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Biodiversity & Conservation Management Plan

Document No. xxx

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Contents

Abbreviations

AfDB	African Development Bank
AOI	Area of Influence
CBD	Convention on Biological Diversity
CCMSWA	Convention on the Conservation of Migratory Species of Wild Animals
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
CRM	Collision Risk Model
EIB	European Investment Bank
EMCA	Environmental Management and Coordination Act
EN	Endangered Species
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental Social Impact Assessment
ESMP	Environmental and Social Management Plan
GIS	Geographic Information System
IBA	Important Bird Areas
iBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Areas
KFSC	Kenya Forestry Seed Centre
KMFRI	Kenya Marine and Fisheries Research Institute
KPI	Key Performance Indicator
KWS	Kenya Wildlife Service
LTWP	Lake Turkana Wind Power Ltd.
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organisation
NMK	National Museums of Kenya
OHS	Occupational Health and Safety
OPIC	Overseas Private Investment Corporation
PMC	Project Management Contractor
RSPB	Royal Society for the Protection of Birds
SAPP	Sensitive Area Permit to Proceed
UNCCD	United Nations Convention to Combat Desertification
UNESCO	United Nations Education, Scientific and Cultural Organisation
VU	Vulnerable Species
WCMA	Wildlife Conservation and Management Act

1 Introduction

This Biodiversity and Conservation Management Plan is designed to avoid, minimise or mitigate potential negative impacts upon species, habitats and ecosystem services resulting from the development and operation of the Lake Turkana Wind Power Ltd (LTWP) wind farm at Loiyangalani and the upgrade of the 204km road between Laisamis Junction and the wind farm site within Loiyangalani subdivision.

Maintaining the ecological quality of the environment and its eco-system services is important to LTWP, which is committed to the following measures:

- To ensure compliance with relevant legislation, Environmental Social Impact Assessment (ESIA) recommendations, conditions, and the overarching project requirements of the Project namely International Finance Corporation (IFC) Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management, and relevant Lenders' standards (as listed in Section 3 below);
- To protect species, habitats and eco-system services, ensuring no net reduction to any critically endangered / endangered species and no net loss of any critical habitats (as defined by IFC Performance Standard 6) whilst minimising disturbance to other species and habitats to the extent practicable;
- To extent possible work with/ assist appropriate stakeholders to progressively rehabilitate the biodiversity of the site, either through the promotion of natural propagation or replanting with local vegetation species (e.g. via a pilot tree nursery / propagation project or purchase of suitable seedlings as appropriate) throughout the Project's life cycle;
- To assist with the identification and successfully eradicate any alien invasive species that may become established within the Project's area of influence as a result of Project related activities; and
- To make biodiversity survey information available from the above initiatives/ interventions to key Project stakeholders.

2 Objectives, Scope and Approach

2.1 Objectives

The objectives of this Management Plan are to:

a) Outline the Project's obligations with regards to the protection of flora, fauna, habits and ecosystems services;
b) Define the procedures, controls and mitigation measures for all construction and operation phase activities with the potential to adversely affect flora, fauna, habitats and ecosystem services;
c) Define roles and responsibilities, including training requirements;
d) Define monitoring and reporting procedures; and
e) Describe long term actions and the need for further research where necessary.

2.2 Scope

LTWP is committed to complying with various environmental legislation and international standards (see Section 3 below) which are managed through the suite of topic-specific Management Plans as described in the Project's **Framework Environmental and Social Management Plan** (ESMP).

The potentially affected landscape comprises the land within and adjacent to the following Project components:

1. The wind farm site footprint and immediate surroundings;
2. The road upgrade corridor from Laisamis via Illaut to Kargi Junction, then from Kargi Junction to the C77 road up to the extent of the wind farm site footprint; and

Flora and fauna may be affected to a greater or lesser extent by construction activities within the wind farm footprint area during the construction of the Project's various facilities, including the access road rehabilitation sub-project between Laisamis and the site. Accordingly, this plan addresses the range of control measures required to avoid, minimise and rehabilitate impacts to biodiversity that might be caused during the construction phase.

This Plan also sets out the detailed long-term protection and monitoring measures and addresses both the potential for impacts upon fauna, including the well documented potential impact on birds and bats, and the introduction of alien invasive species during the operations phase. Details of arrangements for dealing with the implications for biodiversity during the eventual site closure and rehabilitation phase will be defined at a later date.

2.3 Approach

This Plan focuses on mitigating the direct, indirect and cumulative potential adverse impacts of the LTWP wind farm on flora and fauna and ecosystems services within the Project Area of influence (AOI). Some of the measures mitigating potential impacts are reflected in the ESIAs that informed the Project. A **Biodiversity & Conservation Update** (see Appendix A) carried out by LTWP further builds upon the information presented in the Project's various ESIAs, characterising habitats within the Project AOI in accordance with characterisation and further analysing the impacts of the Project on terrestrial biodiversity including:

- terrestrial habitats and species (including bats and birds);
- species of national or global conservation interest; and
- protected areas or areas of recognised conservation value (i.e. those protected or recognised under Kenyan laws and those recognised by international conventions and/or conservation organisations).

This plan addresses LTWP's and its Lenders' biodiversity requirements as set out in the following standards:

a) The IFC Performance Standards, in particular #6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, 2012;
b) The European Investment Banks' (EIB) Environmental and Social Practices Handbook and in particular the Vol. A: Standards, especially #3: Standards on Biodiversity and Eco-system Services, 2014; and
c) The Overseas Private Investment Corporation's (OPIC) Environmental Guidance: Renewable Energy – Wind Projects, 2012.

Where applicable, those documents are directly referred to in this Plan; however, this document collates all the measures associated with biodiversity and conservation in order to ensure a consistent and effective approach.

2.3.1 Context

Land-take and construction activities will inevitably result in some loss or degradation to existing habitats and ecosystem services as well as direct and indirect disturbance and displacement to both flora and fauna; however, appropriate mitigation and site rehabilitation can successfully attenuate construction phase impacts.

During the operational phase, although no significant impacts to terrestrial ecology are documented by the Project ESIAs, consideration needs to be taken of potential impacts on bats and birds from site-specific disturbance, habitat loss (both direct and/or indirect) and collisions. The key potential impacts being fatal collisions with turbine blades, overhead lines and masts, particularly in relation to larger birds, such as raptors and bats during migrations, and 'decompression barotrauma[1]' in bats. There are two migration periods; the spring migration (March-April) has a duration of 6 – 8 weeks and the autumn migration (October-November) 10 – 15 weeks dependent on the species. The precautionary principle will therefore be advocated in regard to potential impacts and on-going monitoring of birds and bats will take place.

Further details on the wider biodiversity and conservation impacts associated with the wider Project are provided in Section 6 of this Plan.

2.3.2 Roles and Responsibilities

2.3.2.1 Overall responsibility for the implementation of this Management Plan shall rest with the LTWP Employer's Representative, Aldwych Turkana Limited (ATL), ESHS Manager, who shall report progress to the General Manager.

Lines of responsibility between LTWP, ATL, the Project Management Contractor (PMC) and the various contractors are described in the **Framework ESMP** and the **Construction Environmental and Social Interface Management Plan**, as well as other documents.

2.3.2.2 The ATL ESHS Team will:

- have overall responsibility for the implementation of this Management Plan;
- provide guidance to contractors and other LTWP service providers on appropriate protection of biodiversity;
- consist of an ESHS Manager and ESHS Officers who will monitor Contractors' performance; and
- review and update this Plan as required.

2.3.2.3 Construction contractors will:

[1] Barotrauma typically occurs when an organism is exposed to a significant change in ambient pressure, during uncontrolled decompression of a pressure vessel, but can also be caused by a shock wave. The lungs of bats are typical mammalian lungs, and unlike the lungs of birds, they are thought to be more sensitive to sudden air pressure changes in their immediate vicinity, such as when near wind turbine blades, and are therefore more liable to rupture.

- be responsible for the integration of the requirements detailed in this Plan within their own operating procedures, management plans and method statements; and
- ensuring their workforce is adequately trained in the requirements of this and their own equivalent Plans.

2.3.3 People

Training will be provided to all ATL employees, contractors and their sub-contractors to ensure that each employee has sufficient knowledge to be able to understand the requirements of this Plan. This will include training on such aspects as awareness of wildlife and habitat management (including details of actions to be taken when wildlife conservation concern is identified), prohibitions on feeding wildlife and the secure storage and disposal of food wastes.

At the current time, LTWP does not anticipate a need to appoint a full-time ecologist to its ESHS Team. Instead, it proposes to give bird and bat identification training to its ESHS Officers to facilitate informal observations during the construction/early operations phase and engage specialist consultants for formal bird and bat surveys as required. The costs of personnel and specialist surveys are already accounted for in the Project ESHS mitigation budget.

As appropriate, potential 'volunteers' with the requisite identification or other ecology-related skills (such as birdwatchers or amateur photographers) among the work force may also be used to support biodiversity monitoring activities.

2.3.4 Equipment

ATL will avail its ESHS Team with suitable equipment and reference materials needed to undertake the activities required by this Plan.

Currently, LTWP does not anticipate the acquisition of any sensing technology (e.g. infra-red cameras, bat detectors, thermal imaging, X-band radar or motion sensitive cameras) for biodiversity monitoring, but will review its position should monitoring results indicate a clear case for introducing such technologies.

3 Regulatory and Other Requirements

3.1 Kenya's Legislative Framework

Kenya has signed and ratified the following international Conventions which relate to the goals of the National Biodiversity Strategy and Action Plan (NBSAP):

- Convention on International Trade in Endangered Species of Wild Fauna (CITES);
- Convention on the Conservation of Migratory Species of Wild Animals; (CCMSWA)
- Convention on Wetlands of International Importance especially as waterfowl habitats (the Ramsar Convention);
- United Nations Convention to Combat Desertification (UNCCD); and
- United Nations Convention on Biological Diversity (CBD).

Further to its ratification of the CBD and adoption of the UN's 2020 Aichi Biodiversity Targets, Kenya has developed a National Biodiversity Strategy and Action Plan (NBSAP) endeavouring to reverse the rate of biodiversity loss and to maintain biological resources at sustainable levels for posterity. Kenya reports on implementation progress (issued to the Convention on Biodiversity and available at (https://www.cbd.int/nbsap/search/default.shtml).

The primary legislation comprises the core Environmental Management and Coordination Act (EMCA), which regulates ESIA and development planning, and the Wildlife and Conservation Management Bill (WCMA), 2013 which sets out the roles of the Kenya Wildlife Service (KWS) and the Wildlife Regulatory Council. Other legislation such as the Water Act (2012) and the Forest Act (2005) may also have a bearing on biodiversity and/or conservation at and around the wind farm. All of the above agencies and others form part of the National Environmental Management Authority's (NEMA) environmental specialist consultation process that review project ESIA's on NEMA's behalf. Feedback from these agencies is fed into NEMA's review and permitting of projects. Where significant impacts are identified by an agency these concerns form part of ESIA approval process and if significant are detailed in the Licence conditions.

The WCMA covers a range of issues including national parks, protected areas / ecosystems and management plans; it also establishes the national lists of critically endangered, endangered, vulnerable, near threatened and protected faunal species and trees plus invasive species. Note that there may be difference between national (WMCA schedules) and international designations (IUCN classifications) of endangerment and vulnerability. The IUCN Critically Endangered / Endangered categories as per IFC Performance Standard 6 criteria will be applied in this Plan. The plan will be reviewed annually using the Integrated Biodiversity Assessment Tool (IBAT)[2] to take into account any revisions to designations and national lists applicable to habitats and species within the wind farm area.

3.2 LTWP's Biodiversity and Conservation Policies

LTWP has defined its environmental and social policies for the Project (see **ESMS Policy Manual**). The policies' objective #2 commits LTWP to managing "the associated environmental and social risks and impacts in accordance with the principles of sustainable development, applicable legal requirements, relevant international standards and recognised good industry practice".

LTWP recognises the need of managing impacts on biodiversity and will *inter alia*:

- Minimise habitat disturbance and, to the extent practicable, excess dust generation, noise emissions, soil erosion, siltation or other pollution of surface waters, and land contamination;

[2] https://www.ibatforbusiness.org

- Undertake surveys of bird and bat presence and migration in the AOI to confirm the nature and likelihood of the predicted impacts of operations;
- Ban all hunting, bushmeat trading and felling of trees /destruction of vegetation by Project workers and monitor changes to eco-system services relied on by local communities;
- Remain alert to the presence of critically endangered / endangered species in the Project AOI and any situations that might trigger further interventions in accordance with good international practice; and
- Record bird or bat fatalities from collision with turbine blades.

LTWP also intends that its environmental endeavours shall be consistent with international practice and has adopted the IFC Performance Standards (e.g. mitigation measures such as no perimeter fencing around the wind farm site, installation of bird deflectors on overhead lines within the wind farm, onsite vehicle speed limits, etc.). This Plan is therefore intended to meet the applicable requirements set out in Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources. These requirements include the need to assess the risks to nearby critical habitat, avoid impacts upon protected and internationally recognised areas, and implement controls on invasive alien species. The ESIA and associated suite of documents confirm that the wind-farm is unlikely to significantly impact any of the above protected areas and therefore LTWP will adopt a precautionary approach and consult with the relevant authorities on a regular basis and to implement any mitigation as per licence/ permitting requirements.

3.3 Protected and Designated / Internationally Recognised Areas

There is a range of formal, nationally protected and designated areas in Kenya, comprising National Parks, National Reserves, Forest Reserves and Cloud Forest Sites. These are complemented by further 'designated' or internationally recognised areas, not all of which are formally protected or recognised by the Kenyan government. These can include UNESCO World Heritage and Biosphere Reserves, Ramsar sites, and NGO-designated Key Biodiversity Areas (KBA), Important Bird Areas (IBA), Important Plant areas and so on. There are also community reserves and private game reserves and other conservancies.

There are a number of protected areas located outside the Projects' area of influence (see Figure 3.1) and as such are unlikely to experience any significant impacts as a result of the Project, including inter alia:

- The Sibiloi World Heritage site (due to its global archaeological significance) and Sibiloi National Park to the north of the proposed development - 250 km to the north of the wind farm;
- The Central Island and South Island National Parks in Lake Turkana – 200 km to the northwest and west of the wind farm site respectively;
- Marsabit National Park to the east - 250 km to the east of the wind farm; and
- The Mount Kulal Biosphere Reserve to the north/northeast of the site, which serves as a water shed for the Lake Turkana Basin and as a wildlife dispersal area - 70 – 80 Km to the north of the wind farm.

Also, it is noted that the KWS classifies Lake Turkana and Mt. Kulal as 'endangered ecosystems', while the whole of Lake Turkana, c.10km to the west of the site boundary, has also been designated by Birdlife International as an Important Bird Area.

See Appendix A, Section 3: Areas of Conservation Interest / Habitats for further details on this topic.

3.4 Lenders' Standards

The African Development Bank (AfDB), European Investment Bank (EIB) and the Overseas Private Investment Corporation (OPIC) require their respective standards applied to the project. The EIB Standard 3: Biodiversity and Ecosystem Services and the new Integrated Safeguards of the AfDB, including Operational Safeguard 3: Biodiversity and Ecosystem Services, are generally compatible albeit with some minor variations with the IFC requirements which were adopted by LTWP and incorporated into this Management Plan and its supporting

documentation (e.g. the EIB has Natural, Semi-Natural and Urban habitats whereas the IFC have only Natural and Modified).

OPIC has an Environmental and Social Policy Statement (2010) which generally demands compliance with the IFC Performance Standards as a minimum and they will not invest in any project that involves conversion or degradation of Critical Natural Habitats / Forest Areas. However, OPIC's 2012 Environmental Guidance Renewable Energy – Wind Projects document sets out specific requirements in regard to any presence of critical or sensitive habitat on or adjacent to the site (4.1) and/or any presence of bird or bat migration routes or areas of congregation (4.2).

4 Biodiversity Stakeholders

4.1 Government

The Ministries of Environment and Mineral Resources, Forestry, Lands, Finance, Special programs in the Office of the President, Fisheries and Agriculture have varying degrees of responsibility biodiversity and conservation, although in practice responsibility is delegated to agencies and institutions. The following agencies are

- **National Environment Management Authority** (NEMA) is responsible for establishment and coordination of the legal and institutional framework for the management and conservation of biological diversity;
- **Kenya Wildlife Service** (KWS) and is mandated to conserve and manage wildlife and to enforce related laws and regulations. KWS undertakes stewardship of National Parks and Reserves and oversight of wildlife conservation and management outside protected areas, including wildlife crime; and
- **National Museums of Kenya** (NMK) is a multi-disciplinary institution whose role is to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage. NMK established a Centre for Biodiversity and its ornithologists participated in the URS Scott Wilson led bird surveys.

The **Kenya Forestry Seed Centre** (KFSC) is able to provide tree seed however investigation and feedback from specialists confirmed that tree propagation from seedlings in the AOI have been unsuccessful. LTWP will continue to investigate and consult with various stakeholders as to appropriate options/ measures to mitigate tree losses. Other central government organisations such as Kenya Forest Service (KFS) and the Kenya Marine and Fisheries Research Institute (KMFRI) are less likely to have a role in regards to the LTWP Project.

4.2 Marsabit County

At the County level, biodiversity and conservation issues fall under the Water, Environment and Natural Resources Department and the Wildlife Conservation Committee, both of which may need to be engaged by LTWP from time to time.

4.3 National and International NGOs

In addition to local tribal trusts and community based organisations, a wide range of national and international non-governmental and academic organisations may wish to be engaged on various issues and/or request information on the Project's biodiversity performance. Potential stakeholders may include *inter alia*:

- UNESCO (Sibiloi National Park and cultural heritage)
- International Union for Conservation of Nature (IUCN) (scientific/conservation base)
- RSPB (bird survey methods)
- Nature Kenya/Birdlife International (KBA / IBAs and wind farm bird fatalities)
- East African Wildlife Society / Kenya Wildlife Conservation Forum and partners such as Flora and Fauna International (campaigning on general wildlife / endangered species issues)

LTWP in accordance with its **Stakeholder Engagement Plan** will consult with the above parties in respect to this biodiversity and conservation plan on an annually basis and update this plan accordingly with any recommendation or findings.

5 Biodiversity & Ecological Characterisation

The original ESIAs provided a general characterisation of the Project area but did not identify protected habitats or which red list species might be present in the area impacted by the Project, although they did list observations of some such species. As part of the **Biodiversity & Conservation Update**, a list of national and global species was collated from the Kenyan Red List[3] (as published in the Wildlife and Conservation Management Bill (WCMA), 2013) and validated against the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (published and updated on-line at: http://www.iucnredlist.org/) to confirm their current international designation (note that fully endemic species are not assessed by the IUCN).

A detailed list of the Kenyan Red List and IUCN Red List species found in Kenya is provided in **Biodiversity & Conservation Update** (see Appendix A), while a summary is presented in this Plan. The Kenyan Red List and IUCN Red List review categorised species as follows:

- 'high likelihood of occurrence ' (red): - species that are known or recently understood to have been present within the Project area;
- 'medium likelihood of occurrence' (amber): – species that are potentially present to a greater or lesser degree; and
- 'low likelihood of occurrence' (green): - species that will not be present within the Project area either due to their habitat type or range.

Note that where no range information or map available, LTWP will consult with local experts to determine whether or not those specific species are likely to be impacted during Project activities and, if so, what specification measures to apply in the event that they cannot be avoided.

Use of internet-based resources relating to the Project area enabled a clearer picture of both protected / designated areas in proximity (i.e. within 10 km) to the proposed wind farm and road rehabilitation corridor. The information was complemented by checks on the IUCN range maps[4], satellite/GIS imagery and photographs to confirm habitat determination. Further research was conducted including checks on the IUCN range maps[5] and wider internet searches to confirm potential presence or eliminate from further consideration and inform the critical habitat determination process as described above.

The output of this exercise comprises the list of 'species of interest'; note that where there is any doubt as to the likelihood of an 'at risk species' presence in the Project area, the species is included in the list so that it forms part of the ESHS causal wildlife sightings effort or other measures – see Section 6.1 below.

5.1 Habitats

5.1.1 Wind Farm Site

The wind farm site is approximately 162km^2 in size and comprises a mixture of 'masai xeric' grassland and scrubland[6] with areas of bare alluvial deposits. There are very few trees across the site and there are no permanent water bodies. Limited preparatory works have already commenced here, including clearance of

[3] As the Kenyan Red List does not list all species of global concern, further input was obtained from other web sites including at http://www.ehow.com/about_5456468_plants-endangered-kenya.html and at http://earthsendangered.com/search-regions3.asp

[4] IUCN data is often dated 10 years or more and may not be a reliable indicator in regard to species' range, especially where there have been rapid changes due to anthropomorphic activities.

[5] IUCN data is often dated 10 years or more and may not be a reliable indicator in regard to species' range, especially where there have been rapid changes due to anthropomorphic activities.

[6] A full description of this grassland and scrubland ecoregion can be found in Olson et al., 2001) and http://worldwildlife.org/publications/terrestrial-ecoregions-of-the-world.

tracks and the installation of 8 data masts sited on representative ridges across the area to be occupied by the turbines.

Some acacias are found growing along occasional low lying water course areas (locally known as 'laggas'), which do not flow in the dry season. Laggas may be periodically flooded for a few hours/ day and not necessarily every year (the area has seen long periods of drought). The southern end of the site generally has a proportionately greater coverage by acacia-commiphora scrub lining the dry 'laggas'/ water courses, although this is sparse compared to similar areas to the south of the site along the C77 road. Further north, the habitats are dominated by a rocky desert habitat with very sparse vegetation.

The shoreline of Lake Turkana, which is dominated by exposed lava rocks (Rhyolite and Tuffaceous outcrops), is located c.10km to the west of the site boundary. From the southern site boundary the habitats gradually change to scrub and scant acacia woodland as the main settlement of South Horr is approached at c.60 km to the south of the site. South Horr is located within a canyon between Mount Nyiru and Mount Ol Donyo Mara. To the east/northeast of the site the land rises up to Mount Kulal (2,335m) where there is a cooler habitat with moist broadleaf forests and steep-sided valleys.

5.1.2 Road Upgrade Corridor

The road upgrade comprises the rehabilitation of an existing murram road through rangelands marked by low lying terrain lying between numerous hills and crossed by laggas, similar to the grasslands and scrublands that make up the wind farm location.

5.2 Protected Areas and Critical Habitat

5.2.1 Wind Farm Area

The wind farm site avoids several nearby designated / recognised areas including the Mount Kulal Biosphere Reserve, Mount Nyiru Forest Reserve, and both South Island National Park and the Lake Turkana IBA.

It should however be noted that although the proposed wind farm site avoids the core area and buffer zone of the Mount Kulal Biosphere Reserve[7], it is considered to be within either the transition zone, which can accommodate sustainable resource development such as wind power. It can be concluded that the Project activities will have minimal impact on the Biosphere Reserve.

5.2.2 Road Rehabilitation Component

The **Project Description** contains a figure depicting the original proposed road rehabilitation route and the later realignments.

From Laisamis, the existing D371 road runs parallel to the Losai National Reserve (IUCN category VI protected area) which is a restricted tourism area, having formerly been a habitat for black rhino and elephants. The D371 then crosses the north-western tip of the Losai Reserve towards Ngurunit where the existing road briefly enters the Ndotos Range Forest Reserve.

However, a route diversion is planned around Ngurunit, traversing directly from Namarei to Ilaut, so the realignment will avoid impacts on both the Losai National Reserve and the Ndotos Range Forest Reserve. The original D371 then heads northwest to the Paul Teasdale Old Road, where the proposed realignment will continue directly across country up to Kargi Junction then down to the wind farm site, thereby also avoiding the Mount Nyiru Forest Reserve along the C77 road at South Horr.

[7] Neither the UNESCO web page (See http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?code=KEN+02&mode=all) nor the World Database on Protected Areas (or its search facility, protectedplanet.net) provide details of the core, buffer or transition boundaries.

The road upgrade is of potential concern in regards to the Losai National Reserve as, hitherto, its relative isolation and inhospitable terrain made it very difficult to visit; however, although the road upgrade may improve access to the general area, the rugged terrain and thorn bush habitat is almost impenetrable and the key species (black rhino, elephant, greater / lesser kudus and lion) have apparently been poached out.

5.2.3 Critical Habitat

Although in many respects 'natural', the overall habitat within the wind farm area has been affected by pastoral, timber harvesting and other anthropomorphic activities and is therefore considered to be 'modified' to various degrees. Applying the IFC's criteria defined in the Performance Standard 6 Guidance Note (i.e. criteria 1-3 tiers 1 and 2 and criteria 4 and 5 plus potentially impacted protected areas), both the wind farm area as a whole and the road rehabilitation corridor are considered ***not*** to be 'critical habitat'.

However, it is recognised that the habitats in those areas are not homogenous and that some localised habitats, such as vegetation strips along laggas, have relatively greater importance within the area and therefore should be avoided by construction activities as far as possible.

5.3 Flora

The common plant species of the project area include dwarf shrubs[8] such as*, Duosperma eremophilum, Sericocomopsis hildebrandtii, Acacia reficiens, Acacia mellifera* and *Commiphora africana*. The most prominent tree of the project area is the *Acacia tortilis* (Umbrella Thorn) which is found along the laggas and along the drainage areas.

Trees are in decline from drought and anthropogenic pressures as they provide important eco-system service to the local population including construction timber, wood fuel (often converted to charcoal in artisanal processes), food for livestock, and as raw material in crafts. Acacia trees within the site footprint are generally small in height normally growing to around 5m-6m. Annual grasses are common especially during the rainy season. They include *Aristida mutabilis, Aristida adscensionis* and the species of *Eneopogon* and *Cencrus*.

There is no confirmed high likelihood of occurrence species of conservation interest in the AOI, although there are three species that might potentially be present to a greater or lesser degree, namely:

Species	**Kenyan/ IUCN Red List Status**	Likelihood of occurrence
Osyris lanceolata (East African sandalwood)	Endangered (EN)	
Ocotea kenyensis (Camphor);	Vulnerable (VUL)	
Polyscias kikuyuensis (Parasol tree).	Vulnerable (VUL)	

Note that the plant species *Pandanus kajui* and *Croton alienus* are endemic to central Kenya and as such has the potential to be impacted by the Project, however there is no know records of these species occurring within the AOI and as such the precautionary principle is to apply.

Species identified within the AOI as likely to be considered as sacred (to be confirmed through local stakeholder engagement) and/or providing an important ecosystem service are as follows:

- **Acacia Seyal**: The species is highly valued by some of the community living around Loiyangalani for production of gum Arabica.
- **Bosilia Species**: The Bosilia species and in particular the Malala-doomberger is of economic importance in the making of traditional baskets.
- **Afzequensis**: The species is a sacred tree among members of the Samburu community.

[8] Note that English language names of many plants are not always clearly specified in learned journals.

- **Acacia Totillis**: The tree is highly regarded by members of the local community as an indicator of presence of ground water (deduced from the lining pattern).
- **Ficus Species**: These trees produce fruits that eaten by wild animals and provide a perpetual habitat for some animals.
- **Sandal wood:** The tree is of high economic value, although mainly for illegal trade.

Further details of vegetation in the area can be consulted in the wind farm ESIA (at Annex 6: Common Flora Identified within the Project Area and Surroundings) and the **Biodiversity and Conservation Update** (Appendix A of this Plan).

5.4 Fauna

The Project area was described in the Project related ESIAs as suffering from a "paucity of wildlife", mainly as a result of competition for pasture with livestock and other anthropogenic pressure such as poaching activities, which have decimated mega-fauna outside of protected areas. No information was provided in regard to either birds or small mammals and field observations were restricted to occasional sightings of ostrich, gerenuk, stripped hyena and jackal. However, the wind farm ESIA stated that the Project area hosts many species of reptiles as well as scorpions and other invertebrate fauna.

As recommended in the ESIA, a one-year programme of ornithological studies was carried out by international environmental consultancy, URS Scott Wilson, to develop baseline information and validate the conclusions of the impact assessment process. A one-off week-long bat survey was also carried out following a site reconnaissance visit and discussions on survey methodologies were held involving the Royal Society for the Protection of Birds and NMK.

5.4.1 Mammals

Currently, the IUCN and Kenya Red List species that have potential to be within the AOI include the endangered Grevy's Zebra. A number of other 'medium likelihood of occurrence' (amber) mammals are potentially present to a greater or lesser degree, including:

Species	**Kenyan/ IUCN Red List Status**	Likelihood of occurrence
Equus grevyi (Grevy's Zebra)	Endangered (EN)	
Diceros bicornis (black rhinoceros)	Critically Endangered (CR)	
Lycaon pictus (African Hunting dog)	Endangered (EN)	
*Loxodonta africana (*elephant)	Vulnerable (VU)	
*Panthera leo (*lion)	Vulnerable (VU)	
Acinonyx jubatus (cheetah)	Endangered (EN)	
*Panthera pardus (*leopard)	Vulnerable (VU)	
*Hyaena Hyena (*striped hyenas)	Near Threatened (NT)	
Crocuta crocuta (spotted hyenas)	Least Concern (LC)	
*Alcelaphus buselaphu ssp lelwel (*Lelwel hartebeest)	Least Concern (LC)	
Tragelaphus strepsiceros (Greater kudu)	Near Threatened (NT)	
Tragelaphus imberbis (Lesser kudus)	Near Threatened (NT)	
Rhinopoma macinnesi (MacInnes's mouse-tailed bat)	Data Deficient	
Tadarida lobata (Kenyan big-eared free-tailed bat)	Least Concern (LC)	
Otomops martiensseni (Large-eared free-tailed bat)	Least Concern (LC)	

Various techniques were used in the bat survey including daylight surveys of known roost sites, mist netting and both static and transect use of bat detectors.

The bat survey confirmed their use of the site, albeit limited, particularly near to vegetation along the laggas within the wind farm. Potential risk of turbine blade collision or decompression barotrauma above the ridges where the turbines are to be located cannot yet be excluded.

5.4.2 Birds

Bird species are potentially present or pass through the site to a greater or lesser degree, including:

Species	Kenyan/ IUCN Red List Status	Likelihood of occurrence
*Falco cherrug (*Saker Falcon)	Endangered (EN)	
Neophron percnopterus (Egyptian Vulture)	Endangered (EN)	
Macronyx sharpei (Sharpe's longclaw)	Endangered (EN)	
Falco naumanni (Lesser Kestrel)	Vulnerable (VU)	
Trigonoceps occipitalis (White-headed Vulture)	Vulnerable (VU)	
Torgos tracheliotos (Lappet-faced Vulture)	Vulnerable (VU)	
Aquila clanga (Greater Spotted Eagle)	Vulnerable (VU)	
Aquila heliacal (Eastern Imperial Eagle)	Vulnerable (VU)	
Falco vespertinus (Red-footed Falcon)	Near Threatened (NT)	
Falco concolor (Sooty falcon)	Near Threatened (NT)	
Gyps africanus (White-backed vulture)	Near Threatened (NT)	
Gyps rueppellii (Rueppell's vulture)	Near Threatened (NT)	
Circus macrourus (Pallid Harrier)	Near Threatened (NT)	
Aquila ayresii (Ayres's Hawk-Eagle)	Least Concern (LC)	
Polemaetus bellicosus (Martial Eagle)	Least Concern (LC)	
Balearica regulorum (Grey-crown crane)	Least Concern (LC)	
Cinnyris tsavoensis (Tsavo Sunbird)	Least Concern (LC)	

The one year bird survey, carried out by URS Scott Wilson, used various ornithological techniques including:

- Vantage point watches for overflying birds of larger species such as raptors, bustards, flamingos, pelicans, storks and cranes; and
- Transect surveys were used to identify bird populations within the wind farm area.

URS Scott Wilson concluded that although generally there would be no significant risk to migrating raptors, there was some turbine collision risk to certain birds of prey (especially during the autumn migration) and to some resident species. Resident bustard species could also be potentially at risk from collision with overhead wires and recommended fitting bird deflectors to the power lines.

A programme of on-going monitoring of birds and bats, using similar methodologies and including collection of any corpses, was recommended during the wind farm's operational phase.

5.4.3 Reptiles, Amphibians, Insects and Snails

No high likelihood of occurrence species of reptile, amphibian, inset or snail has been confirmed as likely present in the Project area; however, a relatively high proportion of reptiles and amphibians on the Kenyan Red List are endemic species that are not assessed by the IUCN. Consequently, no range information is available and LTWP will check with local ecologists whether those species are likely to be encountered during Project activities and, if so, what practical measures might be required to mitigate any impacts.

Neither the national nor IUCN Red List identifies any threatened species of arachnid, centipede or worm within Kenya.

5.5 Potential Biodiversity & Conservation Impacts

The main Project related potential impacts on biodiversity include:

- loss of habitat through land occupied for construction and operation of the wind farm and its facilities and the construction works for the road upgrade;

- potential barrier effect of the linear developments and associated vegetation clearance, and consequent impacts on landscape and animal population connectivity;
- hydrological impacts of the linear road developments ;
- air pollutants, particularly dusts from construction and vehicles;
- noise and vibration (blasting is not anticipated);
- light and other disturbance, including disturbance from human activities;
- mortality / injury to animals from vehicle collisions and/or from machinery;
- habitat fragmentation and edge effects;
- induced access and in-migration and any resulting pressures on biodiversity and eco-system services ;
- hunting, bushmeat and other wildlife trade; and
- invasive species and disease / pathogens.

All habitats potentially affected by the Project have been subject to varying degrees of disturbance by human activities including over-grazing, deforestation, hunting and tourism which have resulted in changes to primary ecological functions and/or species composition (e.g. disappearance of fauna). Accordingly, the habitats would be considered to be 'modified' in accordance with the IFC definition in Performance Standard 6, but it is considered unlikely that any of those habitats would meet the IFC criteria for 'critical' habitat:

(i) There is no habitat of significant importance to IUCN Critically Endangered and/or Endangered species. For example, the Endangered Grévy's Zebra ranges widely across disjointed areas of Kenya and Ethiopia and, whilst confirmed as present within the Project area, the habitat is not considered to be a "discrete management unit" for that species. Any loss of habitat would be marginal to the extent of available land and therefore unlikely to potentially impact the species' long-term survivability;

(ii) The Project avoids habitat of significant importance to endemic and/or restricted-range species, which are largely contained within protected or designated areas (e.g. there will be minimal if any impacts upon the core area of the Mount Kulal Biosphere Reserve and only limited if any Project-related impacts on its buffer zone and transition area);

(iii) There is no impact upon habitat supporting globally significant concentrations of migratory species and/or congregatory species (e.g. the waterbird concentrations in the South Island National Park in Lake Turkana);

(iv) The Project avoids all highly threatened and/or unique ecosystems including montane forests and Lake Turkana; and

(v) No areas associated with key evolutionary processes have been identified.

6 Continuous Biodiversity Monitoring

Throughout the Project, ATL's ESHS team shall monitor opportunist and 'casual' sightings (i.e. observations made during the course of normal working activities as opposed to any sightings achieved through the deliberate application of a scientific methodology) and wildlife incidents and complaints / grievances.

6.1 Casual Wildlife Observations

Recording opportunistic / chance or casual wildlife sightings can improve the biodiversity data for the Project area and, as a result, improve understanding of the impacts of the Project within the area and/or the effects of biodiversity and conservation management upon target habitats or species. All wildlife records, whether common or rare, can support decision-making for the Project but also at all levels within local authorities, regional agencies, conservation organisations and within government at national and international level.

However, it is not feasible to record every species of flora or fauna and the ESHS team shall concentrate upon a more limited range of fauna species of interest (i.e. birds, especially raptors, bats and any notable examples or events such as observations of critically endangered or endangered species or new animals / birds entering the area). The species of interest include:

- All species identified as high likelihood of occurrence (red) / medium likelihood of occurrence (amber) in **Biodiversity & Conservation Update** Appendix A (i.e. Egyptian Vulture, Grévy's Zebra, etc.) and summarised in Section 5 of this Plan;
- Bats; and
- Other rare species at potential risk due to low population recovery rates (e.g. Black / Verraux's Eagle, Steppe Eagle, Tawny Eagle, etc. – NB: to be reviewed during planned operations ornithological surveys).

The ESHS team shall record their own sightings and collate any significant reports / observations from LTWP colleagues or contractors in a diary (or database).

Each wildlife observation should include approximate details of date/ time, location, species type and number, who made the sighting, plus any additional information or comments (e.g. age of animals, behaviours, distance at which sighted/observed, duration of sighting, etc.). A template for wildlife observations is included in Appendix D.

6.2 Wildlife Incidents / Grievances

Wildlife incidents may occur at any time during the Project life cycle, but are more likely during construction activities when the ESHS team is deployed on contractor oversight (**see Construction ESHS Oversight Management Plan**). Similarly, anyone, either internal or external, may raise complaints on biodiversity or related issues at any time in accordance with LTWP's grievance procedures (see the **Stakeholder Engagement Plan**).

The ESHS team will collate details and investigate all Project-related wildlife complaints and incidents including instances of unauthorised hunting, poaching, bush trade, destruction of protected trees, occurrence of invasive species, disturbance of breeding sites and injuries / fatalities. Corrective actions will be instigated where needed to avoid recurrence.

7 Construction Phase Mitigation and Monitoring

During the construction phase, ATL's ESHS team will fulfil a contractor oversight role in regards to potential biodiversity impacts as defined in the **Construction ESHS Oversight Management Plan** to ensure that LTWP's construction ESMP standards are adhered to, thereby minimising impacts on wildlife and biodiversity.

Their mitigation and monitoring role covers both proactive involvement, such as providing advice and assistance (e.g. walk-throughs prior to commencement of work on sensitive areas / habitats) and capacity building, and reactive involvement in relation to investigating wildlife incidents and monitoring the effectiveness of corrective actions. Note that occupational health and safety (OHS) risk assessments may need to be undertaken prior to field work where poisonous snakes or other biodiversity may be encountered – see the **OHS Management Plan**.

7.1 Walk-throughs Prior to Construction Work

Prior to the start of any construction or associated activities in areas of potential biodiversity concern (i.e. laggas, swamp land, nesting sites, bat roosts / maternity colonies, etc.), the ATL ESHS Manager or Officer will carry out a walk-though over the area accompanied by an appropriate contractor representative. The objective is to identify any sensitive habitats including potential for species of conservation interest (i.e. to consider the presence of any rare species of flora or fauna, but establish possible risk of snake bites; inspect tree cavities for bats, etc.) that may be directly or indirectly affected by the proposed works.

Any important and significant habitats / areas / trees should be suitably demarcated and a **Sensitive Area Permit to Proceed (SAPP)** completed by the appropriate contractor. An appropriate level of mitigation should be agreed between the ATL ESHS Manager/Officer and the contractor prior to starting construction. The ATL ESHS team will provide support to contractors as follows:

- review the contractor SAPP applications to ascertain the level of compliance with LTWP's Framework ESMP Standards or other policy undertakings. Any areas of concern will be escalated to the respective Contractor by the ATL ESHS Manager;
- any areas of concern not addressed by the contractor in the final SAPP application may be escalated to the ATL General Manager (as required to ensure a satisfactory outcome);
- during the construction phase, ATL will monitor the works and any site rehabilitation. Any short comings or non-compliances will be subject to either an Improvement Action and, for any unsatisfactory or dangerous situation, a Stop Notice.

7.2 Site Clearance and Rehabilitation

The ATL ESHS Officers will monitor contractor compliance to the required mitigation measures throughout the construction phase as specified throughout the Framework ESMP standards, including the following:

- **Standard 8. Vegetation Clearance and Rehabilitation** (i.e. chase wildlife away and not kill animals unless risk to life, no hunting, poaching or bush meat trade activities, progressive rehabilitation/ revegetation and habitat improvement / creation, etc.). LTWP will to the extent possible avoid felling of trees and will record the number felled due to construction. Artificially propagated Acacia have yet to be found to survive in the harsh Turkana environment, and those that survive are generally self-germinating. In parallel LTWP will protect self-germinating Acacia where practicable and continue to develop other practical options (if required);
- **Standard 11. Air quality and Dust Management** (e.g. dusts accumulation on habitats and vegetation); and
- **Standard 13. Erosion and Sediment Management** (e.g. with particular regard to any disturbance or degradation of aquatic habitats such as swampland or downstream of road crossings etc.).

The ATL ESHS Manager/Officer will determine site restoration condition and rehabilitation requirements on a site-by-site basis and will include temporary construction phase facilities and access tracks. In addition to the dismantling and removal of all contractor amenities, equipment and materials, requirements will vary from basic ground preparations to restore previous ground features.

Where needed, ESHS team will use the following techniques for monitoring site restitution:

- Landscape function analysis ground condition, vegetation dynamics and habitat complexity;
- Practicalities associated with new planting of native species to replace losses;
- Observations of biodiversity and evidence of nesting in the rehabilitated area; and
- Invasive alien plant monitoring to ensure Project does not lead to introduction or promotion of such species

7.3 Invasive Alien Species

The ATL ESHS Officers will monitor construction work areas for signs indicating the presence of established invasive alien species (e.g. prosopsis / *Juliflora prosopsis* which is identified in the ESIAs as present within the general area) and/or any new introductions into the area resulting from the import of plant and equipment (i.e. species listed in the National List of Invasive Species[9] or on the Global Invasive Species Database[10]).

If discovered, the ATL ESHS Officer should take appropriate action to ensure the correct in situ eradication or removal and destruction as appropriate of the offending invasive species (e.g. incineration in the LTWP waste management compound).

7.4 Wildlife Incidents

All wildlife incidents are to be reported to the ATLESHS Team. The PMC, who oversees OHS during the construction phase, will forward all wildlife-related incident details to the ATL ESHS team who will investigate further, agree suitable corrective actions and monitor their effectiveness as necessary – see the **Construction Environmental & Social Interface Plan**.

Note that any incidents, in which it is suspected criminal acts have been committed, will be duly reported to the relevant authorities for further action.

[9] See the WMCA, Seventh Schedule

[10] This database is managed by the Invasive Species Specialist Group (ISSG) of the IUCN Species Survival Commission and can be accessed via: http://www.issg.org/database/species/search (by country)

8 Operation Phase Monitoring and Mitigation

8.1 Monthly Bird / Bat Surveys

The URS Scott Wilson ornithological study report recommended that a programme of further bird and bat surveys is undertaken in accordance with best industry practice for birds[11] and bats[12] in order to validate their conclusions and identify impacts from the wind farm's operations. Surveys will adopt the URS Scott Wilson methodologies[13] or acceptable equivalent to ensure consistency of results. It was proposed to undertake these surveys on a monthly basis for birds (bat survey frequency is TBA – URS Scott Wilson did a 1 week survey, and deemed impact to bats as 'low risk') in years 1[14], 2, 3, 5, 10 and 15 of operations, subject to a review at the end of the year 3 surveys which will take account of the results of carcass searches (see 8.2 below) and determine whether or not the results prove that LTWP should continue with the bird and/or bat monitoring in years 5, 10 and 15.

LTWP is committed to having these surveys conducted (included in budget) and will discuss the scope and specification of those surveys with RSPB / Birdlife International / Nature Kenya. Contractual arrangements with appropriately qualified and experienced ornithologists (such as the NMK personnel involved in the original studies) will commence during construction.

Bird surveys will comprise:

a) Vantage point watches that target passage migrants and other overflying birds;
b) Transect surveys to identify resident and breeding species as well as any temporary stopover or overwintering migrants; and
c) A limited carcass search around the turbines.

Vantage point survey results will be analysed to predict risks over a 20-year operational phase using a Collision Risk Model[15]; transect results will simply be tabulated with details of density per km^2 and for the wind farm site as a whole while carcass search results will simply list species, numbers and locations.

Bat surveys are to comprise a mixture of static and transect bat detector use, mist-netting and roost site surveys. Results will be tabulated as appropriate (e.g. species if identified, survey times / conditions, etc.).

The contracted service provider's report will include conclusions derived from the survey results (e.g. changes in populations, migration routes, etc.) and recommendations for modifications to future surveys and/or adaptive measures for LTWP's mitigation measures and/or monitoring routines.

8.2 Bird Deflectors

It is LTWP's intention that bird deflector apparatus will be affixed on overhead lines within the wind farm, as per URS Scott Wilson's recommendations. This cost has also been budgeted.

[11] Scottish Natural Heritage: Guidance – Recommended bird survey methods to inform impact assessment of onshore wind farms, 2013. Note that this Guidance was updated to incorporate updates in applicable UK legislation and there are no material changes to survey methodologies, although they are aimed at wind farms in Scotland.
[12] Natural England Technical Information Note TIN051: Bats and onshore wind turbines
[13] Scott Wilson: Lake Turkana Wind Power Project: Methodology for Ornithological Survey
[14] 'Year 1' of surveys will commence in month 23 of the wind farm construction (and only last 9 months) when the first batch of turbines become operational. The subsequent years 2 and 3 would survey the fully operational wind farm
[15] Either the method described in the URS Scott Wilson report (Developing field and analytical methods to assess avian collision risk at wind farms) or a suitable alternative, such as the Scottish Natural Heritage Collision Risk Model (CRM), which is also known as the Band Model (available via http://www.snh.gov.uk)

8.3 Bird / Bat Carcass Searches

Upon commissioning of the first wind turbines, the ESHS Manager will define a programme for checking the area around active turbines for evidence of bird and bat fatalities (i.e. actual carcasses, predated remains, etc.). Carcass searches are only expected to find some of the birds and bats that might be killed by turbines, overhead wires or fencing. Some carcasses may be removed by scavengers; others may land outside the search area, while others may be overlooked by the searcher. Each of these factors can vary depending upon the immediate terrain, the area searched, and the individual searching in the field.

The searches will be undertaken over a defined group of turbines on a frequency determined by findings during operations and search routines are modified on the basis of experience. A maximum radius of 85m (to accommodate all sizes of animal falls) from the turbine base - adjusted as necessary for multiple turbines / alignment – and up to 20m from the centreline of overhead electrical distribution lines will be searched. Searches can be undertaken on foot (preferred) or from a vehicle (e.g. when site conditions make walking impractical).

Wherever possible, each fatality will be identified (e.g. through consultation of reference materials or by submitting photographs to recognised ornithologists), although it is recognised that predation may make identification challenging. LTWP will photograph and record details of each find in a database (see format in Appendix F – i.e. date, time, location/WTG, species/ age / sex, number, condition and comments in regard to factors such as prevailing weather / turbine operations, etc.). In the event of fatalities involving rare, critically endangered or endangered species, ATL will notify the relevant authorities (NMK / KWS) – normally by email with photograph file attachment.

As appropriate, carcasses of rare or endangered species may be preserved (by freezing) and made available for scientific analysis and research. OHS risk assessments will ensure adequate provision of personal protective equipment such as antiseptic wipes and/or disposable gloves for handling for handling animal corpses or parts, and suitable containers for transporting remains.

8.4 Performance Evaluation

LTWP shall monitor key biodiversity / conservation related issues throughout the life of the wind farm, using the following Key Performance Indicators (KPIs) to benchmark Project performance:

Proposed KPI	Target / Threshold	Monitoring measure*
Percentage of workers undertaking environmental awareness training	100% of those identified for training	ATL and contractors' training records
Number of reported non-compliances against the mitigation controls identified in this Management Plan.	Minimise and achieve continuous improvement in number of reported non-compliances	See Environmental Management and Monitoring Plan & audit and inspection routines
Number of incidents/activities resulting in significant adverse impact to flora and fauna, and in particular any incidents involving rare or endangered species or designated sensitive habitats	Target Zero Threshold: 5	ATL and contractors' incident records, stakeholder feedback, etc.

* The detailed monitoring measures are to be set by the ATL ESHS Manager, once deployed to site. NB: The term 'significant adverse impact' or other thresholds or categories of impacts will be defined in the future and these will be different for different species and will be further developed within the context of LTWP's procedures and regionally applicable information.

The analysis and evaluation of the aforementioned monitoring results will be subject to technical review by the ESHS Manager to ensure compliance with Project requirements.

Consultations with stakeholder communities will be held regularly to determine the success and effectiveness of this Plan and to address any community concerns. The initial frequency of these meetings will be agreed with the various stakeholders and communities, but are expected to become less frequent as the Project becomes established.

The fauna and flora surveys undertaken as part of the Project's ESIA process provided an initial baseline against which the construction phase monitoring of the impacts will be measured. The baseline information will be added to by the proposed operational phase monitoring.

8.5 Adaptive Management Approach

The ATL ESHS Manager will review monitoring results and refine and adapt ongoing and planned mitigation measures and monitoring routines as appropriate (subject to routine authorisation limits / budgetary controls, etc.).

In the event that monitoring activities and/or bird surveys identify a significant number of bird and/or bat mortalities that can be attributed to wind farm operations, potential mitigation options that LTWP could consider include:

- Management of raptor prey species (e.g. remove any collision carcasses and reduce density of specific prey species);
- Use of alternative coatings on towers / blades (e.g. application of UV coatings);
- Use of radar and/or acoustic detection systems to determine the presence of bats / bat migration;
- Selective shut-down of high-fatality turbines to reduce bird fatalities (e.g. during peak migration movements);
- Cutting blade rotation at low wind speeds to reduce bat fatalities; and
- Use of ultrasonic transmitters to deter bats away from turbines.

Selective shutdown and/or curtailing blade rotation under certain conditions appear to be the most accessible solutions but, as some techniques are still developmental, further studies would be needed to determine the practicalities of each option at the LTWP wind farm location. As appropriate, the ESHS Manager will organise such studies as might be required and identify suitable practical measures to abate bird or bat fatalities.

9 Closure Phase Mitigation and Monitoring

The biodiversity requirements for this section are 'intentionally omitted' in this revision and will be included in the eventual decommissioning management plan, which will be prepared 3 years in advance of the anticipated closure date.

Biodiversity considerations relating to eventual decommissioning need to take account of the following factors:

- Effects of progressive rehabilitation and habitat improvement / creation during construction and operations phases;
- Need for benchmarking flora and fauna populations against baseline conditions in order to identify priorities for any habitat improvements and, potentially, species reintroductions;
- Identification and eradication of any invasive alien species; and
- Post closure monitoring requirements.

10 Reporting

In addition to any on-going transfer of casual sightings, formal surveys, details of fatalities and incidents to key stakeholders, ATL will collate biodiversity performance information for inclusion in its annual disclosures to communities and the wider public.

References

LTWP documents:

To be updated by the construction team as required.

External documents:

- Wildlife and Conservation Management Bill (WCMA) and Sixth / Seventh Schedules, 2013,
- World Resources Institute's Ecosystem Services Review
- Scottish Natural Heritage: Guidance – Recommended bird survey methods to inform impact assessment of onshore wind farms, 2013
- Natural England Technical Information Note TIN051: Bats and onshore wind turbines
- Scott Wilson: Lake Turkana Wind Power Project: Methodology for Ornithological Survey, 2010
- URS Scott Wilson: Ornithological and Bat Surveys – Final Survey Report, 2011
- Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P., Kassem, K. R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938.

Appendices

APPENDIX A: Biodiversity & Conservation Update

[NB: Embedded PDF. Double click on document to open]

Revision 1

Biodiversity & Conservation Update

Document : xxx

31/07/2014

APPENDIX B: Ecosystem Services - Preliminary Scoping Assessment

Eco-system Service	Subcategory	Definition	Nature and Extent within Project Area of Influence	Condition, trends and non-Project threats	Beneficiaries of eco-system services	Project dependence on eco-system services
Provisioning services: The goods or products obtained from ecosystems						
Food	Crops	Cultivated plants or agricultural products harvested by people for human or animal consumption as food	Minimal – activity restricted to localised family plots / gardens by adverse local soil, water and meteorological conditions	Not applicable	Some members of sedentary local communities	None predicted
	Livestock	Animals raised for domestic or commercial consumption or use	**PRIORITY:** Nomadic pastoralism is the main local occupation and source of livelihood (camels, goats and sheep)	Long term drought, erosion, desertification, deforestation and overgrazing have degraded available rangeland pasture. As a consequence, there is increasing incidence of rustling and outbreaks of conflict over grazing rights within the general area	Local communities in general, including the Sirima people	None predicted
	Capture fisheries	Wild fish captured through trawling and other non-farming methods	Nearby Lake Turkana has regionally / locally important fisheries – but it is considered unlikely there will be any significant impacts upon the Lake or its fisheries from the Project	Gibe III dam in Ethiopia predicted to significant lower water levels in Lake Turkana over several years, with potential for loss of habitats and fishery species.	Local communities close to lakeside benefit from fish in diet. Little wider distribution due to lack of logistical resources to move product to national markets.	Very limited - i.e. potential source of fresh fish for workforce, but can source elsewhere.
	Aquaculture	Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of freshwater or saltwater confinement for purposes of harvesting	Not applicable (no aquaculture activities)	Not applicable	Not applicable	Not applicable
	Wild foods	Edible plant and animal species gathered or captured in the wild	Unknown: Limited selection of edible plants and some limited potential for poaching / 'bush meat' but consumption information lacking	Long term drought, erosion, desertification, deforestation and overgrazing degrading plant life. Mega fauna already depleted through disturbance, competition with livestock and over-hunting	Local communities in general	None predicted
Biological raw materials	Timber and other wood products	Products made from trees harvested from natural forest ecosystems, plantations, or non-forested lands	**PRIORITY:** Wood is an important raw material for shelters. Also some use for making basic utensils	High demand for wood as fuel and for building materials plus overgrazing has significantly degraded wood products ecosystem services. No economically available alternatives	Local communities in general	None predicted
	Fibres and resins	Non-wood and non-fuel fibres and resins	No specific examples identified	Not applicable	Not applicable	Not applicable
	Animal skins	Processed skins of cattle, deer, pigs, snakes, sting rays, or other animals	No specific examples identified	Not applicable	Not applicable	Not applicable
	Sand	Sand formed from coral and shells	Not applicable	Not applicable	Not applicable	Not applicable
	Ornamental resources	Products derived from ecosystems that serve aesthetic purposes	Not applicable	Not applicable	Not applicable	Not applicable
Biomass fuels		Biological material derived from living or recently living organisms—both plant and animal—that serves as a source of energy	**PRIORITY:** Wood is very important fuel / source of fuel (e.g. inefficient conversion to charcoal). Some use for making basic utensils	High demand for wood as fuel and for building materials plus overgrazing has significantly degraded wood products ecosystem services. No economically available alternatives	Local communities in general	None predicted
Freshwater resource		Inland bodies of water, groundwater, rainwater, and surface waters for household, industrial, and agricultural uses	**PRIORITY:** Lake Turkana (saline) several kms distant but no other permanent water features on site, only ephemeral laggas. Some rivers along road route and wells are most important source of water for human / livestock consumption. Loiyangalani Spring is locally important resource	Long term drought and increasing water demands from people and livestock likely to be depleting groundwater supplies.	Local communities in general (access to water is important stakeholder concern)	Limited impact on groundwater supplies for LTWP village – can be offset by tankering bulk supplies / switching to bottle potable water / using wind power to desalinate water from Lake Turkana.

Genetic resources	Genes and genetic information used for animal breeding, plant improvement, and biotechnology	No specific examples identified	Not applicable	Not applicable	Not applicable
Biochemicals, natural medicines, and pharmaceuticals	Medicines, biocides, food additives, and other biological materials derived from ecosystems for commercial or domestic use	Unknown: Limited selection of medicinal plants for domestic use, but consumption information lacking	Long term drought, erosion, desertification, deforestation and overgrazing degrading plant life.	TBC Community Liaison to check.	None predicted
Eco-system Service / **Subcategory**	**Definition**	**Nature and Extent within Project Area of Influence**	**Condition, trends and non-Project threats**	**Beneficiaries of eco-system services**	**Project dependence on eco-system services**
Regulating services: The benefits obtained from an ecosystem's control of natural processes					
Regulation of air quality	Influence ecosystems have on air quality by emitting chemicals to the atmosphere (i.e. serving as a "source") or extracting chemicals from the atmosphere (i.e. serving as a "sink")	No specific examples identified	Not applicable	Not applicable	Not applicable
Regulation of climate – Global	Influence ecosystems have on the global climate by emitting greenhouse gases or aerosols to the atmosphere or by absorbing greenhouse gases or aerosols from the atmosphere	No specific examples identified	Not applicable	Not applicable	Not applicable
Regulation of climate – Regional / local	Influence ecosystems have on local or regional temperature, precipitation or other climatic factors	No specific examples identified	Not applicable	Not applicable	Not applicable
Regulation of water timing and flows	Influence ecosystems have on the timing and magnitude of water runoff, flooding and aquifer recharge, particularly in terms of the water storage potential of the ecosystem or landscape	Unknown: Aquifer recharge, particularly along laggas may be important ecosystem service in this category, as community wells can be dug into lagga beds	Long term drought has already diminished aquifer recharge (only occurs once every 5-10 years)	TBC Community Liaison to check.	TBC
Erosion control	Role ecosystems play in retaining and replenishing soil and sand deposits	No effective regulating service	Long term drought, erosion, desertification, deforestation and overgrazing degrading plant life that could regulate erosion	Not applicable	Not applicable
Water purification and waste treatment	Role ecosystems play in the filtration and decomposition of organic wastes and pollutants in water; assimilation and detoxification of compounds through soil and subsoil processes	Unknown: Limited to areas around settlements where sanitary effluent disposal	TBC	TBC	TBC
Regulation of diseases	Influence that ecosystems have on the incidence and abundance of human pathogens	Unknown: No specific examples of regulation identified; health conditions are generally 'poor' across the area with upper respiratory diseases, malaria and diarrhoea being prevalent	TBC	TBC	TBC
Regulation of soil quality	Role ecosystems play in sustaining soil's biological activity, diversity, and productivity; regulating and partitioning water and solute flow; storing and recycling nutrients and gases; among other functions	Unknown: Limited to areas around settlements where sanitary effluent disposal	TBC	TBC	TBC

Regulation of pests	Influence ecosystems have on the prevalence of crop and livestock pests and diseases	No specific examples identified	Not applicable	Not applicable	Not applicable
Pollination	Role ecosystems play in transferring pollen from male to female flower parts	No specific examples identified	Not applicable	Not applicable	Not applicable
Regulation of natural hazards	Capacity for ecosystems to reduce damage caused by natural disasters such as hurricanes and tsunamis and to maintain natural fire frequency and intensity	No specific examples identified	Not applicable	Not applicable	Not applicable

Eco-system Service	**Subcategory**	**Definition**	**Nature and Extent within Project Area of Influence**	**Condition, trends and non-Project threats**	**Beneficiaries of eco-system services**	**Project dependence on eco-system services**
Cultural services: The nonmaterial benefits obtained from ecosystems						
Recreation and ecotourism		Recreational pleasure people derive from natural or cultivated ecosystems	Unknown: Believed to be not applicable but ought to check with stakeholders. Currently no extensive tourism within Project AOI (only some in-transit visitors passing through to Lake Turkana or Marsabit National Parks / UNESCO World heritage Site)	TBC	TBC	TBC
Ethical and spiritual values		Spiritual, religious, aesthetic, intrinsic, "existence," or similar values people attach to ecosystems, landscapes or species	Unknown: Believed to be not applicable but ought to check with stakeholders (proximity to UNESCO site etc.)	TBC Community Liaison to check.	TBC	TBC
Educational and inspirational values		Information derived from ecosystems used for intellectual development, culture, art, design and innovation	Unknown: Believed to be not applicable but ought to check with stakeholders (proximity to UNESCO site etc.)	TBC Community Liaison to check...	TBC	TBC
Supporting services: The natural processes that maintain the other ecosystem services (NB may already be covered by other types of services)						
Habitat		Natural or semi-natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances	Not examined during scoping (deterioration in pastureland and loss of fauna from area suggest there is no effective ecosystem service of this type)	TBC	TBC	TBC
Nutrient cycling		Flow of nutrients (e.g. nitrogen, sulphur, phosphorus, carbon) through ecosystems	Not examined during scoping (lack of surface / groundwater flows suggests there is no effective ecosystem service of this type)	TBC	TBC	TBC
Primary production		Formation of biological material by plants through photosynthesis and nutrient assimilation	Not examined during scoping (already considered above in relation to rangeland pasture and harvest of wood products)	TBC	TBC	TBC
Water cycling		Flow of water through ecosystems in its solid, liquid, or gaseous forms	Not examined during scoping (ongoing drought suggests that only limited or ephemeral in nature)	TBC	TBC	TBC

APPENDIX C: Biodiversity Implementation Plan (Provisional)

Activity (Purpose)	**Specific Tasks / Methods**	**Schedule / Frequency**	**Responsibility**	**Project Phase**	**Priority**	**Status**	**Comments**
Acquisition of resources to facilitate implementation of Plan	Specify and acquire appropriate resources for biodiversity monitoring,	Phase-in as appropriate (e.g. basic kit to coincide with ESHS team training, full kit when wind farm starts operations)	LTWP	TBC	Medium	TBC	Precise nature of equipment still to be discussed / finalised
Biodiversity / conservation training for ESHS team	0.5 - 1 day theoretical (lender requirements, wind farms impacts on bats / birds, monitoring techniques such as casual sightings, Kenyan laws, etc.)	One-off activity (assuming either train-the-trainer approach to ESHS Manager who will deliver to team OR ESHS Manager and Officers all present)	LTWP / Consultant	Pre-Construction	Medium	TBC	May not be needed for all team members if already experienced / knowledgeable
Stakeholder engagement - biodiversity stakeholders	As appropriate, undertake stakeholder analysis and plan engagements on biodiversity / conservation issues as needed (e.g. confirmation of specification of outsourced bird / bat surveys, early contact with KFSC on seed availability / costs etc.)	To be developed as needed	EHSH Manager	On-going	Medium	TBC	
ESHS team deployment on road rehabilitation / wind farm construction oversight then operations (biodiversity)	Section walk-throughs to identify potentially sensitive receptors (such as sacred trees / cultural heritage features or sites, **locally important habitats, including laggas / river crossings**, etc.). Advise contractors on site restoration requirements in regard to habitat rehabilitation / creation	Progressive schedule prior to commencement of road works (may involve simultaneous starts at different sites along the route)	EHSH Manager	Pre-Construction - wind farm / road	High	TBC	
	Record casual wildlife sightings	As /when observations of species of interest	EHSH Manager	Wind farm / Road Construction and Operation	Medium	TBC	
	Boots-on-the-ground monitoring of contractor / sub-contractor activities (from mobilisation of temporary camps / facilities, breaking ground through erection / installation of components and eventual site clearance) and potential effects upon biodiversity	Continual	EHSH Manager	Wind farm / Road Construction	Medium	TBC	
	Confirmation of no bushmeat / hunting / poaching and no invasive alien species etc.	6-monthly check	EHSH Manager	Wind farm / Road Construction	Medium	TBC	
	Rehabilitation – passive re-vegetation of pastureland / scrubland and native tree re-planting subject to sourcing of seeds / saplings	Continual	ESHS Manager	Wind farm / Road Construction and Operation	High	TBC	
	Investigation and reporting on wildlife incidents / invasive species	As/ when occur	EHSH Manager	Wind farm / Road Construction and Operation	High	TBC	
Commission Bird / Bat Surveys to be undertaken by ornithologists during operational phase (ESIA / lender commitment)	Bird surveys will comprise: a) Vantage Point watches that target passage migrants and other overflying birds; b) Transect surveys to identify resident and breeding species as well as any temporary stopover or overwintering migrants; and c) A limited carcass search around the turbines. Bat surveys are to use comprise a mixture of static and transect bat detector use, mist-netting and roost site surveys.	Monthly basis for birds (bat survey frequency is TBA) in years 1, 2, 3, 5, 10 and 15 of operations, subject to a review at the end of the year 3 surveys to decide if years 5,10 and 15 are worthwhile	EHSH Manager	Wind farm Operation	High	TBC	Methodologies as specified in draft BCMP / URS Scott Wilson Ornithological Study Report

Carcass searches	ESHS Officer to search a maximum radius of 85m from the turbine base - adjusted as necessary for multiple turbines / alignment – and up to 20m from the centreline of overhead line wayleaves. Searches can be done on foot (preferred) or from a vehicle (e.g. when site conditions / thorn bushes make walking impractical). Finds to be photographed and recorded + notified to key stakeholders. If required, carcasses of rare species to be collected and preserved for later analysis.	Daily / weekly routine to be established progressively as wind farm becomes operational. To take account of findings (i.e. scale up/down relative to number of identified fatalities)	ESHS Manager	Wind farm Operation	Medium-High	TBC	
Ongoing monitoring, review, adaptive actions and reporting	Periodic monitoring and reporting as required. Analysis of monitoring results to identify adaption modifications to planned mitigation and monitoring measures.	Weekly / monthly / annual etc	ESHS Manager	Life cycle	Medium	TBC	

APPENDIX D: Wildlife Observation Template

Date	Time		Location	Species	Certainty			Numbers/ Ages (adults/juveniles)	Comments (behaviour)
	from	to			Def.	Prob.	Poss.		

APPENDIX E: Sensitive Area Permit to Proceed Form

Sensitive Area Permit to Proceed

Permit No:	Date:

This certificate **MUST** be displayed while the work is in progress.

Site conditions and protective measures **MUST** be checked **PERSONALLY BY SIGNATORIES.**

All SECTIONS MUST BE COMPLETED

Part A: Definition of Area and what makes it sensitive (cultural heritage / biodiversity /other)	
Part B: Physical barriers (if required)	**Part C: Warning signage (if required)**
Part D: Precautions / protective measures to be in place during work activities	
Part E: Supervisory responsibilities for site protection during work activities	
Part F- I certify that provided the above precautions shall be undertaken to protect the area in question	
We have read and understood this certificate Name……Signature…… (Contractor) Date/time……. Name……Signature…… (ATL ESHS)	
Part G- Completion report (no damage / specify what damage)	

APPENDIX F: Bird / Bat Carcass Search Record

Date	Time	Location (WTG ref. number)	Species	Certainty			Numbers/ Ages (adults/juveniles)	Photo?	NMK informed?	Comments (carcass condition)
				Def.	Prob.	Poss.				