



Rotan Power Combined Cycle Gas Turbine Power Plant, Ghana

Volume IV - Environmental and Social
Management and Monitoring Plan

April 2017

Rotan Power Limited



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1 Introduction

1.1 Overview

This report is the Environmental and Social Management and Monitoring Plan (ESMMP) for the Rotan Power Combines Cycle Gas Turbine (CCGT) power plant (the Project). The primary objective of an ESMMP is to safeguard the environment, site staff and the local population from site activity which may cause harm or nuisance. This ESMMP is intended to provide a framework to ensure transparent and effective monitoring, prevention, minimisation, mitigation, compensation and off-setting measures to address the environmental and social impacts associated with the Rotan Power CCGT power plant.

This document constitutes Volume IV of the Environmental and Social Impact Assessment (ESIA) process which has been undertaken by Mott MacDonald. The ESIA comprises four volumes organised as follows:

- Volume I: Non-Technical Summary
- Volume II: Environmental and Social Impact Assessment (Main Report)
- Volume III: Technical Appendices
- **Volume IV: Environmental and Social Management and Monitoring Plan (this volume)**

This ESMMP is an overarching framework for environmental and social (E&S) management covering both the construction and operation phases and should be updated and/or revised as necessary to address the prevailing conditions of the Project. Responsibilities for implementation of identified mitigation or management actions are outlined in the ESMMP and fall on either Rotan Power Ltd (the Project Proponent) or the Turnkey Contractor. At the time of writing a Turnkey Contractor has not been appointed.

The Project Proponent, in collaboration with the Turnkey Contractor, will be required to transpose the measures and principles of this framework document in to a Construction Environmental and Social Management and Monitoring Plan (CESMMP). The CESMMP details environmental control steps necessary to reduce E&S impacts through the entire construction phase of the Project, identifying as a minimum:

- A description of the works
- Regulatory requirements
- Site organisation and management
- Roles and responsibilities
- Review, reporting and auditing procedures
- Environmental and social risks and impacts
- Mitigation and protection measures
- Monitoring requirements
- Training requirements
- Emergency response plans
- Method statements (where applicable)

The development of the CESMMP will be prepared prior to site preparation and construction works, and will be supported by the following:

- **Policies** – overarching system of principles to guide the Project's environmental and social performance.
- **Plans** – additional, more detailed plans prepared by the Turnkey Contractor related to specific aspects and areas which are impacted by their scope of works (i.e. Waste Management Plan).
- **Procedures** – more specific work instructions developed by the Project Proponent, in collaboration with construction Turnkey Contractor, to support the implementation of the plans.

For the operation phase, the Project Proponent will be responsible for ensuring the Project complies with mitigation measures outlined within this document. Typically, this would take the form of an Operational Environmental and Social Management and Monitoring Plan (OESMMP) or part of an Environmental and Social Management System (ESMS).

1.2 Structure of this ESMMP

Section 1 introduces this ESMMP (this section)

Section 2 looks at the institutional arrangements covering the construction and operational phases of the Project.

Section 3 sets out the mitigation and management objectives that the need to be met as part of the ESMMP by the Turnkey Contractor and the Project Proponent. The predicted impact is identified, alongside the proposed management and/or mitigation to address the impact. Responsibilities and timescales are identified. This provides the framework for specific management plans to be produced.

Section 4 provides an overview of reporting requirements associated with the activities and commitments contained within the ESMMP documentation. The reporting requirements include an 'adaptive management' capacity to the ESMMP reflecting that it is intended to be a live document subject to regular review and update as the Project activities evolve.

2 Institutional Arrangements

2.1 Overview

Responsibility for the implementation of identified mitigation, monitoring and management actions are outlined in the ESMMP and fall mainly on the Turnkey Contractor. It will be the responsibility of the Project Proponent to monitor, audit and assess the compliance of the Turnkey Contractor's implementation of the relevant aspects of this ESMMP during the construction phase and ensure that corrective actions are taken when necessary to maintain environmental, health and safety (EHS) performance in line with international standards and Good International Industry Practice (GIIP).

The Turnkey Contractor will be required to transpose the measures and principles of this framework document into its own CESMMP, while the Project Proponent will be required to transpose the measures and principles of this framework document into an OESMMP.

2.2 Roles and responsibilities

2.2.1 The Project Proponent's role

The Project Proponent (Rotan Power Limited) will have the overall responsibility for the compliance of the Project during the construction and operational phases with the mitigation measures outlined within this ESMMP. The Turnkey Contractor will be required to meet the specific requirements outline within this ESMMP for the construction phase and this is to be implemented through the use of contract clauses within agreements between the Project Proponent and the Turnkey Contractor. Clauses to be inserted in the Turnkey Contractor's agreements should ensure compliance with this ESMMP and appropriate international requirements such as the IFC/WB Performance Standards.

The Project Proponent is to monitor the Turnkey Contractor' performance on a regular basis and will undertake the following throughout the duration of the construction period:

- Review Turnkey Contractor documents against the requirements of this ESMMP
- Undertake regular audits
- Continuously check records
- Set up a Turnkey Contractor reporting structure
- Conduct regular meetings where EHS is an agenda item

During the construction phase the Project Proponent should closely monitor all reports received from the Turnkey Contractor to monitor compliance. Mitigation measures described for the operational phase will be implemented by the Project Proponent using the proposed system described in this document.

2.2.2 The Turnkey Contractor's role

It will be the responsibility of the Turnkey Contractor to implement the construction phase mitigation measures outlined within this document and to ensure compliance of any construction sub-contractor in meeting the requirements within it. The Turnkey Contractor will be required to undertake regular monitoring

and inspections of the construction sub-contractor and the Project sites and will be required to keep up to date records as prescribed in this ESMMP and report regularly to the Project Proponent.

2.2.3 Third party auditing

An independent, accredited third party will periodically undertake audits during the construction and operational phase to ensure compliance of the Project with this ESMMP. The Project Proponent and the Turnkey Contractor will be required make available all records of monitoring and meetings during any construction monitoring visits that the auditor may undertake.

2.2.4 Owners engineer

The role of the Owners Engineer (OE) is to supervise construction, including acting as the representative of the Project Proponent, also managing all E&S aspects of the Project.

2.2.5 Lenders environmental and social consultant

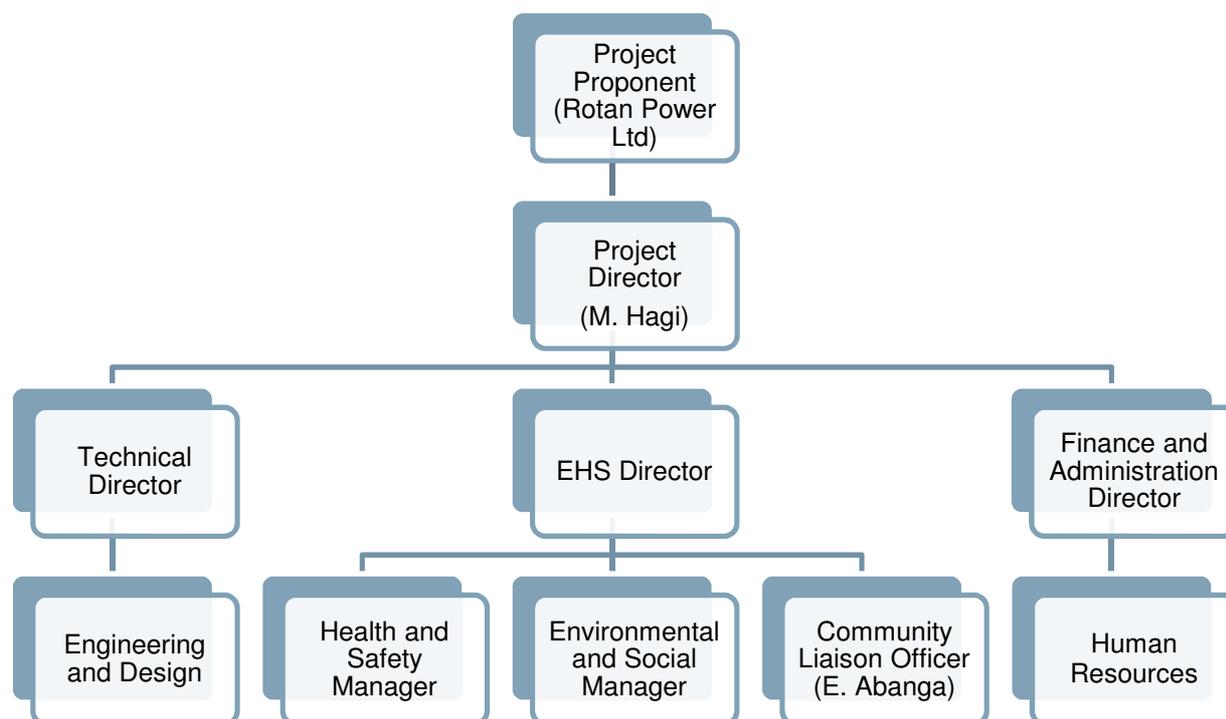
The Lenders Environmental and Social Consultant (LESC) will periodically undertake audits during the construction and operational phase to ensure compliance of the Project with this ESMMP. The Project Proponent and the Turnkey Contractor will be required make available all records of monitoring and meetings during any construction monitoring visits that the LESC may undertake.

2.3 Project Proponent EHS management

The Project Proponent will finalise its formal EHS and social policies and systems along with other management systems that will be in place for the commencement of construction and carried into operation. It is the Project Proponent's intention to develop a comprehensive EHS Department to oversee and manage all EHS issues during the construction and operational phases.

A preliminary staffing structure of the EHS department is under development but consists of the key roles as set out in Figure 2.1 and in Table 2.1. The Project Proponent's personnel key roles and responsibilities will be set out in procedures created as part of the EHS management system, including organisational and individual working procedures.

Figure 2.1: Preliminary EHS Organogram



Source: Project Proponent

Table 2.1: The Project Proponent’s core EHS Department - key roles and responsibilities

Role	Num	Responsibility	Location	Construction	Operation
EHS Director	1	Policy, overall responsibility, government liaison	Head Office with regular visits to Project site	✓	✓
EHS Manager	1	Compliance reporting on EHS issues to the EHS Director	Head Office with regular visits to Project site	✓	✓
Community Liaison Officer (CLO)	1	Management and monitoring of social issues and performance	Head Office with regular visits to Project site	✓	✓
EHS Support staff	to be defined	Community liaison, EHS reporting and monitoring, etc.	Head Office with regular visits to Project site	✓	✓

It should be noted that there will also be a number of support staff, including environmental officers and engineers and technicians, social specialists and administrative staff. Whilst some evolution of the department structure, staff numbers and responsibilities will change as the Project moves through construction into operation the overall structure and roles and responsibilities will be defined during its inception and modifications implemented as required.

2.4 Turnkey Contractor's EHS management

The Turnkey Contractor will be required to adhere to the principles of ISO 14001:2015¹ and OHSAS 18001:2007² or equivalent if not already accredited. These standards place strong emphasis on the need for continuous improvement of the EHS management systems and resultant EHS management performance.

The appointed Turnkey Contractor will be required to agree to the following actions:

- Develop a project specific CESMMP
- Elaborate other management plans
- Implement the requirements of the mitigation activities in the CESMMP
- Produce detailed method statements relating to key activities that include specific reference to requirements of the plans contained herein during the Project progression.
- Provide all training necessary to oversee and implement CESMMP requirements prior to and throughout construction as appropriate
- Be responsible for producing comprehensive suite of EHS management and coordination procedures
- Identify a full time person on site with dedicated EHS responsibilities to oversee works on site.

The Turnkey Contractor will be required to be responsible for sub-contractors' performance, including sub-contractor(s) adherence to the requirements of the CESMMP. All sub-contractors will be required to have dedicated E&S staff to implement the CESMMP and to monitor and manage this on an on-going basis. The sub-contractors staff will be required to liaise closely with the Turnkey Contractor's EHS staff including the provision of monthly reports and participation in weekly construction review meetings, for example. A typical construction Contractor EHS staffing structure that could be expected for this Project is set out in Table 2.2 below.

¹ ISO 14001:2015 <http://www.iso.org/iso/home/standards/management-standards/iso14000.htm>

² OHSAS 18001:2007 <http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/>

Table 2.2: Typical Turnkey Contractor EHS staffing

Role	Number*	Responsibility	Location	Comment
Project Director	1	Overall responsibility for EHS performance of Project contracted works, including sub-contractor(s).	Project site	-
Construction Site Manager	1	Responsible for practical implementation of EHS requirements at site and for onsite EHS performance.	Project site	-
EHS Manager	1*	Monitoring and reporting of project EHS performance. EHS regulatory interface.	Project site	*Number of officers may vary depending on level of construction activity
EHS Officer(s)	1*	Management and monitoring of CESMMP plans implementation and environmental issues and performance	Project site	*Number of officers may vary depending on level of construction activity
Support staff	to be defined		Project site	*Number of officers may vary depending on level of construction activity

*Number of officers may vary depending on level of construction activity

3 Policies, Plans and Procedures

This Chapter summarises the mitigation and control measures that should be implemented during the construction phase of the proposed Project. These mitigation measures are drawn out from the extensive environmental impact assessment that has been undertaken for the proposed Project.

Mitigation measures as defined by the following control plans will be implemented during the construction phase of the proposed Project:

- Section 3.1: Air Quality
- Section 3.2: Water Discharges and Flood Risk
- Section 3.3: Soil and Ground Conditions
- Section 3.4: Noise
- Section 3.5: Terrestrial Ecology and Biodiversity
- Section 3.6: Waste, Materials Handling and Storage
- Section 3.7 : Landscape and Visual
- Section 3.8 : Cultural Heritage
- Section 3.9: Socio-economics
- Section 3.10: Hazards and Accidents
- Section 3.11: Climate Resilience and Adaptation
- Section 3.12: Greenhouse Gas Emission

3.1 Air Quality

Table 3.1: Air Quality management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid dust generation from construction activities and plant	<ul style="list-style-type: none"> <input type="checkbox"/> Development of a Dust Management Plan <input type="checkbox"/> Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression) <input type="checkbox"/> Minimising dust from open sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content <input type="checkbox"/> Keep all vehicle movements on site to designated haul routes and employ dust suppression techniques, such as applying water or non-toxic chemicals to minimize dust emissions <input type="checkbox"/> No open burning of solid waste 	Turnkey Contractor	<p>Turnkey Contractor to undertake daily visual inspections</p> <p>Project Proponent EHS support staff to undertake visual checks of construction area every two weeks</p>	Maintain a record of high dust incidents. In the event high dust levels are as a result of poor site management Project Proponent to impose disciplinary action on Turnkey Contractor
Avoid dust generation from construction vehicles	<ul style="list-style-type: none"> <input type="checkbox"/> Manage emissions from mobile sources as per the EHS Guidelines for Air Emissions and Ambient Air Quality <input type="checkbox"/> Develop a Traffic Management Plan <input type="checkbox"/> Emissions from on-road and off-road vehicles should comply with national requirements. In the absence of these, the following should be considered: <ul style="list-style-type: none"> – Regardless of the size or type of vehicle, owners / operators should implement the manufacturer recommended engine maintenance programmes – Drivers should be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits – Old construction vehicles should be replaced with newer more fuel efficient alternatives – Convert high use vehicles to cleaner fuels where possible – Install and maintain emission control devices such as catalytic convertors <input type="checkbox"/> Implement regular vehicle maintenance and repair programme. 	Turnkey Contractor	Project Proponent to EHS support staff to undertake visual inspection of construction site every two weeks	Turnkey Contractor to keep copy of all service records for construction plant and construction vehicles

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Operation				
Avoid increase in ambient pollutant concentrations of NO _x , NO ₂ , SO ₂ , VOCs and PM ₁₀ in the proposed Projects airshed	<ul style="list-style-type: none"> <input type="checkbox"/> Continuously monitor ambient concentrations of NO_x and NO₂ in accordance with internationally recognised approaches <input type="checkbox"/> Continuously monitor ambient concentrations of SO₂ <input type="checkbox"/> Continuously monitor ambient concentrations of PM₁₀ <input type="checkbox"/> Monitoring combustion efficiency to manage emissions of VOCs <input type="checkbox"/> Include a dispersion model ready meteorological station in accordance with US EPA guidance which can monitor wind speed, direction and temperature <input type="checkbox"/> Be subject to regular calibration procedures and audits to ensure proper function in accordance with international best practice <input type="checkbox"/> Be located offsite, at the point of maximum impacts predicted by the dispersion modelling where there is population exposure <p>To avoid any future cumulative impacts:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Regular liaison between operators <input type="checkbox"/> Regular reporting of results <input type="checkbox"/> A strategy for actions in the event of exceedances of national ambient standards or emission limits 	Project Proponent	Emissions monitoring and ambient monitoring (including use of consistent approaches and standards where appropriate)	Monthly records of monitoring results

3.2 Water Discharges and Flood Risk

Table 3.2: Water Discharges and Flood Risk management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Control discharges to avoid adverse impacts on receptors	<ul style="list-style-type: none"> <input type="checkbox"/> No discharge of sewage water without primary treatment <input type="checkbox"/> Wastewater streams from toilet facilities and kitchens located in the Project area will be disposed of once treated or using a septic tank and soakaways <input type="checkbox"/> Water containing silt will not be pumped directly into any surface water bodies <input type="checkbox"/> Settlement ponds to collect run-off from the construction site (from washing aggregate and/or storm water) to allow suspended solids to settle prior to discharge and to be located close to the wash plant 	Turnkey Contractor	Daily visual inspection and regular water quality monitoring	<p>Monthly records of water quality analysis</p> <p>Monthly records of visual inspections on marine flora and fauna</p>

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> <input type="checkbox"/> Suitable provision is to be made for the storage and handling of concrete wash water, the washing out of concrete mixing plant or ready mix concrete lorries so that washings do not flow into any drain, any watercourse, or seep underground. Wash water is to be stored and allowed to evaporate in a settlement pond. 			
Avoid flooding from the Anakwari River and its tributaries	<ul style="list-style-type: none"> <input type="checkbox"/> In order to minimise and reduce the risk of flooding the Project site is recommended to be set and levelled at 6.32mAMSL. <input type="checkbox"/> Provide proper internal drainage system 	Turnkey Contractor	Visual inspections and monitoring of levelling works	<ul style="list-style-type: none"> <input type="checkbox"/> Design plans <input type="checkbox"/> Monthly site monitoring logs

3.3 Soil and Ground Conditions

Table 3.3: Soil and Ground Conditions management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid soil erosion and sediment advection with rainwater runoff due to construction activities	<ul style="list-style-type: none"> <input type="checkbox"/> Strip and stockpile valuable top soils before commencing construction works. <input type="checkbox"/> Construction zones will be created to minimise the work footprint. Work will be restricted to these areas which will be demarcated. 	Turnkey Contractor	Daily visual checks for: <ul style="list-style-type: none"> <input type="checkbox"/> Heavy machinery traffic breaches of working area will be monitored <input type="checkbox"/> Monitoring performance against provisions in Habitat removal and restoration plan 	<ul style="list-style-type: none"> <input type="checkbox"/> Proportion of land revegetated <input type="checkbox"/> Log of breaches of heavy machinery traffic and complaints relating to traffic and transport. <input type="checkbox"/> Documentation to show topsoil stockpile location and amounts <input type="checkbox"/> Records of toolbox talks on soil and ground conditions, refuelling activities and PPE <input type="checkbox"/> Plans of construction zone area
Avoid exposure to contaminants in soil and their effect to human health and groundwater during construction activities	<ul style="list-style-type: none"> <input type="checkbox"/> Strictly regulate heavy machinery traffic. Heavy vehicles to be confined to working areas and access roads. Limit the movement of machinery to the work sites and marked access ways. <input type="checkbox"/> Measures to reduce runoff across the site, minimise erosion and minimise the potential for contaminants to migrate to groundwater or surface water features. <input type="checkbox"/> Appropriate revegetation and rehabilitation of land as soon as possible after disturbance. <input type="checkbox"/> Undertake soil sampling prior to any earthworks to minimise potential for exposing contaminated soil thus opening pathways to human receptors and facilitating mobilisation via groundwater. <input type="checkbox"/> Baseline values for soil and groundwater quality should be established before construction at the site. These values will be used for comparison with future monitoring results and to identify the conditions the site should be returned to in future when the pipeline has been decommissioned. <input type="checkbox"/> An Occupational Health and Safety Plan will be 			

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Avoid disturbance of sensitive topsoil in temporary construction areas and access tracks	<p>developed and implemented for the whole CCGT Project.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Suitable topsoil will be removed and stockpiled for reuse during site rehabilitation and landscaping. The topsoil stockpiles will be stored in such a way that the soils are not damaged and that they are not eroded. This may include covering the soils. <input type="checkbox"/> Scarify as needed damaged sites, regrade the sites, then replace the layer of topsoil that was previously put to the side during construction work. <input type="checkbox"/> Topsoil spread out, graded and seeded. Access road grading and seeding as required. 	Turnkey Contractor	Regular visual inspection of topsoil.	Monthly report summarising topsoil stockpile location and amounts, and information on regraded areas
Avoid mobilisation of dust and secondary impacts on human health	<ul style="list-style-type: none"> <input type="checkbox"/> Use best practice construction methodology in line with local regulations and international guidelines. <input type="checkbox"/> Undertake earthworks during suitable weather conditions i.e. low wind strength to minimise the level of windblown dust, which may be potentially contaminated. <input type="checkbox"/> Use damping down of soils during dry conditions. <input type="checkbox"/> Contractors to wear suitable PPE to protect against inhalation of dust. A risk assessment will be carried out to identify the level of PPE required in line with site specific risk factors. <input type="checkbox"/> Any material to be used for reinstating ground to be tested for contaminants 	Turnkey Contractor	Daily visual checks for: <ul style="list-style-type: none"> <input type="checkbox"/> Any sign of vegetation and washing and reduced visibility <input type="checkbox"/> Any sign of contamination such as staining and fuel smell 	Records of daily visual checks and any dust grievances
Avoid leaks and spills to the ground	<ul style="list-style-type: none"> <input type="checkbox"/> Use best practice construction methodology in line with local regulations and international guidelines. <input type="checkbox"/> Maintain transportation vehicles and machinery in good working order so as to avoid oil and fuel leaks and all other pollutants. Drip trays must be used when servicing vehicles or equipment that could result in spillage of hydrocarbon products. <input type="checkbox"/> Hazardous materials will be suitably stored to prevent leaks and spills. Drip trays will be used to intercept leaks and spills from equipment and during refuelling. Adequate bunding will be provided for all fuel and chemical storage. <input type="checkbox"/> Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground, or use appropriate spill protection measures. <input type="checkbox"/> Develop and implement an Emergency Response 	Turnkey Contractor	Daily inspections for: <ul style="list-style-type: none"> <input type="checkbox"/> Leaks or faulty equipment. <input type="checkbox"/> Any sign of contamination such as staining and fuel smell 	Monthly report summarising: <ul style="list-style-type: none"> <input type="checkbox"/> Any incidents <input type="checkbox"/> Inventory of hazardous materials (chemicals, oils, paints and fuels etc.) stored onsite <input type="checkbox"/> Copies of Material Safety Data Sheets (MSDS) for all hazardous materials held on-site

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<p>Plan and separate Spill Contingency Plan in accordance with local regulations Plan (NOSCP, 1986) and IFC and HSE guidance. Clean-up contaminated material in case of fuel leaks.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Any spills to ground will be remediated immediately by an appropriately qualified person and post remediation verification carried out 			
Avoid any contamination from fill and dredged material	<ul style="list-style-type: none"> <input type="checkbox"/> Implement Dredging Management Plan. <input type="checkbox"/> If imported fill is required, care will need to be taken transporting the dredged material to onshore location, with tail gates of lorries – where used – require proper fitting. <input type="checkbox"/> Material should be tested for a suite of contaminants, proportional to the quantity of material to ensure it is of a suitable quality for use on the site. <input type="checkbox"/> For dredged materials, dewatered effluent from the dredging's will be required to be properly treated before discharge (settlement) and regularly tested to ensure that it complied with the relevant national discharge standards. 	Turnkey Contractor	<p>Daily inspections for :</p> <ul style="list-style-type: none"> <input type="checkbox"/> Soil sampling of fill material before usage <input type="checkbox"/> Regular inspections facilities for leaks or faulty equipment. <input type="checkbox"/> Daily visual checks for a sign of contamination 	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> soil analysis <input type="checkbox"/> Inspections records <input type="checkbox"/> Inventory of hazardous materials (chemicals, oils, paints and fuels etc.) stored onsite <input type="checkbox"/> Copies of Material Safety Data Sheets (MSDS) for all hazardous materials held on-site
Operation				
Avoid leaks and spills to the ground	<ul style="list-style-type: none"> <input type="checkbox"/> Use best practice in line with local regulations and international guidelines for operation of the pipeline. <input type="checkbox"/> Drip trays will be used to intercept leaks and spills from equipment and during refuelling. <input type="checkbox"/> Develop and implement an Emergency Response Plan and a separate Spill Contingency Plan in accordance with local regulations (NOSCP, 1986) and IFC and HSE guidance. Clean up contaminated material in case of fuel leaks. <input type="checkbox"/> Any spills to ground will be remediated immediately by an appropriately qualified person and post remediation verification carried out. <input type="checkbox"/> Hazardous materials will be suitably stored to prevent leaks and spills. Bunding at least 110% of largest container will be provided for all fuel and chemical storage. <input type="checkbox"/> All chemical storage areas will have impermeable bases. <input type="checkbox"/> Bunds will be regularly checked for any blockage of outflow pipes. <input type="checkbox"/> Refuelling of equipment and vehicles will be carried out in designated areas along with appropriate spill protection measures. 	The Project Proponent	<p>Regular inspections of the bunding and spill kits</p> <p>On-going monitoring and maintenance of the drainage system</p>	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Environmental incidents <input type="checkbox"/> Inventory of hazardous materials (chemicals, oils, paints and fuels etc.) stored onsite <input type="checkbox"/> Copies of Material Safety Data Sheets (MSDS) for all hazardous materials held on-site <p>Monthly records of monitoring and maintenance of drainage system</p>

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> <input type="checkbox"/> Collection systems will be installed in the refuelling areas. Fuels will be collected and either reused, treated by incineration or removed by a local contractor. <input type="checkbox"/> Pipeline design specification must be able to withstand corrosive ground conditions <input type="checkbox"/> Develop and implement a ground and surface water monitoring programme. 			

3.4 Noise

Table 3.4: Noise Impacts management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid noise disturbance to accommodation/living areas	<ul style="list-style-type: none"> <input type="checkbox"/> Noisy activities be limited to daytime working hours, where possible <input type="checkbox"/> Part 4 of the IFC General EHS Guidelines for Construction and Decommissioning includes recommendations for noise reduction and control strategies to be considered for works close to community areas including: <ul style="list-style-type: none"> – Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance – Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines – Avoiding or minimizing project transportation through community areas. <input type="checkbox"/> General guidance on the mitigation of noise during construction is given in BS 5228:2009+A1:2014 to minimise of the adverse effects due to construction. The assessment of construction phase noise impacts has identified that the phase of activity with the potential to generate the greatest noise impacts is set up and enabling works. Specific measures that are relevant to this type of activity include: <ul style="list-style-type: none"> – Unnecessary revving of engines will be avoided and equipment will be switched off when not in 	Turnkey Contractor	At monthly intervals monitoring compliance with EHS Guidelines and BS Standard, national noise levels and Traffic Management Plan	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Records of toolbox talks on PPE <input type="checkbox"/> Monitoring records <input type="checkbox"/> Grievances <p>The layout of the Project site where possible designed to minimize potential impacts on noise sensitive receptors</p>

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	use <ul style="list-style-type: none"> - Internal haul routes will be kept well maintained - Plant and vehicles will be sequentially started up rather than all together - Use of effective exhaust silence systems or acoustic engine covers as appropriate - Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas - Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturers specifications - Screening e.g. noise barriers and bunds will be used as appropriate 			

3.5 Terrestrial Ecology and Biodiversity

Table 3.5: Terrestrial Ecology management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid loss/degradation of terrestrial habitat, flora and soil contamination, noise disturbance and collision with fauna	<ul style="list-style-type: none"> <input type="checkbox"/> Develop Ecological Management Plan (EMP) and Habitat Removal and Restoration Plan (HRRP) <input type="checkbox"/> Minimise temporary working area size <input type="checkbox"/> Minimise number and extent of temporary access routes and instruct all construction vehicles to use specified access routes <input type="checkbox"/> Pre-clearance survey for breeding birds burrowing mammals, reptiles and amphibians and invasive plants <input type="checkbox"/> Vegetation removal and top soil stripping two weeks prior to the start of pipeline stringing works <input type="checkbox"/> No storage of fuels or chemicals on the pipeline RoW <input type="checkbox"/> Separation of top soil from other soils and storage within the pipeline RoW <input type="checkbox"/> No night time work unless construction requires 24 hour working (i.e. continuous concrete pours if required) <input type="checkbox"/> Minimise noise disturbance by using modern, 	Turnkey Contractor	<p>EMP and HRRP will be adhered for environmental management and monitoring measures before the start of vegetation clearance and construction.</p> <p>Checks will be undertaken for the accidental introduction or spread of alien, invasive species, especially plant species which may be brought into the areas from construction activities (on vehicles, in</p>	<p>Monthly reports summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Records of surveys <input type="checkbox"/> The number of reported incidents or fauna kills. <p>Details of the local NGO or consultancy, and the specialists that will undertake some of the activities that require specialist and local knowledge.</p> <p>Details of the environmental staff to be hired by the contractor and their responsibilities</p>

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<p>lower noise equipment and compliance with national noise standards</p> <ul style="list-style-type: none"> ☐ Minimise noise disturbance by use of modern and well maintained vehicle and construction fleet ☐ Incorporate egresses from trench every 250m in order to assist with exiting of animals trapped within the trench during construction ☐ Production of environmental awareness displays and materials to be distributed and displayed in site offices ☐ Environmental issues addressed as part of EHS induction of all staff ☐ Monitoring of alien species and treatment of materials contaminated by invasive plant materials e.g. seeds and roots ☐ Monitor for the accidental introduction or spread of alien, invasive species from construction activities (on vehicles and earth moving equipment used in other regions and imported fill material if required). Checks by a qualified ecologist will be undertaken along the pipeline RoW every three months. 		<p>any imported materials).</p> <p>Checks by a qualified botanist will be undertaken around all major working areas and site compounds every three months.</p>	

3.6 Waste, Materials Handling and Storage

Table 3.6: Waste, Materials Handling and Storage management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid any leakage or spillage of waste	<ul style="list-style-type: none"> ☐ A detailed project specific Materials Handling and Storage Plan (MHSP) will be developed prior to the commencement of work. ☐ A detailed project specific Waste Management Plan (WMP) will be developed prior to the commencement of work. ☐ An Operation phase WMP will be developed by the Project Proponent prior to commissioning of the Project. The WMP will form part of the Operation phase ESMMP. ☐ A Borrow Pit and Spoil Management Plan (BPSMP) will be developed by the Turnkey Contractor prior to commencement of work. The BPSMP will form part of the Construction phase ESMMP. ☐ A Spill Prevention and Response Plan (SPRP) will be developed by the Turnkey Contractor for 	The Turnkey Contractor	<p>Weekly site inspections for leakages or spills of waste</p>	<p>Monthly records for environmental incident related to spills / leakages</p> <p>Monthly records of re-used material i.e. excavated soil</p> <p>Monthly inventory control of reduced amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs</p> <p>Monthly waste inventory including:</p>

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<p>application during the construction phase. This will form part of the Construction phase ESMP.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Identify suitable temporary storage locations for each waste stream. Both the onsite and offsite waste storage facilities will include the following: <ul style="list-style-type: none"> – Separate storage areas for hazardous and non-hazardous wastes – Separate skips or containers for each waste stream to allow segregation in order to maximise re-use and recycling opportunities – All skips and waste containers to have a suitable covers – Liquid wastes/oil to be stored in tanks or drums as appropriate, located in bunded areas which can hold 110% of the total storage volume – Spill kits containing suitable equipment in line with national and internal requirements to be available at all times in waste storage areas 			<ul style="list-style-type: none"> <input type="checkbox"/> waste stream volume; <input type="checkbox"/> disposal route; <input type="checkbox"/> competent waste contractor; <input type="checkbox"/> date of uplift; <p>Monthly reporting of bunding and spill kit statuses</p> <p>Monthly records of consignment and waste transfer notes</p>
Avoid any environmental incidents due to spills and leakages of hazardous materials	<ul style="list-style-type: none"> <input type="checkbox"/> Material handling and storage areas will be established and specifically designed giving due consideration to the following requirements: <ul style="list-style-type: none"> – Located away from sensitive receptors – Not at risk from theft or vandalism – Prevention of being spoiled by the elements – Easily accessible in a safe manner – Well ventilated – Unlikely to be damaged – Located next to any required PPE (as necessary for irritants and hazardous materials) – Bunded and located next to spill kits (as necessary for hazardous liquids). 	The Turnkey Contractor	Daily visual inspection for spills or leakages of hazardous material	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Environmental incident records <input type="checkbox"/> Records of transfer and consignment notes related to waste uplifts <input type="checkbox"/> Locations and status of spill kits
Avoid dust and odour associated with the handling and storage of some waste streams	<ul style="list-style-type: none"> <input type="checkbox"/> Keep all waste skips covered at all time <input type="checkbox"/> Regular disposal of the waste collected by authorised sub-contractor 	The Turnkey Contractor	Daily visual inspection of storage area and waste collection	Monthly grievances
Avoid the use of potentially finite and/or scarce resource	<p>Material use and handling measures will be considered and include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Re-using materials on site wherever possible. The most significant opportunity in the construction phase is with respect to excavated materials. 	The Turnkey Contractor	Monthly monitoring of materials use	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Records of the of re-used materials and substituted raw materials

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> <input type="checkbox"/> Implementing good housekeeping and operation practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs <input type="checkbox"/> Implementing procurement measures that recognise opportunities such as ordering the correct amount of materials to be delivered when needed, reducing the amount of packaging used by suppliers and establishing a take back system with suppliers <input type="checkbox"/> Substituting raw materials or inputs with less hazardous or toxic materials wherever economically and technically feasible. 			
Operation				
<p>Avoid contamination of environments due to leakage and spillage of wastes associated with poor waste handling and storage arrangements</p>	<ul style="list-style-type: none"> <input type="checkbox"/> An Operation phase WMP will be developed by the Project Proponent prior to commissioning of the Project. The WMP will form part of the Operation phase ESMMP. <input type="checkbox"/> A Spill Prevention and Response Plan (SPRP) will be developed by the Project Proponent for application during the operational phase. This will form part of the Operational phase ESMMP. <input type="checkbox"/> The establishment of a waste management hierarchy philosophy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes <input type="checkbox"/> A map showing waste storage locations on board the CCGT <input type="checkbox"/> A description of each waste generated by the operation of the CCGT, the appropriate handling methodology, the correct approach for storage and the correct route for removal/disposal off site (vessel handling, offloading and final disposal) <input type="checkbox"/> Staff training requirements with respect to waste handling procedures <input type="checkbox"/> Waste generation data collection for each waste stream by volume, according to the EWC. This will include the proportion of each waste stream going for reuse, recycling or disposal; any unusual waste volumes will be investigated <input type="checkbox"/> Any waste monitoring as deemed to be necessary <input type="checkbox"/> An audit schedule which details the frequency of waste management audits and those responsible for undertaking them <input type="checkbox"/> A section related to continuous improvement and 	<p>The Project Proponent</p>	<p>Monitoring of the waste streams to the point the waste leaves the CCGT</p>	<p>Monthly report summarising:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Records of waste transfer and hazardous waste consignment notes <input type="checkbox"/> Copy of all waste carriers' licences and disposal site licences <input type="checkbox"/> Updates on the storage areas for hazardous and non-hazardous wastes <input type="checkbox"/> Grievances

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<p>corrective actions where audit findings can be recorded and incorporated into the waste management procedure; this will also highlight any new and feasible reuse or recycling opportunities which may arise over time</p> <ul style="list-style-type: none"> <input type="checkbox"/> A mechanism by which to routinely track waste consignments from the CCGT to the final waste treatment and disposal location <input type="checkbox"/> The correct procedure for reporting any environmental incidents related to waste <input type="checkbox"/> The specific regulatory reporting requirements as they relate to waste 			

3.7 Landscape and Visual

Table 3.7: Landscape and Visual management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Minimize removal of trees and vegetation	<ul style="list-style-type: none"> <input type="checkbox"/> Develop a Habitat Removal and Restoration Plan <input type="checkbox"/> Lighting associated with constructions works at night time to be carefully designed to minimise light pollution. <input type="checkbox"/> Minimise duration of construction-phase lighting by turning off/reducing lighting during periods when construction work is not taking place <input type="checkbox"/> Wherever practicable, existing natural vegetation / plantations to be protected with fencing; removal of very large trees to be avoided as far as practicable. <input type="checkbox"/> Existing vegetation to be supplemented with native species to enhance local landscape character. <input type="checkbox"/> Construction traffic routing should be planned to avoid passing settlements where practicable. <input type="checkbox"/> Minimise land required for construction and laydown areas by defining agreed access routes, storage of materials and spoil. <input type="checkbox"/> When possible, restore landforms to their original arrangement and blend new levels smoothly with existing levels for an orderly effect. <input type="checkbox"/> By clearly predefining needed land, minimize the loss of vegetation 	Turnkey Contractor	Daily visual inspections	Monthly records of areas that are cleared and/or avoided
Operation				
Minimize the loss of key landscape features and views	<ul style="list-style-type: none"> <input type="checkbox"/> Produce a landscape/ecological masterplan to provide a landscape and ecological framework for 	The Project Proponent	Monitoring of restoration and reinstatement	Monthly records of: <ul style="list-style-type: none"> <input type="checkbox"/> Number of

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
beyond the coastal strip.	<ul style="list-style-type: none"> the Project for the reinstatement of the environment to pre-construction conditions. <input type="checkbox"/> Restore land affected by construction, laydown areas, temporary construction accommodation and the pipeline corridor to its former condition. <input type="checkbox"/> Decompact areas of compacted ground to allow for natural regeneration of native-species vegetation <input type="checkbox"/> Plant more palms that were removed for construction. <input type="checkbox"/> Plant trees of local provenance for shade around the car park and administrative buildings to provide shade and natural cooling. 		activities	<ul style="list-style-type: none"> <input type="checkbox"/> planted trees Plans indicating reinstated areas

3.8 Cultural Heritage

Table 3.8: Cultural Heritage management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid impacts of Project construction and operation to Fort San Sebastian and Fort Orange and removal and damage of potential archaeological remains	<ul style="list-style-type: none"> <input type="checkbox"/> Prior to any activity beginning, a ground breaking ceremony, involving the local Chiefs will be undertaken on site to allow for this important cultural event <input type="checkbox"/> The Turnkey Contractor is responsible for preparing and managing a chance finds procedure. 	Turnkey Contractor	Daily visual inspections	Monthly records of chance find procedures

3.9 Socio-economics

Table 3.9: Social Impacts management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Construction				
Avoid change of land use beyond the project footprint and undertake close communications with PAPs (See Chapter 15 – Social Impact Assessment).	Where private assets (such as crops, fruit trees, structures or similar) are affected within the pipeline servitude, these must be valued by the Lands Valuation Board and compensation must be paid to the asset owner.	The Turnkey Contractor	Monthly monitoring of the land use change based compensation	Monthly reporting of the community grievances, compensation paid to eligible asset owner and resolution process
Maximise and manage local employment	<p>The below proposed plans will include specific indicator and process for mitigating key social issues during the construction phase:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Occupational Health and Safety (OHS)Plan <input type="checkbox"/> Labour Accommodation Plan (LAP) 	Monitoring and supervising subcontractors' management is contractually	Monthly monitoring of the plans and annual update of Stakeholder Engagement Plan	Monthly OHS monitoring reporting of accidents, injuries, lost-time incidents, near misses and community interactions on health issues

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<input type="checkbox"/> Stakeholder Engagement Plan (SEP) <input type="checkbox"/> Community Investment Plan (CIP) <input type="checkbox"/> Recruitment, labour profile reporting, and skills development plan <input type="checkbox"/> Security Plan (SP) <input type="checkbox"/> Emergency Preparedness and Response Plan (EPRP)	<p>Turnkey Contractor's responsibility</p> <p>The Project Proponent will support and oversee the activities</p> <p>SEP's ownership and update is the responsibility of both Turnkey Contractor and the Project Proponent</p> <p>CIP to be supported by the Project Proponent</p>		<p>Monthly LAP audit reports of corrective measures and action plan, photographs demonstrating corrective measures implemented.</p> <p>Monthly SEP monitoring to include consultation logs, grievance logs -SEP will be updated annually-</p> <p>Monthly CIP to report any project induced in-migration, records of meetings with regional government authorities, NGOs and civil society bodies.</p> <p>Monthly recruitment, labour profile reporting, and skills development audit report will include updated labour profiles, records of training for local residents (name, type of training, village of origin, etc.) and skills trainings.</p> <p>Monthly SP monitoring will include updates on description / photographs of fencing / signage around site perimeter, documentation to show vetting and training of security personnel, site registry identification system and site induction procedure.</p> <p>EPRP monthly report will include accidental and emergency situations during construction</p>
Operation				
Maximise local employment, continue with the stakeholder	The below proposed plans will include specific indicator and process for mitigating key social issues	The Project Proponent	Quarterly SEP, CIP and SP monitoring.	SEP monitoring to include consultation logs, grievance logs and will be updated

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
engagement meetings and close communications with PAPs to avoid future grievances	during the operation phase: <input type="checkbox"/> Stakeholder Engagement Plan <input type="checkbox"/> Community Investment Plan <input type="checkbox"/> Security Plan			annually. CIP to report any project induced in-migration, records of meetings with regional government authorities, NGOs and civil society bodies. SP monitoring will include documentation to show vetting and training of security personnel, site registry identification system and site induction procedure
Minimize risks to safety from vehicle traffic	OHS Plan and Community Health and Safety Plan	The Project Proponent	Daily visual inspections of vehicle traffic	Monthly reporting of accidents, injuries, lost-time incidents, near misses and community interactions on health issues

3.10 Hazard and Accidents

Table 3.10: Hazard and Accidents management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Operation				
Principles risk associated with the operating regime are: <input type="checkbox"/> Gas fire <input type="checkbox"/> Vapour cloud explosion <input type="checkbox"/> Distillate fire <input type="checkbox"/> Transformer explosion <input type="checkbox"/> Turbo-generator or steam Generator over speed <input type="checkbox"/> On-site fire <input type="checkbox"/> External hazard <input type="checkbox"/> Operator chemical exposure <input type="checkbox"/> Electrical hazards <input type="checkbox"/> Pressurized systems <input type="checkbox"/> Hot surfaces <input type="checkbox"/> Confined spaces	<input type="checkbox"/> Health and Safety Management System should be created. <input type="checkbox"/> HAZOP studies should be carried out at the design phase and reviewed prior to commissioning to ensure all the requirements for operational procedures are captured. (This would be required to develop the safety case) <input type="checkbox"/> Suitable safe working procedures should be developed for operation and maintenance. <input type="checkbox"/> EPRP <input type="checkbox"/> Liaison should be carried out with local emergency services such as hospitals, ambulance service and fire brigade to ensure that the emergency services are able to respond to an accident on site when required. <input type="checkbox"/> Electrical Hazards should be addressed through electrical safety analysis study such as an Electrical	The Project Proponent	Daily visual inspections of potential risk items and any breaches of safety zone	Monthly reports summarising: <input type="checkbox"/> Records of maintenance programmes <input type="checkbox"/> Records of visual inspections <input type="checkbox"/> Records of toolbox talks <input type="checkbox"/> Records of safety cases, safe working procedures, EPRP activities <input type="checkbox"/> Permits for electrical hazards, pressurised

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> Systems Safe Operability Review □ Operator Chemical Exposure: Hydrazine is often used as an oxygen scavenger in power plant water systems. Hydrazine is carcinogenic and its use is being discouraged by regulatory authorities in Europe and we would recommend a safer alternative is used if it can be sourced in Ghana. □ Permit to work systems should be established to minimise operator exposure to personnel hazards such as: Electrical Hazards, Pressurised Systems, Hot Surfaces and Confined Spaces. □ The Project will be developed within the APE therefore constraints are in place on the development of housing and other sensitive receptors in the immediate vicinity of the power station in the event of Gas Fire, Vapour Cloud Explosion. 			<ul style="list-style-type: none"> □ systems, hot surfaces and confined spaces.

3.11 Climate Resilience and Adaptation

Table 3.11: Climate Resilience and Adaptation management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Avoid any potential changes to sea level and precipitation	The final Project design should ensure that facilities are designed and sited at appropriate levels to take account of changes to the sea level or flood risks and therefore reduce these risks to an acceptable level	The Project Proponent	Project design	Final design

3.12 Greenhouse Gas Emissions

Table 3.12: GHGs management and mitigation objectives

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
Operation				
Avoid burning of the waste	<ul style="list-style-type: none"> □ Prohibition of open burning of solid waste whenever possible □ Briefing and education of workers on the above prohibition 	Turnkey Contractor	Daily visual inspections of any waste combustion	Monthly reporting of toolbox talks and incidents
Avoid excessive emissions from construction machinery, generators and vehicles	<ul style="list-style-type: none"> □ Efficient planning of the construction phase to minimise transportation requirements, workers and materials and optimising the use of resources to avoid potential wastage 	Turnkey Contractor	Daily visual checks of construction vehicles bi-	Vehicle and machinery service records, registration records of vehicles in accordance with national regulations and vehicle

Impact to be addressed	Management and mitigation measures	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> <input type="checkbox"/> Control of vehicles travelling to and from the site through regular servicing <input type="checkbox"/> Regular maintenance of vehicle and equipment according to manufacturer's specifications <input type="checkbox"/> Manage emissions from mobile sources as per IFC EHS guidelines for Air Emissions and Ambient Air Quality <input type="checkbox"/> Locate generators away from nearby residential receptors <input type="checkbox"/> Drivers should be instructed on benefits of driving practices that reduce both accident risk as well as fuel consumption, including measured acceleration and driving within safety limits 		weekly (violation to be reported only)	maintenance records
Operation				
Emissions from the combustion of fuel in the CCGT	<ul style="list-style-type: none"> <input type="checkbox"/> The amount of oil combusted should be minimised where possible. <input type="checkbox"/> The Project should aim to source the highest quality commercially viable fuel in order to minimise its impact. 	The Project Proponent	Emission levels	Monthly and yearly records of on-site electricity and fuel use

4 Reporting Requirements

4.1 Introduction

Effective reporting is essential for rendering an ESMMP of practical value. Routine independent auditing provides the necessary impetus for continual improvement. Without these two fundamental elements, such systems simply become data collecting exercises. Performance monitoring, reporting and auditing should be carried out to ensure compliance with the requirements of this ESIA and ESMMP. The following provides an outline approach which is aligned to the requirements of ISO 14001, the reference point for Environmental Management Systems. The final scope and format of all reports proposed herein is normally agreed with the lender prior to them being required and produced.

4.2 Adaptive management

The ESMMP framework allows adopting an 'adaptive management' approach throughout the life cycle of the Project. The creation of the plans at the outset is a fluid process with the management objectives and performance indicators tailored to the current design and objectives of the Project. The ESMMP utilises to the extent possible existing Project knowledge to fully address the actual environmental and social impacts of the Project at the time and allow flexibility in environmental and social management decisions made on the Project.

To ensure adaptive management of the ESMMP the following actions will need to be implemented:

- The ESMMP will be reviewed and amended in accordance with the Project as it evolves. Key information about any changes to Project description will be regularly reviewed (monthly) and site visits undertaken by the Project Proponent staff to identify the true impacts of the Project.
- Specific Management Plans will need to be developed to meet the management and mitigation objectives set out here, and the outcomes of regular reviews.
- Evaluation of the effectiveness of measures included in the ESMMP need to be undertaken on a regular basis as the Project evolves through construction, operation and decommissioning. Evaluation will be undertaken through on-going communication with the Turnkey Contractor, stakeholders and lenders supplemented by site audits and monitoring data review to identify weaknesses and / or gaps in the management plans. The ESMMP will be changed and / or updated accordingly to ensure appropriate, robust and effective environmental and social management commensurate to the scale of the Project through its lifetime.

4.3 Monitoring and reporting

4.3.1 Turnkey Contractor monthly internal reports

The Turnkey Contractor will undertake a weekly compliance monitoring of its sub-contractors' environmental and social activities as per this ESMMP.

The Turnkey Contractor is to prepare a monthly EHS report for issue to the Project Proponent. These reports should contain the following as a minimum:

- Progress in implementing the ESMMP and any management plans

- Findings of the monitoring programmes, with emphasis on any breaches of the control standards action levels or standards of general site management
- Outstanding Non-Compliance Reports (NCRs)
- Detail reporting of the environmental performance of construction activities
- Detailed reporting on all H&S aspects presenting statistics and expanding on accidents and incidents that may have occurred
- Summary of any complaints by external bodies and actions taken/to be taken; and
- Relevant changes or possible changes in legislation, regulations and international practices.

Any breaches of the acceptable standards specified by law/construction permits and/or this ESMMP should be reported promptly to the Project Proponent.

4.3.2 Project Proponent monitoring of construction activities

The Project Proponent should undertake on a monthly basis, compliance monitoring of the Turnkey Contractor environmental and social activities as per the IFC Environmental, Health, and Safety guidelines and this ESMMP. Internal audits should be undertaken within two months of commencement of construction and thereafter every three months focussing on the performance of the implementation of this ESMMP.

Any breaches of the acceptable standards specified by law/construction permits and/or this ESMMP should be reported as a Corrective Action. Records of Corrective Actions should be kept by the Project Proponent's responsible party and tracked to their completion.

4.3.3 Project Proponent monitoring of operational activities

The environmental and social impacts that will occur during the operation phase have been assessed through in the ESIA (Volume II). Impacts will be managed and monitored through the commitments outlined in this ESMMP. The Project Proponent responsible party should prepare annual reports to be available to investors or lenders summarising progress against implementation of the Project Proponent's ESMMP obligations throughout the operational phase. This will include full reporting of monitoring results where relevant.

4.3.4 Project Proponent external reporting for regulatory compliance

A register of all external stakeholder reporting requirements under Ghanaian Legislation and for regulatory compliance purposes should be developed where appropriate. The frequency of reporting, the required reporting format and the person(s) responsible for producing the report (along with any necessary specialist service providers/constructors required to assist for data collection or interpretation purposes) is to be noted in the register.

The Project Proponent will need to ensure that all the necessary reports are produced and submitted in a timely fashion in order to achieve on-going regulatory compliance throughout the life of the Project.

Meeting regulatory reporting requirements is to also form part of the scope for any internal audits and management reviews.

4.3.5 Independent monitoring

The IFC PS1 guidance notes state that Projects require an independent environmental and/or social expert to verify project monitoring information. During the construction phase and as a minimum, throughout the first year of the operations, arrangements should be made by the Project Proponent for an industrial environmental management specialist to carry out an independent due diligence audit of the existing practices against the requirements of the ESMMP. The key objectives of the audit should be as follows:

- Report on the practical implementation of the ESMMP and progress since the last reporting period
- Establish feasible improvement objectives for completion before the next reporting period.

These audits should be used to re-examine the continued appropriateness of the ESMMP and to provide advice on any updates required. Attention should be given to lessons learnt in the light of experience. In particular, consideration should be given to the monitoring programmes in place to determine whether their purpose has been served and they can therefore be terminated or reduced in frequency.