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12 Environment and Social Management Plan (ESMP)

The purpose of the ESMP is to ensure that social and environmental impacts, risks and liabilities identified during the ESIA process are effectively managed during the construction, operation and closure of the proposed project. The ESMP specifies the mitigation and management measures to which the Proponent is committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled.

The key objectives of the ESIMP are to:

- Formalize and disclose the program for environmental and social management; and
- Provide a framework for the implementation of environmental and social management initiatives.

Best practice principles require that every reasonable effort is made to reduce and preferably to prevent negative impacts while enhancing the benefits. These principles have guided the ESIA process. In many cases, potential negative impacts have been avoided through careful design and location of facilities.

The ESIA involved concurrent and ongoing data collection and public consultation activities to date.

12.1 Structure of the ESMP

The ESMP stipulates the environmental standards to be adhered to by the parties involved in the various phases of the project life cycle. As such the ESMP comprises of a section for each of the following project life cycle phases:

- Planning and design;
- Pre-construction and construction activities;
- Operation; and
- Decommissioning

12.2 Planning and design

The planning and design phase of the project is not expected to have any direct impacts on the environment and consequently no management control measures are required and/or proposed.

Various layout options were considered to minimize the environmental impacts and the currently proposed layout plan has been chosen on the basis of these considerations.

12.2.1 Environmental procedures and specifications

12.2.1.1 Site layout and land matters

- a) Ideally, turbines should be positioned at least 750m (10 rotor diameters) from residences to avoid shadow flicker and noise impacts;
- b) If this is not possible, affected households should be assessed for shadow flicker;
- c) If the shadow flicker analysis confirms flicker, the layout must be modified and/or certain turbines switched off at certain times (i.e. when shadow flicker occurs over the recommended 30 hours per year or 30 minutes per day);
- d) Consideration must be given to orderly and precise arrangement of the turbines to minimize the negative visual impacts;
- e) To accommodate future expansion, the layout should be able to accommodate additional turbines in a manner that reinforces the original pattern;
- f) Consideration must be given to the loss or destruction of habitat and species of special concern, in order to minimize impacts on threatened or protected species;

12.2.1.2 Turbine design

- a) The turbines should be painted either white/off-white/very light grey color with matt coating.

12.3 Pre-construction and construction

This section deals with the pre-construction and construction related activities.

12.3.1 Scope of construction EMP

The construction EMP is intended for use by the appointed contractor(s) and Kipeto Energy Limited during the construction phase of the project. construction related activities associated with the proposed wind energy facility include:

- Surveying of the site;
- Setting up of construction camp(s);
- Storage of construction materials and equipment in laydown areas;
- Excavation (for wind turbine foundations);
- Sourcing and storage of fill materials;
- Identification of sites for spoil material (if required);
- Cement mixing and pouring (for wind turbine foundations);
- Site leveling and fencing;
- Construction of buildings/sub-station;

- Upgrading of the E407 road and construction of new access roads to each wind turbine;
- Installation of electrical infrastructure;
- Operation of construction plant and equipment along the access roads and on the project site; and
- Clearance of vegetation for:
 - Site camp;
 - Construction area;
 - New access roads;
 - Sub-station; and
 - Equipment and material storage areas.

The following sections detail management and mitigation measures that will be undertaken to address the environmental impacts that have been identified in the ESIA, in addition to general environmental good practice.

12.3.2 Roles and responsibilities

The general roles and responsibilities of various parties are outlined below.

12.3.2.1 Kipeto Energy Limited

Kipeto Energy Limited (Proponent) has assigned Galetech Energy Developments (GED) of Ireland as their project manager for the proposed wind energy project. Irrespective of other duties assigned to them, GED shall be responsible for:

- Ensuring that the contractor is duly informed of the EMP and associated responsibilities and implications of this EMP;
- Appoint an HSE officer to monitor the implementation of this EMP during the construction phase of the project. the appointed HSE officer shall be a qualified HSE professional with relevant HSE expertise;
- Ensuring that the construction contract makes provision for rehabilitation to the satisfaction of the relevant authorities, of any environmental damage resulting from the proposed project as well as non-compliance with the EMP, environmental regulations and relevant legislation carried out by the contractor.

12.3.2.2 The HSE Officer

The HSE officer shall be a qualified HSE professional. The HSE officer shall be responsible for checking compliance of the contractor(s) with the requirements of this EMP and any other relevant environmental legislation for all activities associated with the contract.

The general duties of the HSE officer are as follows:

- Being familiar with the environmental management requirements contained in this EMP;

- Regular auditing of the contractor(s) with the view of ensuring that all activities on the site are undertaken in accordance with the EMP;
- Issuing regular audit reports to the Project Manager and contractor(s) regarding compliance with this EMP;
- Providing ad-hoc environmental advice including environmental legal requirements to the Project Manager, Proponent and the contractor(s) regarding issues that may arise during the contract.

12.3.2.3 The Contractor(s)

The contractor(s) must ensure that all aspects of the contract comply with both this EMP and other relevant environmental legislation. The contractor(s) shall be responsible for:

- Appointing an HSE officer (on-site) who irrespective of other duties will also be responsible for overseeing all activities associated with the contract;
- Ensuring that the HSE officer has the means to carry out his/her tasks;
- Be responsible for rehabilitation of, or the cost of rehabilitation of any environmental damage that may arise out of non-compliance with this EMP and/or environmental legislation. Such rehabilitation shall be to the satisfaction of the relevant authorities and/or the Project Manager.

12.3.2.4 Contractor(s) HSE Officer

The contractor(s) HSE officer shall be responsible for implementation of this EMP and any other environmental requirements that may be identified by the Project Manager during the course of the contract. The contractor(s) HSE officer shall have received basic HSE training either as part of the contract or previously. In addition to any other responsibilities, the general duties of the contractor(s) HSE officer shall be:

- Ensuring that all personnel (including sub-contractors) are duly informed of the requirements contained in this EMP, and the associated responsibilities and implications of this EMP;
- Ensuring that all records needed to demonstrate compliance with the EMP requirements are obtained, filed and readily available for inspection by the Project Manager or the Proponent;
- Consulting with the Client's HSE Officer regarding interpretation of the EMP and any other aspects of the contract that may impact significantly on the environment;
- Ensuring that all personnel demonstrate respect and care for the environment in which they are operating;
- Acting as a point of contact for local residents and community members.

12.3.3 Environmental procedures and specifications

12.3.3.1 Procedures

This section outlines the overall processes/procedures associated with the implementation and monitoring of this construction EMP.

Compliance auditing

- a) The client's HSE officer and the contractor(s) HSE officer shall conduct a pre-construction site inspection to identify sensitive environments, no-go areas, location of site camps, etc.;
- b) The client's HSE officer will prepare a pre-construction audit report which will include photographs of the general condition of the key features of the site. the photographs shall be used for comparison purposes on completion of the contract i.e. after rehabilitation of the construction areas;
- c) The client's HSE officer will conduct monthly site audits of all construction related activities described in section 12.3.1;
- d) On completion of the construction activities, the client's HSE officer together with the contractor(s) HSE officer will conduct a site inspection. Any items requiring attention shall be included in a post-construction audit report;
- e) On completion of the defects liability period, the client's HSE officer shall accompany the Project Manager and the contractor with the view of determining whether outstanding matters from the post-construction audit have been adequately addressed.

HSE incidents

- a) The contractor(s) HSE officer shall maintain a register of all HSE related incidents occurring as a result of the activities associated with the contract. HSE related incidents that shall be recorded include (but not limited to):
 - Fires;
 - Accidents;
 - Spills of hazardous materials that contaminate soil or water resources;
 - Improvement orders/notices issued by the NEMA or DOSHS or other relevant lead agencies; and
 - Non-compliance with this EMP.
- b) Each HSE related incident will be investigated by the client's HSE officer and an incident report forwarded to the contractor and project manager. An incident report will be presented within five working days;
- c) HSE incident reports will include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage; and
- d) Prescribe additional measures that may be required to remediate damage resulting from the incident and/or to prevent similar incidents occurring in the future.

Training

The contractor is responsible for ensuring that their workers are provided HSE training as stipulated in the OSHA 2007 and its subsidiary legislation. In addition to formal training, the contractor should undertake tool-box talks. A training register should be kept on site for all training conducted as proof for auditing purposes. The HSE training should include among other topics:

- The importance of conforming with all HSE policies;
- The HSE impacts of the proposed activities;
- HSE benefits of improved personal performance;
- Worker roles and responsibilities in achieving conformance with the client's HSE policy, procedures and this EMP including associated procedures and emergency preparedness and response requirements;
- Potential consequences of departure from specified operating procedures; and
- Mitigation measures required to be implemented when carrying out their work activities.

12.3.3.2 Specifications

General environmental specifications

- a) Construction workers shall be prohibited from entering areas of the site that fall outside the work area and no harming of wild or domestic animals or destruction of vegetation shall be allowed;
- b) No wildlife or indigenous vegetation may be harmed or removed unless approved by the client's HSE officer in conjunction with the necessary permits;
- c) New tracks must be constructed in such a way as to reduce the denuded land and subsequent visual contrast;
- d) Vehicles and/or plant and personnel shall only be permitted within the demarcated construction areas or on existing roads and/or access tracks between demarcated areas;
- e) Where topsoil is disturbed/excavated, such topsoil shall be stockpiled on the site where it originated from for later use during rehabilitation. Stockpiles will be protected by suitable means from wind and water erosion.

Site demarcation and vegetation clearing

- a) The construction camp should be located away from the public domain and where it can be screened by existing vegetation; if possible it should not be visible from any prominent roads;
- b) Clearing of vegetation shall be kept to the minimum required and where possible, shall be avoided and areas for construction related activities shall be located where the natural habitat has been transformed;
- c) All construction sites and camp site areas should be clearly demarcated;
- d) Temporary construction camps and storage areas must be located on previously transformed portions of the site;

- e) Areas where priority plant species are growing must be demarcated as no-go zones;
- f) All disturbed or cleared areas should be kept clear of alien invasive plants for the duration of the construction and defects notification period;
- g) Access tracks should avoid sensitive areas, especially steep gradients;
- h) No clearing of vegetation, storage of materials or other construction related activities shall be permitted outside the demarcated construction area.

Materials handling and storage

- a) Materials for construction shall be stored within demarcated construction areas

12.3.3.3 Control of hazardous materials

Measures aimed at preventing contamination of soil, surface water or groundwater by environmentally hazardous materials (e.g. fuels, oils, cement, etc.) during the construction phase include:

- a) All hazardous materials shall be stored away from water courses and drains and handled over an impermeable surface at all times;
- b) Hazardous materials shall be stored in properly bunded areas to contain any leaks and drip trays shall be in place under all fuel bowsers;
- c) Appropriate spill kits must be available in areas of proximity to watercourses and drains;
- d) Should any hazardous materials spills occur, the contaminated soil shall be removed and disposed off in accordance with L.N. 121: Waste Management Regulations, 2006;
- e) Any material used to soak up hazardous material spills must be disposed off in accordance with L.N. 121: Waste Management Regulations, 2006;
- f) Spilled hazardous materials within bunded areas shall either be recovered or disposed off in accordance with L.N. 121: Waste Management Regulations, 2006;
- g) All cement mixing shall be conducted on an impervious surface and where possible ready-mix cement will be used;
- h) All wastewater that is contaminated with hazardous substances shall be collected in a container, allowed to evaporate and the sludge disposed off as hazardous waste;
- i) All personnel shall be trained and educated during induction on the safe handling of hazardous substances on site.

12.3.3.4 Control of possible heritage impacts

- a) The Proponent should consider appointing an archeologist during the construction phase to monitor and oversee vegetation clearing and earth moving process to avoid negative impacts on archeological material;
- b) Construction managers/foremen should be informed before construction starts on the possible types of archeological artifacts they may encounter and the procedures to follow when they find such sites;

- c) Sufficient time must be allowed to remove/collect such material;
- d) If archeological material already identified during the archeological impact assessment will be impacted upon by the wind turbine footprint, mitigation in the form of test pits, systematic excavation and sampling must be undertaken before trenching and any other earth moving activity is carried out.

12.3.3.5 Waste management

The project manager in consultation with the contractor(s) will be responsible for ensuring that waste management is undertaken in conformity with the requirements of L.N. 121: Waste Management Regulations, 2006. Some of the aspects that will be incorporated for waste management include:

- a) Sufficient weather and scavenger-proof bins (with lids to prevent the escape of litter) shall be provided and be accessible at all points where waste is generated;
- b) The project area should be kept clean and free of litter and no litter from the site shall be allowed to disperse to surrounding areas;
- c) All personnel shall be instructed to dispose of all wastes in a proper manner;
- d) The contractor shall identify and separate materials that can be reused or recycled to minimize waste;
- e) All construction materials should be suitably stored and protected so that they do not become damaged and unusable;
- f) The contractor shall be responsible for the regular disposal of all waste generated as a construction of the wind energy facility;
- g) No dumping within the surrounding area shall be permitted and no waste may be buried or burned.

12.3.3.6 Fire prevention and control

- a) The contractor will undertake to ensure that they develop and implement a fire safety policy in accordance with L.N. 59: Fire Risk Reduction Rules, 2007;
- b) No burning of vegetation whether to clear vegetation or of cleared vegetation shall be permitted;
- c) No cooking or heating fires shall be permitted except in designated areas within the construction camp;
- d) Sufficient firefighting equipment shall be maintained and accessible at all times. In particular such firefighting equipment shall be readily available where hot works may be required;
- e) In the event that a fire is too large for on-site personnel to control, the fire brigade shall be called to extinguish it.

12.3.3.7 Sewage and stormwater

- a) No wastewater shall be disposed off to the surrounding soil or natural water resources;
- b) All effluent from the camp/office sites shall be disposed off in accordance with relevant requirements of L.N. 120: Water Quality Regulations, 2006;

- c) Wastewater that is contaminated with soaps, detergents, grease, oils, paints and other undesirable materials shall be collected in conservancy tanks and disposed off in accordance with L.N. 120: Water Quality Regulations, 2006 and L.N. 121: Waste Management Regulations, 2006;
- d) An adequate number of portable toilets for male and female workers in accordance with the Public Health Act shall be positioned in all construction areas. These toilets shall be regularly serviced by the contractor or an outside service provider;
- e) Sanitary requirements should be to the satisfaction of the client's HSE officer and in compliance with the Public Health Act.

12.3.3.8 Dust and noise control

- a) To minimize dust impacts, areas to be cleared of vegetation or topsoil shall be cleared only when required and shall be rehabilitated immediately on completion of the construction activity in that area;
- b) Access roads should be kept to a minimum and shall be limited to designated construction areas;
- c) Vehicle speeds should be limited to 30km/h on unpaved surfaces;
- d) When necessary, dust suppression measures (wetting of soil) shall be implemented;
- e) To minimize disturbance to neighboring landowners, activities that are likely to generate noise should be restricted in accordance with L.N. 61: Noise and Excessive Vibration Pollution Control Regulations, 2009.

12.3.3.9 Equipment maintenance

- a) All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period;
- b) Equipment maintenance will be carried out on an impermeable surface;
- c) Leakage from equipment will be prevented by regular inspection and repair;
- d) Should a leak or equipment malfunction be detected, appropriate personnel shall be notified immediately and every effort made to prevent further leakage.

12.3.3.10 Rehabilitation of disturbed areas

- a) All disturbed/cleared areas will be rehabilitated as soon as construction in that area has been completed as part of the construction contract;
- b) Stockpiled topsoil from the cleared areas shall be spread over the disturbed areas after construction in each area has been completed and rehabilitated with indigenous vegetation;
- c) Excess sub-soil will be carted away to an approved location advised by the Ol Kejuado County Council;
- d) All cleared areas must be re-vegetated and rehabilitated as soon as construction in that area has been completed;
- e) Compacted areas due to movement of construction plant and equipment will be scarified to loosen soil and enable re-growth of vegetation.

12.4 Operation

This section deals with environmental aspects that are relevant during the operational phase of the proposed wind energy facility and associated infrastructure.

12.4.1 Scope of EMP

The operational phase of the wind energy facility refers to all activities that take place on the site after construction completion and/or may be required for effective functioning of the development. The activities include:

- Maintenance of the access roads including trimming of vegetation;
- Routine maintenance of the turbines; and
- Operation of the control building.

12.4.1.1 Roles and responsibilities

The management of HSE aspects related to the proposed wind energy facility will be the responsibility of the operations and maintenance company.

12.4.2 Procedures

The proponent will as required conduct both routine and abnormal maintenance of the proposed wind energy facility as the need arises. The aim of the specifications provided in this section is for the personnel conducting inspections and/or maintenance to take note of HSE matters and to report these to relevant parties.

12.4.3 Environmental procedures and specifications

- a) A monitoring program should be implemented to increase the existing knowledge on the impact of the wind energy facility on avifauna. The monitoring program should collect data on a host of environmental factors including avifaunal collisions; the monitoring program should be conducted by an ornithologist;
- b) In the event of a high rate of avifaunal (e.g. bats) mortalities, exceeding generally accepted international standards:
 - i). The use of alternative methods such as radar to alert bats to the presence of wind turbines should be implemented and the effectiveness thereof monitored. Alternative methods may also include turning turbines off under certain conditions or at certain times; or
 - ii). Turbines should be shut-off in low wind conditions at night when the bats are foraging
- c) Turbines should be shut down in extreme low visibility events such as thick cloud or mist;
- d) The facility should be maintained in a neat and tidy way;

- e) Components of the wind turbines shall be maintained in a good state of repair so that impacts (such as noise) caused by malfunctioning are prevented;
- f) Future maintenance and repair work must be undertaken with minimal visual intrusion;
- g) Routine maintenance should be conducted during the day and on weekdays with emergency maintenance being an exception;

12.5 Closure

The proposed wind energy facility is expected to have an operational life span of at least 25 years. However it is anticipated that turbines and components will be replaced with new ones as and when required. After 25 years, the option will exist to continue to apply for the appropriate permits to continue to operate, to replace the turbines and components with more up to date technology or to decommission the wind farm. Therefore the lifespan of the proposed development is potentially indefinite. No detailed closure/decommissioning phase is therefore proposed. The following management control measures are required if and when the facility ceases operation:

- a) All turbine components (including towers, rotor blades, nacelles, etc.) are to be dismantled and removed from site preferably for reuse elsewhere or alternatively, for recycling of materials; and
- b) Infrastructure associated with the development (e.g. roads, power lines and buildings) which has no immediate use or value to the landowner, must be decommissioned and the property rehabilitated to the landowners satisfaction.

12.6 Contractor health and safety

It is noted that this EMP is not a health and safety (H&S) plan. It is the contractor(s) responsibility to ensure that a H&S plan as per the requirements of the OSHA is prepared prior to any physical work occurring on the site.

12.7 EMP requirements for the pre-construction phase

The requirements that need to be fulfilled during the pre-construction phase of the project are as follows:

- There should be continuous liaison between the Proponent, the EPC contractor and Landowners along the wayleave to ensure all parties are appropriately informed of construction phase activities at all times;
- The Landowners should be informed of the starting date of construction as well as the phases in which the construction will take place;
- The EPC contractor must adhere to all conditions of contract including the Environmental Management Plan;

- The EPC contractor should plan the construction program taking cognizance of climatic conditions along the wayleave especially wet seasons and disruptions that can be caused by heavy rains;
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. This will allow for easy assessment of any damage to the roads which may result from the construction process. If necessary some repairs should be done to prevent damage to equipment;
- The construction site office must keep a proper record of all complaints received and actions taken to resolve the complaints;
- A Project HSE Officer should be appointed by the Proponent and Contractor HSE officer should be appointed by the EPC contractor to implement this EMP as well as deal with Landowner related matters;
- Internal and external environmental inspections and audits should be undertaken during and upon completion of construction. The frequency of these audits should be quarterly;
- The Project HSE Officer should conduct regular inspections along the wayleave in order to maintain good control over the construction process during the construction phase;
- A formal communications protocol should be set up during this phase. The aim of the protocol should be to ensure that effective communication on key issues that may arise during construction be maintained between key parties such as the Project HSE Officer, project manager and EPC contractor. The protocol should ensure that concerns/issues raised by stakeholders are formally recorded and considered and where necessary acted upon. If necessary, a forum for communicating with key stakeholders on a regular basis may need to be set up. This could be done through the EPC contractor's site office that would meet on a regular basis. The communications protocol should be maintained throughout the construction phase.

Table 1: Environment Management Plan - Pre-construction phase

Impact	Environmental Mitigation Measure/Monitoring Plan – Pre-construction phase	Responsibility	Frequency/ Monitoring requirement
Pre-construction phase impacts	<ol style="list-style-type: none"> 1) The Proponent should appoint a project HSE Officer while the EPC Contractor should appoint his/her HSE officer; 2) Demarcate clearly (e.g. using fencing) all areas to be developed before construction commences; 3) The EPC contractor to comply with the conditions of the EIA License for the project; 4) Maintain records of environmental incidents and avail a copy of these records to relevant lead agencies on request throughout the construction phase; 5) Identify and confirm suitable sites for the construction camps and storage areas for materials; 6) Store construction equipment in construction camps. Ensure oil changes take place on an impermeable surface such as reinforced concrete slab; 7) Provide as much as possible opportunities for employment to persons from the local areas along the wayleave; 8) Train site staff on the following areas of environmental management; <ol style="list-style-type: none"> a) Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artifacts; b) Project Manager shall ensure that the training and capabilities of the Contractor’s site staff are adequate to carry out the designated tasks; 	KEL, Project HSE Officer	Bi-monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Pre-construction phase	Responsibility	Frequency/ Monitoring requirement
	<ul style="list-style-type: none"> c) Operators of construction equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks; d) No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the EPC Contractor and certified competent by the Project Manager; e) Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. 		

12.8 EMP requirements for construction phase

12.9 Site preparation

Site clearing for each turbine will be limited to the footprint of each turbine which is expected to be 20m x 20m. Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within say one month of time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained.

12.9.1 Establishment of Construction Camps and Materials yards

The proposed 100MW wind farm project will utilize approximately two construction camps and laydown areas. The construction camp locations have been identified based on the ease of access to the wind farm area as well as the transmission line.

Site establishment shall take place in an orderly manner and all required amenities shall be installed at Camp sites before the main workforce move onto site. The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction. The EPC Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of using NEMA approved waste handlers. A Waste Tracking Sheet required by Legal Notice 121: Waste Management Regulations, 2006 will be obtained by the EPC contractor and kept on file. The disposal of waste shall be in accordance with the Waste Management Regulations, 2006. Under no circumstances may any form of waste be burnt on site.

Table 2: Environment Management Plan - Construction Phase

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
<p>Poor traffic and access management during construction</p>	<p>Construction traffic</p> <ol style="list-style-type: none"> 1. Clearly define construction routes and required access roads; 2. Use the minimum number of trips for delivering construction plant and equipment along the wayleave; 3. Strictly control the access of all construction and material delivery vehicles especially during wet weather to avoid compaction and damage to the topsoil structure; 4. Schedule the delivery hours to avoid peak hour traffic, weekends and evenings; 5. Implement wheel washing and damping down of un-surfaced roads to reduce dust and nuisance; 6. Service vehicles and equipment regularly to avoid the contamination of soil from oil and hydraulic fluid leaks, etc. Servicing of vehicles and equipment must be done off-site and on an impermeable surface such as concrete; 7. Soils compacted by construction equipment along the wayleave should be ripped and regarded. <p>Access</p> <ol style="list-style-type: none"> 8. Rehabilitate temporary access roads prior to the EPC contractor leaving the site; 9. Position entry and exit points strategically to ensure minimal effects on traffic; 10. Clearly signpost primary routes to the site and issue to all suppliers and Sub-Contractors. 	<p>EPC contractor, Project HSE Officer</p>	<p>Bi-weekly</p>

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>11. Plan access routes to the site for construction purposes in conjunction with the EPC contractor and affected Landowners. All agreements reached should be documented and no verbal agreements should be made. The EPC contractor shall clearly mark all access roads.</p> <p>12. Where new access roads are constructed, this must be done according to design and contract specifications. Drainage channels shall be suitably designed to ensure erosion does not occur, especially at the outflow points. The new access road shall be designed to allow for the natural flow of water where required. Crossing of eroded areas on access routes to new sites shall be thoroughly planned and installed according to design and contract specifications. All areas susceptible to erosion shall be protected with suitable erosion control measures from the onset of the project. Prevention is the ultimate aim, as restoration is normally difficult and costly.</p> <p>Road maintenance</p> <p>13. All damaged roads shall be rehabilitated using suitable measures. In the event of rehabilitation work being required on private roads, such work will be done to the original specifications of the private road;</p> <p>14. Access roads should be maintained in good condition by attending to potholes, corrugations and stormwater damage as soon as these develop.</p> <p>General</p> <p>15. Safety requirements shall be complied with at all times during the construction phase. All equipment transported shall be clearly labeled as to their potential hazards according to specifications. All the required safety labeling on the containers and trucks used shall be in place;</p>		

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	16. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken.		
Improper setup and operation of Construction camps	<p>Site of construction camp</p> <ol style="list-style-type: none"> 1. The EPC contractor to seek approval from the relevant local authority for the location of the construction camp. Factors to consider during siting of construction camps include location of local residents and/or ecologically sensitive areas, including flood zones and slip/unstable zones. If the EPC contractor chooses to locate the camp site on private land, he must get prior permission from both the Project Manager and respective landowner; 2. Minimize the size of the construction camp (especially where natural vegetation or grassland has had to be cleared for its construction); 3. Provide adequate parking for site staff and visitors. This should not inconvenience or serve as a nuisance for neighbors; 4. Provide adequate drainage around the camp site to avoid standing water and/or sheet erosion. <p>Storage of materials (including hazardous materials)</p> <ol style="list-style-type: none"> 5. Choose storage area location by considering prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary; 6. Designate, demarcate, fence off and secure all storage areas to minimize the risk of crime; storage areas should be safe from access by unauthorized persons; 7. Provide fire prevention facilities at all storage facilities; 	EPC contractor, Project HSE Officer, Contractor HSE Officer	Bi-weekly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>8. Store all hazardous materials such as oils, paints, thinners, fuels, chemicals, etc. in properly constructed and impermeable bunded areas. Hazardous materials must not be allowed to contaminate the subsurface or enter into drainage systems. Siting of hazardous material storage areas must be approved by the Project Manager.</p> <p>9. The EPC contractor to acquire MSDSs for all chemicals and hazardous substances used on site. Training on environmental impacts of chemicals and hazardous substances and PPE required to worn must be provided to the users.</p> <p>10. Hazardous material storage areas must be signposted clearly</p> <p>11. Use a NEMA licensed waste handler for disposal of all used oils from the camp sites. A waste tracking sheet must be completed as required by L.N. 121: Waste Management Regulations 2006 whenever used oils are being disposed.</p> <p>12. Dispose off any excess concrete mixes in consultation with the Project Manager.</p> <p>13. Immediately contain, recover and cleanup any spillages that may occur during the construction phase. All spillages must be reported to the HSE Officer and Project Manager.</p> <p>Drainage of construction camp</p> <p>14. Ensure that all potentially contaminated run-offs from the construction camp meets the discharge limits set under Legal Notice 120: Water Quality Regulations. Run-off from the camp site must NOT discharge into neighbors’ properties or into adjacent wetlands, rivers or streams.</p>		

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>End of construction</p> <p>15. Rehabilitate all storage areas after construction has been completed on site and all excess material has been removed. Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, leveled and re-vegetated;</p> <p>16. Store construction materials, soil stockpiles, machinery and other equipment in designated areas;</p> <p>17. The construction camp must be kept clear of litter at all times. Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for correct disposal. No open fires are allowed within the construction camp and no wood from surrounding vegetation may be used to create a fire.</p>		
Lack of HSE training for construction staff	<p>Environmental training</p> <p>1. Ensure that all site personnel have a basic level of environmental awareness training. The EPC contractor must submit a proposal for this training to the Project HSE Officer for approval.</p> <p>Topics covered should include;</p> <ul style="list-style-type: none"> • What is meant by “Environment”; • Why the environment needs to be protected and conserved; • How construction activities can impact on the environment; • What can be done to mitigate against such impacts; • Awareness of emergency and spills response provisions; and • Social responsibility during construction e.g. being considerate to local 	EPC contractor, Project HSE Officer	Monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>residents.</p> <ol style="list-style-type: none"> 2. It is the Contractor’s responsibility to provide the site foreman with no less that 1 hour’s environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff; 3. Training should be provided to the staff members on the use of the appropriate fire-fighting equipment. Translators are to be used where necessary; 4. Use should be made of environmental awareness posters on site; 5. The need for a “clean site” policy also needs to be explained to the workers; 6. Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. <p>Monitoring of environmental training</p> <ol style="list-style-type: none"> 7. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the Contractor HSE Officer and/or a translator should be called to the site to further explain aspects of environmental or social behavior that are unclear. Toolbox talks are recommended. 		
Improper use and management of borrow pits	<p>Location of borrow pits</p> <ol style="list-style-type: none"> 1. Borrow pit localities must be negotiated with the relevant local authority to ensure consensus of their location; <p>Management of borrow pits</p> <ol style="list-style-type: none"> 2. The EPC contractor must also compile an information document which states the methods which will be utilized when creating borrow pits. This document must include, but not be limited to the following: 	EPC contractor, Project HSE Officer, Contractor HSE Officer	Monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<ul style="list-style-type: none"> • Plans which detail the expected quantity of excavation that will be required; • Temporary and permanent stormwater control; • The final contouring of the borrow pit and the proposed method of rehabilitation; • The current status and land use of the borrow pit; • Topsoil management strategy (preservation of topsoil for reinstatement); • Proposed management of dangerous conditions (e.g. steep slopes, loose and unstable material, holes). 		
Impacts on terrestrial ecology	<p>Impacts on terrestrial vegetation</p> <ol style="list-style-type: none"> 1. Where necessary, avoid destruction of trees and bushes and allow regeneration of plants. 2. Avoid dumping of excavated soils during construction of foundation of the structures. This will avoid smothering of vegetation by soil dumps. 3. Construction during extreme dry weather period should be limited. water sprinklers should be used whenever heavy machines are used to turn soil in order to reduce dusts released 4. Construction should take place when long or short rains are offing in the area. This will avoid uncertainties associated with runoffs. 5. Piles of soil should be reduced/avoided in order to prevent erosion by runoffs. 6. Interference of runoff directions should be avoided or where necessary it should be improved by constructing culverts on areas where runoff used to pass. This will sustain normal drainage of water and enhance dispersal of seeds. 7. Most of soils for compaction of murram roads should be obtained locally to avoid 	EPC Contractor, Project Manager, HSE Officer	Bi-monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>incidents of carrying propagules of invasive plant species from other places.</p> <p>8. Small water pans or dams (water conservation) should be constructed at strategic points on the terrain to collect water and reduce amount of soil materials eroded away.</p> <p>Impacts on mammals</p> <ol style="list-style-type: none"> 1. Reduce use of flood lights at night 2. Fish born road pattern should be designed to allow for dispersal of rodents to other areas. 3. Culverts should be constructed on roads an interval of 50 m to provide underpass for rodents. <p>Impacts on herpetofauna</p> <ol style="list-style-type: none"> 1. Culverts should be constructed on roads an interval of 50 m in areas with bushes to provide underpass for species. 2. Fish born road pattern should be designed to allow for dispersal of reptiles and amphibians to other areas. 		
Impacts on soils and geology	<p>Soil erosion</p> <ol style="list-style-type: none"> 1. Implement silt control measures such as silt fences and silt traps. 2. Stockpiles of excavated materials should be stored appropriately in designated areas and at a minimum distance of 10m from any nearby watercourses or drains. 3. Measures should also be taken to avoid direct rainfall on stockpile materials or exposed areas of ground that may result in slippage and washout of sediments into nearby drainage channels. 4. The control of the generation of silt laden surface water runoff will be by means of 	EPC Contractor, Project Manager, HSE Officer	Bi-monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>the use of mitigation measures such as bunds, settlement ponds, silt fences, silt traps or by covering the stockpiles with plastic sheeting. Long term stockpiles will be sealed at a suitable gradient and grass planted.</p> <p>Ground contamination from oil, fuel and chemical leaks</p> <ol style="list-style-type: none"> 1. Storage of chemicals will be in bunded areas of sufficient capacity while refueling of vehicles/machinery will be expected to be done offsite. 2. Where necessary, construction machinery will be re-fuelled onsite by means of a mobile fuel bowser done by trained personnel. This will be done in designated, bunded areas of hard-standing that are situated a minimum of 10m from surface water bodies. A spill tray and an emergency response spill kit will be brought onto the site with the mobile fuel bowser during refueling operations. <p>Destruction of soil structure by heavy vehicles</p> <ol style="list-style-type: none"> 1. Used of approved access routes and use of stone and laterite (murrum) on access tracks to protect underlying soil. This should be well compacted in order to carry the weight of the expected heavy vehicles. 2. The tracks should be constructed in such a way as to allow for easy drainage of surface run-off on either side of the track. In sloped areas, the drainage channels on the sides of the tracks should have concrete barriers at intervals of 30 to 50 metres (depending on the slope) to check erosion and cutting into the drainage channel. 		
Impacts on surface water	<p>Soil erosion and silt laden runoff washing into water bodies</p> <ol style="list-style-type: none"> 1. Excavation stockpiles will be managed in order to minimize potential for generation of silt laden runoff. 2. Surface water runoff from excavated areas should be directed to settlement/silt ponds to remove suspended solids prior to discharge to nearby watercourses. 	EPC Contractor, Project Manager, HSE officer	Bi-monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>3. Excavations to remain open for very short time before placement of fill to minimize potential for entry of surface water runoff into excavations.</p> <p>4. Direct surface water runoff away from and around access tracks by implementing a suitably designed drainage system to minimize potential for landslides along the access tracks.</p> <p>5. Watercourse crossings to comprise culverts of suitable design.</p> <p>Contamination of surface water</p> <p>6. Incorporation of acceptable equipment to arrest oils/fuels arising from accidental spills and/leaks to stop leakage towards surrounding water courses.</p> <p>7. Regular inspection of dewatering drains to ensure that they work efficiently.</p> <p>8. Storage of chemicals and hydro-carbon products in bunded areas of sufficient capacity. Refueling only in designated areas under strict protocol.</p>		
Avifauna impacts	<p>Impacts on avifauna associated with general construction activities</p> <p>1. Good site practices and procedures to be implemented to reduce the environmental effects identified. These practices may include:</p> <ul style="list-style-type: none"> • Specifications regarding disposal, dust control, artificial drainage system maintenance and soil compaction control. • All disturbed areas of the construction site should be stabilized immediately and re-vegetated as soon as conditions allow; • Maximize use of existing tracks for access roads • Minimize removal of vegetation • Avoid disturbance to wet grassland areas onsite. 	EPC Contractor, Project Manager, HSE Officer	Bi-monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<ul style="list-style-type: none"> • Habitats subjected to temporary loss will be re-vegetated as soon as possible after construction, to replicate the habitat <p>Waste Disposal Sites may attract scavenging species like Marabou storks and egrets to the site</p> <ol style="list-style-type: none"> 1. Site-specific waste collection and disposal management plan should be in place to, include good site practices such as: <ul style="list-style-type: none"> • Systematic collection of waste • Providing the appropriate spill kits (e.g., containing absorbent cloths and disposal containers) on-site during construction • Prohibition of dumping or burying wastes within Project site • Implementation of an on-going waste management program consisting of reduction, reuse, and recycling of materials <p>Temporary increase in dust, odor, from construction vehicle emissions indirectly affect avifauna</p> <ol style="list-style-type: none"> 1. Dust will be controlled by watering where necessary 2. All combustion engine equipment should be appropriately maintained to meet emission standards <p>Short-term construction-related noise from heavy equipment and vehicle traffic</p> <ol style="list-style-type: none"> 1. All engines associated with construction equipment should be equipped with mufflers and/or silencers in accordance with NEMA guidelines and regulations 		

Impact	Environmental Mitigation Measure/Monitoring Plan – Construction Phase	Responsibility	Frequency/ Monitoring requirement
	<p>Potential for disturbance of natural features, habitats, and species from limited removal of vegetation and increased human activity</p> <ol style="list-style-type: none"> 1. Infrastructure such as access roads should be limited to existing paths 2. Tree clearing (if required) should be minimized by locating access roads outside the natural habitats e.g. woodlands and wetlands 3. Tree and/or bush clearing should be completed prior to or after the core breeding season for woodland and grassland birds 4. Should clearing be required during the breeding bird season prior to construction, surveys should be undertaken to identify the presence/ absence of nesting birds or breeding habitat. 5. The work areas should be restored to pre-construction conditions following construction 6. Disturbed areas of the construction site should be stabilized immediately and re-vegetated as soon as conditions allow 7. Construction to be done outside main breeding season 8. Conduct pre-operation survey for breeding birds and nest locations 		

Table 3: Environment Management Plan - Operational Phase

Impact	Environmental Mitigation Measure/Monitoring Plan – Operational Phase	Responsibility	Frequency/ Monitoring requirement
Terrestrial ecology impacts	<p>Impacts on terrestrial vegetation</p> <ul style="list-style-type: none"> • Operating vehicles and other equipment should be cleaned thoroughly to avoid carrying propagules of the invasive species to the project site. • Low speed limit (maximum 40km/hour) should be adopted for operation in the area to avoid vehicles hurling dusts. • Water sprinklers should be used for dust suppression when intense operation of vehicles is to take place. <p>Impacts on sensitive habitats</p> <ul style="list-style-type: none"> • Vegetation mosaics should be improved in order to allow animal species to connect to other habitats in the area • Encourage regeneration of plants in the riverine areas <p>Impacts on Priority Plant Species</p> <ul style="list-style-type: none"> • Livestock grazing should be avoided around the area in order to allow the plants to grow. • Access to the project site should be restricted. Other than the known local people, only authorized persons should be allowed to enter the area. • If possible, their area of occurrence should be fenced out of reach to people and regeneration encouraged. <p>Impacts on Insect Pollinators</p> <ul style="list-style-type: none"> • Improvement of habitat (vegetation) connections should be enhanced by conserving grasses and bushes that occur in the wider landscape. 	O&M Company/ Proponent HSE Officer	Monthly

Impact	Environmental Mitigation Measure/Monitoring Plan – Operational Phase	Responsibility	Frequency/ Monitoring requirement
	<ul style="list-style-type: none"> • Fish born road pattern should be designed to allow for dispersal of insect pollinators to other areas. • The road should be allowed to have natural small growths of grasses to provide attractive passage to the other side of the road. <i>Zizula hylax</i> and <i>Azanus jesous</i> have been observed on murrum roads with small grassed. The species were only observed mostly on road sides of murrum roads. Improvement of habitat (vegetation) connections should be enhanced by conserving grasses and bushes that occur in the wider landscape. <p>Impact on Mammals</p> <ul style="list-style-type: none"> • Improvement of habitat (vegetation) connections should be enhanced by conserving grasses and bushes that occur in the wider landscape. • Potential road kills of large mammals can be reduced by limiting speed to 30km/hour at night and 40km/hour during the day to reduce impacts of accidents when vehicle collide with animals also the speed can give drivers lapsing period for braking. • Speed of vehicles should be controlled (i.e. reduced) in the area to avoid unnecessary distractions. <p>Impact on herpetofauna</p> <ul style="list-style-type: none"> • Potential road kills of reptiles and amphibians can be reduced by limiting speed to 30km/hour at night and 40km/hour during the day to enable drivers to brake as they cross the road. 		
Impacts on birds	<p>Bird collision impacts</p> <ol style="list-style-type: none"> 1. Prepare a bird monitoring program for the operations phase (including targets based on international norms as well as local monitoring data). 	O&M Company/ Proponent	March – May, September – December

Impact	Environmental Mitigation Measure/Monitoring Plan – Operational Phase	Responsibility	Frequency/ Monitoring requirement
	<ol style="list-style-type: none"> 2. Conduct monthly bird carcass searches at a representative sample of turbines to ascertain the extent of bird kills and potential causes, with any carcasses found being sent to an appropriate institution for analysis (if possible). It is suggested this program be conducted for an experimental period of 2 years, and thereafter decision be taken if it is worthwhile to continue the program. 3. A post-construction monitoring study for birds should be developed and implemented to understand the effects of potential bird collisions with the rotors during the operational phase. 		
Reduction in bat mortality impacts	<p>Minimizing impacts on bats</p> <ol style="list-style-type: none"> 1. Conduct carcass bat searches at a representative sample of turbines to determine the level of bat mortality around wind turbines. This is especially important during the periods March to May and September to December when bats are migrating between summer and winter roosts. Carcass searches should be made early in the morning to minimize the effect of scavengers (which remove carcasses). Carcasses should be frozen and sent to a bat specialist for identification purposes. It is suggested this program be conducted for an experimental period of 2 years, and thereafter decision be taken if it is worthwhile to continue. 2. Prepare and conduct a monitoring program to identify which bat species occur on the site, for an experimental period of 2 years. Thereafter, decide if it is worthwhile to continue the program. A body such as the National Museums of Kenya could be appointed to conduct the monitoring. 		
Impacts on noise quality	<p>Reducing noise impacts</p> <p>Conduct noise monitoring during the first year of operation of the turbines to confirm that the actual noise complies with the predicted noise levels in the EIA.</p>	O&M Company/ Proponent	Monthly

Table 4: Social Management Plan - Construction and Operational Phase

Impact	Social Management and Monitoring Plan	Responsibility	Frequency/ Monitoring requirement
Impacts on local infrastructure, services and natural resources	<p>Access Roads for construction and operations</p> <p>1. All roads being used by the project should be well maintained, and left in as good state, or better than their current state</p> <p>Upgrading of existing roads</p> <p>2. Involve the community during road upgrades. The Proponent should also consider upgrading roads that will be used by the project with minimal local grassland impact.</p> <p>Straining existing water supplies for the construction phase</p> <p>3. The Proponent should clearly identify the amount of water required for the project and should work closely with the community to avoid straining the already meager water resources available for livestock and humans</p> <p>Increase in traffic and traffic related impacts on grassland resources</p> <p>4. A traffic management plan should be developed for all vehicle drivers given the importance of least effect on grassland and respect of local grazing livestock</p>	EPC Contractor, Project Manager, HSE Officer	Bi-monthly
Visual impacts	<p>Minimization of visual impacts</p> <p>1. No permanent outside storage of equipment, spare parts or other ancillary materials should be visible. Keep these off-site where possible, or limited to low visibility sites.</p> <p>2. The site should be kept in a clean and well maintained condition.</p> <p>3. The exterior of any visible surface of the turbines should be cleaned, repainted, repaired or replaced if it rusts, corrodes or otherwise visibly deteriorates.</p>	O&M Company/ Proponent	Monthly

Impact	Social Management and Monitoring Plan	Responsibility	Frequency/ Monitoring requirement
	<p>4. All fencing should be kept in a clean and repaired condition.</p> <p>5. All fugitive waste or debris should be collected and removed from the site and properly disposed.</p> <p>6. Lighting should be designed to minimize light pollution without compromising safety. Investigate using motion sensitive lights for security lighting. Turbines are to be lit according to Kenya Civil Aviation Authority regulations.</p> <p>Enhancement of positive visual aspects of the development</p> <p>7. Maintenance of the turbines is important. A spinning rotor is perceived as being useful. If a rotor is stationary when the wind is blowing it is seen as not fulfilling its purpose and a negative impression is created.</p> <p>8. Signs near wind turbines should be avoided unless they serve to inform the public about wind turbines and their function. Advertising billboards should be avoided.</p> <p>9. An information kiosk (provided that the kiosk and parking area is located in a low visibility area) and trails along the wind farm can enhance the project by educating the public about the need and benefits of wind power.</p>		
Impacts on indigenous Maasai people's identity and culture	<p>Damage to livestock grazing resources</p> <p>1. The EPC contractor should map access roads and implement strict driving instructions to adhere to such roads without going off-road thus destroying livestock grazing resources</p>	EPC Contractor, Project Manager, HSE Officer	Bi-monthly

Impact	Social Management and Monitoring Plan	Responsibility	Frequency/ Monitoring requirement
	<p>Maintenance of community relations</p> <p>2. The contractor should develop a code of conduct to guide the employees on how to relate with the community to avoid conflicts;</p> <p>3. Human Rights of all should be respected irrespective of their rights awareness</p>		