blood pressure, etc)

If no orthodox health facility in the community, obtain distance (in km, time eg 2hrs and cost eg N100 bus/taxi) to nearest facility that community members patronize. Obtain as much information as possible using question 3 as guide.

If possible, obtain medical records from facility in the community or the nearest one.

4. Traditional Birth Attendants/Drug stores. Obtain estimate of their numbers.

5. Common diseases experienced in households by community members.

6. Nutrition problems (How many meals is the average household able to provide daily? What does the mean usually consist of?)

7. Patronage of health facilities, estimate proportions (eg drug store/chemist 40%, orthodox facilities 20%, TBA 20%, herbalist 10%, etc).

8. Education facilities (**Type/Number** eg 2 primary schools, 1 secondary school; **No. of arms** eg primary 1-6; **No. of classes per arm** eg 2 classes of 1-3 and 1 class of 4-6; **Total No. of students in school, per arm and by gender** eg 20 students in primary one made up of 10 boys and 10 girls; **Total No. of Teachers** by class and by gender; **Facilities in each school and their adequacy** ie class room blocks, teachers' offices, desks for students, running water, toilets)

If unable to get actual figures, obtain informed estimates from teachers/parents/community members. You can also get distribution of students/teachers in proportions eg 20% boys and 80% girls.

9. Source of water supply to households in the community. If they obtain water from outside the community, how long (in km, time eg 2hrs and cost eg N100 bus/taxi) does it take?

10. Market (Daily or periodic; is market built up or open stalls; estimate number of stalls; who developed the market; who manages it)?

11. Communication facilities. Number of GSM services available.

12. Electricity (Is there public electricity? Type-national grid/community generator/supply from community operating in community or nearby; Proportions of households that use public and private electricity).

13. Security and Courts ie Police/Military and Customary/Magistrate/High/Appeal courts.

14. Welfare eg orphanage and old people's home.

15. Motor Parks/Jetties.

16. Public Recreation facilities.

17. Hospitality facilities (ie hotels, guest houses; obtain a sense of size in terms of rooms if possible)

18. Transportation (common means of transport; cost by bus/taxi/boat to nearest town/urban centre, to LGA headquarters/state capital).

LIVELIHOOD ACTIVITIES

1. Livelihood types/occupations (from the most common to others eg farming; trading; artisanship practices ie tailoring, craft, electrical/electronic repairs auto mechanic, etc; civil/public service; contracting; fishing, etc).

2. Obtain list of equipment/implements used in farming, fishing, hunting, etc.

3. Traditional farming methods (eg bush fallow/duration, bush burning, digging ridges and moulds, etc)

4. How are farms owned/obtained (hereditary family farmlands, communal ownership, allocation by central authority for housing/farming)?

5. Who owns/manages lands in the community? Can women own land?

6. Traditional resource conservation practices (eg bush fallow, forbidden bushes)

7. List common farming, fishing and hunting sites/areas.

8. Estimate proportion (%) of community members in each livelihood activity.

9. Estimate average monthly income from each livelihood activity.

10. Estimate distribution (by proportion) of household monthly expenditure.

SETTLEMENT/HOUSING

1. Obtain a sense of size of the settlement/settlements (small, medium, large).

2. Description (urban, rural).

3. House construction materials (obtain a sense of the proportions eg 80% mud walls, 20% cement blocks; 10% thatch roof, 20% aluminum, 70% zinc).

4. Average number of rooms in a living house.

5. Average number of persons sleeping in one room.

6. Sources of energy used in cooking and their relative proportions (eg coal 5%, firewood 80%, kerosene, cooking gas, etc).

7. Toilet facilities in houses in the community and their relative proportions (eg bush 40%, pit 50%, water closet 10%).

8. Where do households throw away their refuse (ag bush, bury, collected by LGA, Contractors, etc).

PERCEPTIONS, CONCERNS/FEARS AND EXPECTATIONS OF THE PEOPLE

1. Are they willing to accept the project?

2. What are their fears about impact of the project on their lives?

3. What benefits do they expect from the project?

4. Do they have any suggestions about how to mitigate or enhance their perceived impacts of the project?

APPENDIX 4.5

EVIDENCE OF CONSULTATION

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum — **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	KABIR LABO	MINISTRY OF RESOURCE DEV.	REGN. SECRETARY	08035986[illegible]	
2	MUSA M. BARDA	"	D.M.E.	08036254041	
3	[illegible]	"	[illegible]	[illegible]	
4	[illegible]	"	S.O	08065104081	
5	RABO SANI-BAT S/MUSA	KATSINA STATE RADIO	ASST DIRECTOR	08166422277	
6	[illegible]	M.P.F	[illegible]	[illegible]	
7	Najim ANIMASHAUN	NOVA POWER	DMD	08038482797	
8	[illegible]	KEDCO KATSINA	MD/CEO	08036401955	
9	[illegible]	[illegible]	[illegible]	[illegible]	
10	Bashir Adamu	Energy Commission	Chairman	08026316172	
11	[illegible]	[illegible]	[illegible]	[illegible]	
12	Lawal Ibrahim Yar'adua	Min. of Land & Survey	A.D Valuation	08168521499	
13	Umar Nazir Gumel	KEDCO Katsina B/Unit	Head Tech. Engineer	08034509037	
14	SANI NAZIRU	KANKIA	MODERATOR	08066020777	
15	[illegible]	Village Head K/Daura	VH Katsina Dam	08065782577	
16	PATRICK AGUSTI	FUGRO NIGERIA LTD	ESIA Project Mgr	08034706005	
17	Lawal Ibrahim Kankiya	Kankiya	Chief Imam	07036980655	
18	UNOMA GIESE	NOVA SOLAR POWER	PHOTOGRAPHER	07062921234	
19	MUNTARI KADE	MIN. OF ENV. KATSINA ST.	DIRECTOR	08037616374	
20	ENEOFU OREZI	NOVA SOLAR POWER	Project Manager	08036521236	
21	IBRAHIM USMAN K/SAURI	KATSINA STATE M.W.H.&T	ELECT. ENGR II	08034694718	
22	ENGR. SADA YAKUBU	✓	PRINCIPAL ELECT. ENGINEER	07068307964	
23	Engr Sani Magaji	" " " "	Director (M/E)	08034175839	
24	ABDULAZIZ LAWAL K.	" " " "	ENR. ELECT. ENGR.	08066927886	
25	Arit Muntaka A. Gafai	Katsina Chamber of Commerce	V.P Commerce		
26	Hajia Fatima M. Yari	" " "	V.P Women Affairs		
27.	RABIU ABUBAKAR	" " "	Director General	-07039135532	

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum — **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	Al-Hassan Tukur	Fanga	Kankia	—	
2	Alhaji Bashir	Fanga	Kankia	070-34200865	
3	Hassan Yusif Bello	Daurawa	Kankia	080-60348701	
4	Yusuf Bello	Daurawa	Kankia	070368-5136	
5	Mohammed Abdullahi	Buddai	Kankia	080-32838138	
6	Mansir Yusuf	Daurawa	Kankia	—	
7	Nasiru Dan'Kasafi	G/Kaya	Kankia	070-65837327	
8	Ghamesu Adamu Gaggi	Gaggi	Katsina	08064840320	
9	Sani Abba	Dankalaka	Kankia	—	
10	Hajia Muntari	Gachi	Kankia	081-68687816	
11	Yusuf Abdullahi R.	Gachi	Kankia	08067428864	
12	Kabiru Sani	Gachi	Kankia	07037929085	
13	Marwana Umar	Daurawa	Kankia	09033090794	
14	Muttalla Muntari	Daurawa	Kankia	07062894965	
15	Abdullahi Lawal	K/Minna	Kankia	08162103933	
16	Adamu Aliyu	Dankalaka	Kankia	081-08360738	
17	Isiaku Ibrahim	K/Maina	Kankia	070-68291842	
18	Usman Hamisu	Daurawa	Kankia	081-60089246	
19	Dahiru Lawal	Daurawa	Kankia	070-66257888	
20	Mai Fada Tibrin	K/Maina	Kankia	—	
21	Hamisu Abdu	Daurawa	Kankia	081-66321514	
22	Alh Sani Salisu	Gachi	Kankia	080-34246683	
23	Sabitu Abdullahi	Gachi	Kankia	—	
24	Muhammadu Tukur	Yamaka	Kankia	—	
25	Ade Sabitu	Gachi	Kankia	—	
26	Yahaya Moh'd	Dankalka	Kankia	080-60851718	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Public Forum:

Date: 3rd August, 2014

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	SAMINU SANI GACHI	GACHI, KANKIA L.G.A KAT	08067861798	
2	MAIMUNA USMANI GACHI	GACHI, KANKIA L.G.A. KAT		
3.	SANUSI KANIMU	GACHI, KANKIA. L.G.A. KAT	08166477201	
4.	ABDUL-AZIZ AMADU	GACHI. KANKIA. L.G.A. KAT	07034825957	
5.	HAMZA AMADU	GACHI. KANKIA. L.G.A. KAT.	08066726862	
6.	KAMILU M. SULE BUSSAU	FAKUWA / KAFIN DANGI. KANKIA.	08014413092 3	
7.	SAYYABU M. SULE BUSSAU	FAKUWA. KAFIN DANGI KANKIA		
8.	IDRIS USMAN	KAFIN-DANGI KANKIA		
9.	RAMAT ABUBAKAR	KAHARI GALADIMA		
10.	HAMZA MATI	KALYOM-MAINA		
11.	RABI HAMZA	KALYOM-MAINA		
12.	SA'U BUSSAU	KAFIN-DANGI		
13.	SHA'ITU BUSSAU ALIYU	KAFIN-DANGI		
14.	SALE ALIYU BUSSAU	KAFIN-DANGI		
15.	MUSTAPHA RABI'U	KAFIN-DANGI	08134774879	
16.	MUSTAPHA AMADU	KAFIN-DANGI		
17.	MUSTAPHA SAHIRU	KAFIN-DANGI		
18.	SAHIRU BELLO	KAFIN-DANGI	08140119086	
19.	ABDULLAHI A. SA'U	KAFIN-DANGI		
20	ALH SAHIRU YAKUBU	KAFIN-DANGI		
21	SURAJO SAHIRU BUSSAU	KAFIN-DANGI		
22.	ALIYU YUSUF	GACHI	09030750322	
23.	NAFI'U YAKUBU	KANDARAWA	08065744108	
24.	YAKUBU ABU	KAFIN-DANG.		
25.	BALA MOHAMMED	GACHI	08069777299	
26.	SANI MUSA	GACHI	080-61882833	
27.	Akhasi Babangida	Gachi	070-36756830	
28	ISIYAKU ABUBAKAR	GACHI	08060308648	
29	Abdullahi Hamisu	S/Abuja	08064588600	
30	Muntari A-Dumoye	S/Abuja	07061777744	
31	Sufiyanu Ahmed	Gachi	070-36598631	

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	SABI'U SALISU	GACHI	KANKIA	081-0107860 1	
2	Hajiya Maikudi	Kofar Yamma, Kanti	KANKIA	08163234202	
3	Maimunawa Dauda	Daurawa	Kankia	070-64669843	
4	IBRAHIM LAWAL	Daurawa	Kankia	—	
5	YUSHA'U ABUBAKAR	Daurawa	Kankia	—	
6	SALMANU Abdullahi	Daurawa	Kankia	070-66317105	SALMANU
7	SHA'AIBU BALARABIA	Daurawa	Kankia	—	
8	ABUBAKAR YUSUF	Daurawa	Kankia	—	
9	MOHAMMADU LAWAL	Gachi	Kankia	—	
10	MOH'D SALISU BELLO	Daurawa	Kankia	070-64873814	
11	YUSUF BELLO	Daurawa	Kankia	070-36825136	
12	ILIYA SAFIYANU	Daurawa	Kankia	—	ILIYA
13	TUKUR USMAN	Daurawa	Kankia	—	
14	ABUBAKAR YAHAYA	Daurawa	Kankia	080-62982059	
15	SANI ABBU	Daurawa	Kankia	—	
16	ATIKU ABDULLAHI	Daurawa	Kankia	—	
17	LAWAL ZUBAIRU	Gachi	Kankia	—	
18	IBRAHIM B. IMAM	Gachi	Kankia	080-69814728	
19	DIKKO LAWAL	K/Maina	Kankia	081-32506279	
20	HAFIZU SALISU	Daurawa	Kankia	081-46087127	
21	IDRIS YUSUF	Gachi	Kankia	070-65398037	
22	AMMU HALLIRU	Daurawa	Kankia	081-46116151	
23	MUBARAK ISAH	Daurawa	Kankia	081-38578162	
24	Abdurrazak Sani	Daurawa	Kankia	070-38329078	
25	Adamu Mahamud	K/Maina	Kankia	080-63340128	
26	Liman Sale	G/Kaya	Kankia	088-21154155	LIMAN

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	NURA BARA'U	GACHI	KANKIYA	08036874952	
2	HUSAINI TA'U	GACHI	KANKIYA	07061274474	
3	HUSAINI TA'U	GACHI	KANKIYA	07061274474	
4	YUSUF Lawal	Fanga	Kankiya	07037300172	
5	Buhari K/mama	K/maina	Kankiya	07039076046	
6	Tijjani Shehu'A	K/maina	Kankiya	08032426876	
7	Habibu Usman	K/maina	Kankiya	08160745686	Habibu
8	Kabir Lingo	G/kaya	Kankiya	09036088329	
9	Muhammadu Sirajo	Fanga	Kankiya	08107770678	
10	Umar Gwaza	Gachi	Kankiya	07063314746	
11	Yusuf Sirajo	Fanga	Kankiya	08107770678	
12	Sanusi Muhammad	Dawawa	Kankiya	08107934915	
13	Zaharaddini Sanusi	Dawawa	Kankiya		Sanusi
14	Jamilu Yahaya	Dawawa	Kankiya		Sanusi
15	Maidugawa Dawai	Dawawa	Kankiya		Sanusi
16	Sanusi Muhammed	Dawawa	Kankiya		Sanusi
17	Aboubakar Muhammed	Dawawa	Kankiya		Sanusi
18	Alh Muhammadu Tela	Gachi	Kankiya	08034940237	
19	Haruna Aliyu	Fanga/Buddai	Kankiya		
20	Aliyu Abdullahi	Gachi	Kankiya	07065071917	
21	Zainab Hamisu	Gandun Kaya	Kankiya		
22	Fatsima Halidu	Gandun Kaya	Kankiya		
23	Ramatu Abdulkadir	K/maina	Kankiya		
24	Rukayya Sirajo	K/maina	Kankiya		
25	Rabo Audu	K/maina	Kankiya		
26	~~Amina Sirajo~~				

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum — **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	Sulaiman Salmanu	Dauraua	Kankia	070-35856664	S. S
2	MUSA BELLO	Dauraua	Kankia	—	MMM
3	ALIYU ABUBAKAR	Dauraua	Kankia	—	A.L-A
4	SAMA'ILA USMAN	Dauraua	Kankia	—	SAM
5	MUSA ITTO	Dauraua	Kankia	—	MUSA
6	AMINU ABUBAKAR	Dauraua	Kankia	—	AMINU
7	ZAINA USMAN	Gachi	Kankia	080-68235836	ZAINA
8	MUSA MAKO	Gachi	Kankia	070-68290419	[illegible]
9	IBRAHIM USMAN	Gachi	Kankia	070-67796991	[illegible]
10	YUSUF SALISU	Dauraua	Kankia	070-64375946	[illegible]
11	Zubairu Habibu	Dauraua	Kankia	—	[illegible]
12	AMINU SALISU	Dauraua	Kankia	081-37085027	[illegible]
13	HAYATU ISAH	Dauraua	Kankia	080-61629565	[illegible]
14	NUSAIBATU AR MUNTARI	Dauraua	Kankia	08060260837	[illegible]
15	UMMITA IBRAHIM	Dauraua	Kankia	07039139462	[illegible]
16	MUHAMMADU MUSA	Dauraua	Kankia	—	[illegible]
17	USMAN USMAN	Dauraua	Kankia	080-69332637	[illegible]
18	Abdul Karim YUNUSA	K/Maiaka	Kankia	070-39296853	[illegible]
19	ILIYASU ABDULLAHI	Dauraua	Kankia	081-45879400	[illegible]
20	Alhaji Abu Kasimu	K/Maiaka	Kankia	080-62690078	[illegible]
21	BARA'U MAJIDI	Gachi	Kankia	081-05668045	[illegible]
22	IBRAHIM SALISU	Dauraua	Kankia	081-02535758	[illegible]
23	YA'U SALISU	~~Dauraua~~ G/Kaya	Kankia	—	Ya'u
24					
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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum

3rd August, 2015

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	ALH MUSA IMASSANIS	DISTRICT HEAD KANKIA	KACKIYMAL KATSINA	08037041115	
2	Abdullahi H Sada	Magajin Gari	D	08036447745	
3	Sanusi Dangam	— Kankiya —	— Kankiya —	08036019214	
4	Alh Sada Bello	Magajin K/Dawaki	Kankia	08069823171	
5	Alh Lawal Fanga	Fanga village	Kankia	—	
6	Malam Sada Mugaweri	M/Mugawa fanga	Kankia		
7	A-KASIMU YAU	DAURAWA	KANKIA	08062247867	
8	SALISU KABIRU	FANGA	KANKIA	08069810097	
9	SADIKU Abubakar	FANGA	KANKIA	07030912791	
10	KABIR SALISU	FANGA	KANKI	08143361474	
11	ZAHIRU SALISU	FANGA	KANKIA	07062907844	
12	Umar Salisu	FANGA	KANKIA	07033129855	
13	MOHAMMED SALISU GAMBO	IMPEX BUSINESS	MALUMFASHI	08032957882	
14	SADA MAMMAN	SARKIN AGUJA	KANKIA	08133096908	SAA
15	MUHAMMAD LAWAL	FANGA	KANKIA	—	ML
16	ISAH ABDULLAHI	DAURAKA	KANKIA	07064660033	ISAH
17	YASIU MUSA GARBA	DAURAKA	KANKIA	08036517511	
18	ISAH SULEMAN	FANGA	KANKIA	—	ISAH
19	AKILU LAWAL	FANGA	KANKIA	—	
20	HARUNA SHAIBU	FANGA	KANKIA	—	
21	MARAIYA HARUNA	FANGA	KANKIA	—	
22	SALI USMAN	K/MAIKIA	KANKIA	070-35958297	
23	Abubakar Ibrahim	Fanga	KANKIA	080-32705699	
24	GARBA IBRAHIM	Fanga	Kankia	—	
25	HARUNA MAMMAN	Fanga	Kankia	08065881570	
26	Alkali Sani	Fanga	Kankia	080-05087252	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Public Forum: **Date: 3rd August, 2015**

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1.	MUSTAPHA ABDULMUMINI	DANRANWA	070-3513 8044	
2.	BABANGIDA DANMUNE	11	081-03798193	
3.	INDO MUSA	11	081-39056016	
4.	ADE A. IKASIMU	11	070-35166667	
5.	BASIRU SHAIBU	11	081-42875987	
6.	JAMILU ABDULMUMINI	11		
7.	~~ABDULMUMINI~~			
~~8.~~	SANI ISMA'IL	GACHI	08182368303	
8.	DANMUNE YARO	DANRANWA	07066255224	
9.	Abdul717 Abdulmumini	11		
10.	AYUBA A/MUMINI	11		
11	BISHIR USMAN	BUDDAI	081-62467[illegible]6	
12	ISYAKU A/MUMINI	DANRANWA	070-31369254	
13	ABDULHAAI DA'IRU	BUDDAI		
14	RABIU ALH. ALI	BUDDAI		
15	BALA ZANGO	ZANGO		
16.	SALISU HAMZA	K/MAINA		
17.	ADAMU HAMZA	11		
18.	ZUBAI SAIDU	11		
19	ALI ABDULLAHI	KANTI	090-24447600	
20	HASSAN MAIKUDI	B/K KANKIA	07035867953	
21	SALISU SADA	KANTIN KWARICIA	080.37205489	
22	MACAM IDRIS	GACHI KANKIA	08109954011	
23	JAMILU DANJUMA	C/KANKIA KANKIA		JAMIL

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Public Forum: **Date: 3rd August, 2015**

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	AUWAL HABIB	DAURAWA	08136618237	
2	ABUBAKAR muhammed	DAURAWA	08131689725	
3	ABUBAKAR Yahaya	DAURAWA	08062982039	
4	TSNAH Yahaya	DAURAWA	08067604452	
5	Rabi'u Sama'ila	Daurawa	08033577366	
6	Ahmed Bello	Daurawa	07068593792	
7	Isama'ila Zubairu	Daurawa	—	
8	Sani Musa	Daurawa	08107243668	
9	Rabi'u Tukur	Daurawa	—	
10				

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Public Forum: **Date: 3rd August, 2015**

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	ASMA'U BARAU	KANKIA	—	
2	IZATU BARAU	KANKIA	—	
3	SALAMATU NASURU	GANDUN KAMA	—	
4	BARIRA SADA	FANGA	—	
5	NAFISA SADIKU	FANGA	—	
6	AMINA SURAJO	FANGA	—	

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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum — **3rd August, 2015**

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	ABDULRAHAMAN GARBA	GACHI	KANKIA	07061276450	
2	HAMZIRU LABIRU	GANUHANKAYA	KANKIA	07032870056	
3	ISAH ISARA'U	GACHI KANKIA	KANKIA	07033450997	
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125MWP UTILITY SCALE SOLAR PV BASED POWER PLANT ESIA IN KANKIYA, KATSINA

Public Forum

3rd August, 2015

Attendance List

S/N	NAME	ORGANISATION/COMMUNITY	DESIGNATION	Phone No	SIGNATURE
1	Haulau Yusuf	Dawaya	Kanuna		
2	Salisu Lawal	Fingo	Kanuna	08[illegible]06537117	
3	Nafiu Yakubu	Dandumkoya	Kanuna	08065744108	
4					
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125MWP UTILITY SCALE PV-BASED POWER PLANT EIA IN KATSINA STATE

MEETING BETWEEN NOVA POWER, KATSINA STATE GOVT REPS. DATE: 07/08/2015 AND FUGRO REPS.

S/N	NAME	ORGANISATION	DESIGNATION	PHONE NUMBER	SIGNATURE
1	Lawal Ibrahim Y	LANDS & SURVEY	ACTO (Valuation)	08168521499	Ibrahim Lawal
2	Salihu Kado	Ministry of Lands & Survey	Permanent Secretary	08033708180	
3	ABDULKHAIR HAMZA	LANDS & SURVEYS	DIRECTOR ESTATE	08068129584	
4	PATRICK AGIOH	FUGRO	PROJECT MANAGER	08034706005	
5	EMEOTU OKEZI	NOVA SOLAR POWER	Project Manager	08036521236	
6	MAJDALLAH Yassine	NOVA POWER	Project Manager	+212 663 33 54 73	
7	PIUS ADEJOH	FUGRO	Socio-economist	08023599648	
8					
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125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: MEN/ELDERS GROUP CONSULTATION **Date:** 8/02/2015

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	ABDULLAHI HASSAN SADA	MAGAJIN GARIN KANKIYA	08036447745	
2	HASSAN MUHD. GALADIMA	GALADIMAN KANKIYA	08064976293	
3	SADA BELLO	KAFIN DANGI	08069523171	
1.	KABIR ALIYU	Health Worker	08069625722	
2.	ABDUL-RAHMAN IBRAHIM	Health Worker	08036447750	
3.	LAWAL MUHAMMAD MAKWA	SCHOOL TEACHER	08069635163	
4	SADIQ ABUBAKAR-K/DAMGA	WARD HEAD	09014445663	
5.	ABDULKADIR MUSA	"	08132553246	
6.	RABIU USMAN T.	WARD HEAD	08065253162	
7.	SALEH KAILINSHIDA	"	08069383593	
8.	SANI BELLO GACHI	WARD GACHI	07088776449	
9.	ALIYU ABDULLAHI	WARD GACHI	NIL	
9.	MALAM SHUAIBU LIMAN	LIMAN N-S-O	08060757674	
10	ALH. ABDULKADIR	"	08130041601	
11	ADO DAURAWA	WARD HEAD	09092891037	
12	USMAN GALADIMA	"	08069461159	
13	AMADU ZANGO	"	07069002425	
14	RABE HA[illegible]	"	07065627507	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: CONSULTATION MEETING WITH DISTRICT HEAD OF KANKIYA / SITE VIRIFICATION / DATA GATHERING

Date: 7/02/2015

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	MUSA HASSAN SADA	DISTRICT HEAD KANKIYA.	08037041115	
2	Abdullahi Hassan Sada	Magajin Gari Kankiya	08036447745	
3	UMAR DIECO	Shamgalin Kankiya	08062648421	
4.	SANUSI MUHAMMAD	P.A. D/Head Kankiya	07065469067	
5	Yusuf Umaru	Assistant Director Enviro	08054989335	
6	ABDULAZIZ LAWAL K/GABAS	MINISTRY OF WORKS KATSINA STATE	08066927886	
7	Muhammad Nasiru Usman	DRIVER	08075112360	
8	ISMAIL ALIYU JEKA	MINISTRY OF ENV. Katsina	08036427284	
9.	Mohammed Awwal Saidu	Fed. Min of Env. Abuja	08069225772	
10.	ISA BELLO RADDA	Min of Resource Development KT	07032137676	
11	Chika Ofume	FUGRO	07033328149	
12	DATRICK AGBOH	FUGRO	08034706005	
13	EMEOTU OREZI	NOVA SOLAR POWER	08036521236	
14.	Okuso Emeka. A	FUGRO	07031004071	
15	ANTO AMBOSON	FUGRO	08168910424	
16	Chika Ofume	FUGRO	07033328149	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: YOUTH GROUP CONSULTATION **Date:** 8/02/2015

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	~~RABIU SALISU~~	~~Hunter~~	~~0806~~	
2	Aliyu Nalado S.	Business	08069461159	
3	Suleman Musa	"	07063235360	
4	BISHIR SANI	STUDENT	08066683216	
5	Suleman Ahmed	Business	Sul	
6	Hamisu Adamu Bello	"	08064840320	
7	MARIANA UMAR	"	09023090947	
8	MARIAM USMAN	"	08147969735	
9	AZIMA SANI		08091445663	
10	Babangida Usman	"	07065837327	
	Nasiru Umaru	"	09164211883	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: TRADITIONAL/CLAN HEADS CONSULTATION **Date:** 8/02/2015

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	ABDULLAHI HASSAN SABA	MAGAJIN GARIN KANKIYA	08036447745	
2.	HASSAN MUHD. GALADIMA	GALADIMAN KANKIYA.	08064976793	
3.	Mal. SIRAJO ABUBAKAR	KAUYEN MAINA	08066117532	
4.	SADA BELLO	KAGNI DANGI	08069823171	
5	ALHAJI ADO SULEMAN	SACHI	08066335262	

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: WOMEN GROUP CONSULTATION **Date:** 8/02/2015

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	MARIYA YAMMAE	GACCHI		
2	HALIMA BELLO	GACHI		
3	HADIZA GALADIMA	GALADIMA		
4	ASMA'U ISHAKU	MAGAJIN GARI		
5	BARA'ATU ZAKARI	MAGAJIN GARI		
6	RAMATU SURAJO	K/MAINA		
7	ASIBI MAMMAN	GALADIMA		
8	RUKAYYA SURAJO	K/MAINA		
9	HAJA ABDULKADIR	K/DANGI		
10	KABI ABDULKADIR	K/DANGI		

125MW UTILITY SCALE SOLAR PV BASED POWER PLANT EIA IN KATSINA

Meeting Purpose: HUNTERS / FARMERS CONSULTATION **Date:** 08/02/15

Attendance List

S/NO	NAME	NAME OF ORGANISATION/COMMUNITY	PHONE NO.	SIGNATURE
1	SALISU AHMAD	HUNTERS	07065494067	
2	AMINU BABI'U	"	08066948583	
3	RABIU SALISU	HUNTERS	08065435884	
4	SANUSI ADO (SAMKIN Dmg	"	080 30875506	