FINAL
INTEGRATED HEALTH SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM

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REVISION HISTORY

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Draft INTEGRATED HEALTH SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM

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ACRONYMS

AfDB	African Development Bank
BOO	Build Own and Operate
CITES	Convention on International Trade in Endangered Species
CSR	Corporate Social Responsibility
DOSH	Directorate of Occupational Safety and Health
DOSHS	Directorate of Occupational Safety and Health Services
EMCA	Environmental Management and Coordination Act
ESAP	Environmental and Social Assessment Procedures
ESIA	Environmental & Social Impact Assessment
GDC	Geothermal Development Corporation
GHGs	Green House Gases
HAZOP	Hazard and Operability
HSE	Health Safety and Environment
IFC	International Finance Corporation
ILO	International Labour Organization
IPP	Independent Power Producers
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest service
KPLC	Kenya Power and Lighting Company (now Kenya Power)
KWS	Kenya Wildlife Service
NAWASSCO	Nakuru Water Sanitation Services Company
NCGs	Non condensable Gases
NEMA	National Environment Management Authority
OHSAS	Occupational Health and Safety Assessment Series
OHSMS	Occupational Health and Safety Management System
OSH	Occupational Safety and Health
OSHA	Occupational Health and Safety Act
OSHPP	Occupational Safety and Health Project Plan
PISSA	Project Implementation and Steam Supply Agreement
PPA	Purchase Agreement
PPE	Personal Protective Equipment
QPEA	Quantum Power East Africa
SMART	Specific, Measurable, Achievable, Realistic and Time bound

Elements of ISO 14001:2015 in the QPEA Integrated HSE Management System

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1 INTRODUCTION

1.1 Background

QPEA GT Menengai Limited is a company registered and incorporated in Kenyan as a developer, owner and operator of Geothermal Power Plants. This company is in turn owned by Quantum Power East Africa Ltd (QPEA) being a registered holding company located in Mauritius.

QPEA GT Menengai Limited is one of the three Independent Power Producers (IPPs) each awarded a tender by Geothermal Development Corporation (GDC) through competitive bidding to install a 1x35MW Geothermal Modular power Plant in Menengai Geothermal Field in Nakuru County for 25 years on a Build Own and Operate (BOO) basis. The purpose of the Power Plant Project is to increase the power generation capacity of Kenya to enhance socio-economic development and diversify sources of power supply by developing the country's huge geothermal potential.

QPEA GT Menengai Limited acknowledges that some aspects of its operations can have undesired adverse effects that could harm the biophysical environment, people or assets. The company has therefore formulated an Integrated Health, Safety and Environment (HSE) Management system towards controlling and managing such undesired effects. The integrated HSE Management System is a result of careful examination by QPEA Menengai Limited of its envisaged activities and the host environment following the Environment and Social Impact Assessment of the Project

Reference

ISO 14001: 2015 (4.1)

1.2 Company mission and vision

1.2.1 Mission

Our mission is to provide sustainable energy supply and management solutions that satisfy the needs of our customers and affiliates.

1.2.2 Vision

Our vision is to be the preferred independent power producer offering cost effective and sustainable management solutions to our customers.

1.3 Purpose

This Integrated HSE Management System manual defines the company's health safety and environment management system and provides a linkage of the system documents to the various elements of the Environmental Management System ISO 14001:2015 standard. This manual shall therefore be read with the ISO 14001:2015. In this document the terms "Integrated HSE Management System'' and "HSE" should be treated as synonymous.

It provides a formally approved institutional structure developed by QPEA GT Menengai Limited that systematically integrates environmental sustainability, health and safety in the management and work practices at all levels, so that QPEA GT Menengai Limited activities

are accomplished efficiently while protecting the environment, assets, employees, general public and the company reputation

The purpose of this Integrated HSE Management System document is to:

- To provide a basic reference document for all employees and contractors to use in the execution of their work;
- To appraise our clients and affiliates and other interested parties on the nature of QPEA GT Menengai Limited's Health, Safety and Environment management system;
- To communicate QPEA GT Menengai Ltd's environmental, health and safety policies and management system requirements; and
- To facilitate environment, health and safety management activities and provide a basis for auditing and ensuring continual improvement.

The main objectives of this Integrated HSE Management System are to:

- Ensure compliance with the relevant Kenyan legislations on environmental health and safety;
- Ensure compliance with IFC 2012 Performance Standards particularly the (a) Environmental, Health, and Safety Guidelines for Geothermal Power Generation (b) International Labour Organisation (ILO) Core Labour Conventions and Terms and Conditions of Employment both as at 14 September, 2013;
- Ensure compliance with the AfDB Environmental and Social Policies Guidelines; particularly (a) the African Development Bank Group's Policy on Environment dated February 2004; (b) the Involuntary Resettlement Policy dated November 2001; (c) the African Development Bank Group's Policy on Poverty Reduction dated February 2004;(d) the Gender Policy dated June 2001; and (d) the Integrated Safeguards System, 2014 and associated Environmental and Social Assessment Procedures (ESAP);
- Ensure compliance with the Geothermal Development Company (GDC) HSE policies and management plans;
- Promote a healthy and safe work environment;
- Promote communication among management, employees and the community in addressing safety issues at the workplace and its surrounding;
- Contribute towards risk identification, prevention and management; while considering the outputs of the ESIA i.e. Environmental Management Plan (EMP);
- Train and motivate employees to enable them to fulfil the HSE requirements; and
- Measure, appraise and report on HSE performance.

The principal elements of the system described in this manual are:

- Environmental Health and Safety policies
- QPEA GT Menengai Limited and stakeholders
- HSE Planning
    - Environmental aspects
    - Legal and other requirements
- Implementation and operation
    - Organisation, resources, roles and responsibilities
    - Competence, training and awareness
    - Communication
    - Documentation
    - Operational control
    - Emergency preparedness and response plan
- System Performance evaluation
- Environmental management plans incorporating objectives and targets
- Health and safety management plans including objective and targets.
- Management review

1.4 Scope

QPEA GT Menengai Ltd has defined its HSE Management System in line with the elements of ISO 14001:2015 Environmental Management System and integrates requirements of Kenyan Occupational Safety and Health Act (OSHA), 2007 and OHSAS 18001:2007 OSH Management System.

The QPEA GT Menengai Limited HSE management system provides a mechanism for managing Health, Safety and Environmental risks throughout all areas and departments of organization whose registered office is Apollo Centre, 2nd Floor, Wing A, Ring Road Parklands, Westlands and its Geothermal Modular power Plant in Menengai Geothermal Field, Nakuru County. The HSE Management System is designed to cover Health, Safety and Environmental aspects, which QPEA GT Menengai Limited can control and directly manage, and those it does not control or directly manage but can be expected to influence.

The HSE Management System prescribes and directs the management of all health, safety and environmental aspects, physical, natural and / or social, associated with and arising from construction and operation works undertaken for the proposed Menengai geothermal power plant. It covers the following principal areas:

- Waste Management Plan;
- Environmental Restoration;
- Security Management Plan;
- Traffic Management Plan;
- Air and Noise Management Plans;
- Emergency Response Plan;
- Fire Safety Management Plan;
- Utility consumption plans;
- Cultural and archaeological management;
- Environmental Sustainability;
- Standard Operational HSE procedures and work instructions;
- Occupational Health and Safety;
- Community Development Plans;
- Stakeholder Engagement Plan; and
- Safety Management plan.

Reference

ISO 14001:2015 (4.3)

1.5 QPEA and stakeholders

QPEA GT Menengai Limited is one of the three Independent Power Producer (IPPs) awarded a tender by Geothermal Development Corporation (GDC) a Geothermal Modular power Plant in Menengai Geothermal Field in Nakuru County for 25 years on a Build Own and Operate (BOO) basis. GDC will supply the steam resources required to run the power plant which will be hosted within GDC premises.

The power plant will be driven by steam owned by the GDC and supplied to the Power Plant under Project Implementation and Steam Supply Agreement (PISSA). GDC is thus a key interested party as far as QPEA GT Menengai Limited operations are concerned. The power generated will be supplied to Kenya Power Company (KP) under the terms in the Power Purchase Agreement (PPA) for distribution to commercial and industrial activities countrywide. The Project is on land owned by the Government of Kenya, under the custody of Kenya Forest Service (KFS). GDC holds a 30-year Special-Use License for the Land in Menengai

Geothermal Project area and shall sub-lease a 140×180 metre plot to QPEA GT Menengai Limited under the terms of the PISSA.

In addition to GDC, KP, KFS, the company has identified other stakeholders in its HSE management system including the other IPPs. The HSE Management System interests of GDC and other parties interested in QPEA operations are summarised below.

Table 1-1: Stakeholders in QPEA GT Menengai Limited Operations

Stakeholder	**Interest**	**QPEA GT Menengai Obligations/expectations**
GDC	Project Implementation and Steam supply under PISSA Environmental sustainability of its operation sites including the health and safety of personnel and the general public	GDC environment health and safety policy Health ,Safety and Environment obligations in the PISSA
ERC	Safe and sustainable energy generation, transmission and distribution	Electricity Generation Licence obligations and conditions
NEMA	Overall authority in environmental management	EMCA requirements and Environmental license conditions
Directorate of occupational safety and health	Ensuring safety of workers and persons legally in a workplace	OSHA requirements
KFS	Forest and conservation	Sustainable management of Menengai forest land
Other IPPs in Menengai (Orpower 22 and Sosian)	Cumulative environmental impacts of power plants' operations	Closer liaison in impacts monitoring and management
KETRACO and KP	Power Substation and transmission lines for product evacuation	Closer liaison in impacts monitoring and management
County government of Nakuru	Local community and general development	Liaison in meeting community expectations Protection of public health (including noise monitoring)
Local communities	Receptors of any environmental impacts, both positive and negative	
Financing institutions e.g. IFC, DEG and AfDB	Environmental Sustainability, occupational and public safety in supported project	Environmental and social safeguards

Most of these stakeholders were either consulted and or have had their policies and safeguard requirements considered during ESIA studies and updates thus making their expectations known to QPEA. Additionally, QPEA GT Menengai Limited has developed a Stakeholders' Engagement Plan (SEP) for continuous involvement of the identified stakeholders in project construction and operation phases. Further, QPEA has formulated a Community Development Plan (CDP) towards handling local community expectations.

Reference

ISO 14001:2015 (4.2)

Applicable procedure(s)

HSE 004: Procedure for internal and external communication

2 HEALTH, SAFETY AND ENVIRONMENT, (HSE) POLICIES

2.1 Management commitment

QPEA GT Menengai Limited management is committed to upholding its policies on Health, Safety and Environment and communicating the importance of meeting compliance obligations and other requirements to its employees, contractors and other interested parties.

Continued system improvement will be enabled through environmental health and safety policies, management objectives, provision of resources towards the integrated HSE system, planned monitoring and management reviews.

The company policies are approved and signed by the Business Manager (BM) before circulation to staff and sharing with other interested parties. The BM also approves other system documents, and chairs the HSE committee and management review meetings.

Reference

ISO 14001:2015 (5.1)

2.2 Health, Safety and Environment Policy

2.2.1 Policy statement

QPEA GT Menengai Limited is committed to meeting industry best practice in environmental performance through adoption of environmentally sustainable management practices and continuous improvement. Where we operate, we will conduct our activities with respect and care to the environment and systematically manage risks to ensure sustainability. We are committed to eliminating all injuries, occupational illnesses, unsafe practices and incidents of environmental harm from our operations. We believe that good environmental performance helps ensure good business performance.

In pursuit of these commitments we will:

(1) Comply with applicable environmental, health and safety laws and regulations as well as international standards and guidelines to which we subscribe;
(2) Identify, assess and manage the environmental, health and safety risks and impacts of our planned and existing operations;
(3) Set objectives and targets that result in continuous improvement of our environmental, health and safety performance;
(4) Require every employee to take personal responsibility towards meeting our environmental, health and safety objectives;
(5) Provide the leadership and resources that will enable our workforce to meet our health safety and environment improvement objectives and targets;
(6) Educate and train our employees, to help them include environmental considerations in all aspects of their work;
(7) Ensure that all processes and systems of work are designed to take account of health and safety of employees, clients and the general public;
(8) Communicate regularly with the communities where we operate to develop and maintain a mutual understanding of goals and expectations;
(9) Promote the conservation of energy and natural resources and reduce waste; and
(10) Routinely monitor, assess and report on the company's Environmental, Health and Safety performance and on our conformity with this policy.

The management of QPEA will regularly and systematically review this policy to align it with any organizational and/or legislative changes.

Signed _____ Date _____

Business Manager

2.2.2 Policy Objectives

(1) To comply with all statutory environmental obligations in Kenya together with all other applicable statutory provisions and codes of practice;
(2) To promote efficient and sustainable use of natural resources;
(3) To promote environmental, health and safety awareness throughout the organization;
(4) To maintain a safe and healthy working environment for our employees, with adequate facilities appropriate to the nature of the business activities; and
(5) To minimise any negative social impact of our company's activities and avoid any damage to the environment; through regular reviews of the company activities through environmental management plans and audits.

2.2.3 Strategies

QPEA GT Menengai Limited is committed to the health, safety and welfare of its entire staff and to a healthy and safe working environment in all of its operations. QPEA GT Menengai Limited will endeavour to achieve this by:

(1) Providing a safe and healthy work environment;
(2) Ensuring that all employees are aware of their own responsibilities in respect of relevant health, safety and environmental matters and enrol their support in improving the Company's performance;
(3) Meeting or exceeding all relevant legal requirements;
(4) Providing safe work procedures to ensure that employees and subcontractors are protected and that their work does not result in hazards to themselves or others;
(5) Promoting good health and being concerned with the prevention of occupational and non-occupational disorders and diseases using health counselling and health education; and
(6) Pursue pollution prevention, natural resources conservation and waste reduction in our operations.

QPEA GT Menengai Limited requires the full and active participation of all employees in order that the principles outlined in this policy statement are achieved. The statutory duties placed on QPEA GT Menengai Limited and all our employees, affiliates and suppliers of products and services, are to be regarded as minimum standards. We aim to have the best practice in terms of environment, health and safety in all that we do.

Reference

ISO 14001:2015 (5.2)

2.2.4 Policy on personal safety

1. **Purpose**

To support employees and visitors in ensuring personal safety in the workplace

2. **Scope**

All employees, contractors and visitors

3. **Responsibility**

Functional Managers

4. **Reference documents**

Performance appraisal form

5. **Principles**

5.1. QPEA GT Menengai Limited is committed to taking all reasonable precautions necessary to secure the health and safety of those carrying out work activities. This commitment extends to the protection of those employees who work away from QPEA GT Menengai Limited premises.

5.2. The management ensures that:

5.1.1. Working alone is avoided wherever reasonably practical.

5.1.2. Where employees do work alone, there is regular communication with a responsible person before, during and upon completion of the work. Lone workers must take the necessary steps to ensure that they do not put themselves at significant risk during the work activity, when using work equipment or as a consequence of the work environment.

5.1.3. Managers are responsible for the adequate supervision of employees to ensure that they do not endanger themselves or others by work activities, practical jokes or horseplay. This requires the prevention of unapproved systems or practices, unauthorized work activities, and all other unsafe acts.

5.1.4. Attitudes to personal safety are reviewed as part of a formal performance appraisal. Appropriate records must be kept.

5.1.5. Any special arrangements are made depending upon the nature of the risk. They may include provision of personal alarms, communication equipment or other safety devices.

5.1.6. Professional advice on, or assistance with, personal safety is obtained where required.

5.1.7. Employees have received sufficient information and training regarding their personal safety to enable them to work without risk, so far as is reasonably practicable.

5.2. Employees are required to:

5.2.1. Ensure that they do not compromise their own health and safety while at work.

5.2.2. Report to the supervisor or Head of Department if there is a perceived shortcoming in the arrangements for the work activity which could affect the personal safety of any individual

5.2.3. Work in accordance with safe working methods at all times, and comply with QPEA policies on all matters.

5.2.4. Give thought and attention to any hazards that are present in and around the working area where work is undertaken away from QPEA premises.

5.2.5. Familiarize themselves with safe working methods, including emergency arrangements, applicable to all premises which they enter.

5.2.6. Report any situations presenting a risk to personal safety to supervisor or Head of Department immediately, so that measures can be taken to rectify the situation.
5.2.7. Never deliberately misuse plant or equipment.
5.2.8. Never to tamper with anything that has been provided in the interests of health and safety.
5.2.9. If working alone, maintain regular communication with supervisor or HOD or a responsible person.
5.2.10. Inform a responsible person of any personal health condition which may be affected by the work activity.
5.2.11. Ensure that safety alarms and warnings can be heard at all times.
5.2.12. Actively participate in evacuation drills and with other arrangements.
5.2.13. Not undertake tasks without having received authorization.
5.2.14. Only bring personal equipment to work where this is expressly permitted.

2.2.5 Policy on Personal Protective Equipment (PPE)

1. **Purpose**

To ensure safety and health of employees, visitors and others in places where hazards exist that have not been eliminated by use of other means, e.g., engineering controls.

2. **Scope**

All areas where Personal Protective Equipment (PPE) are to be used

3. **Responsibility**

Employees, Functional Managers and Supervisors

4. **Principles**

4.1. QPEA will provide PPE when the risk presented by a work activity cannot be adequately controlled by other means. All reasonable steps will be taken to secure the health and safety of employees who work with PPE.

4.2. It is the intention of QPEA to ensure, through the proper use of this equipment, that any risks are reduced to a minimum.

4.3. Whilst it is generally recognized that the use of PPE can be undertaken without undue risks to health, it is appreciated that some employees may have genuine reservations and concerns, QPEA will seek to give information and training to enable a fuller understanding of these issues

4.4. The management will:
4.4.1. Carry out an assessment of proposed PPE to determine whether it is suitable
4.4.2. Take any necessary measures to remedy any risks found as a result of the assessment
4.4.3. Ensure that where two (or more) items of PPE are used simultaneously, these are compatible and are as effective when used together as when they are used separately (e.g., combinations of goggles, respirators, and face shields)
4.4.4. Arrange for adequate accommodation for correct storage of the PPE
4.4.5. Implement steps for the maintenance, cleaning and repair of PPE
4.4.6. Train staff in the safe use of PPE for all risks within QPEA GT Menengai Ltd
4.4.7. Replace PPE as necessary and at no cost to the employee
4.4.8. Inform every employee of the hazards associated with the process and the risks to health and safety which exist
4.4.9. Reassess as necessary if substances used or work processes change.

4.4.10. Give sufficient information, instruction and training to ensure the health and safety of workers using PPE, which includes temporary staff, persons gaining work experience with QPEA, as well as those in direct employment
4.4.11. Monitor the health of the employees using PPE through periodic medical examinations
4.4.12. Ensure that PPEs are stored and washed separately from other clothing and/or equipment
4.4.13. If PPE will be reused, it is cleaned before each day of reuse, according to the instructions from the PPE manufacturer. If there are no other instructions, PPEs will be washed with detergent and water.
4.4.14. Ensure that the cleaned PPEs are dried before storing.
4.4.15. Store clean PPEs away from other clothing and away from poisonous substance areas.
4.4.16. Inform people who clean or launder PPE:
4.4.16.1. That PPE may be contaminated with hazardous substances.
4.4.16.2. The potential harmful effects of exposure to hazardous substances
4.4.16.3. How to protect themselves when handling PPE.
4.4.16.4. How to clean PPE correctly.

4.5. Where an employee raises a matter related to health and safety in the use of PPE, the management will:
4.5.1. Take all necessary steps to investigate the circumstances
4.5.2. Take corrective measures where appropriate
4.5.3. Advise the employee of action taken.

4.6. Where a problem arises in the use of PPE, the employee should:
4.6.1. Inform a responsible person immediately
4.6.2. In the case of an adverse health condition advice his/her supervisor who will advise him/her on action to be taken.
4.6.3. Follow the manufacturer's and QPEA GT Menengai Ltd's instructions on the correct use of PPEs.
4.6.4. When using two (or more) types of PPE together, ensure that items are compatible when used together and that the combination does not reduce their effectiveness.
4.6.5. Report symptoms of discomfort or ill health immediately to a responsible person.

2.2.6 Drugs and substance abuse

1. Purpose

To control and eliminate the abuse and use of drugs and substances by the employees, visitors and contractors

2. Scope

All areas and activities of work

3. Responsibility

The management and all employees

4. Definitions

The drugs include stimulants (e.g., cocaine and miraa), depressants (e.g., heroine, alcohol, and morphine), steroids, hallucinogens (e.g., marijuana, hashish) and prescribed drugs (e.g., valium, morphine).

5. Principles

5.1. It is the policy of QPEA that all employees keep off from alcohol and drugs in the work place. Prolonged use and abuse of alcohol and drugs may lead to impairment and loss of control, violence, physical disorder, peptic ulcers, poor concentration and defective memory.

5.2. The management will:

5.1.1. Endeavour to give information to the staff as often as possible regarding alcohol and drug abuse.
5.1.2. Carry out regular medical checks for identified staff to determine any foreseeable incidents related to alcohol and drug use.
5.1.3. Monitor the behaviour of all employees, including absenteeism, to identify any changes from general conduct and take the necessary actions.
5.1.4. Provide counselling and where possible, rehabilitation of the drug and or alcohol abusers and their families
5.1.5. Take necessary disciplinary action for those who do not perform as expected and in accordance with the safety and health policies

5.3. Employees should report to the Human Resource Officer or Supervisor any noticeable changes in the character and behaviour of colleagues so that appropriate action can be taken in good time

5.4. Excuses like alcohol and/or drugs make a person gain courage, relax, forget problems, relieve stress, etc. will not be tolerated in QPEA.

5.5. Any employee reporting to work drunk or under the influence of drugs should be reported immediately to the Human Resource Officer or any other Senior Manager.

5.6. Any employee suspected to be drunk or under the influence of drugs should not be allowed to operate any machine or equipment

5.7. Any concerns employees may have regarding alcohol and drug use should be reported to the Human Resource Officer.

2.2.7 Personal hygiene of employees

1. Purpose

To maintain personal cleanliness and hygiene in the workplace by all employees

2. Scope

All employees

3. Responsibility

The Heads of Departments and all employees

4. Definition

Personal hygiene – maintenance of self-cleanliness and taking good care of oneself and others

5. Reference documents

Public Health Act

6. Principles

6.1. Good personal hygiene practice is important in ensuring a safe and healthy place of work, in that it will help avoid adverse effects on the employee or the services provided or the product.

6.2. The management will ensure that:

6.2.1. Applicants for employment are screened for pre-existing health conditions which may have been caused or exacerbated by poor personal hygiene (professional medical assistance and advice should be obtained where required).
6.2.2. Employees receive sufficient information and instruction in the standards of personal hygiene that are required and the facilities that are available at the workplace to assist in achieving these standards.
6.2.3. Personal protective equipment are stocked, issued and maintained in accordance with QPEA work instructions and replaced or disposed of at the appropriate time.
6.2.4. Suitable washing arrangements are made for cleaning of overalls and uniforms for all staff.
6.2.5. Work conditions and facilities, including washing and sanitary conveniences, are adequate to enable workers to maintain good standards of personal hygiene.
6.2.6. Employees comply with QPEA rules on eating, drinking and smoking at the workplace.
6.2.7. Drinking water is available for all employees at the workplaces
6.2.8. Potential hygiene problems are dealt with quickly and effectively, taking into consideration the need for medical confidentiality where this applies.
6.2.9. All matters relating to personal hygiene will be handled sympathetically and, where relevant, with medical confidentiality
6.2.10. QPEA disciplinary actions are used to improve performance for employees persistently displaying poor personal hygiene standards which put at risk their health and safety and that of others.
6.2.11. Staff handling food and beverages comply with the requirements of the Public Health Act.

6.3. The employees are required to:

6.3.1. Maintain good standards of personal hygiene while at the workplace
6.3.2. Comply with QPEA working arrangements for maintenance of personal hygiene.
6.3.3. Where problems are identified in working arrangements or facilities or with the health and safety of the individual, report to the supervisor immediately.
6.3.4. Make full and proper use of facilities which are provided to assist in achieving the required standards of personal hygiene. These facilities include:

6.3.4.1. Washrooms and showers
6.3.4.2. Washing arrangements for uniforms and overalls
6.3.4.3. Personal protective equipment and clothing

6.4. Before starting work, check that there are no signs of skin irritation or open wounds.
6.5. Cover open wounds with suitable waterproof dressings and ensure that existing dressings are clean before starting work.
6.6. Avoid direct contact with hazardous substances at work.
6.7. Ensure that protective clothing is clean, changed when necessary and regularly washed where appropriate.
6.8. Ensure that protective clothing is repaired or replaced when necessary.
6.9. Where there is a possibility of contamination, wash hands and face before eating, drinking and where necessary, thoroughly wash or shower at the end of each day.
6.10. Wash hands before and after using toilet facilities.

6.11. Do not keep contaminated rags or materials in pockets
6.12. Make full use of barrier creams, cleansers and other skin creams.
6.13. Refrain from spitting at the workplace.
6.14. Report any problems to a responsible person without delay.

2.2.8 Fire safety

QPEA GT Menengai Ltd acknowledges its responsibility for fire safety and will ensure that fire safety risk assessments are carried out on all its premises to determine the precautions and preventive measures needed to avid the occurrence of a fire.

We will effectively plan, organize, implement, control, monitor and periodically review the precautionary, preventive and protective measures to ensure their effectiveness in the safety of employees, contractors, visitors and property. The following principles will be our basis for fire safety in the premises:

a. Avoiding risks;
b. Evaluating the risks which cannot be avoided and combating them at the source;
c. Giving appropriate instructions to employees, contractors and visitors;
d. Providing the needed equipment and facilities for fire safety;
e. Reducing the risk of fire on the premises and the risk of fire spread;
f. Ensuring suitable means of escape from the premises;
g. Providing suitable equipment for detecting fire and communication;
h. Training employees on actions to be taken in case of a fire.

3 PLANNING

3.1 Health, Safety and Environmental (HSE) Aspects

3.1.1 Identification of health safety and environmental aspects

QPEA GT Menengai Limited has identified health, safety and environmental aspects of its proposed operations through Environmental and Social Impact Assessment (ESIA) study using the following guidelines:

- Environmental Management and Coordination Act (Impact Assessment and Audit) Regulations 2003;
- International Finance Corporation (IFC) 2012 Performance Standards particularly the Environmental, Health, and Safety Guidelines for Geothermal Power Generation; and
- African Development Bank (AfDB) Environmental and Social Policies Guidelines, particularly: (a) the African Development Bank Group's Policy on Environment dated February 2004; (b) the Involuntary Resettlement Policy dated November 2001; (c) the African Development Bank Group's Policy on Poverty Reduction dated February 2004;(d) the Gender Policy dated June 2001; and (d) the Integrated Safeguards System, 2014 and associated Environmental and Social Assessment Procedures (ESAP).

During environmental impact assessment studies, significant environmental impacts were defined as being those which:

a) Are subject to legislative control;
b) Relate to protected areas or to historically and culturally important areas;
c) Are of public concern and importance;
d) Are determined as such by technically competent specialists;
e) Trigger subsequent secondary impacts;
f) Elevate the risk to life threatening circumstances; and
g) Affect sensitive environmental conditions and parameters.

3.1.2 HSE Hazard identification, risk assessment and determining controls

In addition to the ESIA studies conducted, QPEA GT Menengai Limited has defined and documented a procedure, HSE 001, procedure for hazard identification, risk assessment & determining controls in subsequent stages of its operations.

The procedure:

a. Outlines how to identify hazards arising from her activities, record of past accidents and near misses, products and services within the scope of her integrated HSE management system. These hazards include those that QPEA GT Menengai Limited can control & influence, activities of all persons having access to the QPEA GT Menengai Limited workplaces including contractors and visitors, new or modified activities, design of work areas, processes, installations, operating procedures and work organization including their adaptation to human capabilities;
b. Categorizes the identified hazards and perform an assessment on the scale of the risks presented by the various hazards on a risk matrix. Adequate management controls are then put in place and the risk element from the hazard re-evaluated and freshly weighted till it becomes an acceptable risk;
c. Ensures that in reducing risks, elimination of the hazard or hazardous situation is given first priority. Other methods employed to reduce risk, in ranked form, are:

    i. Substitution;

ii. Engineering controls;
iii. Use of signs;
iv. Warnings;
v. Administrative controls; and
vi. Use of personal protective equipment and/or clothing.

The identified key environmental and safety effects of QPEA operations are detailed in the ESIA update study report and are summarised below.

3.1.3 Noise

Geothermal power plants construction and operation is associated with several sources of noise. In addition to workers, some noise sensitive receptors may exist in close proximity of the power plant. Noise may not only be a nuisance but can also be detrimental to the health of exposed persons and wildlife depending on the magnitude and exposure period. A noise impact assessment for the Menengai plant was carried out as part of the ESIA study and mitigation plan proposed.

3.1.4 Air pollution

The major negative impacts of geothermal power plants are associated with discharge of Non Condensable Gases (NCGs) into the atmosphere. NCGs constitute 3.3% to 4% of the geothermal steam from Menengai and hydrogen sulphide (H_2S) and carbon dioxide (CO_2) are the predominant NCGs. H_2S presents an unpleasant, typically “rotten eggs” odour at relatively low concentrations and is toxic in higher concentrations.CO_2 is not significant in terms of direct impact to human health in open environments but is a greenhouse gas. Air Quality impact assessment for the Menengai plant was carried out as part of the ESIA study and mitigation plan proposed.

3.1.5 Impacts on Flora and fauna

Limited vegetation will be cleared during construction of power plant, office buildings, transmission lines, and access roads. Noise, power transmission cables and air pollution may disturb the habitat, interfere with breeding and displace the animals and thus increase animal-human conflicts.

3.1.6 Water and energy resources

Construction and operation (both on site and at head office) activities may result in misuse of water and energy resources if conservation measures are not adopted.

3.1.7 Waste

The power construction phase will generate two types of solid wastes: spoils and household refuse. Construction spoils will consist of building materials, concrete, paper and plastic (for example from packaging materials and lagging), timber, scrap metal, etc. During construction the Contractors will setup various facilities for temporary accumulation, which have to be removed and dismantled on completion of the works. Operation of the geothermal power plant is not anticipated to generate significant amount of wastes. However, limited domestic and food wastes, sewage wastes, sludges will also be generated. Another form of operation waste, spent geothermal fluid, will be re-injected into the steam reservoir through the reinjection wells

3.1.8 Increase in Amount and Tonnage of Traffic

Construction traffic for the power plant within the caldera is bound to increase from the commencement to completion of construction phase of power plant. This traffic will vary from fast, light vehicles used for transport of supervisors, minibuses transporting workers to site, pickups, tracked excavators, fuel tankers, and tipping trucks (dump trucks). All the roads used for access to and within the caldera are of murram or of gravel type. The roads also have a number of blind meanders. These are likely to result in dusty environment and noise pollution

within the area as a result of the anticipated heavy traffic along the roads during construction phase.

3.1.9 Wildfires

Vegetation within the caldera is prone to natural wildfires. Activities of power plant construction staff including improper disposal of any cleared vegetation and of cigarette butts are likely to increase incidences of wildfires within the caldera especially during dry spells.

3.1.10 Potential Impacts on archaeological features

No archaeological sites have been recorded and no surface artefacts were seen on the proposed development site. However, since the absence of artefacts on the surface does not exclude the possibility existence of artefacts or features buried in the ground, there is a chance of encountering buried artefacts during excavation and other earthwork construction activities hence the need for a chance find procedure.

3.1.11 General public and occupational safety and health risks

Accidents are likely to occur within the plant area. The key risks include exposure to high levels of noise and H_2S which are detrimental to health.

3.1.12 Head office activities

A number of materials are purchased, used and disposed of at head office. These include paper, plastic cups and toner cartridges. Although the impacts of the purchase, use and disposal of these materials are considered to be small compared with the impacts of some site activities, the impacts are included here and a system for improvements in environmental performance are given in Environmental Management System

3.1.13 Water pollution

Underground water is the main water supply to the locals and the nearby Nakuru town. Consultations with the regional office of Water Resources Management Authority and the existing bulk water service provider in the area, NAWASCO pointed out that since geothermal wells in the Menengai caldera were commissioned, the water temperature from the boreholes near the proposed power plant have been recording increased temperatures.

3.1.14 Chemical spills

During plant operation, hydrocarbons and other chemicals such as solvents, coolants, acids, and, alkalis will be used. Accidental spillage or improper disposal of these hydrocarbons can be harmful to the receiving environments.

3.1.15 Security

Insecurity within the project area was identified as one of the social problems in the project host community. Incidents of insecurity within the power plant are may not only expose the locals to danger from handling dangerous items but also expose the plant facilities to vandalism and operational inconveniences.

3.1.16 Socio-economic interest by local communities

ESIA revealed that the local communities have high socioeconomic interests and a lot of expectations with the geothermal power development activities going on within the Menengai caldera. Some expectations and even false information are held by the communities and appropriate community engagement is necessary to handle their expectations.

References

- ISO 14001:2015 (6.1.2);
- ESIA Study Report for the proposed 1X35MW Modular geothermal power plant in Menengai, Nakuru County;
- Noise assessment report;
- Air Quality assessment report;
- Site Report for the Assessment of Archeological Resources at Menengai by the National Museums of Kenya

Applicable procedure(s)

- HSE 001: Procedure for Hazard Identification, Risk Assessment & Determining Controls
- HSE008: Procedure for Monitoring & Measuring Key Operational Characteristics with Significant Impact on Integrated HSE management System Performance and Legal Compliance

3.2 Legal and other requirements

It is the policy of QPEA GT Menengai Limited to comply with legal and statutory regulations related to its operations. To this end, the company has established and will implement a procedure, HSE 002, to facilitate the identification, accessibility and update of applicable legal requirements, including other requirements related to environment, safety and health.

QPEA has established the media of communicating relevant information on legal and other requirements to contractors, suppliers, customers, visitors and other relevant interested parties.

From the existing updates of the ESIA study on its proposed Menengai geothermal modular power plant, the legal provisions relevant to QPEA GT Menengai Limited are presented in Table 3-1.

Table 3-1: Relevant legal provisions for QPEA operations

Legislation/contractual obligations	Comments/Relevance
The Constitution of Kenya, 2010	This is the main law of the land. It recognises the role of the environment in sustaining our heritage as a heritage of inter-generational benefit. Chapter 5 on Land and Environment is more particular on this.
Environment Management and Coordination Act (No. 8 of 1999)	This is the main legislation governing environmental management in Kenya with provisions of relevant administrative framework. Various legislations. It has also provided for the development of several subsidiary legislations and guidelines that govern environmental management Vests on every person a right to a healthy environment and a responsibility to safeguard it.
(a) Environmental (Impact Assessment and Audit) Regulations 2003	Regulates conduct of ESIA and environmental audit. Requires an ESIA license of the project being undertaken. Requires annual audit of on-going projects and submission of the resultant audit reports to NEMA

Legislation/contractual obligations	Comments/Relevance
(b) Environmental Management and Coordination (Waste Management) Regulations 2006	Outline requirements for handling, storing, transporting, and treatment / disposal of all waste categories.
(c) Environmental Management and Coordination (Water Quality) Regulations 2006	Regulates water quality for various uses including drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes.
(d) Environmental Management and Coordination (Conservation of Biological Diversity) (BD) Regulations 2006	Apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of Biological Diversity and protection of environmentally significant areas, access to genetic resources and benefit sharing.
(e) Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006	apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions
(f) Environmental Management and Coordination (Controlled Substances) Regulations 2007	Regulates production, importation, exportation, and handling of controlled substances including ozone depleting substances.
(g) Environmental Management and Coordination, (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations 2009	Regulations include management of wetlands, wetland resources, riverbanks, lakeshores, and seashores.
(h) Environmental Management and Coordination (Noise & Excessive Vibration Pollution) Control Regulation, 2009	Prohibits making or causing any loud, unreasonable, unnecessary or unusual noise and excessive vibrations which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.
(i) Environmental Management and Coordination (Air Quality) Control Regulations, 2014	Provides for the prevention, control and abatement of air pollution. The regulations set emission limits of various liquid or gaseous substances and prohibits emission in levels exceeding the set limits.
Energy Act No. 12 of 2006	Governs energy generation, storage, transmission, distribution and sale in Kenya. Section 103 of the Act specifically makes provisions on renewable forms of energy including geothermal energy Section 30 of the Act mandates Energy Regulatory Commission (ERC) to take into account the impact of the undertaking on the social, cultural or recreational life of the community when determining license generation applications.
Geothermal Resources Act, 1982	The Act controls the exploitation and use of geothermal resources and places responsibility and liability to the licensee for any loss, damage or injury to any person or property resulting from his works or operations, whether as a

Legislation/contractual obligations	Comments/Relevance
	result of negligence or otherwise.
Geothermal Resources Regulations, 1990	Regulation 6 prohibits the use of a geothermal resource license to give rights over or enter upon a burial ground, church, public roads, national park or reserve Regulation 13 provides that all geothermal operation must be conducted in a workman-like manner and must prevent the unnecessary waste of or damage to geothermal resources, protect the quality of surface waters, air, and other natural resources including wildlife, protect the quality of cultural resources among other provisions.
Occupational Health and Safety Act, 2007	Provides for the safety, health and welfare of all workers and all persons lawfully present at workplaces and protect persons other than those at work against safety and health arising out of, or in connection with the activities of persons at work.
Work Injury Benefits Act (WIBA), 2007	Provide for compensation to workers for injuries suffered and occupational diseases contracted in the course of their employment.
The Public Health Act (Cap. 242)	Make provisions for securing and maintaining health. Section 115 of the act prohibits causing nuisance or other conditions liable to be injurious or dangerous to health. Section 118 provides a list of nuisances that includes any noxious matter, or wastewater, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any watercourse, irrigation channel or bed thereof not approved for the reception of such discharge.
Water Act 2002	Mandates Water Resources Management Authority (WRMA) to impose management controls including permitting on use of various water resources.
The Wildlife (Conservation and Management) Act, 2013	The act in its sixth schedule list various animal and tree species that are nationally considered as critically endangered, vulnerable, nearly threatened and protected. It also lists in its seventh schedule, national invasive species for which control is required. Section 48 restricts activities involving the above listed species without a permit from KWS.
Urban Areas and Cities Act No. 13 of 2011	Section 27 and 28 of the Act, it empowers County Government to appoint a Manager to manage or prohibit all places of work that by reason of smoke, fumes, or chemical gases, dust smell, noise or vibration or other cause may be a source of danger, discomfort, or annoyance to the neighbourhood, and to prescribe the conditions subject to which businesses, factories and workshops shall be carried on.
Forest Act, 2005	Act provide for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development. It establishes the Kenya Forest Service (KFS) with mandate to oversee management of state forest

Legislation/contractual obligations	Comments/Relevance
	resources.
Land Act, 2012	It provides for the acquisition of private property by government for public purposes or for public interest. Conditions and guidelines for acquiring are described in Part VIII of the Act
Land and Environment Court Act, 2012	Establish a court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land.
The National Museums and Heritage Act CAP 216 (2006, revised 2009)	Protects all archaeological and historical cultural heritage objects.
GDC's Health, Safety and Environment Policy	All parties working with GDC are required to adhere to the provisions of GDC's Health, Safety and Environment Policy
Memorandum of Understanding between GDC and KFS	Stipulates agreement on protection of forest environment and resources within Menengai geothermal field
NEMA license conditions	Stipulates general and mandatory conditions to me met in the power plant development through the various phases of construction, operation and decommissioning.
IFC performance standards on environmental and social sustainability	Provides guidance to ensure IFC beneficiaries identify risks and impacts, avoid, mitigate and manage risks as a way of doing businesses in a sustainable way.
African Development Bank (AfDB) Environmental and Social Policies Guidelines	Provides guidance to ensure AfDB beneficiaries identify risks and impacts, avoid, mitigate and manage risks in a environmentally sustainable manner.

The legal register shall be up dated at least annually or as new laws or amendments necessitate. Updates shall be done by the HSE&CSR manager and or the HSE committee as described in the Procedure HSE 002.

Reference

ISO 14001:2015 (6.1.3)

Applicable procedure

HSE 002: Procedure for identification, access to legal requirements & other requirements related to environment, safety and health

3.3 Objectives, targets and programs

QPEA GT Menengai Limited has formulated and adopted HSE objectives for its operations in line with the established HSE aspects. The objectives, targets and programs have been documented in the relevant management plans including guidelines and procedures as appropriate for the following aspects:

- Waste management
- Traffic management
- Security plan
- Air and noise
- Fire
- Emergency response
- Utility consumption
- Cultural and archaeological management
- Procurement
- Occupational health and safety
- Community development
- Environmental restoration
- Stakeholder engagement plan
- Safety

The overall objectives for HSE are:

1) To have nil reportable environmental incidents
2) To monitor lost time in hours, due to occupation accidents, with a view to reducing them by 10% in the first year of implementation of the integrated HSE management system;
3) To undertake at least four emergency drills in a year with a view to achieving 100% emergency preparedness levels;
4) Undertake site/office HSE audits/inspections as per defined schedules; and
5) Close Out any non-conformance status within number of days agreed upon between auditee and auditor

The above objectives, which are in line with the HSE policies, are supported by action plans which define the performance and provide a programme for achieving the objectives.

Each department has developed its objective in line with the overall objectives so as to identify HSE hazards in the organization and develop mitigation measures for the same. Each departmental objective is also supported by an action plan.

The objectives are structured to ensure adequate commitment to the identification and management of HSE hazards and compliance with applicable legal and corporate requirements. The objectives are reviewed during the management review meetings to ensure their achievement and relevance.

Reference

ISO 14001:2015 (6.2.1-6.2.2)

4 IMPLEMENTATION AND OPERATION

4.1 QPEA Organisation

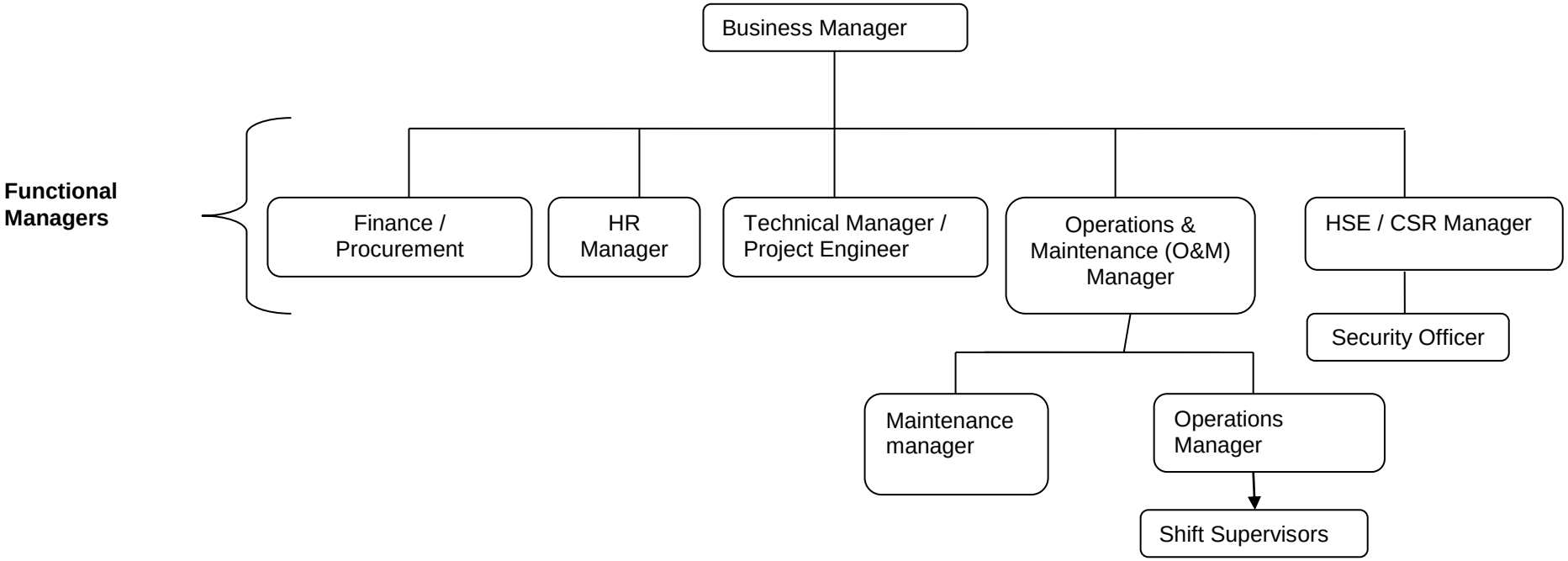
QPEA GT Menengai Limited is a registered company incorporated in Kenya and operating as a developer, owner and operator of the Geothermal Power Plant. This company is in turn owned by Quantum Power East Africa Ltd (QPEA) being a registered holding company located in Mauritius.

The company's structure for construction operations is shown overleaf.

Reference

ISO 14001:2015 (5.3)

Proposed Operations Organogram



4.2 Resources, roles, responsibilities and authority

4.2.1 Resources, roles and responsibilities

Integrated HSE Management System roles, responsibilities and authorities are defined at relevant functions and levels within the company. The management of QPEA GT Menengai Limited is committed to providing the needed resources for the successful implementation the Integrated HSE Management System. This commitment is re-emphasised during planned staff meetings and also by the environmental and safety policies.

The top management assures that the resources essential to the implementation and control of the integrated HSE management system are available, including:

- Human resources;
- Training;
- Financial resources;
- Operation and maintenance;
- Specialty services;
- Technical services; and
- Informational services.

The roles of the different positions are defined in the job descriptions and the holders of these positions have been given written job descriptions defining their roles, responsibilities, accountabilities and authorities as far as implementation of the integrated HSE management system is concerned.

The roles and responsibilities are described here below:

a) Business Manager (BM)

The Business Manager has the overall responsibility for administration, policy generation, including corporate culture. He is ultimately responsible for:

- The environmental performance of the company and for ensuring that systems are in place to comply with environmental and occupational health and safety legislations;
- Endorsing the integrated HSE management system documents and ensuring that appropriate and sufficient resources are available for the implementation of system; and
- Chairing of the HSE committee and management review meetings.

b) Finance/ Procurement Manager

The financial/procurement manager will be responsible for:

- Maintaining environmental information on suppliers and contractors;
- Allocation of adequate funds for implementing the systems requirements and any statutory environment payments; and
- Participating in internal system audits and evaluation for continuous improvement.

c) Health Safety Environment and Corporate Social Responsibility Manager

The Health Safety Environment and Corporate Social Responsibility (HSE&CSR) Manager has been given full responsibility and authority to oversee the implementation and maintenance of the integrated HSE Management System. He/she reports directly to the BM on the performance of the HSE management system.

The HSE&CSR Manager is responsible the following:

- Maintenance and implementation of the integrated HSE Management System;
- Reporting to top management on the performance of the system for review including recommendations for improvement;
- Liaising with external parties including regulatory authorities, GDC, neighbouring communities and other IPPs on matters related to the integrated HSE management system.
- Providing specialist environmental advise and guidance to the company project management team and contractors as required;
- Assessing contractors' and other suppliers' environmental capabilities and oversee the submission of their environmental documents;
- Reviewing contractors' CEMP for compliance with company policy and other relevant guidelines;
- Auditing and ongoing monitoring of environmental performance and identifying activities with potential environmental impacts which have not been adequately covered by the CEMP, advising the Site Manager and contractors of any potential risks and where necessary, issuing of non-compliance notices and /or revising project's CEMP or the relevant contractor CEMP;
- Conducting routine scheduled site inspections and audits of construction activities on site in order to assess compliance to site CEMP, permit and approval conditions, and adherence to national and county Local Government environmental regulations and by laws;
- Ensuring the QPEA GT Menengai Limited site manager or technical manager is informed in a timely manner of all non-compliances and environmental incidents;
- Participating in environmental incident investigations and assisting in the development and implementation of Corrective/Preventative Actions;
- Maintenance of appropriate integrated HSE management system records including copies of applicable current legislation, permits, approvals and licenses, audit and incident reports, and weekly /monthly project environmental field inspection and progress reports measuring actual performance against stated objectives;
- Conducting and /or organising environmental monitoring as required;
- Conducting environmental inductions as part of the Project induction process for all new employees and developing and implementing ongoing environmental awareness training programs maintaining appropriate records; and
- To maintain an environmental complaints register and to ensure all complaints are investigated, resolved and recorded in accordance with legislative provisions and system requirements.

d) Technical Manager (TM)

The Technical Manager shall be responsible for a particular contract and site and will be responsible for implementing the requirements of the integrated HSE management system on individual contracts. The division of responsibilities will depend on the size and complexity of the contract, but will be shown in the environmental risk assessment which will be prepared for each contract.

- Liaises with HSE&CSR manager to ensure engineering design incorporates environmental sustainability and safety controls measures as far as practicable;
- Participate in environmental health and safety risk assessment within the project;
- Inform on any planned process changes within the power plant and initiation of risk revisions as necessitated by the process changes;
- Ensure contractors' work methods are safe and environmentally sound;

- Implement permit to work system where applicable;
- Responsible for reporting any environmental or safety incidents/accidents; and
- Participating in environmental and safety incident investigations and assisting in the development and implementation of corrective/preventative actions.

e) Operation and Maintenance (O&M) Manager

- Ensure operation of the plant is within the technical integrity envelope of the power plant;
- Ensure Plant maintenance procedures/instructions are adhered to as applicable;
- Perform job safety analysis for various O&M tasks;
- Implement the permit to work system when the plant is operating;
- Authorize clearance before work starts in the operating plant;
- Maintain operation and maintenance records;
- Ensure incidents ,equipment failures near misses are properly investigated
- Activate emergency response activation and perform related duties;
- Manage plant change systems and reviews of job safety analysis;
- Undertake damage assessments where incidents, accidents and serious infringements have occurred on or a relevant distance off site;
- Communicate to the HSE&CSR manager, verbally and in writing, giving adequate notice well in advance regarding any proposed O&M actions which may have negative impacts on the environment;
- Issue site instructions giving effect to the HSE requirements where applicable;
- Review any HSE-related complaints received from O&M staff and issue instructions as necessary;
- Supporting the HSE performance monitoring and internal audit process; and
- Request for, review and approve any Method Statements prepared by the Plant equipment suppliers/maintenance contractors in consultation with the TM and HSE&CSR manager.

f) Health Safety and Environment (HSE) committee

The QPEA GT Menengai Limited shall establish a Health Safety and environment committee in accordance with the legal requirements who meet quarterly to come up with quarterly action plans to ensure a planned implementation of set environmental health and safety objectives. This is a cross functional steering committee responsible for spearheading the implementation of the Integrated HSE management system and its review. Members of the committee shall be constituted as follows:

The HSE committee shall consist of the following as a minimum:

- Business Manager - Chairman;
- HSE&CSR Manager - Secretary;
- Operation and Maintenance manager - Member
- Finance/Procurement line manager- Member;
- Human resource manager-Member;
- Co-opted members ; and
- Trained first aiders and fire Marshals.

The HSE committee will meet quarterly to review progress of the integrated HSE Management System, and to redefine, if necessary the company's environmental objectives.

g) Human Resource Manager

This function is responsible for the following with respect to the system

- Documents personnel qualification and competency requirements for various roles and ensuring that competent staff are maintained;
- Incorporation of environmental, safety and health performance in planned staff appraisals;
- Plans and liaises with HSE&CSR manager to facilitate staff induction and training in environmental, safety and health policy aspects of the company;
- Control of all routine HR activities and staff welfare including safety related matters; and
- Maintenance of up-to-date staff records including qualifications for assignments and other relevant trainings.

h) Employees

All employees will be accountable for learning and following the system requirements including proper procedures at all times. These accountabilities are fundamental components of evaluating performance at all levels.

Employees are obliged to:

- Acquaint themselves with existing QPEA GT Menengai Limited Environment, Health and Safety policies, management plans and procedures and work instruction including safe systems of work and abide by the recommendations made in the work or process risk assessments;
- Promote environmental, health and safety awareness throughout the organisation;
- Employ the best principles, systems and measures to safeguard the environment and conserve resources including paper, energy and water;
- Be conscious of existing environmental and health hazards in their respective work environment;
- Provide feedback on the implementation of the environment policy and bring to the attention of the managers and supervisors all HSE hazards, unsustainable and unsafe environment practices;
- Promote good housekeeping;
- Avoid drinking or being under the influence of alcohol or other drugs while on duty;
- Report to the supervisor/ site manager any accident near miss at dangerous situation that may be observed or occur involving self or a witness;
- Always wear appropriate Personal Protective Equipment (PPE)/safety wear at the time of executing duties on site;
- Follow all traffic requirements including speed limits and motor vehicle safety requirements while on the road; and
- Comply with our legal obligations under the relevant laws in Kenya together with all other applicable statutory provisions and relevant international best practices.

i) Shift supervisor

- During the operation phase, the shift supervisor shall take responsibility of health and safety of all workers during a particular shift;
- In the absence of the HSE&CSR manager, the shift manager will take overall responsibility for all environmental health and safety matters on site; and
- Where necessary, activate emergency response in the shift.

j) Security manager

The security manager shall:

- Implement/maintain effective security controls;
- Ensure site activities comply with security plan requirements;
- Ensure all site workers reporting to work register before commencement of works;
- Ensure all visitors are dully registered;
- Notify HSE&CSR manager, or in his absence the shift supervisor immediately in the event of an HSE incident; and
- Participate in emergency handling immediately after any HSE incident under direction of HSE&CSR manager.

k) Contractors and sub-contractors

All QPEA GT Menengai Limited contractors and their sub-contractor(s) shall be responsible for ensuring good environmental performance in line with the company and GDC performance requirements. All contractors shall:

- Address specific HSE requirements before bid submission;
- Be responsible for HSE performance of its subcontractors;
- Ensure adherence to stipulated HSE obligations;
- Conduct pre-job meetings to address HSE expectations as necessary;
- Require formal subcontractor HSE induction course for all new employments at the site;
- Conduct regular HSE meetings and committee with internal organization and subcontractors to ensure that works are carried out on site with minimum adverse impacts to environment workers and to the public;
- Provide adequate equipment/facilities on site to protect the environmental health and safety during their works, or at the direction of HSE&CSR manager;
- Notify HSE&CSR manager immediately in the event of an environmental incident;
- Stop work at the direction of HSE&CSR manager or the project engineer, if any non-conforming environmental incident has occurred or is likely to occur; and
- Clean up any environmental spillage immediately after the incident.

4.2.2 Authorities

Authorities of the various responsible personnel are defined in Table 4-1.

Table 4-1: Integrated HSE management system authorities

Resource	Authority	Reporting to
Business Manager	• Overall authority	
Technical manager	• Direct design to ensure HSE controls • Direct work on site • Stop work if HSE incident or significant noncompliance with QPEA conditions	Business Manager
HSE&CSR manager	• Direct implementation of HSE measures at all sites • Stop work in the event of an HSE incident or significant noncompliance with QPEA conditions • Order work to stop, in the event of environmental damage occurring or having the	Business Manager

Resource	Authority	Reporting to
	potential to occur. • Deny admission to site employees who are inadequately prepared in terms of safety • Must advise the Technical Manager with regard to standard of environmental protection measures and stopping work, in the event of environmental damage occurring or having the potential to occur. • Activate emergency plan when necessary	
Operations and Maintenance Manager	• Stop O&M work in the event of an HSE incident or significant noncompliance with QPEA conditions • Deny admission to site employees and maintenance contractors who are inadequately prepared in terms of safety • Activate emergency plan when necessary	Business Manager
Shift supervisor	• Deny admission to site employees who are inadequately prepared in terms of safety • Order work to stop, in the event of environmental damage occurring or having the potential to occur. • Activate emergency plan when necessary	HSE&CSR manager (on HSE related matters) Operation and Maintenance Manager
Human Resource manager	• Deny deployment of staff to site if not yet inducted on environment and safety • Sanction employees who have continuously shown laxity in implementing the system requirements	Business Manager
Security manager	• Deny entry of unauthorized persons into work site • Ensure materials leaving site (including wastes for disposal) have requisite documentations as directed by the HSE&CSR manager	HSE&CSR manager

4.3 Competence, training and awareness

Competence levels have been identified at various positions in the company. They guide management where there is need to recruit staff. These competence standards are contained in the job descriptions for the various company positions. The Management of QPEA GT Menengai Limited ensures that its entire workforce is competent to perform on the basis of education, training, skills and experience.

Basic competence requirements for the different positions and tasks which could affect conformity to the integrated HSE management system have been defined and documented. The requirements are updated from time to time for their conformity.

Awareness on the requirements of the integrated HSE management system will be created throughout the organization. In addition, it is the responsibility of Functional managers to ensure that the staffs are aware of the importance of their activities in relation to the environment, occupational safety and health.

QPEA GT Menengai Limited has a planned training program to address identified training needs. A procedure for awareness, competence and training, HSE 003, has been documented and will be implemented. The Human Resources Officer maintains records of education, training, skills and experience for respective staffs in the training and personal files.

4.3.1 Purpose

Training and awareness creation will aim at:

- Gaining staff commitment to the company environmental health and safety policies, objectives and targets and associated management plans;
- Understanding requirements of EIA legislation in Kenya, IFC performance standards, AfDB policies and other international best practices to achieve compliance;
- Developing awareness on the HSE implications of the project and QPEA GT Menengai Limited operations and instill sense of individual responsibility;
- Develop awareness and understanding of the personnel and institutional arrangements for managing environmental impacts within QPEA operations; and
- The need for HSE Auditing, Monitoring and compliance.

4.3.2 All Staff

The HSE &CSR Manager shall arrange for all permanent members of staff to receive induction on the company HSE Manual and associated documentation (if appropriate). All staff must, however, have ready access to controlled copies if they are not themselves copy holders.

4.3.3 Staff on Site

All staff on site shall be inducted on the site specific HSE Plans by the HSE & CSR manager.

The site manager shall ensure that all relevant personnel on site, including sub-contractors, are aware of the site HSE Plans and its requirements. A copy of the site's HSE Plans shall be available on site.

4.3.4 Guidelines on Environmental Training

All staff must have appropriate training necessary to enable them to comply with the requirements of integrated HSE System.

HSE training will include, but are not limited to:

- Company HSE policy and objectives;
- Significant HSE aspects of company operations;
- All HSE plans;
- Current applicable environmental laws and regulations; and
- Expectations of interested parties including GDC, KFS, NEMA etc.

All training information, records and certificates shall be properly documented, kept, and made available for verification.

4.3.5 Training Review

The need for training on the HSE aspects of QPEA activities shall be taken into account when reviewing the training needs of staff as part of the annual training review.

Reference

ISO 14001:2015 (7.2 & 7.3)

Applicable procedure (s)

HSE 003: Procedure for awareness, competence and training

4.4 Communication

4.4.1 General

QPEA values the importance of communication of environmental health and safety hazards and risks. Procedures for both internal and external communication, HSE 004 and QPEA/ESH/PR/005, have been defined and documented and shall be implemented throughout the company.

4.4.2 Staff participation and consultation

QPEA staff is actively involved in the identification of hazards, risk assessments and determination of controls. All incidents and accidents are investigated and corrective and preventive action taken. Consultations are held with specialized persons or organizations to ensure that the corrective and preventive actions are effective in the elimination or reduction of impacts of the hazards and risks.

A procedure, HSE 005, for workers participation and involvement in environmental health and safety matters has been documented and shall be implemented.

4.4.3 External communication

QPEA has developed a Stakeholders Engagement Plan (SEP) to guide continuous consultations with external parties and the host communities.

Reference

ISO 14001:2015 (7.4.2 & 7.4.3)

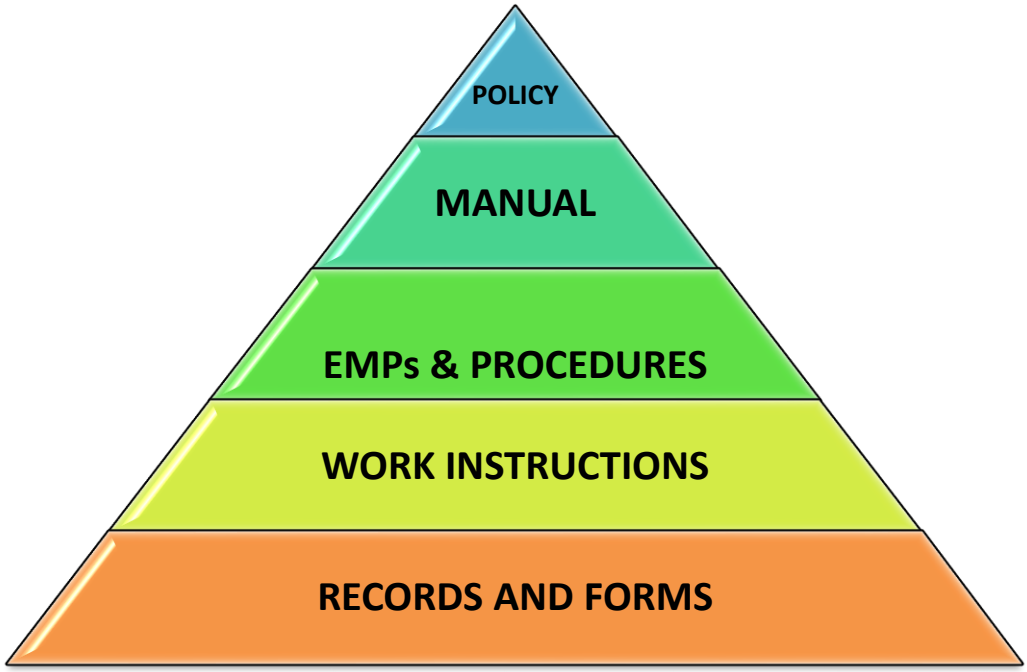
Applicable procedure (s)

HSE 003: Procedure for awareness, competence and training

4.5 Documentation

4.5.1 Documentation

QPEA has adopted a five tier system for its documentation of the HSE Management System as indicated below:



a) HSE Policies

These are the policy statements that give guidelines for environmental health and safety management as established by top management. The policy objectives are developed and approved by the top management and cascaded to the relevant functions and levels within the company. Policy objectives are supported by action plans.

b) Manual

This manual is structured and implemented in line with ISO 14001:2015, Environmental System Management requirements and also integrates OHSAS 18001:2008 Occupational Safety and Health Management System standard requirements. It gives the policy guidelines on the environmental, health and safety management system and what QPEA GT Menengai Limited does to ensure environmentally sound operations within a safe and healthy work environment.

c) HSE Procedures and Environmental Management Plans

Procedures provide description and co-ordination of different activities within QPEA GT Menengai Limited. They define criteria, main responsibilities and general methods required for carrying out of a specific activity in such a way that adequate and continuous control is exercised. They cover all departments, sections and activities. The Environmental Management Plans describe measures proposed to address the already identified key HSE aspects of the company.

d) Work Instructions

Work instructions, also known as safe work procedures, describe how certain activities of the process are carried out. The work instructions are developed for key activities where it is felt that environmental health and safety would be adversely affected if the instructions are not followed for a certain task.

The work instructions include service specifications, test methods, job instructions, etc. Reference is also made to National and International Standards and legislation applicable to QPEA kind of business.

e) Records and forms

These provide objective evidence, showing conformity to requirements of the integrated HSE management system and other related documents of external origin, e.g., standard specification, contracts, orders etc.

4.5.2 Control of HSE system documents

All documents used in the integrated HSE management system are authorized by the BM. They are issued to users and controlled by the HSE&CSR manager. The HSE&CSR manager maintains a master list of the documents used in the system.

Upon review of any document, all issued documents related to the reviewed document are recalled to update the proposed changes and subsequently re-approved before re-issue. The changes identified are captured on the document change request forms which are then used by the HSE&CSR manager to update the master list.

Documents of external origin shall be filed in referenced files and their distribution captured in the Document Control Register.

All obsolete documents are stamped “superseded” to prevent their unintended use.

Uncontrolled copies are issued only to outside organizations such as affiliates, customers and suppliers. These copies are current during the time of issue but the holders do not receive subsequent amendments. The copies are marked/stamped “uncontrolled”. The HSE&CSR manager controls the soft copies of the integrated HSE system documents through a read-only media.

QPEA GT Menengai Limited has developed a procedure, HSE 010-Procedure for control of documents, detailing how the company maintains, approves, distributes and controls documents related to its integrated HSE management system.

4.5.3 Control of HSE Management System records

Records are part of integrated HSE management system documentation. They are stored in files, cabinets or even electronically to prevent and protect them from loss and damage. All records are available to the users through the respective departmental head to ensure that all appropriate controls such as disposition time on completion of retention period, safe storage, maintenance etc, are adhered to.

Records that demonstrate conformance to specified requirements have been established for the various processes that impact on environmental health and safety.

Controls needed for the identification, storage, protection, retrieval, retention time and disposal of records have been defined.

All hard copies of records shall be kept safely and in an orderly manner so that they are well protected against harsh weather and theft to ensure they are readily identifiable, traceable, and legible.

Soft copies of records stored on the company local area network shall be protected by ensuring read only rights to users except to the custodian of the records who shall be allowed to update them.

Retention times of the records and means of disposal shall be documented in the master list of the integrated HSE management system.

Custodian of the records, HSE&CSR manager, shall be responsible for disposing records with authority from the BM ensuring while any relevant legislation is adhered to.

Reference

ISO 14001:2015 (7.5)

Applicable procedure (s)

HSE 010: Procedure for control of documents

4.6 Operation control

QPEA GT Menengai Limited has identified all hazards and operations and activities associated with the hazards. Controls to manage the risks associated with these hazards have been determined and shall be implemented.

Procedure for operation control, HSE 005, has been formulated to evaluate QPEA operations that are associated with her identified environmental health and safety hazards to ensure that they are managed diligently to either control or reduce the risks associated with them.

The controls implemented include those for purchasing, contracting and visitors management. The documented procedures together with operating criteria identified in the various HSE management sub plans aim at avoiding deviations from the environmental health and safety policies and objectives.

Reference

ISO 14001:2015 (8.1)

Applicable procedure (s)

HSE 005: Procedure for operational control

4.7 Emergency preparedness and response

QPEA GT Menengai Limited has developed an emergency preparedness and response plan for responding to potential and actual emergency situations. The plan takes into consideration relevant interested parties. In addition, a procedure for emergency handling and evacuation HSE 006 has been formulated and shall be implemented.

In general, the response required for any environmental incidence will be as follows.

Identify	Identify the environmental incident and make sure the area is safe for staff and public.
Stop	Respond immediately and take action to stop the incident from spreading or escalating (if safe to do so).
Contain	Contain any material which has or may have escaped.
Clean up	Clean up as much as possible and seek assistance where required.
Report	Report and escalate as required.

Awareness on the emergency preparedness and response plan shall be created throughout the company and new employees adequately inducted. Drills shall be carried out periodically to test the preparedness of the employees to emergencies. Where necessary, the drills will

involve relevant interested parties. Issues arising from the drills will be taken into consideration in the review of the emergency preparedness and response plan and procedures.

Reference

ISO 14001:2015 (8.2)

Applicable procedure (s)

HSE 006: Procedure for emergency handling and evacuation

5 SYSTEM PERFORMANCE EVALUATION

5.1 HSE Monitoring and Measurement

QPEA GT Menengai Limited shall monitor and measure the performance of the integrated HSE management system on a regular basis in line with HSE 008, a procedure for monitoring and measuring key operational characteristics with significant impact on integrated HSE System performance and legal compliance.

The HSE&CSR manager maintains monitoring and measurement programme with defined criteria as per the relevant legal and other requirements to which QPEA subscribe. The programme takes into account proactive and reactive measurements and shall include monitoring and measurement for:

- Legal compliance with environmental, health and safety standards;
- Tracking utilization of resources including steam, energy, water, other raw materials etc.
- Tracking environmental control measures such as operation of waste treatment plants, management of hydrogen sulfide, air quality and noise levels;
- Calibration of environmental data measuring equipment including for noise and hydrogen sulfide. Where such equipment are outsourced, the vendors must provide valid calibration certificates.

It is the policy of the company to use calibrated monitoring and measuring devices. The HSE&CSR manager shall maintain a master list of all monitoring and measuring devices and ensures it is updated for new and/or superseded devices or equipment. The HSE&CSR manager also maintains records of calibration and maintenance activities and results.

All monitoring and measuring devices shall be kept in a known state of calibration. When a monitoring and measuring device is found to be out of order it is removed from use/or suitably labelled until such time that it is brought back to calibration.

Reference

ISO 14001:2015 (8.2)

Applicable procedure (s)

HSE 008: Procedure for Monitoring & Measuring Key Operational Characteristics with Significant Impacts on HSE Management System Performance

5.2 Evaluation of compliance

It is the policy of QPEA GT Menengai Limited to comply with legal and statutory requirements related to its operations. Results and/or reports of all evaluations and activities related to environmental health and safety are maintained by the HSE&CSR manager. The company has established and will implement procedure HSE 008.

Reference

ISO 14001:2015 (9.1.2)

Applicable procedure (s)

HSE 008: Procedure for Monitoring & Measuring Key Operational Characteristics with Significant Impacts on HSE Management System Performance

5.3 Nonconformities, corrective and preventive actions

A procedure, HSE 007, has been established to deal with actual and/or potential nonconformities identified within the implementation of the Integrated HSE management system. It elaborates ways on how to eliminate the detected nonconformities.

Effective corrective actions will be taken to eliminate the cause(s) of nonconformities and their recurrence. Potential non-conformities are dealt with by taking appropriate preventive actions.

Timely investigations shall be carried for all HSE incidents/accidents, near misses, and cases of ill health. The investigations are meant to establish the root causes of the accidents, near misses, incidents and cases of ill health and corrective and preventive actions are taken to ensure they do not recur. The results of investigations are communicated to those who need, to the employees and where applicable, interested parties.

Reference

ISO 14001:2015 (10.2)

Applicable procedure (s)

HSE 007: Procedure for Incident Investigation, Nonconformity, Corrective and Preventive Action

6 SYSTEM AUDIT AND REVIEW

6.1 Internal and external audits

Audit programmes are planned taking into consideration the status and importance of the processes and areas to be audited, risk assessments as well as the results of previous audits. The audit criteria, scope, frequency and methods are defined.

Conduct of audits ensures objectivity and impartiality of the audit process. Management responsible for the area being audited takes timely action to eliminate non-conformities and their causes. Follow up activities include the verification of the actions taken and reporting of the verification results.

Results of audits are presented to the management review committee by the HSE&CSR manager.

6.1.1 Responsibilities

The HSE&CSR Manager shall:

1. At the beginning of each calendar year establish a schedule of audits for the coming year. This will include Head Office in Nairobi and site activities in Menengai. The schedule shall be revised as necessary during the year.
2. Initiate the schedules of audits and nominate the audit team for internal audit or consultants for statutory audits.
3. Supervise the conduct and reporting of each audit and maintain Schedule and Record of Audit summaries. Maintain a file of audit reports and make them available to future auditors.
4. Maintain a record of those people in the company with the experience to carry out system audits.

Internal audits will be conducted in accordance with the defined internal audit procedure, HSE 011.

6.1.2 Guidelines for internal audits

A short audit opening meeting will be followed by interviews and examination of documents. The audit will conclude with a closing meeting.

Opening meeting

This meeting will:

- Confirm the availability of appropriate personnel during the duration of the audit;
- Explain the audit scope and criteria;
- Agree any changes to the published audit plan; and
- Answer any questions from the auditees.

Audit interviews

At the beginning of each audit the auditor will examine, with the auditee, the contents of any previous audit report for completion and continued compliance with any corrective actions. The auditor will then interview the auditee and selected personnel, during which relevant documentation may be studied.

Closing meeting

It is important that all personnel involved in the audit attend a closing meeting. In the meeting, the auditor will present a summary of his/her findings and written details of each non-conformance. Corrective actions with dates for completion will be agreed for each non-conformance and recorded on the form given later in this section.

Audit Report

The auditor will prepare a report within ten days recording his findings and the corrective actions agreed.

The auditor will issue a copy of the report to the auditee and the HES&CSR Manager.

Follow up

The auditee will confirm to the auditor, within the agreed timescale, that the corrective actions are complete. If this is not done, the auditor will, depending on the importance of the non-conformance, either check completion of the non-conformance immediately or at the next audit.

Reference

ISO 14001:2015 (9.2)

Applicable procedure (s)

HSE 011: Procedure for Internal Auditing/Inspections

6.1.3 Statutory audits

Suitably qualified consultant (s) shall be hired to conduct annual environmental and occupational safety and health audits in line with EMCA, 1999 and OSHA, 2007 respectively.

The annual audit reports shall then be submitted to the relevant statutory bodies i.e. NEMA and DOSH for review as required. Copies of the reports and review feedbacks shall be maintained by the HSE&CSR manager and shall be considered in evaluating performance of the system and instituting improvement actions.

Gaps identified by the statutory bodies shall be treated as non-conformities and appropriate corrective actions shall be formulated by or under the direction of HSE&CSR manager. The action plans shall be included in the subsequent HSE plans

6.2 Management review

The integrated HSE management system shall also be reviewed during planned management review meetings to ensure continued suitability, adequacy effectiveness and continuous improvement. The management review meetings shall be held on quarterly basis under the chairmanship of the BM and attended by functional managers, designated HSE representatives with the HSE&CSR manager as the Secretary.

The HSE&CSR manager shall at the beginning of each calendar year establish, communicate and maintain a schedule of management review meetings for the year. The schedule shall be revised where necessary and any revisions communicated as necessary during the year.

In these meetings, the main agenda includes, among other items:

a) Follow-up actions from previous management reviews;

b) Review of results of internal audits/inspections and evaluations of compliance with legal other requirements to which the organization subscribes;
c) Any results of employees participation and consultation;
d) Comments, including complaints, from external interested parties;
e) Evaluation of the extent to which the system objectives have been met;
f) Status of any environmental and safety incident investigations, corrective actions and preventive actions;
g) Any prosecutions, threatened prosecutions or improvement notices received by the company;
h) Any significant changes in environmental legislation affecting the company, national or international standards on environmental management;
i) Recommendations for improvement; and
j) Any other issues as identified by the participants.

Records of the management reviews shall be maintained by the HSE&CSR manager in the management review file.

As a result of the review, appropriate changes to the company environmental health and safety procedures and documentation will be made and staff informed of these changes by the HSE&CSR manager.

Reference

ISO 14001:2015 (9.3)

Applicable procedure (s)

HSE 012: Procedure for Management Review Meeting

7 ENVIRONMENTAL MANAGEMENT PLANS AND GUIDELINES

7.1 Introduction

QPEA GT Menengai Ltd has developed and is maintaining an Environmental and Social Management Plan (ESMP) in order to ensure that we continue to generate clean energy while providing a safe, healthy workplace for our employees, the general public and acting as a responsible member of our community. The ESMP is designed to help us understand our environmental effects and/or impacts and, through proactive management, reduce the risks that our operations pose to our employees and to the environment. The ESMP is also the means through which we follow on the commitments stipulated in our environmental policy.

Objectives

The overall objectives of the ESMP are to:

- Ensure compliance with regulatory requirements and guidelines of the Environmental Management and Co-ordination Act (EMCA) of 1999, its subsequent regulations and other relevant Kenyan regulatory requirements/legislation and guidelines;
- Ensure compliance with the IFC 2012 Performance Standards and the AfDB Environmental and Social Policies and Guidelines;
- Ensure compliance with GDC HSE Policy and Management plans;
- Ensure compliance with the Memorandum of understanding between GDC and KFS including the special licence conditions;
- Ensure compliance with the ESIA licence conditions issued by NEMA;
- Inform, verify and monitor environmental performance through information on impacts as they occur;
- Establish specific control measures and actions to minimize impact to the environment;
- Provide a consistent and structured approach, assuring that the required standards of environmental protection are attained and maintained;
- Provide documentation and feedback for continued improvement in environmental performance; and
- Ensure sufficient allocation of resources for implementing, sustaining and reviewing the ESMP.

Sub-Plans Arising from the ESMP

This document is the Environmental and Social Management Plan for QPEA GT Menengai Ltd operations and facilities. The ESMP has been developed to comply with the above objectives and tailored to the main operations of the organization. The ESMP identifies the activities related to the company's health, safety and environment Policy, responsibilities, implementation, monitoring and management review.

The ESMP has taken into consideration the operations and activities likely to have environmental effects and/or impacts as identified in the existing Environmental Impact Assessment (ESIA) study report of the project done by QPEA and GDC. It specifically focuses on the following issues:

- Waste Management;
- Traffic Management;
- Sustainable Utility (water and energy) Consumption;
- Fire Prevention and Management Plan;
- Archaeological and Cultural Heritage Management Plan;
- Hydrocarbons and Chemical Handling;
- Procurement Management;

- Security Management;
- Environmental Training and Awareness;
- Biodiversity Management Plan;
- Air and Noise Management;
- Health and Safety Management Plan;
- Community Development Plan; and
- Stakeholders' Engagement Plan.

Specific sub-plans have therefore been developed to cover the key thematic issues arising in the ESMP. Each of these sub-plans is discussed in subsequent sections.

7.2 Waste Management Plan

7.2.1 Management objectives

QPEA GT Menengai Ltd has developed this Waste Management Plan as part of its Environmental and Social Management Plan (ESMP).

The objectives of the Waste Management Plan are to:

- Establish waste management priorities based on the understanding of the potential Environmental, Health and Safety (EHS) risks and impacts associated with its operations and considering the consequences of waste generation;
- Consider the prevention, reduction, reuse, recovery, recycling, removal and disposal of waste arising from project activities in such a manner as to minimise the potential impacts to human health and the environment;
- Minimise, contain, transport, handle and dispose of solid and liquid wastes arising from project activities in such a manner as to minimise impacts to human health and the environment;
- To comply with Water Act 2002and the Water Resources Management Rules (2007) which prohibits the pollution of waters; and
- To minimize the discharge of sediment and other pollutants to lands and/or waters during constructionand operation activities.

7.2.2 Legal and Other Requirements

Legal and other requirements applicable to this plan are as follows:

- Environmental Management and Coordination (Waste Management) Regulations 2006;
- Environmental Management and Coordination (Water Quality) Regulations 2006;
- Public Health Act (Cap 242);
- GDC's HSE policy (Section 6.2.2 to 6.2.5) on waste management; and
- NEMA license conditions.

7.2.3 Procedure for solid waste management

1. All QPEA GT Menengai Ltd employees and contractors shall embrace the waste management hierarchy (prevention, minimization, reuse, recycling, energy recovery and finally disposal) to promote waste minimisation within our workplaces and encourage re-use and/or recycling wherever possible;
2. The Technical Manager and Finance/Commercial Manager shall ensure that planning and procurement process reduces and where possible eliminate waste;
3. Office and Site managers will ensure that there is adequate supply of colour coded waste skips provided at convenient points, together with an external storage and disposal area;
4. All staff will ensure that no waste material or refuse accumulates within their work stations / a working area;

5. Prior to starting work on site, the QPEA GT Menengai Ltd Site Manager will assess what waste will be generated by the site activities and determine if any waste should be classed as hazardous (Refer to Waste Management Regulations of 2006 for classification). Should a potential waste be identified as hazardous the Site Manager will liaise with the HSE & CSR Manager and NEMA to ensure correct handling, storage, transfer / transportation and disposal;
6. Ensure any wastes generated are segregated (hazardous/non-hazardous and recyclable and non-recyclables) at source as per the guidelines inTable 7-1, inventoried, quantities estimated and appropriate methods of disposal used;
7. Hazardous wastes shall not be allowed to stack one above the other and no mixing shall take place at any period of storage or transportation. Storage shall be in a secured area with controlled access;
8. QPEA GT Menengai Ltd Contractors shall be bound, through appropriate clauses in their agreements, to reduce and ensure appropriate waste disposal of any generated wastes;
9. QPEA GT Menengai Ltd will engage a NEMA licensed contractor for waste collection and transportation to an approved dump site. All waste treatment/disposal contractors engaged, must be fully compliant with their legal obligations. Records of waste handlers' licences (copies) shall be maintained by the HSE & CSR manager;
10. Ensure that no waste is taken off site unless it is accompanied by a Waste Transfer Note/documentation that fully complies with the Waste Management Regulations (See Form III in the First Schedule to the Waste Management Regulations, 2006). Copies of the waste transfer documentation shall be maintained on site;
11. Create awareness among all staff to ensure these principles are adhered to; and
12. Maintain appropriate documentation of types, quantities and disposal means for the generated wastes.

Table 7-1: Guide on waste segregation receptacles and storage time

Classification of waste receptacles	Colour	Type of waste collected	Max. allowed storage from the date of generation
Food waste	Green	Food leftovers, vegetable wastes, meat wastes etc.	1 week
Recyclables including scrap	Blue	Paper, plastics, wood, bottles, metal, rubber etc.	1 month
Hazardous wastes	Red	Paint tins, coating materials, batteries, fused bulbs, used oils and grease, wires, used PPEs etc.	2 months or as stated in material safety data sheet
Biomedical waste	Yellow	Used cotton, bandages, etc from First Aid procedures / Kit.	24 Hours in the hot season 48 hours during the cold season

7.2.4 Procedure for liquid waste management

Liquid waste in this context is defined as wastewater or sewage being discharged into the environment.

The HSE & CSR Manager shall:

1. In consultation with the wastewater contractor, where applicable, ensure that any wastewater treatment Plant is working at its optimum condition and that any odour from the Plant is controlled and not unduly offensive;
2. Ensure that the waste management contractors monitor the effluent quality on a regular basis and keep a record of the same to be submitted to NEMA on quarterly basis;
3. Ensure that there is adequate backup to handle untreated influent in case of any breakdown in the treatment Plant;
4. Ensure that the soak pit does not pollute or discharge water on to the road and the surrounding environs;

5. Track effluent parameters to ensure that the waste water quality is within the acceptable standards for effluent discharge into the environment as stipulated in the third schedule of the Environmental Management and Co-ordination (Water Quality) Regulations, 2006;
6. In consultation with QPEA GT Menengai Ltd Management continuously liaise with GDC to receive monitoring reports on re-injection wells and estimated volumes of re-injected effluent.
7. Ensure that no grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) is released to adjacent watercourses and/or water bodies without permit;
8. Ensure that water containing pollutants such as cements, concrete, lime, chemicals and fuels are discharged into a conservancy tank for removal from site;
9. Ensure that the Contractors instruct their staff and sub-contractors that they must use toilet provided and not the bush or watercourses; and
10. Make arrangements to prevent reduction of baseline water quality through construction actions/activities (for example cofferdams, silt traps or plastic lining).

Effluent discharge

QPEA GT Menengai Ltd shall:

1. Check that appropriate consents for disposal of all effluent are in place, and that personnel are aware of the quantity and quality of the effluent that can be discharged;
2. Where applicable, wastewater is treated effectively before disposal;
3. If a settlement/septic tank is being used, check and ensure it is working;
4. Continuously liaise with GDC to confirm that undertakings by GDC to minimize impacts on water resources by re-injection and discharge of geothermal fluids from power plant operations are carried out as per GDC's Health Safety and Environment (HSE) Policy. These undertakings include:

    (i) Elaborating a comprehensive geological and hydro-geological model including overall geological, structural and tectonic architecture, reservoir size, boundaries, geotechnical and hydraulic host rock properties;
    (ii) Completion of a hydro-geologic and water balance assessment during the project planning stage to identify hydraulic interconnections between the geothermal extraction and reinjection points and any sources of potable water or surface water features;
    (iii) Isolation of steam producing sources from shallower hydrologic formations which may be used as sources of potable water through careful site selection and properly designed and installed well casing systems; and
    (iv) Avoiding negative impacts on surface water by introducing strict discharge criteria and appropriate means to bring water quality and temperature to acceptable standards.

7.2.5 Performance criteria

- Adherence to relevant permit and/or licenses and water quality standards;
- Nil Stop Work Orders from NEMA;
- Separation of all wastes into non-hazardous and hazardous categories, recycling/reusing waste products where possible; and
- No complaints received in relation to QPEA GT Menengai Ltd waste management practices.

7.2.6 Monitoring

- As part of its due diligence procedures, QPEA GT Menengai Ltd shall liaise with GDC to keep records of management of brine and condensate from the power plant;
- Sampling of brine prior to re-injection for laboratory tests and where necessary, soil/water sampling shall be undertaken (and evaluated against water quality regulations, 2006) to ensure work areas are safe;

- QPEA GT Menengai Ltd and Individual Contractors are responsible for monitoring housekeeping, waste collection, storage, and disposal procedures and facilities.
- Surveillance of site waste minimization and disposal shall be conducted on a daily basis.
- Routinely check pipe works and any outfalls from site to ensure they are clean and clear of litter, etc
- Complaints from other water users within the locality;
- The quality of surface water discharges from site will be monitored should there be concerns in relation to water quality. Parameters to be monitored shall include, but not limited to, pH, Total Dissolved Solids, Suspended Solids, Dissolved Oxygen, Heavy Metals, Trace Ions and Total Oil and Grease; and
- Monitor any water treatment methods deployed to ensure their effectiveness

7.2.7 Required Documentation

- Wastes data log including: Types of waste generated, estimated waste quantities, and waste tracking documents;
- Agreement with waste handlers including handlers' valid and current licences;
- Staff sensitisation records; and
- Relevant Suppliers' contract clauses.

7.3 Traffic Management Plan

QPEA GT Menengai Ltd recognises that traffic to and from its site can have a widespread environmental effect on the surrounding neighbourhood. These include dust, fumes, noise and even accidents.

7.3.1 Legal and other requirements

- Occupational Health and Safety Act, 2007;
- Public Health Act (Cap. 242);
- Work Injury Benefits Act (WIBA), 2007;
- Traffic Act (Cap 403) and its regulations;
- Public roads and roads of access Act (Cap 399);
- GDC's HSE policy (Section 5.0) on transportation and traffic management plan; and
- The Kenya Roads (Kenya National Highways Authority) Regulations, 2013.

7.3.2 Management Objectives

- To ensure maximum safety of on-site personnel (pedestrians and drivers) and neighbouring communities;
- To minimize environmental nuisance and impact as a result of construction and operation traffic; and
- To ensure QPEA GT Menengai Ltd traffic does not interrupt traffic associated with other operations at Menengai Geothermal Field.

7.3.3 Procedure for traffic management

Because of the impact that traffic can have, particularly in residential and conservation areas, it is important to try and control it on and off-site. The control that can be exercised over sub-contractors or delivery vehicles once they have left site is limited. Contract sanctions may be possible in some cases. However, constant encouragement should be given by way of signs and verbal instructions to stick to the appropriate routes.

Dust, fume and noise from traffic can be reduced as much by careful driving as by technical means. Drivers should be reminded of their responsibilities by notices and speed limit signs. A

major cause of noise complaints for vehicles is from reversing alarms. Signed circular routes for delivery vehicles can reduce the need to reverse.

The following procedures will be adopted to minimise these effects:

1. QPEA GT Menengai Ltd will encourage car-pooling by its employees to site wherever appropriate;
2. Delivery routes to the site will be considered, if appropriate, preferred routes will be agreed with GDC. Only GDC approved routes shall be used by drivers;
3. Notices will be clearly displayed at the site entrance and elsewhere (in liaison with GDC) reminding drivers to drive carefully to minimize noise and dust. Speed limit signs will be erected where appropriate;
4. Any hazardous road conditions shall be brought to the attention of GDC and communicated to contractors and material delivery drivers, especially when new to the site and its surroundings. Upgrading of existing roads where necessary to take care of the new traffic;
5. Erection of proper signage along all site roads used and at approaches to junctions with the access roads;
6. Sensitization of drivers on applicable GDC guidelines and traffic restrictions in and around site;
7. Monitoring, enforcement and disciplinary action of offenders;
8. For transportation of abnormally sized loads, relevant permits shall be obtained in good time and escort and chase vehicles shall be used;
9. Site plan shall ensure there are designated walkways on and around site clearly marked;
10. Project vehicles should display a badge on the windscreen stating project contact details, so the driver can contacted if the vehicle is found to be parked inappropriately;
11. Ensure all vehicles are in good working order with an up-to-date maintenance records; and
12. Monitor vehicle movements to reduce the likelihood of queuing or causing congestion in and around the local area;
13. Improving driving skills and requiring all drivers to hold appropriate licences;
14. Adopting limits for trip duration and arranging driver rosters to avoid overtiredness; and
15. Provision of training to all drivers on the requirements for safe driving measures, e.g., speed limits; and
16. Ensure that all vehicles have the required permits to access the project site.

7.3.4 Performance criteria

- No vehicle incidents;
- Adherence to traffic act/or license conditions;
- No traffic related complaints (on noise, dust, inconveniences etc.) from adjoining property owners and local communities.

7.3.5 Monitoring

- Visual monitoring of all traffic movements on site will be carried out to ensure the safe movement of traffic and the protection of persons and property through and around the site;
- The Menengai geothermal fields and the power plant site will be inspected to ensure road signage and traffic barriers etc. are in place, clearly visible, and performing their function in directing traffic and alerting drivers of safety issues;
- Site roads will be inspected regularly to ensure road conditions support safe working and driving. Inspection frequency shall be increased following incidences of heavy rains or any other adverse conditions.

7.3.6 Required Documentation

- Incident/accident reporting and investigations; and
- Complaints log

7.4 Water Utility Management Plan

The major water supplies in the project area are from underground abstractions developed by GDC and supplemented by either Nakuru water and sanitation company (NAWASCO) or licensed contractors.

7.4.1 Legal and other requirements

- Water Act, 2002;
- The Water Resources Management Rules (2007);
- WRMA license conditions; and
- NEMA licence conditions

7.4.2 Management Objective

- To ensure sustainable use of potable water.

7.4.3 Procedures

Water utility

QPEA GT Menengai Ltd O&M manager and HSE & CSR Manager will:

1. Establish potable water requirements for the facility;
2. Ensure all water supplies to its facilities are metered and consumption records maintained for easy retrieval and evaluation;
3. Establish water quality by documenting baseline status before work starts on site;
4. Ensure the site has a licence to abstract water from the identified water sources. If supplied by another party, ensure the suppliers are licensed by the relevant authorities;
5. Ensure the site complies with the abstraction licence conditions; and
6. Ensure sensitization of staff on the importance of water conservation.

Water use guidelines

For good practice, the following guidelines will be observed:

- Accidental leakages and bursts of water supply pipelines shall be promptly identified and rectified;
- Recycling of water as much as is possible shall be encouraged, for example water used for curing of concrete can be used for spraying dusty roads;
- Curing of concrete should be done in conservancy tank to avoid wastage;
- Where feasible, harvest water during rainfall times to complement other sources; and
- The Contractor shall be required to comply with the water quality regulations.

7.4.4 Performance criteria

- Adherence to relevant regulations, water quality standards, permit and/or license conditions; and
- Consumption rates must be within the established potable water requirements for the facility.

7.4.5 Monitoring

- Monitor consumption patterns from the consumption records of water use to detect any anomalies;
- As part of the due diligence process, liaise with GDC to maintain records of the quality of potable water used at the Plant;

- Review meter records to identify and manage “unaccounted for” water e.g. from undetected leaks;
- Check on performance of set targets for water resource use, particularly potable water;
- Review achievement of targets for water re-use and recycling;
- Efficiency of the operational and monitoring procedures especially for management of plumbing and sensitisation on avoidance of practices that result in wastage of water.

7.4.6 Required Documentation

- Water quality monitoring data;
- Water use records;
- Copies of abstraction/discharge licenses; and
- Facility maintenance plan and records.

7.5 Energy Resources Management Plan

7.5.1 Legal and other requirements

- Energy Act No. 12 of 2006 and its regulations

7.5.2 Management Objectives

- Conserve energy resources; and
- To minimize energy consumption related emissions.

7.5.3 Procedure for energy

1. QPEA GT Menengai Ltd will endeavour to use energy efficient appliances in both office and site operations as far as feasible;
2. QPEA GT Menengai Ltd employees will to ensure that equipment not in use is switched off;
3. Electric powered equipment will be used in preference to compressed air equipment where possible. Where compressed air equipment is used, compressed air lines shall be checked for leaks on a daily basis;
4. Equipment requiring an uninterrupted power supply, such as security equipment, shall be on a separate circuit so that unessential equipment can be turned off at a central point;
5. Regular servicing of standby generator (s) to ensure efficient consumption of fuel. The generator service sheet shall be maintained;
6. Sensitize staff on energy conservation tips such as switching off unnecessary lights and rely on day lighting whenever possible, and switching off computers and UPS while leaving the office;
7. Contractors shall be required to ensure maintenance of their energy consuming equipment for enhanced efficiency; and
8. Technical manager shall maintain energy use records for easy retrieval and evaluation.

7.5.4 Monitoring

- Review energy (diesel, electricity etc.) consumption records and set targets as appropriate.

7.5.5 Required Documentation

- Energy use records; and
- Equipment maintenance records.

7.6 Fire Safety and Management Plan

7.6.1 Legal and other requirements

- Forest Act of 2005;
- Occupational Safety and Health Act (OSHA) 2007 and its regulations including those under the repealed Factories and Other Places of Work Act that is yet to be superseded;
- Fire risks reduction rules, 2007;
- GDC's HSE policy (Section 3.7) on fire prevention; and
- Memorandum of understanding between GDC and KFS.

7.6.2 Management Objectives

- Conserve forestry and wildlife resources.
- Protect assets, employees and the neighbouring communities; and
- Comply with fire safety regulations in Kenya.

7.6.3 Wild fires

QPEA GT Menengai Ltd operations can sometimes be sited in areas susceptible to wildfires e.g. within natural grassland, shrub land or forest vegetation. Activities of power plant during construction and operation including improper disposal of any cleared vegetation and of cigarette butts are likely to increase incidences of wildfires within such environments.

Procedure for management of wildfires

1. QPEA GT Menengai Ltd plant site shall be planned with inclusion and maintenance of adequate fire buffer zones. These could be open bare ground/un-vegetated areas and planted with fire resistant vegetation e.g. Mexican green ash (*Fraxinussp*). The selected fire resistant species shall be agreed with the Menengai KFS office;
2. Burning of any cleared vegetation or other wastes on site is prohibited;
3. HSE & CSR manager shall liaise with the Menengai KFS office to sensitize construction and operation staff on wildfires and train on wildfire emergency response;
4. All forest rules shall be observed throughout;
5. HSE & CSR manager shall liaise with GDC and Menengai KFS office to maintain and regularly (according to season) update fire danger rating sign post at the power plant site entrance;
6. QPEA GT Menengai Ltd smoking policy shall apply throughout the Menengai site area. No smoking is allowed in non-designated areas; and
7. In case of fire, the site emergency response plan shall be triggered.

7.6.4 Other fires

With the installation of the power plant and related substations and transmission lines, there is likely to be a fire risk during operation. This may not only be detrimental to the development and energy supply to the national grid but also to the safety of operation staff. QPEA GT Menengai design has incorporated the following toward management of fire within the plant:

- The power plant is planned such that the auxiliary transformer and generator step up transformer will be sited separately from adjacent structures by a fire wall;
- Building materials for cooling towers should be fire resistant; and
- Plant fire suppression system shall consist of:
    - Automatic fire detection and alarm system;
    - Foam for the turbine house for oil fire;
    - Water sprinklers for bearing system of the turbine;
    - Portable extinguishers and fire hoses.

Procedure

In addition to the existing design features above, the technical manager and the HSE & CSR manager shall ensure that:

1. Any new equipment and structures are designed taking fire safety into account;
2. Proper housekeeping is maintained throughout all work areas. Combustible materials such as rags, paper, and trash shall be disposed of in proper containers and the containers labelled;
3. All flammable materials/liquids are stored in accordance with the international guidelines on flammable goods stores and all relevant Kenyan standards;
4. Appropriate danger warnings are posted in all locations where flammable materials are held;
5. Use and storage of flammable liquids is strictly controlled. Only personnel with requisite skills and training will be allowed to handle these materials. Smoking is strictly prohibited when handling flammable materials, open flames or electric arcs;
6. The management shall be responsible for maintenance of appropriate fire fighting equipment (fire water tanks, fire extinguishers, fire hydrants, hose reels, fire alarms and sprinklers) within site and ensuring that all staff is well protected and educated through fire drills. Selected staff will be trained as fire marshals;
7. All combustion engines shall be shut down before fuelling except when the refuelling location is sufficiently removed from the engine;
8. All employees are familiar with the location of the portable fire extinguishers and emergency response plan, including fire alarms, and participate in fire drills;
9. All fire detection and alarm equipment required to give warning in the event of fire is properly installed, regularly tested and maintained in good working order.
10. Equipment for fighting fire is available at all times, regularly tested and maintained in good working order;
11. An emergency plan is formulated and posted on site;
12. Adequate means of evacuation in case of fire exist for all persons at its worksites. All means of evacuation shall be sign posted, maintained, kept free from obstruction and available for safe and effective use at all times;
13. That emergency response, assignment of responsibilities and roles to individual persons, notification and investigation procedures are in place and implemented in responding to a fire incident;
14. There shall be regular planning and execution of fire drills to test emergency response preparedness and act on the learning points. Appropriate fire safety training shall be developed and implemented to provide workers with knowledge of fire safety practices, fire extinguishing techniques and evacuation procedures;
15. All welding, burning or other hot work must be covered by a Fire Permit; and
16. Fire safety audit shall be regularly conducted by an independent fire safety expert.

Fire hydrant guidelines

Where water is used in fire fighting, it is a requirement by the Fire risk reduction rules, 2007 that:

- Water storage facility for fire fighting is kept full at all times for use in the event of fire;
- Water pressure in the fire fighting system is capable of raising the water to the highest point at the plant in the event of fire;
- For hose reels supplied by underground or ground level reservoirs, an isolated pump is provided;
- If supply water system is combined for the service and fire fighting, the service outlet shall not draw all water but the hydrant shall be capable of drawing all the water

7.6.5 Performance criteria

- Adherence to GDC and KFS memorandum of understanding;
- Presence of fire danger rating posts;

- Trained fire marshal;
- Fire emergency equipment (appropriate extinguishers).

7.6.6 Required Documentation

- Copy of forest rules;
- Training/sensitization records; and
- Fire fighting equipment inspection and equipment maintenance records

7.7 Archaeological and Cultural Heritage

7.7.1 Legal requirements

- EMCA, 1999;
- The National Museums and Heritage Act CAP 216, 2006 (revised 2009);
- NEMA license conditions; and
- IFC Performance Standard 8: Cultural heritage.

7.7.2 Management Objectives

- Protect any chance find archaeological and cultural artefacts.

Procedure

No archaeological sites have been recorded and no surface artefacts were seen on the proposed development site. However, since the absence of artefacts on the surface does not exclude the possibility existence of artefacts or features buried in the ground, there is a chance of encountering buried artefacts during excavation and other earthwork construction activities. The following procedures will be applied:

1. HSE&CSR manager will maintain a copy of the National Museums of Kenya (NMK) Chance find procedure on site and sensitize the contractor (s) on the same;
2. Before earthworks, QPEA GT Menengai Ltd will be prepared and prepare its contractors for unexpected finds whether or not known archaeological or historical features have been identified onsite;
3. During excavations, QPEA GT Menengai Ltd will retain an archaeologist from National Museum of Kenya to look out for burned or blackened material, brick or tile fragments, coins, pottery or bone fragments, skeletons, timber joists or post holes, brick or stone foundations and in-filled ditches;
4. If something is discovered in the course of excavation, the exercise will be stopped to determine whether a rescue operation needs to be carried out. For any questionable objects, the archaeologist will determine its value and any of the management options outlined in the procedure applied. Only after removal of the objects in question and sign off by the archaeologist will the works continue.

7.7.3 Performance criteria

- Engagement of archaeologist to monitor excavation works

7.7.4 Required Documentation

- NMK chance find procedure; and
- Archaeologist sign off report on excavation works.

7.8 Hydrocarbon and Chemicals Handling

During plant operation, hydrocarbons and other chemicals such as solvents, coolants, acids, and alkalis will be used. Accidental spillage or improper handling and disposal of these hydrocarbons can be harmful to the receiving environments as well as employees.

7.8.1 Legal and other requirements

- EMCA, 1999;
- OSHA, 2007;
- Energy Act No. 12 of 2006 and its regulations

7.8.2 Management Objectives

The objectives of the plan are to minimize:

- Danger to persons;
- Pollution of soil and water;
- Extent of affected area;
- Degree of disturbance during clean-up; and
- Degree of disturbance to wildlife.

Management procedure

1. A secured compound shall be provided for storage tanks for chemicals and fuel. All chemicals and fuels shall be stored with manufacturer's instructions in mind as per the material safety data sheets;
2. Storage of fuel and other flammable materials shall comply with standard fire safety regulations and meet the specifications spelt out by the Kenya Bureau of Standards(KEBS);
3. Storage of fuel and waste oil shall be in areas with oil-impervious (sealed) flooring and secondary containment structures such as berms, ditches, or retaining walls;
4. All above ground fuel tanks should have containment areas that can handle 110% of the fuel stored on the site in case of emergency spillage;
5. Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment or provided with own containment.
6. Pipe-work carrying product from the tank to facilities outside the containment shall be provided with secondary containment;
7. Spill and drip trays shall be used during servicing of machinery as necessary;
8. In cases where waste oil is released into the environment, clean up the release using either a launder able sorbent material or a sorbent material that can be incinerated along with the used and waste oil that it absorbs.(See response plan below);
9. All spilt waste oil shall be removed to the greatest extent possible and within 24 hours of spilling;
10. Response plans for accidental spills will be routinely tested through drills;
11. Use of an oil interceptor in the plant;
12. Waste oil shall be transported in a sealed and leak proof container to the final disposal site/ place or to a recycler.

Response Action Plan

1. Training of personnel is the responsibility of the contractor and all appropriate personnel will be trained before commencement of work on the Project;
2. The individual who discovers a leak or spill shall immediately attempt to stop and contain the leak or spill as per instructions received during personnel training courses;
3. Work in the immediate area of a spill or leak shall be halted and the spill shall be reported to the technical manager and HSE & CSR manager;

4. The contractor will have the full authority to take appropriate action without unnecessary delay;
5. HSE & CSR manger will report spills to GDC and NEMA as per applicable agreements and NEMA license conditions;
6. The contractor will submit a written report to the HSE/CSR manager. A copy will be provided to NEMA.
7. The contractor shall assume the overall responsibility of coordinating a clean-up which will include the following actions:

   (a) Deploy on-site personnel to contain the spilled material using a dyke, pit, absorbent material or booms, as appropriate;
   (b) Assess site conditions and environmental impact of various clean-up procedures;
   (c) Choose and implement an appropriate clean-up procedure;
   (d) Deploy on-site personnel to mobilize pumps and empty drums (or other appropriate storage) to the spill site;
   (e) Apply absorbents as necessary;
   (f) Remove any contaminated soil as directed by the technical manager or the HSE & CSR manager;
   (g) Dispose of all contaminated debris, water, soil, cleaning materials, and absorbents by placing in an approved disposal site; and
   (h) Take all necessary precautions to ensure that the incident does not recur. Soil and water samples may be taken for testing to confirm.

7.8.3 Performance criteria

- Nil accidental spills.
- Adherence to regulations for management of waste contaminated with hydrocarbons.

7.8.4 Required Documentation

- Contractors' Response Action Plan.
- Environmental incidence records.

7.9 Green Procurement

7.9.1 Management Objective

To procure supplies in an environmentally sustainable manner that conserves natural resources and minimises waste generation and pollution.

7.9.2 Procedure

1. Technical manager and Procurement manager will require our suppliers to demonstrate their commitment to environmental best practice. Suppliers' environmental commitment will form part of their assessment and evaluation criteria;
2. Technical manager and Procurement manager will require that our suppliers of goods and services adhere to high environmental performance standards;
3. Procurement manager will specify wherever practicable the purchase of least environmentally damaging materials and goods.

Procurement Guidelines

When ordering, the technical manager and the procurement manager will avoid:

- Over-ordering;
- Ordering inappropriate specifications; and
- Ordering for delivery at the wrong time

When deliveries arrive on site, avoid:

- Damage during unloading;
- Delivery to inappropriate areas of site;
- Delivery of damaged goods; and
- Accepting deliveries of incorrect specification or quantity

When storing materials, avoid:

- Exceeding their shelf life;
- Damage or contamination from incorrect storage; and
- Loss, theft and vandalism.

When handling materials avoid:

- Damage or spillage through incorrect or unnecessary repetitive handling; and
- Delivering the wrong materials to the workplace.

7.9.3 Performance criteria

- Engagement of environmentally conscious suppliers and contractors

7.9.4 Required Documentation

- Contractors' environmental assessment records including copies of their policies, safety plans, work instructions etc.

7.10 Security management

7.10.1 Purpose

1. To regulate access and exit to geothermal project site for authorized personnel.
2. To ensure company and contractor employees observe landowner requirements for site security.
3. To monitor and authorize equipment for admission and use on project site.

7.10.2 Scope

This procedure covers security of premises, admission and exit regulations to project site for QPEA GT Menengai Ltd staff and contractor employees.

7.10.3 Responsibility

- Technical manager
- O&M Manager
- HR Manager
- HSE/CSR manager

7.10.4 Reference documents

1. GDC Health Safety and Environment policy;
2. Visitors/contractors log in form
3. Daily personnel details register.
4. Visitors non-disclosure agreement

7.10.5 Procedure

1. The HR Manager is responsible for issuance of authorized identification tags/badges for all company employees during recruitment.

2. Authorized identification tags/badges for employees will be produced and recorded in daily personnel details register at point of entry and exit to project site.

3. Contractor employees shall provide a prior request of access to project sites, at least seven days prior to the due date; inclusive of a log detail of personal equipment for use on site; addressed to the Technical manager.

4. The Technical manager/ O&M Manager is responsible for approval or rejection of contractor employees' access to project sites and personal equipment for use on site.

5. Upon approval of the request for access to project site, all contractor employees record personal identification details in the visitors log form inclusive of an authorized record of personal equipment at the point of entry.

6. Employees and contractors shall not bring unauthorized individuals (i.e. friends, relatives or observers) onto QPEA GT Menengai Ltd premises. QPEA GT Menengai Ltd and contractors shall observe GDC and KFS requirements for site security. All unauthorized personal equipment for use shall be recorded and deposited at point of entry and collected upon exit.

7. All company and contractor employee persons, vehicles, and equipment shall undergo shall undergo a security check at point of entry to project site.

8. A visitor's non-disclosure agreement shall be signed by all contractor employees prior to gaining confidential information belonging to the company as a result of level of engagement in carrying out services.

9. All company and contractor employee vehicles accessing the site shall adhere to the stipulated speed limit -40kph.

7.11 Environmental Training and Awareness

7.11.1 Purpose

The purpose of

- Understanding requirements of EHS related legislation in Kenya, IFC performance standards, AfDB Policies and its Integrated Safeguards System (ISS) and other international best practices
- Develop awareness of the environmental implications of the project and QPEA GT Menengai Ltd operations;
- Develop awareness and understanding of the personnel and institutional arrangements for managing environmental impacts within QPEA GT Menengai Ltd operations;
- The need for Environmental Auditing, Monitoring and compliance.

7.11.2 All Staff

The HSE&CSR Manager shall arrange for all permanent members of staff to receive induction on the company Environmental Manual and associated documentation (if appropriate). All staff must, however, have ready access to controlled copies if they are not themselves copy

holders.

7.11.3 Staff on Site

All staff on site shall be inducted on the site specific Environmental and Social Management Plan (ESMP).

The technical manager shall ensure that all relevant personnel on site, including sub-contractors, are aware of the site environmental management plan and its requirements. A copy of the site's ESMP shall be available on site.

7.11.4 Guidelines on Environmental Training

All staff must have appropriate training necessary to enable them to comply with the requirements of Integrated HSE management system.

Environmental training will include, but are not limited to:

- Company environmental policy and objectives;
- Current applicable environmental laws and regulations;
- Significant environmental aspects of company operations;
- Emergency preparedness and response plan / drill;
- Health and safety aspects;
- Dust control plan;
- Noise management plan;
- Air quality management plan;
- Fire safety and management plan;
- Security management plan;
- Waste control and management plan;
- Environmental health and safety responsibilities within QPEA GT Menengai Ltd;
- Internal and external communication on environmental health and safety issues

All training information, records and certificates shall be properly documented, kept, and made available for verification.

7.11.5 Training Review

The need for training on the environmental aspects of QPEA GT Menengai Ltd activities shall be taken into account when reviewing the training needs of staff as part of the annual training review.

7.12 Biodiversity Management Plan

The Biodiversity Management Plan (BMP) is an integral of environment planning for managing biodiversity and ensuring the conservation of ecosystem resources. As part of the environmental management, the BMP allows the scheduled project activities to proceed without compromising environmental outcomes.

A BMP is a handy site-specific document meant for use by the site management team to conserve or manage sustainably biodiversity values during construction, operational and at closure stages, and bear in mind risks and opportunities before inception of project activities. The process for developing a BMP focus on identifying, evaluating, conserving (and if possible enhancing) the relevant aspects of biodiversity, and serves to:

- Avoid or mitigate biodiversity loss, with the objective of maintaining the diversity of species, habitats and ecosystems and the integrity of ecological functions

- Contribute towards the remediation of significant global, regional and local biodiversity losses caused by expanding human economic activities worldwide; and
- Realise the project opportunities that arise from biodiversity management.

7.12.1 Determining the Priority Species, Habitats and Ecosystems

Species: Priority depends on the conservation status of the species, either in the IUCN Redlist/national/regional listing or a threatening invasive or colonizer. Criteria for conservation significance depend on:

- Species with strict ecological requirements, as well as
- Rare and endangered species;
- Endemic species;
- Species of special interest to local population.

Habitat/Ecosystem: Priority also depends on the conservation status as well as the threats and the impacts that may lead to loss through destruction, conversion or unsustainable use overtime.

Determining Priority Species: The IUCN's Redlist of Threatened Species online database is used to cross check the conservation status of the species. This involves running English or scientific names of the species on the online IUCN Redlist of Threatened Species database to confirm the conservation status of the species. Other reference resources include Kenya's Wildlife Conservation and Management Act Cap 376 and Birdlife International website which assist in achieving a comprehensive search on species especially those of local conservation interest.

The IUCN Invasive Species Specialist Group (ISSG) online database is operated by a global network of scientific and policy experts on invasive alien species under the auspices of IUCN. An invasive species is one that arrives (often with human assistance) in a habitat it had not previously occupied, then establishes a population and spreads autonomously. Species invasions are one of the main conservation threats today and have caused many species extinctions. The great majority of such invasions are by species introduced from elsewhere, although some native species have become invasive in newly occupied/disturbed habitats.

Determining Priority habitats/ecosystems: This involves valuing ecosystem services. Ecosystem services are the set of ecosystem functions that are useful to humans. Biodiversity richness improves the ecosystem efficiency and productivity, stabilizes overall ecosystem functioning, and makes ecosystems more resistant to perturbations.

The ***Millennium Ecosystem Assessment*** (between 2001 and 2005) assessed the consequences of ecosystem change for human well-being. The MEA 2005 established a framework for defining ecosystem services in relation to benefits people obtain from ecosystems (MEA, 2005).

7.12.2 Setting Targets for Priority Planning

Target Issues grouped, based on (i) priority ecosystems, (ii) priority species, (iii) processes & flux and (iv) ecosystem services

Targets for priority ecosystems	**Targets for priority species**
• Maintain extent – No reduction in size • Achieve condition – Maintain and/or improve the condition of the existing Menengai forest ecosystem • Restoration – Improve the condition of derelict or degraded ecosystems • Expansion – Increase the extent	• Range – Maintain or increase range compared to range in reference year or at start of monitoring • Population size – Maintain or increase population size compared to levels in reference year or at start of monitoring
Targets for processes & flux	**Targets for ecosystem services**
• Variation – Maintain current variation in, for example, wildfire; meaning avoid imposing	• Restoration/creation – of existing or new ecosystem services.

anthropogenic management cycles on naturally stochastic patterns	

Adopted from WBCSD, September 2014

7.12.3 Objectives for BMP Planning

- Conformity with the MoU between KFS and GDC

  Ensure the planning process conforms to the MoU between KFS and GDC with regard to nature conservation and creation of awareness on forest resources.

- Species of Conservation Interest

  Ensure that planning allows coexistence of the project and the wildlife especially those of conservation interest.

- Spread of Invasive Alien Species

  Ensure that the BMP contributes to the decrement in the spread of invasive alien species.

- Landscape Character

  Enhance the protection of key landscape connectivity and features that provide refugia for resident and vagrant wildlife.

- Risk of Wildfires

  Plan in anticipation natural wildfires occurrence and the need for an emergency response mechanism.

7.12.4 Review Analysis

(a) The MoU between KFS & GDC

- Forest Conservation: The impacts on flora will be assessed during development and production of geothermal resources and appropriate mitigation measures undertaken against removal of vegetation in areas cleared for roads, buildings and other structures.
- KFS shall regularly create awareness to GDC Staff on forest rules and regulations particularly with regard to conservation, proper disposal of waste, and handling of forest visitors.
- Develop a five (5) year Forest Management Plan for Menengai Forest to improve the eco system .and protect sacred groves and protected trees

(b) QPEA Land Review Memo

- The only way that forest land can cease to be forest land under the Forest Act is on the recommendation of KFS which then must be approved by a resolution of Parliament.
- While the Land remains a state forest under the Forest Act and is owned by KFS the lease option will not be possible. In order for the lease option to work, the QPEA Project site would need to be de-gazetted as forest land and be transferred to GDC after which GDC would be able to lease the land to QPEA.
- The Land being governed by the Forest Act and KFS being the owner, the only option would be for KFS to grant a special-use licence to GDC and QPEA.

7.12.5 Procedure for BMP

Purpose

To ensure that pressures to biodiversity emanating from our activities, products and services are identified and the risk associated with these pressures are determined and controlled

Responsibility

Project Engineer
HSE/CSR manager

Definitions

Conservation: refers to preserving, guarding or protecting; wise use of biodiversity resources
Eco-friendly: refers to not harmful to the natural environment.

7.13 KFS has the overall mandate on the creation of awareness on forest conservation (including charcoal burning and risk of wildfires) targeting staff and visitors of GDC and by extension QPEA. HSE&CSR manager shall undertake in-house awareness or form collaborations with GDC. Under collaborations, the HSE/CSR manager shall agree and engage GDC counterpart to:

- Directly conduct awareness programs for staff, or
- Facilitate staff to benefit directly from KFS awareness program.

7.14 QPEA shall promote an eco-friendly culture of minimizing the disturbance on the ecological balance within its project footprint during in-house meetings, trainings and editorial materials as well as CSR activities.

- The HSE&CSR manager shall constantly and conveniently remind other site staff and visitors not to collect or remove wild (plant / animals) products, rocks, seeds or nests or alter the natural environment unless necessitated by the project activities such as approved vegetation clearing.
- The HSE/CSR manager shall work closely with KFS Security through real time information sharing to deter staff and visitors from illegal collection of forest products. This will assist the KFS adhere to the Forest (Charcoal) Regulations, 2009.

7.15 QPEA shall also promote forest fire safety culture that encourage formation of tiered forest fire response system; that is a top tier mutual response team that includes GDC and KFS then a lower tier comprising of in-house team of trained fire Marshals.

- During routine HSE training, the HSE&CSR manager shall ensure in-house fire marshals are well equipped with skills and fire-fighting kits to combat minor wildfires before getting out of hand. Wildfire mock drills will be conducted at least once a year to gauge readiness and response.
- HSE&CSR manager shall ensure all present staff and visitors take part in the mock drills.
- HSE&CSR manager shall maintain an emergency response contact list (including liaisons from KFS and GDC) in the order of priority and displaying details such as staff names, institutions and their hotlines within the QPEA premises.
- The HSE&CSR manager shall ensure fire buffer zones are created and maintained around the project footprint including contractor camps and project offices, construction site and all utilities and facilities. The buffer zone should span 100 feet around the project sites.

7.16 The HSE&CSR manager shall ensure the following conservation related site instructions are timely communicated, adhered to and monitored:

I. Restricted and selective Site Clearing

- Make clear demarcations of project footprint before starting of any ground disturbing activities.
- Any East African Sandalwood bush falling on the project footprint shall be marked (by flagging and temporary fence) and made known to the engineers and contractor. The HSE&CSR shall prepare and make available photo plates and biogeography information of Sandalwood for use in identification by site staff.
- To the greatest extent possible, vegetation clearing shall be limited to the project footprint. Selective clearing shall be observed to:

    - preserve species/plants not causing obstruction to project activities;
    - protect the natural cover of protected species (e.g. the East African Sandalwood bushes);
    - preserve plants that are of landscaping or green-space value especially ornamental flowering species;

- Other general procedures for vegetation clearing

    - Any cutting shall be selective;
    - Taller plants shall be cut in a way to reduce damage to nearby vegetation to be preserved;
    - Cutting to stump shall be close and parallel to the ground level, as much as possible, with no sharp splinters or points remaining;
    - Special care shall be taken in clearing vegetation to allow for future regeneration and near ornamentals.
    - Removal of cut material and ferrying shall be done in a way to minimize disturbance on the soil cover or to the remained/preserved vegetation.
    - Invasive species monitoring on cleared areas shall include both documentation and site inspections:
        - Documentation shall involve creation and maintenance of an album/catalogue with photo-plates and bio-geographical details of all invasive species.
        - During monitoring, invasive species shall be identified and prioritized in terms of cover and colonization.
        - Consider site specific issues such as the particular impacts posed by an invasive species to native plant communities.
        - Analyzed data on mapping invasive species shall inform the control mitigations in the ESMP. Database on mapping the invasive species shall be created from the overtime mapping and the progress of invasive deterrence and trend of species spread.

II. Site re-vegetation and grassing for erosion prevention as well as visual intrusion

Site re-vegetation shall be treated as part of the soil erosion control/landscape management procedures:

- Cleared areas or exposed as a result of project activities shall be restored to a natural state by seeding, replanting, or other agreed upon means with native trees, shrubs, and/or grass including establishment of canopy, sub-canopy (if relevant), understorey and ground strata;
- Native species shall be prioritized for the re-vegetation of the disturbed sites. The planting shall consider the recommendations of Menengai Forest Management Plan and the immediate surrounding vegetation where the project is located, and comprise a diverse community structure (re-vegetation comprise both woody and herbaceous species).
- A re-vegetation report shall be compiled regularly in line with the forest management plan to monitor the progress & success. The success is

considered as 80 percent survival of plantings or 80 percent ground cover for broadcast planting of seed after a period of 3 years.

III. Traffic conduct within Wild Environment

HSE&CSR manager shall promote Traffic Rules in the KFS zone as part of eco-friendly culture, in particular speed limits and keeping to designated roads and tracks. Part of the instruction to Driver shall be:

- Always stay on roads or designated tracks when in the Forest Reserve to avoid damage on vegetation due to off-road driving;
- Maintain a speed limit of 40kph (25mph) – and animal always have the right of way;
- Avoid vehicular disturbance by keeping distance from animals as they become distressed when vehicles come close. Keep noise at minimum.

IV. Maintenance of incident records

- KWS/KFS shall be notified (for further action) within 24hours of finding any injured species of conservation interest or any unanticipated damages to their habitats. Contents of notification include the date, time, and location of the incident, and any other pertinent information.

V. Insulation of high heat points and emission vents

- The structural design for the power plant shall be provided with heat insulations and blockades for heat points/emission vents to deter birds from perching, nesting, or roosting.

- HSE/CSR shall make recommendations to the project engineer on risk points within the project structures for design modifications/additions.

VI. Wildlife monitoring

- KFS alongside other government agencies have the lead mandate on wildlife monitoring within the park/reserve areas. HSE&CSR shall liaise with the GDC (and by extension KFS) in establishing (1) quantity and quality of habitats and species, (2) threats and (3) progress in conservation efforts within the project footprint and other areas of influence.

7.16.1 BMP monitoring tools

7.16.2 Record Management

The HSE&CSR should create a filing system for storing the plans documents but in line with internal administrative procedures.

7.16.3 Incidence/complaint and Corrective Action

The MoU and any other agreements between GDC and KFS requires GDC (and by extension QPEA) to undertake mitigation measures during geothermal development. The HSE&CSR manager shall escalate to the Project Engineer, environmental incidences associated with the project. The report will include the details such as:

- The date, time and type of the incident;
- Identify the possible basis of the incident;
- Details on the necessitated remedial/corrective action taken including date;
- Details on the proposed measures to address the incident

Incidence should be reported within 48 hours of occurrence and known to the project engineer.

7.16.4 Compliance Auditing

The BMP document shall be included among other HSE plans and made accessible during audits to determine compliance with the forest management plan, re-vegetation / restoration as well as biodiversity management requirements.

7.16.5 Review of Management Plan

The HSE&CSR manager (in consultation with GDC & KFS-Menengai) shall manage the review of the BMP every five years to align with reviews of the Menengai Forest Management Plan. The BMP will also be reviewed according to changes in the environmental procedures and requirements of the Project, upgrades on the current available technology or best management practices, operational procedures and regulatory requirements.

7.16.6 Reports Production

Table 7-2 Reporting

Report	Title of the Report	Prepared by	Scope	Review by	Frequency and Timing
Biodiversity Management/Ecological Monitoring	Daily Inspection Reports	HSE&CSR manager; Site Staff	Reports related to site instructions and daily routines such as site clearing & re-vegetation	HSE&CSR manager	Daily
	Monthly Progress Reports	HSE&CSR manager; Site Staff	Compilation from daily inspection reports and routine awareness based on the work progress	Project Engineer	Monthly
	Quarterly / Semi-annual / Annual Reports	HSE&CSR manager; Project Engineer	Compilation from monthly reports, major ecological surveys. This will focus on the overall efficacy of the biodiversity management against the performance / completion criteria, and spot issues for adaptive management	Top Management / GDC	Accordingly

7.16.7 The Trigger Action Response Plan (TARP)

Table 7-3 TARP for the Biodiversity Management Plan (BMP)

No.	Aspect	Element	Trigger	Action
1.	Awareness on conservation	Efficacy and adequacy of awareness process	Attitude towards Information, Education, and Communication (IEC) Dynamic shifts in thematic content of training	(a) Conduct post training needs assessment survey to establish general perception as well as populate content gaps for filling; (b) Prioritize emerging issues for next training. (c) Engage GDC to conduct training on specialized recommendations/emerging issues.
2.	Vegetation clearing	(a) Percentage cover (b) Health (c) Species diversity (d) Recruitment (e) Area	Deterioration in the state of vegetation based on the over the time ecological monitoring data. Scale of clearing exceeds Approved instructions Clearing outside of delineated zones	(a) Field inspection to establish cause; (b) If required, GDC consults with KFS-Menengai to get specialist recommendations; (a) HSE&CSR manager to inform the project engineer and top management (b) Consultations with GDC & KFS- Menengai on where clearing exceeds approval, undertake habitat restoration and re-vegetation
3.	Site re-vegetation	Re-vegetation	Failure in re-vegetation / planting	(a) Field inspection to establish cause; (b) If required, GDC consults with KFS-Menengai to get specialist recommendations; (c) Align resumption of re-vegetation as per

No.	Aspect	Element	Trigger	Action
				recommendations achieved from the case investigations.
4.	Traffic conduct	Speed limit	Increased incidence of wildlife loss	(a) Field inspection to establish cause; (b) In consultation with KFS-Menengai, GDC conducts intense traffic counts and speed monitoring surveys and analysis at incident spots; (c) Adopt recommendations according to inferences from the investigations.
5.	Incidences	Human-Wildlife Conflict	Rise in cases	Case by case analysis by specialists from KFS-Menengai. Recommendations from the analysis adopted at case level and necessary remedial actions taken for future deterrence.
6.	Bird Injuries	Influx of cases	Structural failure of the power plant	Design review as well as assessment of project area on habitat modification that cause the rise in cases.
7.	Wildlife monitoring / Control of invasive alien species	Widespread and abundance of invasive Landscape character for in situ conservation and habitat management.	Increase in number of invasive species Maintain or Restore Landscape Connectivity	Ecologist engaged to advise on control measures to be for implementation Conduct ecological and landscape assessment to establish the barriers (such as roads/fences) to landscape connectivity/habitat fragmentation, visual intrusion

7.16.8 Monitoring and Evaluation Reports

Table 7-4 Framework for Monitoring and Evaluation Indicators

No.	What to monitor	Objectively Verifiable Indicator (OVI)	Means of Verification (MoV)	Frequency
1.	Creation of awareness on conservation	Number of awareness meetings; Minutes of awareness meetings; Reduced sighting of number of kilns at the site.	Minutes of meetings; Reports	Quarterly Monthly
2.	Selective and restricted clearing	Site instructions given for clearing	Reports	Monthly
3.	Site re-vegetation	Number of seedlings; survival rates and exposed grounds	Reports	Monthly
4.	Traffic conduct within wild environment	Number of cases reported as over speeding and off-road driving	Reports	Daily
5.	Maintenance of incidence records	Cases records; Trend of decline overtime	Reports	Daily
6.	Insulation of high heat points and emission vents	Birds spotted perching, Nesting or roosting	Reports	Quarterly
7.	Wildlife monitoring / Control of invasive alien species	Trends from ecological surveys	Ecological survey reports	Quarterly

7.16.9 Framework for Monitoring Parameters

Table 7-5 Framework for Monitoring Parameters

No.	Outcome	Data required	Source of Review Records	Method	Sampling Frequency	Data collection
1.	Awareness on conservation	Content on capacity building in awareness materials	Technical Manager; HSE Records	Review of material evidence of awareness (meeting minutes /scripts)	Quarterly	Desktop studies & interviews
2.	Vegetation clearing	Extent of area cleared area. Species cleared (and where feasible, Number, Number of stems, Height, Breast diameter)	Technical Manager; HSE Records	Review of site instructions records	Monthly / Quarterly	Field Inspection & interviews and Desktop studies
3.	Site re-vegetation	Species, Number, survival rates, patches without cover; (per area planted)	Technical Manager; HSE Records	Review of site instructions records	Monthly / Quarterly	Field Inspection & Desktop studies
4.	Traffic conduct	Number of over-speeding / off-road driving detected along site routes	KFS	Analyse traffic camera video clips; Review of traffic control register.	Monthly / Quarterly	Field Inspection & Desktop studies
5.	Incidences	Species and the number of victims during site activities	Technical Manager; HSE Records	Review of site instructions records	Monthly / Quarterly	Desktop studies & interviews
6.	Bird Injuries	Species and the number of victims during site activities	Technical Manager; HSE Records	Ecological survey reports	Annually	Desktop studies & interviews
7.	Wildlife monitoring / Control of invasive alien species	Number, Density and cover of invasive alien species identified within project footprint	KFS	Ecological survey reports	Semi-annually	Field Inspection & Desktop studies

7.16.10 Evaluation Framework for the Biodiversity Management Plan (BMP)

Table 7-6 Evaluation Framework for the Biodiversity Management Plan (BMP)

No.	Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
1.	Awareness on conservation	Number of awareness meetings; Minutes of awareness meetings; Reduced sighting of number of kilns at the site.	Minutes of meetings; Reports	Suitably qualified and trained staff will be engaged to deliver the services.
2.	Vegetation clearing	Site instructions given for clearing specifying locations and unit trees.	Reports	The project engineering report provides a guide on issuing site instructions for clearing.
3.	Site re-vegetation	Number of seedlings; survival rates and exposed grounds	Reports	Clearing and re-vegetation are done in tandem
4.	Traffic conduct	Number of cases reported as over speeding and off-road driving	Reports	All vehicles are subject to a common speed limit
5.	Incidences	Cases records; Trend of decline overtime	Reports	Humane wildlife controls in place for used to wade off / flush out hiding animals. Consult GDC and KFS- Menengai
6.	Bird Injuries	Birds spotted perching, nesting or roosting	Reports	Bird monitoring conducted regularly
7.	Wildlife monitoring / Control of invasive alien species	Trends from ecological surveys	Ecological survey reports	Wildlife free range and disperse throughout and the habitats at Menengai Crater are a continuum including the project footprint

Site vegetation site data log

No.	Species Name	Species Conservation Status		Vegetation Type						Percentage Cover			
		Species of Conservation Interest	Native Species	Tree	Shrub	Ground Cover / Creepers	Herbaceous	Succulent	Grass	% Bare ground	% Invasive Species	% Native Vegetation Cover	Total
1													100%
2													100%
3													100%
4													100%
5													100%
6													100%
7													100%
8													100%
9													100%
10													100%

Additional Details for Data Collection

Groups of Information	What, When, Who, Why	Where	Other Information
What to Record	Data Record Number Name of Invasive species Date of Inspection Who inspected the site Purpose of inspection visit	Specific locality name GPS Co-ordinates (Latitude[Northing] & Longitude [Easting])	Mitigation (Types of control and/or eradication) Comments Number of records for the site Land use category

Vegetation Monitoring Matrix

(a) Vegetation Clearing

No.	Species Name	Conservation Status	Vegetation Type	Change in Cover Overtime									
				Before Clearing	After Clearing								
					wk1	wk2	wk3	wk4	wk5	wk6	wk7		
1.													
2.													
3.													
4.													
5.													

(b) Site Re-vegetation

No.	Species Name	Conservation Status	Vegetation Type	Change in Cover Overtime									Percentage Change	
				Before Re-vegetation	After Re-vegetation									
					wk1	wk2	wk3	wk4	wk5	wk6	wk7		Increase (+)	Decrease (-)
1.														
2.														
3.														
4.														
5.														

8 HEALTH AND SAFETY MANAGEMENT PLAN

8.1 Health and safety management Plan

A number of typical workplace hazards will be encountered in QPEA GT Menengai Ltd Menengai site. These include but are not limited to the following.

- House keeping
- Falling objects
- Falls from heights
- Confined spaces
- Lifting operations
- Cranes
- Welding
- Gas cutting
- Grinding
- Erection of steel work
- Installation of pipeline etc.
- Transportation / Lifting of heavy equipment
- Radiography
- Noise
- Exposure to hydrogen sulfide (H2S)

Prevention and management of these hazards will be through enforcement of a safety plan (section 8.4) and the various work instructions (section 9.2) formulated by the QPEA GT Menengai Limited. In addition, specific plans have been defined for air quality and noise management as presented below.

8.2 Air Quality management

Within QPEA GT Menengai Limited premises, respiratory protective equipment shall be made available to all persons who are exposed to any situation in which there is a possibility of the atmosphere being or becoming deficient in oxygen or containing any harmful substance, whether particle, dust, mist, vapour or gas including:

- Work in locations, containers or vessels where a danger of oxygen deficiency or harmful gases like hydrogen sulfide (H2S)may be present
- Work in cellars/basements, sewer or enclosed septic tanks
- Work in refrigeration plants where the danger of escape of refrigerant gas exists
- Grit or abrasive blasting operations

Whenever the technical manager anticipates an H_2S hazard in QPEA GT Menengai Limited operations, every involved worker will take H_2S awareness course including lifesaving procedures. In conjunction with the H_2S training, adequate training on breathing apparatus will be given as per the code of practice on respiratory equipment.

QPEA GT Menengai Ltd has conducted Air modelling studies for the Menengai Plant to determine the dispersion of air pollution within the plant and the surrounding environment.

The following is key information regarding H_2S:

- H_2S CHARACTERISTICS: Hydrogen sulfide is a highly toxic gas; in high concentrations it can kill in minutes by paralyzing the respiratory system. It is colorless, heavier than air (density 1.19) and highly soluble in water. In low

concentrations, hydrogen sulfide smells like rotten eggs: but in high concentrations, it dulls the sense of smell after one whiff.

Sense of smell cannot be relied on to detect hydrogen sulfide; people who thought they could use their sense of smell to detect H_2S have been killed by the gas.

- H_2S DETECTION: Gas Teck, Draeger or other suitable approved detectors shall be used to detect and monitor H_2S levels. Instructions on the proper use of these instruments must be given. HSE&CSR manager shall ensure that the gas detection and monitoring devises used are duly calibrated and monitoring records maintained.

Whenever employees are required to enter an H_2S area they will do so in pairs, utilizing the buddy system in case an accident should occur.

All H_2S working areas will be equipped with fixed H_2S level monitors with alarm system capable of being triggered at established threshold levels.

QPEA GT Menengai Limited shall be responsible for continuous H_2S monitoring within its premises and monitoring reports shall be maintained by the HSE&CSR manager. Any exposure of employees to H_2S will be recorded in line with the Environmental Management and C-ordination (Air Quality) Regulations, 2014.

As part of its due diligence, Quantum shall continually liaise with GDC and the other IPPs on site to ensure that the community around the project site is sensitised on the key items of the emergency response systems and drills related to the air quality management procedures.

QPEA GT Menengai Limited will liaise with GDC to continuously get monitoring feedback on H_2Smonitoring network within the entire Menengai caldera and in the identified monitoring points in surrounding communities.

8.2.1 Required Documentation

- Emission measuring equipment schedule and calibration certificates; and
- Emission monitoring report
- Records of pollution exposure results.

8.3 Noise

8.3.1 Legal and other requirements

- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, 2006

Procedure/guidelines

In order to minimize and ensure low impacts of both construction and operational noise on the receiving environment it is recommended that the following measures will be adopted as part of the noise management plan.

- Technical manager shall ensure that design of the facilities incorporate noise abatement measures as far as feasible. Equipment vendors shall be required to guarantee optimized equipment design noise levels;
- Technical manager and HSE & CSR manager shall ensure that environmental noise emitted is well contained and shall not exceed the noise levels as set out in the Environmental Management and C-ordination (Noise and Excessive Vibration Pollution (Control)) Regulations and other relevant guidelines.

- The technical manager shall ensure that acoustic attenuation devices are installed on all ventilation outlet and that high pressure gas or liquid should not be ventilated directly to the atmosphere, but through an attenuation chamber or device;
- Vibrating equipment must be on vibration isolation mountings;
- The contractor shall be required to use noise abatement equipment, in good working order, on all heavy machinery used on the project;
- As far as feasible, the contractor shall minimize noise levels during construction;
- Workers in noisy environments shall be provided with and must wear ear plugs or mufflers. No worker shall be exposed to noise level in excess of the continuous equivalent of 90dB (A) in eight hours within any twenty-four hours duration;
- A plan to monitor noise levels, record and respond to complaints and mitigate impacts should be developed. This to include regular monitoring of noise levels will need to be made during operation as per current practice in existing GDC operations;
- The noise levels within QPEA GT Menengai Limited facilities shall be measured on a regular basis and documented for monitoring. This will include short term 24-hour to 1-week sampling conducted at the facility boundaries including the turbine building facades and other sources located inside and outside buildings as well as nearest sensitive receptors. QPEA GT Menengai Ltd will also liaise with GDC to receive noise monitoring results obtained from sensitive receptors outside the Menengai geothermal fields.

8.3.2 Required Documentation

- Noise assessment report;
- Noise measuring equipment schedule and calibration certificates; and
- Noise monitoring report.

8.4 Safety Plan

8.5 Emergency Response and Management Plan

9 PROCEDURES

9.1 Procedures

10 WORK INSTRUCTIONS

10.1 Work Instructions