



Kampala-Jinja Expressway PPP Project Phase 1 Environmental and Social Impact Assessment Volume D: Biodiversity Action Plan

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EXECUTIVE SUMMARY

Purpose of the BAP

This *Biodiversity Action Plan (BAP)* for the Kampala-Jinja Expressway PPP Project Phase 1 (hereafter 'the Project') has been prepared for the Ugandan National Roads Authority (UNRA) by Earth Systems and Atacama. The Project aims to provide a major toll-road link between Kampala and Jinja to help ease congestion along the existing Kampala-Jinja road and to improve the transportation infrastructure in Uganda and East Africa.

The BAP has been prepared in accordance with Ugandan legislation as well as International Finance Corporation (IFC) and other relevant international best practice and guidelines. This BAP provides a framework for the implementation of UNRA's biodiversity mitigation and management measures during pre-construction, construction and operation phases of the Project. This BAP details UNRA's biodiversity management initiatives, commitments and obligations associated with the Project. The overriding aim of the BAP is to avoid and minimise potential residual impacts on Project area biodiversity wherever practical.

UNRA is committed to best practice and avoiding, minimising and restoring impacts on biodiversity, however, it is recognised that the Project will have an impact on some significant biodiversity values. Consequently, UNRA will need to implement a Biodiversity Offset Strategy to compensate for Project-related impacts after all previous steps of the mitigation hierarchy have been enacted. The primary objective of biodiversity offsetting for the Project will be to achieve a 'net gain' for areas of Critical Habitat potentially affected by the Project.

Therefore, the BAP outlines:

- ▶ A framework for the implementation of the UNRA's biodiversity mitigation and management measures during pre-construction, construction and operations phases of the Project;
- ▶ Actions to rehabilitate and restore biodiversity;
- ▶ Proposed approach to implementing offsets and supporting conservation actions to compensate for impacts after all aspects of the mitigation hierarchy have been implemented; and
- ▶ A monitoring plan to evaluate the efficiency and success of biodiversity management and mitigation measures and to enable adjustments to be made where required.

Priority Habitats and Species

The right-of-way (ROW) for the Project is dominated by modified habitats (accounting for 75.7% of land cover), relative to natural habitats (24.3% of land cover), which is a reflection of significant human activity in the vicinity of the Project. Four principal natural terrestrial habitats occur within the ROW and surrounding area, namely: small patches of forest habitats (i.e. closed forest and open forest/woodland) and scrubland as well as large areas of wetlands (including degraded wetlands and higher quality papyrus swamps). The proposed ROW also intersects several rivers and streams including the Sezibwa River. The main modified habitats types present within the ROW are settlement areas, agro-pastoral land and industrial land. No threatened plant species based on the IUCN Red List (2018) were recorded, however the global conservation status of most species recorded during the surveys have not been assessed by the IUCN.

No international protected areas such as sites on the World Heritage List designated for natural values or Ramsar Wetlands occur in the direct vicinity of the Project. The closest site of international significance is the Lutembe Bay Wetland System which is a Ramsar site designated in 2006 and is located approximately 8 km south of the KSB alignment. No National Parks, Wildlife Reserves or Wildlife Sanctuaries occur in the vicinity of the Project.

Several Central Forest Reserves (CFRs) occur in the vicinity of the Project that are managed by the National Forestry Authority (NFA).

The proposed ROW directly intersects the Namanve Central Forest Reserve. A large proportion of the area enclosed by the Central Forest Reserve's boundaries is wetland habitat dominated by papyrus vegetation. The habitat forms a permanent wetland of high quality. However significant disturbance of the wetlands due to human activities has occurred. Numerous settlement areas occur within and surrounding the wetlands within the reserve. Around the edges of swampy areas, sand mining and brick making are common activities.

Mabira Central Forest Reserve and buffer zone are located approximately 11.5 km northeast from the eastern end of the Project. This protected area is considered the largest remnant stand of semi-deciduous forest in central Uganda and is known to support a diversity of threatened species.

Fauna habitats present in the ROW and surrounding environs are fragmented and degraded by human activities. In addition, fauna species are under constant threat from habitat loss and other sources of anthropogenic disturbance. Nonetheless, the baseline assessment in the ESIA identified several priority habitats and species of conservation importance for the Project. A summary of the priority habitats and species are presented in Table E1.

Table E1 Priority habitats and species for the Project

Type of Risk Receptor	Priority Biodiversity Values	IUCN Status	National Threat Status	Confirmed presence in ROW
Legally Protected Areas	Namanve Central Forest Reserve	-	-	+
Priority Natural Habitats (and fauna habitats)	Wetlands	-	-	+
	Forest habitats	-	-	+
Large Mammals	Sitatungas or marshbuck (<i>Tragelaphus speikii</i>)	LC	VU	
Birds	Hooded vulture (<i>Necrosyrtes monachus</i>)	CR	EN	+
	Grey parrot (<i>Psittacus erithacus</i>)	EN	VU	+
	Grey crowned crane (<i>Balearica regulorum</i>)	EN	EN	+
	Saddle-billed stork (<i>Ephippiorhynchus senegalensis</i>)	LC	VU	
Reptiles	Blanding's tree snakes (<i>Toxicodryas blandingii</i>)	NA	VU	
	Cape file snake (<i>Gonionotophis capensis</i>)	LC	VU	

Key: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC=Least Concern

Critical Habitat Assessment

The determination of Critical Habitat is made on a project by project basis. Critical Habitats are defined by the IFC (2012) as the following areas with high biodiversity value: Criterion 1 - Habitat of significant importance to Critically Endangered and/or Endangered¹ species which can be natural or modified in nature; Criterion 2 - Habitat of significant importance to endemic and/or restricted-range species; Criterion 3 - Habitat supporting globally significant concentrations of migratory species and/or congregatory species; Criterion 4 - Highly threatened and/or unique ecosystems; and/or Criterion 5 - areas associated with key evolutionary processes.

Performance Standard 6 (PS6; IFC, 2012) defines quantitative thresholds for Criterion 1 to 3. If these thresholds are exceeded an area qualifies for Critical Habitat status. Criterion 4 and 5 are qualitatively assessed. PS6 also defines two 'tiers' of Critical Habitat (Tier 1 and Tier 2), with quantitative thresholds for criteria 1-3.

Critical Habitat-qualifying features (i.e. habitats and species) were determined using all available information sources including data from field surveys of the ROW and surrounds conducted for the ESIA, a review of the literature and use of biodiversity databases. With consideration of the ecological context of the Project and the characteristics of the potential Critical Habitat-qualifying species, it was identified that one Discrete Management Units (DMUs) would be sufficient for the different species groups identified.

The Critical Habitat Assessment concluded that the Project contains Tier 2 Critical Habitat for a large number of species as defined by Criteria 1 and 2, and the nearby Mabira Central Forest Reserve is itself a Critical Habitat under Criterion 5. No Tier 1 Critical Habitat was confirmed to occur in the vicinity of the Project based on available information. The specific results of the Critical Habitat Assessment for each of the criteria are summarised as follows:

► Criterion 1 –

- **Mammals:** No globally Critically Endangered or Endangered mammal species were identified as present or likely to occur in the habitat of, and surrounding, the Project. However, three species listed as Data Deficient by the IUCN (2018) which are nationally threatened species qualify as having Critical Habitat within the DMU area: the Trevor's mops bat (*Mops trevori*) and Samburu pipistrelle bat (*Neoromicia helios*) and moon shrew (*Crocidura selina*).
- **Birds:** Eight globally Critically Endangered or Endangered bird species were identified as present or likely to occur in the habitat of, and surrounding, the Project. All of the eight bird species have large species ranges and the maximum overlap of the species range with the DMU was 2%. Therefore, the habitat within the DMU qualifies as Tier 2 Critical Habitat for all eight species.
- **Fish:** Three globally Critically Endangered fish species were identified as potentially within the DMU. Current estimates of the three fish species' distributions result in the DMU constituting less than 1% of their total ranges. Thus the DMU's habitat qualifies as Tier 2 Critical Habitat for these three fish species based on available information.
- **Insects:** No Endangered or Critically Endangered insects were identified for which sufficient information is available to confirm if they have Critical Habitat within the DMU. However, 17 nationally Endangered or Critically Endangered butterflies (Insecta: Lepidoptera) have been recorded within the Mabira CFR or other forested areas within the DMU. In line with the precautionary principle these species should be considered as Critical Habitat-qualifying species.
- **Flora:** No globally Critically Endangered or Endangered flora species were identified as present or likely to occur in the habitat of, and surrounding, the Project within the DMU. However, two species for

¹ As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.

which the global conservation status has not been assessed by the IUCN (2018) have been identified that could have Critical Habitat within the DMU - *Mikania microptera* and *Sabicea entebbensis*. Since distribution data is lacking for these species, the two species are also considered as Critical Habitat-qualifying species for the purposes of the Project.

- ▶ **Criterion 2** – Eighty-nine endemic, restricted-range and biome-restricted species were found to have overlapping distributions with the DMU or known to have populations within the DMU. The habitat within the DMU qualifies as containing Tier 2 Critical Habitat for four ecoregion endemic fish species and six bird species that all have more than 1% of their known ranges within the DMU. One endemic primate is known to occur in the Mabira CFR, the Ugandan mangabey (*Lophocebus ugandae*). Seven endemic or restricted-range butterflies (Insecta: Lepidoptera) have been recorded within the Mabira CFR or other forested areas within the DMU. While limited information on these species is available, in line with the precautionary principle they should also be considered as Critical Habitat-qualifying species.
- ▶ **Criterion 3** – Migratory and/or congregatory species were assessed from those known to occur in the Project Footprint and surrounds (i.e. field surveys), and those species known to occur within the surrounding reserves. Twenty-one migratory and/or congregatory bird species were observed or known to occur within the DMU. An analysis of the percentage of their ranges that overlapped with the DMU was conducted. The habitat within the bird DMU does not qualify as Tier 1 or Tier 2 Critical Habitat for these 21 migratory and/or congregatory bird species.
- ▶ **Criterion 4** – Ecosystems located within the Project Footprint are largely human-modified or significantly disturbed habitat and based on the flora and habitat studies conducted for the ESIA these habitats are not considered particularly unique and are unlikely to qualify under Criterion 4. No ecosystems containing unique assemblages of species including assemblages or concentrations of biome-restricted species have been identified based on current information.
- ▶ **Criterion 5** – Based on the literature review, no landscapes or subpopulations near the Project are likely to qualify under Criterion 5 since the area has been significantly altered by a long history of human habitation and intensive agriculture.
- ▶ **Other criteria** – IFC (2012) state that internationally and/or nationally recognised areas of high biodiversity value will likely qualify as Critical Habitat. Since Mabira CFA is a nationally recognised area of high biodiversity value and is known to support globally significant populations of fauna including numerous threatened species, it is likely that the reserve qualifies as Critical Habitat on this basis. The Mabira CFR is not directly impacted by the Project.

Biodiversity Avoidance, Minimisation, Mitigation Targets and Actions

Biodiversity management measures have been developed to avoid and mitigate potential Project-related impacts during the construction and operations phases of the Project. Implementation of these best-practice mitigation measures will minimise the impacts of the Project on biodiversity and ecosystem services. UNRA should also implement a monitoring and evaluation program to assess the effectiveness of the mitigation measures and to inform the requirement for adaptive management.

The following summarises the principal targets and actions that will be implemented to ensure no long-term impact on priority and non-priority biodiversity.

- ▶ **Target A: Avoid habitat loss and degradation**
 - Action 1: Design Project components to avoid impacts on large areas of terrestrial, wetland and aquatic habitat and species;
 - Action 2: Avoid impacts to priority habitats during clearance; and

- Action 3: Avoid introduction of invasive plant species.
- ▶ **Target B: Avoid disturbance to fauna**
 - Action 1: Avoid introduction of pests;
 - Action 2: Avoid disturbance to fauna from artificial lighting;
 - Action 3: Avoid disturbance to fauna through noise, vibration and air blast; and
 - Action 4: Avoid adversely impacting fauna and their habitats through spills of hazardous materials.
- ▶ **Target C: Minimise habitat loss and degradation**
 - Action 1: Minimise disturbance to remnant/retained habitats adjacent to the Project ROW;
 - Action 2: Minimise erosion, pollution, dust and suspended sediments; and
 - Action 3: Minimise invasive species introduction and spread.
- ▶ **Target D: Minimise disturbance to fauna**
 - Action 1: Reduce the likelihood and severity of injury or death caused by vehicle/machinery collisions;
 - Action 2: Minimise the severity of noise and vibration;
 - Action 3: Mitigate artificial lighting disturbance;
 - Action 4: Minimise unauthorised access to the habitats adjacent to the ROW (e.g. stopping for resource extraction on expressway shoulders), protected areas and/or wetlands;
 - Action 5: Limit and prohibit natural resource collection, hunting and fishing by personnel alongside the ROW; and
 - Action 6: Implement all other measures outlined in the project ESMMP.

Restoration and Rehabilitation

After mitigation and management, restoration and rehabilitation activities in and around the Project should be undertaken in accordance with the mitigation hierarchy to further reduce residual impacts on biodiversity and ecosystem services. Further detail on revegetation for the Project is provided in the Revegetation Plan (Volume D). The key restoration and rehabilitation actions discussed in the BAP are:

- Action 1: Establish a seed store and plant database;
- Action 2: Establish a nursery;
- Action 3: Restore, rehabilitate and revegetate terrestrial habitat within the Project Footprint;
- Action 4: If possible, restore and replace any lost flora of conservation significance with newly planted seedlings throughout the life of the Project; and
- Action 5: Restore “natural” water bodies and wetlands within and around the ROW.

Biodiversity Offsetting

The Project is committed to best practice and avoiding, minimising and restoring impacts on biodiversity. However, it is recognised that even with the implementation of best practice management measures, the Project will have an impact on biodiversity values including Critical Habitat-qualifying species. Consequently, to meet international standards, UNRA will need to implement a Biodiversity Offset Strategy to compensate for Project-associated impacts after all previous steps of the mitigation hierarchy have been considered and no alternatives

are available. The primary objective of biodiversity offsetting for the Project will be to achieve a 'net gain' for areas of Critical Habitat potentially affected by the Project.

Offsets are measurable positive conservation outcomes on biodiversity features that are attributed to Project activities, and whose magnitude outweighs that of the residual adverse biodiversity impacts. Offsets require investments in conservation management protection where the results of these investments can be quantified. Offsetting is based on systematic biodiversity accounting based on the explicit calculation of biodiversity losses and gains at matched impact and offset sites.

Offset calculation and biodiversity accounting for the Project will be developed using a habitat-based approach (i.e. representative of biodiversity and ecosystem services) that takes into account the suitability of the habitat for priority species and habitats. The final design and implementation of the offsetting process will include the following six stages: scoping; site screening; offset site selection and evaluation; feasibility study; development and implementation of a detailed Biodiversity Offset Strategy including an Offset Management Plan; and Evaluation/monitoring.

Biodiversity offset policies around the world are often based on the principle of 'Like-For-Like or better'. In accordance with this principle, the proposed Biodiversity Offset Strategy has been tailored to compensate for the specific adverse residual impacts on biodiversity. The strategy will focus on Critical Habitat-qualifying features for the Project as achievement of a net gain in Critical Habitat is a requirement of IFC Performance Standard 6. These species are also globally and locally important species and can act as umbrella species to provide protection for all species within their habitats. Although Critical Habitat-qualifying features will be the focus, the strategy aims to protect and enhance all biodiversity within its scope. It is proposed that the offset program for the Project could include a package of offsets consisting of the following key activities:

- ▶ Offset Activity 1 – Grey Crowned Crane Habitat Protection and Enhancement;
- ▶ Offset Activity 2 – Grey Parrot Habitat Protection and Enhancement;
- ▶ Offset Activity 3 – Aquatic Habitat Protection and Enhancement; and
- ▶ Supporting Conservation Actions.

Offset Activity 1 – Grey Crowned Crane Habitat Protection and Enhancement

The grey crowned crane was selected as a focus species for the offset program as it can be considered an umbrella species to provide protection and recovery of wetlands. Enhancement and protection of wetland habitat, indicated by a net gain in grey crowned crane populations, will also offset impacts on other Critical Habitat-qualifying species and locally important biodiversity in the wetland areas targeted. Other wetland species that would be expected to benefit would include; the Critical Habitat-qualifying northern brown-throated weaver, Basra reed-warbler and Madagascar pond-heron as well as wetland fish including blue spotted tilapia and Allauad's catfish. The grey crowned crane is listed as Endangered according to the IUCN Red List and also has notable cultural significance because it is the national bird of Uganda. The species is commonly sighted and was directly recorded in the field surveys for the ESIA at Mayanja Wetland, Kansanga Wetland and Namanve Wetland. As it also uses other non-forest habitat types, the offsetting activities for this species could also include habitats surrounding wetland areas, which will benefit other species in these areas.

Offset Activity 2 – Grey Parrot Habitat Protection and Enhancement

Based on a similar approach to offset activity 1, the grey parrot was selected as a focus species for the offset program as it can provide protection and recovery of species in forest habitats. Protection and enhancement of forest habitat, indicated by a net gain in grey parrot populations, will also offset impacts on other Critical Habitat-qualifying species that are likely to utilise forests such as the Toro olive greenbul. It would also enhance habitat availability for other Critical Habitat-qualifying forest species with a lower likelihood of occurrence in the vicinity

of the Project including the Trevor's mops bat, moon shrew, Ugandan mangabey and Nahan's partridge. Additionally, offsetting potential impacts on the grey parrot could also serve to offset potential impacts on the two Critical Habitat-qualifying flora species identified (*Mikania microptera* and *Sabicea entebbensis*) although their presence in the vicinity of the Project is uncertain.

Offset Activity 3 – Aquatic Habitat Protection and Enhancement

Offset activity 3 is proposed to have two key components covering the niches of Critical Habitat-qualifying aquatic species potentially affected by the Project and will focus on enhancing and protecting aquatic habitats:

- ▶ **Component A. Offsets for wetland fish.** This component of the offset program should target the three Critical Habitat-qualifying wetland fish species that were identified as likely to be directly impacted by the Project due to loss of wetlands - the blue spotted tilapia, Egyptian mouthbrooder and Allauad's catfish. These species were recorded in Mayanja Wetland, Kansanga Wetland and Namanve Wetland in the field surveys for the ESIA. Offsetting for these species will also benefit other aquatic species in wetlands (e.g. other fish, amphibians, insects). Monitoring of species diversity and population dynamics will be used as indicators of change.
- ▶ **Component B. Offsets for the dark stonebasher.** The dark stonebasher is a Critical Habitat-qualifying fish recorded in the Sezibwa River downstream of the Project. As the construction of the Project has the potential to affect the water quality of the river, offsets are required to ensure a net gain in Critical Habitat. Offsetting this species will also benefit other aquatic species in the Sezibwa River catchment. Monitoring of species diversity and population dynamics will be used as indicators of change.

Supporting Conservation Actions

Supporting conservation actions are often used in conjunction with biodiversity offsetting strategies. Although these actions do not offer a direct compensation (in space and time) for residual Project-related impacts but are expected to lead to a benefit for biodiversity at the local, national and international scales. Supporting conservation actions include activities such as education programs, supporting applied conservation initiatives and research. Potential supporting conservation actions that could be implemented by the KJE Project include:

- ▶ Green Corridor Project / Roadside Revegetation;
- ▶ Supplementary Feeding for the Hooded Vulture;
- ▶ Support for Existing Conservation Areas;
- ▶ Research Support;
- ▶ Support for Alternative Livelihoods; and/or
- ▶ Additional Education, Training and Awareness.

Whether supporting conservation actions are implemented, and which are selected, will depend on the outcomes of further consultations with UNRA, other Government agencies, NGOs and other key stakeholders.

Implementation

UNRA is responsible for establishing a suitably experienced and qualified team to implement and continually improve the BAP and its objectives. This team is proposed to include a dedicated Biodiversity Officer and the wider environmental team, who will be responsible for implementation, enforcement, refinement, compliance monitoring and reporting. National and international ecological specialists and consultants should be engaged to provide guidance and support as and when required.

Key to implementation will be UNRA's collaboration with, and support of, Protected area management teams and NGOs. Collaboration and support will achieve the BAP's objectives and conserve biodiversity within the vicinity of the Project.

Capacity building initiatives will be established for Project delivery, including the BAP. This includes specific training in species identification, survey techniques, equipment and data analysis by experienced consultant ecologists, national and international ecological specialists.

This BAP should be reviewed on a regular basis in accordance with the *Environmental and Social Management and Monitoring Plan* prepared for the Project to determine whether any changes, improvements or updates are required to be made to the Plan.

The following steps are recommended to commence implementation of the BAP:

- ▶ Ongoing engagement with the relevant Government agencies and local communities regarding the biodiversity aspects of the Project;
- ▶ Following award of the concession, the construction contractor/concessionaire should develop a CEMP incorporating the management and monitoring measures in the BAP, which includes detailed procedures for implementation (e.g. SOPs);
- ▶ Where required, agreements should be established with Government authorities for the implementation of the management and monitoring measures outlined (e.g. via MoUs);
- ▶ Consultation and validation with key stakeholders to fully assess and select appropriate offsetting for the Project and to develop the Biodiversity Offset Strategy detailed report, including an Offset Management Plan (see section below);
- ▶ Costs estimations and schedule for the implementation of the BAP to be refined to ensure that adequate funds are budgeted to implement the BAP effectively, including the final biodiversity offset strategy;
- ▶ UNRA to develop internal monitoring procedures in accordance with the BAP monitoring requirements (with specialist support as required); and
- ▶ Update the BAP periodically over the Project life.

The following steps are required to commence implementation of the proposed Biodiversity Offset Strategy:

- ▶ Consultation and validation with key stakeholders to fully assess and select appropriate offsetting for the Project. This should include engagement with:
 - Government of Uganda (and particularly the NFA and Wetland Management Department);
 - NGOs active in the vicinity of the Project area; and
 - Biodiversity experts.
- ▶ Additional surveys / habitat mapping of offset sites for species to be included in the offset program where required to establish a baseline for offsets;
- ▶ Preparation of a stand-alone Biodiversity Offset Strategy (detailed report), including an Offset Management Plan (with schedules, budgets etc). The Offset Management Plan will need to include detailed procedures for the ongoing monitoring and evaluation of the offset program;
- ▶ Implementation of a Feasibility Study for offsets to trial all activities, verify biodiversity gains, and refine the mechanisms and business / financial plan for the delivery of gains;
- ▶ Ongoing consultation and collaboration with key stakeholders as required; and
- ▶ Regular updates of the Biodiversity Offset Strategy and Offset Management Plan as required during implementation.

1. INTRODUCTION

This *Biodiversity Action Plan (BAP)* for the Kampala-Jinja Expressway PPP Project Phase 1 (hereafter 'the Project') has been prepared for the Ugandan National Roads Authority (UNRA) by Earth Systems and Atacama. The Project aims to provide a major toll-road link between Kampala and Jinja to help ease congestion along the existing Kampala-Jinja road and to improve the transportation infrastructure in Uganda and East Africa. Large infrastructure projects can have detrimental effects on biodiversity – an aspect of the environment that should be considered at all stages of Project implementation under both Ugandan legislation and International guidelines (e.g. IFC PS6, IFC Environmental, Health, and Safety Guidelines for Toll Roads). Uganda is an exceptionally biodiverse country with surveys reporting the occurrence of 18,783 species including 4.6% of globally recognised dragonflies, 6.8% of butterflies, 7.5% of mammals and 10.2% of all bird species (USAID, 2006).

The BAP has been prepared in accordance with Ugandan legislation as well as International Finance Corporation (IFC) and other relevant international best practice and guidelines. This BAP provides a framework for the implementation of UNRA's biodiversity mitigation and management measures during pre-construction, construction and operation phases of the Project. This BAP details UNRA's biodiversity management initiatives, commitments and obligations associated with the Project. The overriding aim of the BAP is to avoid and minimise potential residual impacts on Project area biodiversity wherever practical.

UNRA is committed to best practice and avoiding, minimising and restoring impacts on biodiversity, however, it is recognised that the Project will have an impact on some significant biodiversity values. Consequently, UNRA will need to implement a Biodiversity Offset Strategy to compensate for Project-related impacts after all previous steps of the mitigation hierarchy have been enacted.

Therefore, the BAP outlines:

- ▶ A framework for the implementation of UNRA's biodiversity mitigation and management measures during pre-construction, construction and operations phases of the Project;
- ▶ Actions to rehabilitate and restore biodiversity;
- ▶ A proposed approach to implementing offsets and supporting conservation actions to compensate for impacts after all aspects of the mitigation hierarchy have been implemented; and
- ▶ A monitoring plan to evaluate the efficiency and success of biodiversity management and mitigation measures and to enable adjustments to be made where required.

This BAP forms part of the ESIA documents for the Project and has cross-linkages to a number of other reports and management plans. As such the BAP should be considered in conjunction with other documents relevant to biodiversity management for the Project including:

- ▶ ESIA Main Report (Volume B);
- ▶ Environmental and Social Management and Monitoring Plan (ESMMP, Volume D);
- ▶ Resettlement and Livelihood Restoration Plan (RLRP, Volume D);
- ▶ Stakeholder Engagement Plan (SEP, Volume D);
- ▶ Revegetation Plan (Volume D);
- ▶ Water Management Plan (WMP, Volume D).

Specific mitigation measures for potential impacts on ecosystem services are provided in the ESIA Main Report (Volume B). However the biodiversity management and monitoring measures outlined in the BAP will certainly benefit the availability of ecosystem services.

1.1 Brief Project Description

The Project discussed in this BAP is Phase 1 of the overall Kampala-Jinja Expressway (KJE) Project. As part of this overall project, UNRA is proposing to construct a limited access 76 km tolled expressway between Kampala and Jinja to relieve the current congestion and reliance issues on the radial routes out of Kampala city and on the existing Kampala to Jinja highway to cater for future growth. This infrastructure development is part of the Northern Corridor – a vital international highway connecting the port of Mombasa in Kenya to the landlocked countries of Uganda, Rwanda, Burundi and the Democratic Republic of Congo.

The Project also includes the Kampala Southern Bypass which will provide a bypass to the capital city of Kampala, linking to the Kampala Entebbe expressway and the Northern Bypass to form a complete ring road around the city. The overall KJE Project is planned to be undertaken in two phases as follows (Figure 1-1):

- ▶ **Phase 1** – development of the first section (35 km) of the Kampala-Jinja Expressway (KJE) from Kampala to Namagunga and the Kampala Southern Bypass (KSB) (18 km) which is expected to be completed by 2023; and
- ▶ **Phase 2** - development of the second section of the Kampala-Jinja Expressway (KJE) from Namagunga to Njeru (41 km) at the new Nile bridge. Works for the second phase are anticipated to be completed by 2030.

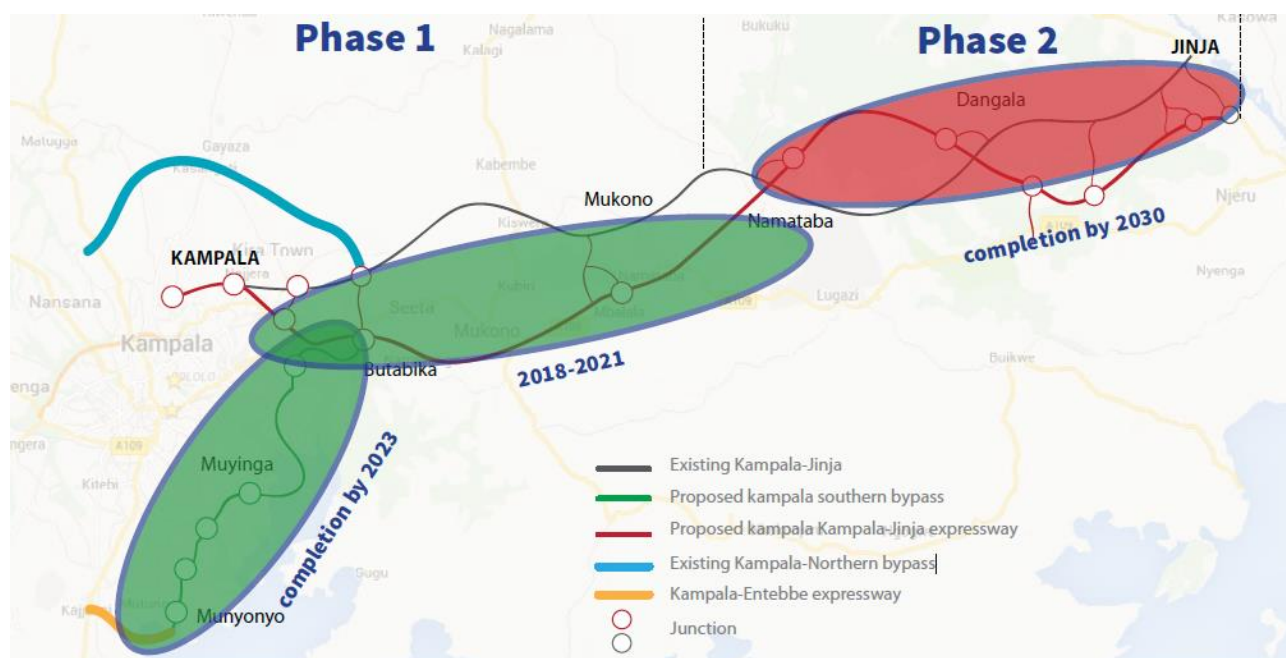


Figure 1-1: Project Phases with indicative construction schedule (UNRA, 2016c)

1.1.1 Phase 1 – KJE Mainline and KSB

The KJE Project is currently planned for a 30-year term, based on a Design, Build, Finance, Operate and Transfer (DBFOT) model that will form the basis of the concession agreement between the Government of Uganda and the successful private sector concessionaire. The period is inclusive of the construction period, after which Project facilities will be transferred back to UNRA. The KJE Project is expected to generate approximately 1,500 jobs

during construction and 250 jobs during operations, most of which will be taken up by Ugandans. Once operational, the expressway is expected to save up to 70 minutes of journey time between Kampala and Jinja.

The KJE Project Phase 1 traverses Kampala City as well as three administrative districts of Wakiso, Mukono and Buikwe. The first section of the proposed mainline alignment is approximately 35 km with a number of interconnectors to join major towns near the expressway (Figure 1-1). The majority of the Project road adopts a new alignment, entirely different from that of the existing main road from Kampala to Jinja.

This alignment has been selected based on detailed engineering design, feasibility and environmental and social studies conducted thus far which date back to 2011. After all the proposed road infrastructure projects in and around Kampala have been completed it is hoped that Kampala will have a robust, interconnected, road network allowing for easy and quick transport around Kampala, and between Entebbe, Kampala and Jinja.

Key design features of the Project are shown in Table 1-1.

Table 1-1: Key design features of the Project, including the KJE mainline alignment (Phase 1) and Kampala Southern Bypass

Design features	KJE Mainline to Namagunga (Phase 1)	Kampala Southern Bypass
Total length	35 km - Greenfield (3km brownfield)	18 km - Greenfield
Design speed (urban)	85 km/hr (first 10 km)	100 km/hr
Design speed (rural)	120 km/hr	Not applicable
Lanes	4+4(3km); 3+3 (32km);	2+2 (18km)
Lane width	3.5 m (main line – urban), 3.7 m (main line – rural) and 3.65 m for link/connector roads	3.5 m (main line)
Median	2-5m with 0.5 m hard strip	2-5 m with 0.5 m hard strip
Shoulder width	3.5 m	3.0 m
Grade separated junctions	9	5
Potential length of viaducts	Approx. 2000 m at km 9+100 – km 10+640	Approx. 2700 m mainly over swamps
Nominal Right of Way width	90 m	60 m
Minimum vertical clearance	5.2 m	5.2 m
Maximum vertical gradient	6% (urban) and 4% (rural)	6 (urban) and 4% (rural)
Vehicular under/overpasses	23(+16 underpasses)	4 (+12 underpasses)
Tunnels	None	None
Pavement type	Asphalt	Asphalt

Source: UNRA, KJE 2017 Feasibility Study Report.

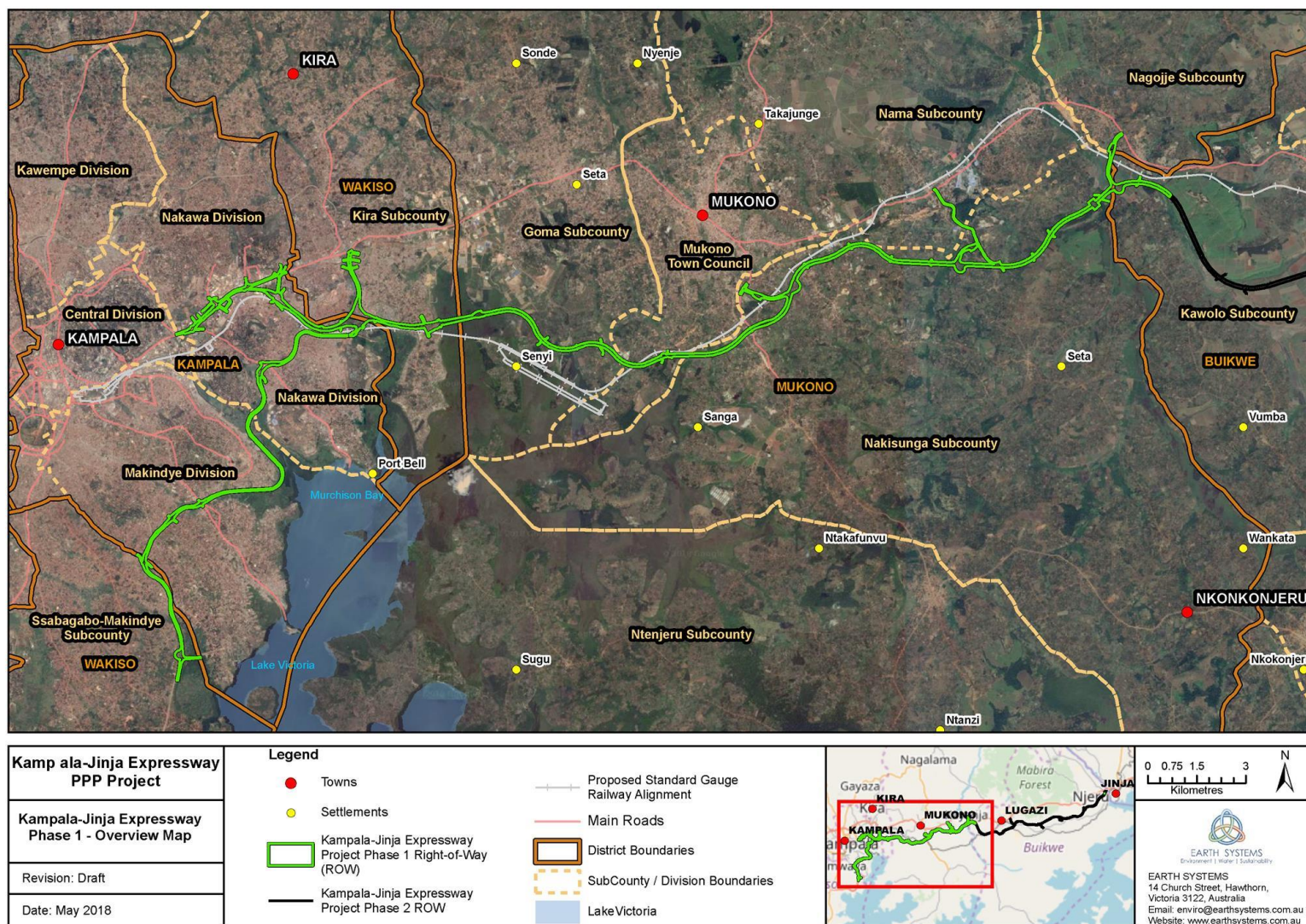


Figure 1-2 Overview of the Phase 1 of the Kampala-Jinja Expressway (KJE) Project

1.2 Principles

This BAP provides a framework for the implementation of biodiversity management, monitoring and offsetting associated with the Kampala-Jinja Expressway Project. The BAP has been developed based on the following best-practice guidance:

- ▶ Standards on Biodiversity Offsets (BBOP, 2012);
- ▶ IUCN Policy on Biodiversity Offsets (IUCN, 2016); and
- ▶ IFC Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012).

This BAP is a dynamic document that will be reviewed and updated by UNRA at least every two years. The Plan will also be updated when deemed necessary based on the outcomes of monitoring activities, to reflect changes to Project activities, commitments, environmental and social conditions, regulatory requirements, and potential optimisation of best management practices. UNRA will be responsible for implementing this BAP throughout the life of the Project and will ensure staff and contractor compliance (refer Chapter 8).

Key principles for this BAP are 'no net loss', 'net gain' and the application of the 'mitigation hierarchy' as described below. The BAP is focused on the management of the 'priority biodiversity features' for the Project that are outlined in Section 3, as well as the Critical Habitat qualifying features identified in Chapter 3.1.1. However, conservation of these umbrella features will benefit surrounding biodiversity and ecosystems.

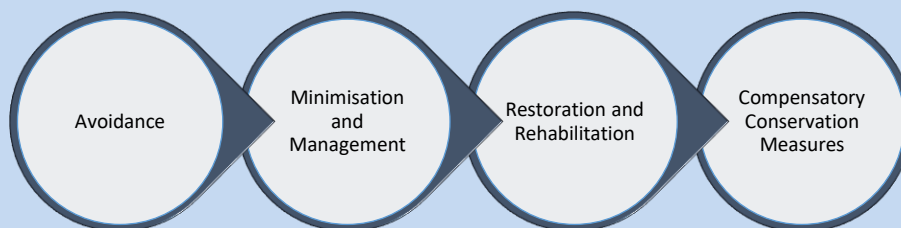
1.2.1 Mitigation Hierarchy

As per IFC Performance Standard 1, adopting the mitigation hierarchy is to *"to anticipate and avoid, or where avoidance is not possible, minimise, and, where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment."*

The application of the mitigation hierarchy is to implement a set of prioritised steps to avoid and minimise the potential impact of the Project on biodiversity. The highest priority action is avoidance, while the lowest priority is providing offsets. A brief description of each aspect of the hierarchy is described in Box 1.

Box 1: Mitigation Hierarchy

The mitigation hierarchy is to “to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment (IFC, 2012).” The mitigation hierarchy involves a series of prioritised steps to help reduce project impacts on biodiversity. The figure below outlines these steps in order of decreasing priority (left to right).



1 Avoidance

Avoidance entails removing the source of impact (e.g. changing the footprint of a site component, avoiding a harmful activity, a sensitive site, a protected species, employing a new technology etc.). Avoidance should be considered where there are biodiversity features that are particularly rare, vulnerable, difficult to restore to their former ecological structure and function, and/or are recognised as the highest priority for conservation.

2 Minimisation and Management

Minimisation and management aims to reduce the severity, duration and/or likelihood of impacts on biodiversity that cannot be prevented by avoidance. Effective minimisation can virtually eliminate many negative impacts on biodiversity. For example, to reduce impacts on wetland habitats passed by a road alignment, viaducts and bridges can be built to reduce the removal of wetland habitat required.

3 Restoration and Rehabilitation

Land that has been impacted and/or cleared and is no longer used by the project is rehabilitated to a similar or better state than prior to the disturbance. The primary aims of rehabilitation are to restore vegetation/habitat, increase geotechnical stability, control erosion and protect water quality. A secondary aim for rehabilitation is often based on stakeholder consultation and may include water catchment protection, plantation of timber/food resources and re-establishment of priority biodiversity values (e.g. reintroduction, plantings).

4 Offset / Compensatory Actions

Biodiversity offset or compensatory actions are measures that compensate for the residual adverse impacts of an action on biodiversity. Biodiversity compensatory actions can be offsets and/or supporting conservation actions that are designed to have long-term benefits on biodiversity, preferably increasing the biodiversity of an area.

Avoidance and mitigation measures are the principal strategies for managing the impact of the project on biodiversity. Offset/compensatory actions will not reduce the impact on the area's biodiversity, they will however, compensate for the unavoidable adverse impacts. A biodiversity “offset” should be designed to

Box 1: Mitigation Hierarchy

meet a number of requirements and only used in specific circumstances. Further detail regarding offset and supporting conservation actions principles is provided in Chapter 6.

1.2.2 No Net Loss / Net Gain

Wherever practical, UNRA is aiming to achieve 'no net loss' and preferably 'net gain' of Project area biodiversity by avoiding, mitigating and restoring the adverse effects of the Project. As per IFC Performance Standard 6, 'no net loss' is defined as:

"The point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional)."

As Critical Habitat has been identified in the Project area, the IFC Performance Standard 6 requires a net gain of biodiversity to be achieved in areas of critical habitat as a result of avoidance, management and offsetting measures implemented by a Project.

1.3 Report Author

The BAP has been prepared by Earth Systems and Atacama Consulting. The contact details for Earth Systems and Atacama Consulting are as follows:

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2. LEGISLATIVE FRAMEWORK AND RELEVANT GUIDELINES

2.1 National Biodiversity Legislation and Governance

The development of the proposed Project will require coordination with several government bodies involved in the conservation of biodiversity and environmental management. Biodiversity management in Uganda is primarily the responsibility of the National Environment Management Authority (NEMA), who are responsible for the overall management of environmental issues in the country. The Ministry of Water and Environment also plays a key role in regards to biodiversity issues as it is responsible for the formulation and enforcement of environmental policies, laws and regulations in Uganda. Additionally, the National Forestry Authority (NFA) is a body of the Ugandan central government that is responsible for among others managing the Uganda's Central Forest Reserves. Key relevant Ugandan institutions and agencies are highlighted in Table 2-1.

Table 2-1 Key national institutions and agencies related to biodiversity management for the Project.

Institution / Agency	Mandate and relevance to the proposed Project
National Environment Management Authority (NEMA)	NEMA was established in January 1996 under the National Environment Act, Cap. 153 and is an independent Central Government Agency responsible for co-coordinating all environment-related matters to ensure the sustainable management of the environment. It has the following functions in relation to the proposed project: it co-ordinates the processes of EIA for listed activities; carries out, alongside other stakeholders, environmental monitoring and audits of road infrastructure activities; ensures and monitors compliance of listed activities with environmental guidelines; and harmonises national and international performance standards in the road/infrastructure sector on environmental sustainability.
Ministry of Works and Transport (MoWT)	Lead ministry from which UNRA derives its mandate. It has responsibility over policy matters. The Department of Construction Standards and Quality Management in the Ministry is mandated to among others: develop adequate engineering specifications and standards; promote good standards in the construction industry; undertake research and materials testing in the construction industry; and promote integration of crosscutting issues namely; Environment, Climate change, Gender, HIV/AIDS, Occupational Health and Safety and Disability in the sector. The MoWT will ensure that applicable environmental and social management tools are used in the ESIA, the roads are constructed following sectoral standards and guidelines.
Uganda National Roads Authority (UNRA)	The mandate of UNRA is to develop and maintain national road system, advise Government on general roads policy and contribute to addressing transport concerns. In this KJE PPP, UNRA is both a developer and lead agency. As a lead agency, UNRA manages national roads infrastructure and is responsible for mitigation of impacts associated with road development. As a developer on the other hand, UNRA is required to comply with National Environmental laws including undertaking EIA and Audits for road projects.
The Ministry of Water and Environment	The Ministry of Water and Environment is the line ministry responsible for the formulation and enforcement of environmental policies, laws and regulations in Uganda. Its main functions include: Mobilisation of resources required to run and implement environment related projects and related issues; Overall responsibility for environmental policy formulation and implementation; Introduction of new draft laws and regulations to parliament and draft amendments of existing laws and regulations; and Coordination with local governments on environment related issues.
Directorate of Water Resources Management Directorate. Ministry of Water and Environment (MoWE)	The Directorate Water Resources Management – (DWRM), has a responsibility to regulate quality and quantity of water resources in the country. The Directorate is responsible for the full range of integrated water resources management (IWRM) activities including monitoring, assessing, planning, allocating and regulating water resources. Specifically, the Water Resources Planning Department is responsible for water regulation through issuance of permits for water abstraction and wastewater discharge. Abstraction of water for road construction purposes and for domestic use in campsites will be regulated by this directorate. Civil works on surface water courses will also be regulated by this Directorate.

Institution / Agency	Mandate and relevance to the proposed Project
Wetlands Management Department. MoWE	The Department is mandated to manage and monitor the use of wetlands to ensure sustainability. The road project will traverse a number of wetlands which requires monitoring and guidance from this Department.
Ministry of Tourism, Wildlife and Antiquities (MoTWA)	The mandate of the Ministry of Tourism, Wildlife and Antiquities (MoTWA) is derived from Article 189 and Sixth Schedule the Constitution of the Republic of Uganda (1995), Uganda Wildlife Act Cap 200, Uganda Tourism Act, 2008, Historical Monuments Act 1967, Universities and other Tertiary Institutions Act, 2006. The Ministry will have to be engaged by the proposed Project given the potential for the project to infringe on certain aspects of the afore-mentioned legal and regulatory aspects as part of the process.
National Forestry Authority (NFA)	NFA is a body of the Ugandan central government that is responsible for among others managing the Uganda's Central Forest Reserves. It was created as a semi-autonomous corporation through the National Forestry and Tree Planting Act of 2003 to replace the prior Forestry Department. NFA will be key in determining practical mitigation measures for impacts on the forests that will be directly or indirectly affected by KJE PPP Phase 1.
Directorate of Fisheries – Ministry of Agriculture Animal Industry and Fisheries.	The Ministry is mandated to: Formulate, review and implement national policies, plans, strategies, regulations and standards and enforce laws, regulations and standards along the value chain of crops, livestock and fisheries; Support the development of infrastructure and use of water for agricultural production along livestock, crop and fisheries value chains; Monitor, inspect, evaluate and harmonize activities in the agricultural sector including local governments; and Develop and promote collaborative mechanisms nationally, regionally and internationally on issues pertaining to the sector. The Ministry and directorate will be a key player in ensuring that the proposed Project activities do not interfere with aspects of fish as it traverses through fresh water ecosystems.
Uganda Wildlife Authority	UWA role is to conserve, economically develop and sustainably manage the wildlife and protected areas of Uganda in partnership with neighbouring communities and other stakeholders for the benefit of the people of Uganda and the global community. The Authority will be involved since the proposed Project will be traversing natural habitats for wildlife.
Ministry of Local Government	The ministry is responsible for guidance and overall vision of Government in local Governments (LGs). The proposed Project will traverse districts of Kampala, Wakiso and Mukono which districts have LGs that are monitored and coordinated by this Ministry.
Uganda Tourism Board	The board is a government organisation that is responsible for promoting the tourism sector to the outside world. The Board is key to the proposed project since the proposed Project play a role in boasting the tourism sector.

National legislation, plans and frameworks relevant to the BAP are detailed in Table 2-2. This includes legislation detailing the protection of wildlife and ecosystems and legislation outlining permitting and environmental management requirements for infrastructure projects.

Table 2-2 Relevant national policy and legislation for the management of biodiversity.

Instrument / Legislation	Overview
Draft National Environment Management Policy (NEMP), 2014	The National Environment Management Policy (1994) provides an enabling framework for the management of environmental resources in all aspects of national planning including providing a system of environmental impact assessment so that the adverse impacts of development activities can be foreseen, avoided or mitigated. This is currently being updated and a 2014 draft is available. The NEMP also outlines national strategies for protecting riverbanks and lakeshores, conserving biodiversity and generating sustainable and renewable energy.
The National Water Policy, 1999	This policy aims to manage and develop the water resources of Uganda in an integrated and sustainable manner. The water policy requires an integration of the water and hydrological cycle concerns in all development programmes. The Policy further emphasizes the need for participatory planning at the lowest possible level and specifically mentions the requirement for districts to set priorities, by-laws and annual development plans within policies and guidelines set by national level ministries.

Instrument / Legislation	Overview
National Policy for the Conservation and Management of Wetland Resources, 1995	The overall objective of this policy is to ensure the sustainable use of wetland resources through guaranteeing conservation of key species, maintenance of ecological functions and promoting equitable access to resources therein. The policy commits government to enhancing public awareness and understanding of wetlands resources and actively encourages participation of the public, local government authorities and institutions in environmental management. The policy implements the Ramsar Convention on Wetlands of International Importance, and provides for the requirement of ESIA for all planned developments in protected wetland areas.
The Uganda Forestry Policy, 2001	The Goal of the Forestry Policy is to ensure that integrated forest sector that achieves sustainable increase in the economic, social and environmental benefits from forests and trees by all the people of Uganda, especially the poor and vulnerable. The government of Uganda acknowledges that the country's forests and woodlands are central to the three pillars of sustainable development - the economy, society and the environment - and that the sector is not being given adequate priority. The country's forest resources provide energy, forest and tree products, employment, livelihoods support, government revenues, business opportunities, environmental functions and services, and they maintain ecological integrity.
The National Wetlands Policy, 1995	This Policy aims at promoting the conservation of Uganda's wetlands in order to sustain their ecological, social and economic functions for the present and future generations.
The Uganda Wildlife Policy, 2014	The policy is an update of the Uganda Wildlife Policy (1999) which forms the basis of the Uganda Wildlife Act, Cap 200. One of the strategies to achieve the objectives of this policy include ensuring that all new developments and interventions within Critical Habitat areas are subjected to appropriate environmental impact assessments.
National Land Use Policy, 2007	The aim of the policy is to: "achieve sustainable and equitable socio-economic development through optimal land management and utilisation". The specific goals include; To reverse and alleviate adverse environmental effects at local, national, regional and global levels; To promote land use activities that ensure sustainable utilisation and management of environmental, natural and cultural resources for national socio-economic development; To ensure planned, environmentally friendly, affordable and well-distributed human; and settlements for both rural and urban areas; and To update and harmonise all land use related policies and laws, and strengthen institutional capacity at all levels of Government.
The Fisheries Policy, 2000	The goal of this policy is to ensure increased and sustainable fish production and utilisation by properly managing the capture of fish; promoting aquaculture and reducing postharvest losses. This goal contributes to the overall national development policy of poverty eradication and food security. The policy provides that participatory planning and policy-making form the basis of fisheries management, so as to ensure that fisheries management systems are based on dynamic processes that take into account technical, biological, social, economic, environmental and cultural aspects. The policy further provides that adverse environmental impacts on fisheries are to be minimised, and mechanisms established at appropriate levels to achieve this by protecting fisheries and aquatic ecosystems from adverse environmental impacts.
The National Climate Change Policy, 2015	The goal of this Policy is to ensure a coordinated approach towards a climate-resilient and low carbon development path for sustainable development in Uganda.
Draft Agricultural Policy (2011)	The overall objective is promote food and nutrition security and to improve household incomes through coordinated interventions that will enhance sustainable agricultural productivity and value addition, provide employment opportunities, and promote agribusinesses, investments and trade.
The National Environment Act, Cap. 153	The National Environment Act, Cap 153, is the most important legal instrument in Uganda with respect to environmental management, providing for an institutional framework through establishment of the National Environment Management Authority (NEMA). It also specifies management measures, addresses pollution control and stipulates mechanisms for enforcement of the law. Under Section 19, the Act states the criteria under which EIA shall be required and the process is further elaborated in Environmental Impact Assessment Guidelines of Uganda (July 1997). The Act provides for environmental audits and inspections by NEMA's environmental inspectors and Lead Agencies. This Act requires operators of projects to maintain records and make annual reports to NEMA to demonstrate environmental compliance. Also the Act prescribes projects for which EIA is mandatory, and road projects are one of these (Section 3 in Third Schedule of the Act).

Instrument / Legislation	Overview
	It is worth noting that a draft bill that seeks to introduce new provisions in the NEA, Cap 153 of 1995 was proposed by NEMA. The draft bill seeks to retain many of the existing provisions, but the new provisions include aspects of oil and gas, chemicals management, and climate change and adaptation, among others.
The Uganda Wildlife Act, Cap 200	The Act provides for sustainable management of wildlife, consolidation of the laws relating to wildlife management, establishment of a coordinating, monitoring, and supervisory body for that purpose and all associated matters.
The Fish (Amendment) Act, Cap 197, 2011	The Act makes provision for the control of fishing, the conservation of fish, the purchase, sale, marketing and processing of fish and matters connected therewith. Section 12, subsection (4) stipulates that 'except where otherwise expressly provided by any written law, no person shall divert the waters of any lake, river, stream, pond or private waters in which fish, their eggs or progeny have been introduced with the consent of the chief fisheries officer, unless the ditch, channel, canal or water pipe conducting the water is equipped at or near the entrance or intake with a screen or a filter of a design approved in writing by the chief fisheries officer, that is capable of preventing the passage of fish, their eggs or progeny into the ditch, channel, canal or water and where the chief fisheries officer so directs there is also provided a by-pass.
The National Forestry and Tree Planting Act, 2003	The Act prohibits the destruction, damage or disturbance of natural forests and forest reserves except in the course of carrying out activities for their sustainable management, or in accordance with a licence issued under this Act. Section 38 of the National Forestry and Tree Planting Act, 2003 also require a person or organisation intending to undertake a project or activity which may, or is likely to have a significant impact on a forest to undertake an Environmental Impact Assessment. The Act further facilitates greater public awareness of cultural, economic and social benefits of conserving and increasing sustainable forest cover.
The Prohibition of the Burning of Grass Act, Cap 33	The Act prohibits the unauthorised burning of grass within a forest reserve, national park, and wildlife reserve or wildlife sanctuary.
The Plant Protection and Health Act 2015	The Plant Protection and Health Act intends to consolidate and reform the law relating to plant protection regarding destructive diseases, pests and weeds. This Act is focused on prevention of introduction and spread of harmful organisms that may adversely affect Uganda's agriculture, the national environment and livelihood of the people. The Act aims to regulate the export of plants and plant products and introduction of new plants in accordance with international commitments. The Commissioner for Agriculture is responsible for the implementation of this Act.
The Environmental Impact Assessment Regulations, 1998	These Regulations reinforce the EIA requirement and prescribe procedures to be followed in conducting EIA of projects. The Regulations also charge the developer with the responsibility of ensuring that mitigation measures from the EIA are complied with. The Regulations further require projects to undertake post assessment environmental audits to assure that predictions made during the assessment are properly managed. The Regulations provide for self-auditing by the project owners (Section 31) and by NEMA (Section 32). The Regulations require a project to undertake first audit not less than 12 months but not later than 36 months from project commencement, and submit findings thereof to NEMA. Public participation: Sub-regulation (1) of Regulation 12 requires the developer to take all measures necessary to seek the views of the people in the communities that may be affected by the Project. Regulations 19, 20, 21, 22 and 23 outline further requirements for public participation. Amendments were made to the EIA Regulations of 1998 as of August 2014, and these take note of the screening and project brief stage which may be used to identify the need for a full environmental impact study.
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	These Regulations in section 34 oblige the developers to undertake an Environment Impact Assessment in accordance with sections 20, 21 and 22 of the National Environment Act 2000 on projects that may have significant impacts on wetlands, riverbanks or lake shores. The Proponent will also have to undertake annual audits and monitoring of any activities that could significantly affect the river bank due to the nature of the Project (Section 34). Under Section 23 of these Regulations, the Proponent will be required to make an application in Form A of the First Schedule of the Regulations for construction and operation activities effects on the river banks.

2.1.1 National Biodiversity Strategy and Action Plan (2015-2025)

Uganda ratified the Convention on Biological Diversity 8th September 1993 and the National Biodiversity Strategy and Action Plan (NBSAP) is the main framework and mechanism for implementation of the Convention within the country. The current NBSAP is the second version of the strategy (NBSAPII). The strategy's objectives are to:

- ▶ "Strengthen stakeholder co-ordination and frameworks for biodiversity management;
- ▶ Facilitate and enhance capacity for research, monitoring, information management and exchange on biodiversity;
- ▶ Put in place measures to reduce and manage negative impacts on biodiversity;
- ▶ Promote the sustainable use and equitable sharing of costs and benefits of biodiversity;
- ▶ Enhance awareness and education on biodiversity issues among the various stakeholders;
- ▶ Harness modern biotechnology for socio-economic development with adequate safety measures for human health and the environment; and,
- ▶ Promote innovative sustainable funding mechanisms to mobilise resources for implementing NBSAPII." (NEMA 2016)

Many of the principles and measures of this BAP are commensurate with the NBSAPII. For example, Action 1.1.9 *"Undertake mapping of the status and trends of ecosystems (especially forests, wetlands and rangelands)"*. Some mapping of forests and wetlands has been undertaken as part of the ESIA process and this can be shared to inform the larger mapping and assessment undertaken for achieving this NBSAPII action.

2.1.2 International Conventions

Uganda is a signatory to a number of international conventions and agreements related to biodiversity management including the Convention on Biological Diversity, among others (see Table 2-3).

Table 2-3 Summary description of key international conventions and agreements related to biodiversity that have been ratified by the Republic of Uganda

International Convention	Date of Signing / Ratification	Description
United Nations Convention on Biological Diversity (1993)	29 th December 1993	Objectives: The conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. The Convention requires countries to prepare a national biodiversity strategy (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity.
Ramsar Convention (1971)	4 th March 1988	Intergovernmental treaty that provides a framework for national action and international cooperation for the conservation and sustainable use of wetlands and their resources. Wetlands that are covered by the Ramsar Convention include lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans. There are 12 Ramsar sites in Uganda, covering 454,303 ha
Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora (1975)	16 th October 1991	CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. It provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level. CITES works by subjecting international trade in specimens of selected species to certain controls. CITES-listed species may only be imported or from a State party to the Convention

International Convention	Date of Signing / Ratification	Description
		if the appropriate document has been obtained and presented for clearance at the port of entry or exit.
Convention on the Protection of World Cultural and Natural Heritage (1972)	20 th November 1987	The convention focuses on the protection of natural and cultural sites listed on the World Heritage List. The States Parties have been encouraged to integrate the protection of the cultural and natural heritage into regional planning programmes. Three properties in Uganda have been inscribed on the World Heritage List, two natural and one cultural
Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) (1983)	1 st August 2000	Intergovernmental treaty that aims to conserve terrestrial, aquatic and avian migratory species, their habitats and migration routes throughout their range
Convention to Combat Desertification (1994)	25 th June 1997	International agreement linking environment and development to sustainable land management to reverse and prevent desertification land degradation and to mitigate the effects of drought in affected areas to reduce poverty and increase environmental sustainability
African-Eurasian Waterbird Agreement (AEWA) (1996)	1 st December 2000	Intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, Middle East, Central Asia, Greenland and the Canadian Archipelago. Species include grebes, pelicans, cormorants, herons, storks, ibises, ducks, waders and cranes.
Protocol for the Sustainable Development of Lake Victoria Basin	29 th November 2003	Intergovernmental protocol between the Republic of Kenya, Republic of Uganda and the United Republic of Tanzania to govern the sustainable development of the Lake Victoria Basin, including the conservation and sustainable utilisation of resources
Protocol on Environment and Natural Resource Management	3 rd April 2006	Intergovernmental protocol between the Republic of Kenya, Republic of Uganda and the United Republic of Tanzania to promote conservation of the environment and sustainable exploitation of natural resources. Partner states have agreed to take measures to foster cooperation in the joint and efficient management and sustainable utilisation of natural resources
Sustainable Development Goals	25 th September 2015	The Sustainable Development Goals were adopted by the United Nations at the 70 th general assembly. It sets out a series of goals aiming to promote sustainable development whilst improving livelihood for people across the world. Goals include the eradication of world poverty and hunger, the protection and sustainable use of terrestrial and marine ecosystems and the promotion of responsible consumption and production.

2.1.3 National Red List

Nationally Threatened Species for Uganda (WCS, 2016) has been prepared because Uganda is committed to implementing the Aichi targets, particularly *“By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.”* The Government of Uganda is a signatory to the Convention on Biological Diversity and conserving the biodiversity of Uganda. Thus, there was a need to identify species of national conservation concern to implement appropriate actions to slow and halt declines.

The Wildlife Conservation Society (WCS), supported by government and private organisations, compiled the national list of threatened species according to IUCN guidelines. Seven taxa were considered for red listing at the national level. The seven taxa were higher plants (i.e. vascular), birds, mammals, reptiles, amphibians, butterflies and dragonflies. Of the 1,432 species considered, 526 were considered to be threatened and four regionally extinct (Table 2-4). It is assumed that more species will be assessed in the future since the number of bird species considered was quite low and Uganda is inhabited by over 1,000 bird species.

Table 2-4 Summary of numbers of species per taxa and conservation category and species considered for inclusion in the Uganda Redlist (WCS, 2016)

	Mammals	Birds	Reptiles	Amphibians	Butterflies	Dragonflies	Plants	Total
Total species considered	329	156	174	90	490	97	96	1,432
Threatened								
Critically Endangered (CR)	14	9	5	1	44	16	20	109
Endangered (EN)	25	24	9	11	69	4	28	170
Vulnerable (VU)	38	50	17	7	71	24	40	247
Other categories								
Data Deficient (DD)	48	32	70	25	235	19	3	432
Regionally Extinct (RE)	2	2						4
Near Threatened (NT)	12	20	16	8	71	34	2	163
Least Concern (LC)	187	19	54	33			3	296
Not Applicable (N/A)	3		3	5				11

2.1.4 Kalagala Offset Sustainable Management Plan (2010-2019)

The Government of Uganda entered into an agreement with IDA/World Bank to further mitigate/offset impacts of the Bujagali Hydro Power Project to ensure environmental management of the Mabira ecosystem. The Kalagala Offset is part of the mitigation measures to reduce negative impacts of the Bujagali Project. The Indemnity Agreement provides for the preparation and implementation of a Kalagala Offset Sustainable Management Plan and commits the Uganda Government to:

- ▶ “Set aside the Kalagala Falls site exclusively to protect its natural habitat and environmental and spiritual values in conformity with sound social and environmental standards;
- ▶ Carry out tourism development activities at the Kalagala Falls site in conformity with sound social and environmental standards;
- ▶ Not to develop power generation that could adversely affect the ability to maintain the Kalagala Falls; and
- ▶ Conserve through a sustainable management programme and budget, the present ecosystem of Mabira Central Forest Reserve, Kalagala Central Forest Reserve and Nile Bank Central Forest Reserve” (Ministry of Water and Environment, 2009).

The Kalagala Falls, Mabira Central Forest Reserve, Kalagala Central Forest Reserve and Nile Bank Central Forest Reserve were selected for offsets as they were within proximity to the Bujagali Project and/or that they were within the broader Mabira ecosystem and shared similar ecological characteristics. The KJE Project is located in the vicinity of the Mabira Central Forest Reserve.

2.2 Relevant International Standards and Guidelines

International standards and guidelines that may be relevant to the biodiversity management for the Project include:

- ▶ IFC Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012);
- ▶ African Development Bank Operational Safeguard 3: Biodiversity and Ecosystem Services;
- ▶ Equator Principles (2013);
- ▶ Biodiversity and National Accounting, World Bank Technical Report (2013);
- ▶ BBOP Standard on Biodiversity Offsets (http://www.forest-trends.org/documents/files/doc_3078.pdf); and
- ▶ IUCN Policy on Biodiversity Offsets (2016).

Key international standards relevant to the Project are described below.

2.2.1 World Bank / IFC Guidelines and Policies

The International Finance Corporation (IFC) is the private lending arm of the World Bank Group and the largest multilateral source of loan and equity financing for private sector projects in developing nations. The environmental and social policies and procedures of the World Bank are widely regarded as de facto international standards for the environmental and social management of resource development projects in countries with developing or absent regulatory frameworks.

Many international financing institutions have adopted the World Bank / IFC Standards in order to effectively manage environmental and social risks associated with large scale development projects. A large number of resource sector companies and operations are adopting World Bank / IFC Standards voluntarily to demonstrate a commitment to sound social and environmental practice.

The updated Sustainability Framework (2012) developed by the IFC articulates strategic commitment to sustainable development and is an integral part of its approach to risk management. The IFC Performance Standards were introduced to provide guidance for IFC clients to manage and improve their environmental and social performance through a risk and outcomes based approach. The most relevant performance standard in terms of ecology is Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (International Finance Corporation, 2012). Performance Standard 6 promotes the importance of protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources through sustainable development.

Relevant definitions from IFC Performance Standard 6 are listed below:

2.2.1.1 Modified Habitat

Modified habitat is vegetated or non-vegetated land that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitat may include an area managed for agriculture, forest plantations, reclaimed coastal zones and reclaimed wetlands.

2.2.1.2 Natural Habitat

Natural habitat is vegetated land composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

2.2.1.3 Critical Habitat

IFC standards and guidelines in relation to Critical Habitat are discussed in Chapter 3.1.1.

2.2.1.4 Alien, Non-native or Invasive Species

Intentional or accidental introduction of alien, invasive, or non-native species of flora or fauna into areas that is beyond their natural/original range can be a significant threat to biodiversity. Many non-native species have become invasive due to high reproductive rates, wide habitat tolerance and/or competitor inhibiting adaptations, spreading rapidly and out-competing native species.

2.2.2 Project Adoption of IFC Criteria

IFC Performance Standard 6 requires that Projects to be developed in areas of high conservation value meet certain standards of planning, management and monitoring. This BAP, in conjunction with the Project design and other management plans, have been developed in accordance with this principle under the assumption that the habitat in the Project area is of sufficient conservation value to warrant a comprehensive management strategy.

Specifically, IFC Performance Standard 6 states:

"...in areas of Critical Habitat, the client will not implement any project activities unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;*
- *The project does not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values;*
- *The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and*
- *A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.*

In such cases where a client is able to meet the requirements defined above, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the Critical Habitat was designated."

Consequently, this BAP outlines various measures to reduce and avoid impacts on biodiversity values, particularly to ensure the viability of key species. A Critical Habitat Assessment is conducted in Chapter 3.1.1. Furthermore, this BAP discusses strategies for achieving a net gain in biodiversity in and around the Project area, through offsetting and supporting conservation actions.

2.2.3 AFDB Operational Safeguards

The AFDB Operational Safeguards are a set of focused policy statements that are in line with the bank's commitments and establish operational parameters for use by relevant stakeholders. They are designed to "better integrate considerations of environmental and social impacts into the bank's operations to promote sustainability and long-term development in Africa (AFDB, 2013)" and to "Prevent projects from adversely affecting the environment and

local communities or where prevention is not possible, minimise, mitigate and/or compensate for adverse impacts and maximise development benefits (AFBD, 2013)."

The most relevant safeguard in terms of ecology is Operational Safeguard 3: Biodiversity and Ecosystem Services. The overall aim of this safeguard is to conserve biodiversity on the African continent and to promote the sustainable use of natural resources. This safeguard has been considered in the development of the BAP, and has the same core principles as the IFC standards considered above.

3. BIODIVERSITY CONTEXT AND PRIORITY BIODIVERSITY FEATURES

A full biodiversity baseline is provided in Chapter 16 of the ESIA Report (Volume B). This baseline is summarised below. Additional information on critical habitat qualifying features is provided in Chapter 4.

3.1.1 Habitats and Flora

3.1.1.1 Habitat Description

The ROW for the Project is dominated by modified habitats (accounting for 73.6% of land cover), relative to natural habitats (26.4% of land cover), which is a reflection of significant human activity in the vicinity of the Project (Figure 3-1). Detailed maps of land use / habitat coverage and distribution are presented in Chapter 7 of the ESIA Report (Volume B). The main modified habitats types present within the ROW are settlement areas, agro-pastoral land and industrial land. These are described below in more detail:

- ▶ **Settlements:** A significant proportion of the ROW lies within Kampala, a densely populated city with an estimated population of approximately 1.5 million as of 2014 (UBOS, 2014). Kampala is the dominant urban centre for Uganda, with 80% of the country's service and industrial sector companies operating there (IFPRI 2011). However, a large proportion of dwellings within and surrounding the ROW are considered to be part of widespread informal settlements, where sprawling, temporary structures are common. Kampala city is devoid of natural habitats, however small fragments of modified habitats (i.e. vegetation, along road verges, parks, gardens, waste land, and culverted watercourses) provide refuge for wildlife. In total, 20.2% of the ROW is settlement land.
- ▶ **Agro-pastoral:** The second most dominant modified habitat types within the ROW are agro-pastoral and fallow land which are generally located near settlements and account for approximately 26.3% of land cover within the ROW. Common species of annual and perennial crops located within the Project Area includes *Saccharum officinarum*, *Zea mays*, *Manihot esculenta*, *Eucalyptus spp*, *Maesopsis eminii*, *Musa spp.*, *Ipomoea batatas*, and *Brassica oleracea*.
- ▶ **Industrial land:** 5.2% of land located within the ROW was classified as industrial land. Industrial land uses in Kampala include factories, retail structures and car dealerships. For example, between KJE Chainage 0 + 000 and the Butabika Interchange many businesses are impacted by the ROW including Total petrol station, Spear Motors, Cooper Motors and Yuasa car bond. This industrial land may still retain some value for biodiversity within the city. For example marabou storks and black kites are common occurrences in industrial areas within Kampala.

Three principal natural terrestrial habitats occur within the ROW and surrounding area, namely: forest habitats (i.e. closed forest and open forest/woodland), scrubland and wetlands (including degraded wetland) (Table 5-1 and Figure 3-2). Aquatic habitats are also present such as the Sezibwa River which is crossed by the alignment.

All terrestrial habitat types within the ROW are common in nature and are unlikely to qualify as 'highly threatened and/or unique ecosystems' or 'areas associated with key evolutionary processes' in accordance with IFC criteria for Critical Habitat (IFC, 2012). However, wetlands are of conservation importance at the local and regional level and are therefore considered to be priority habitat types for the Project. The floristic composition of each of these habitat types are discussed in more detail below:

- ▶ **Forest habitats:** Only 3.4% of the entire ROW comprises forested habitat (i.e. closed forest and open forest/woodland) and is only present within the footprint of the Kampala-Jinja Mainline Expressway (Plate 16-2). A high proportion of forest stands (76% of all forest) located in the ROW are degraded by anthropogenic activities. These degraded stands are characterised by small sized trees, an open canopy

(>50% canopy cover) and an understory of thorny shrubs (i.e. *Capparis erythrocarpos* and *Toddalia asiatica* formed). The encroachment of Paper mulberry (*Brousonetia papyrifera*), a noxious weed, has reduced the floristic composition of the native forest understory. The dominant forest type within the project area is Albizia-Milicia which is characterised by key indicator species, namely: *Celtis Africana*, *Celtis zenkeri*, *Albizia grandibracteata*, *Diospyros abyssinica*, *Sapium ellipticum* and *Milicia* sp.

- ▶ **Scrub:** 4.5% of the ROW comprised scrubland which covers approximately 26.4 ha of the ROW. Scrub is characterised by a mosaic of deciduous or evergreen trees, herbaceous shrubs and woody shrubs that are less than 5 m in height. Scrub is often an intermediate habitat between herbaceous vegetation (i.e. grassland) and forest habitat and often develops in response vegetation clearance activities. The majority of scrub is located in rural environments some distance from Kampala.
- ▶ **Aquatic Habitats:** The KJE mainline alignment intersects the Sezibwa River and the KSB crosses the Nakivubo River (Figure 3-2). Other smaller seasonal streams are also passed by the alignments.
- ▶ **Wetlands:** Located in the Lake Victoria Basin, wetlands are transition ecosystems between land and water and are generally characterized by high diversity of flora and fauna including waterfowl (see Section 3.1.3). Approximately 17.9% of land located within the ROW is classified as wetland. Of this approximately two thirds of the wetlands within the ROW, particularly those wetlands located within the ROW of the Kampala Southern Bypass (i.e. Mayanja, Kansanga and Nakivubo wetlands), are significantly degraded by anthropogenic activities (Figure 3-2).

Relatively higher quality wetlands are only present within the footprint of the KJE mainline (i.e. the Namanve wetland (Plate 16-1) and Kasala wetland; see Figure 3-2). These wetlands are characterised by three naturally occurring transitional zones (Wakwabi, Balirwa and Ntiba, 2006) as follows:

- **Palm Zone** – characterised by an abundance of *Pheonix reclinata*, *Raphia monbuttorum* and *Mitragyna stipulos*.
- **Miscanthidium Zone** – Indicator species include *Sphagnum* spp. *Dissotis brazzei*, *Leersia hexandra* and *Miscanthidium Violaceum*.
- **Intermediate Papyrus Zone** - dominated by Papyrus (*Cyperus papyrus*), *Miscanthus* sp. Interspersed with dense stands of *Phragmites* sp., *Typha* sp., *Echinochloae* sp. and *Afromomum* sp.



Plate 3-1: Namanve Wetland



Plate 3-2: Sezibwa Forest (source: Bulafu, 2018)

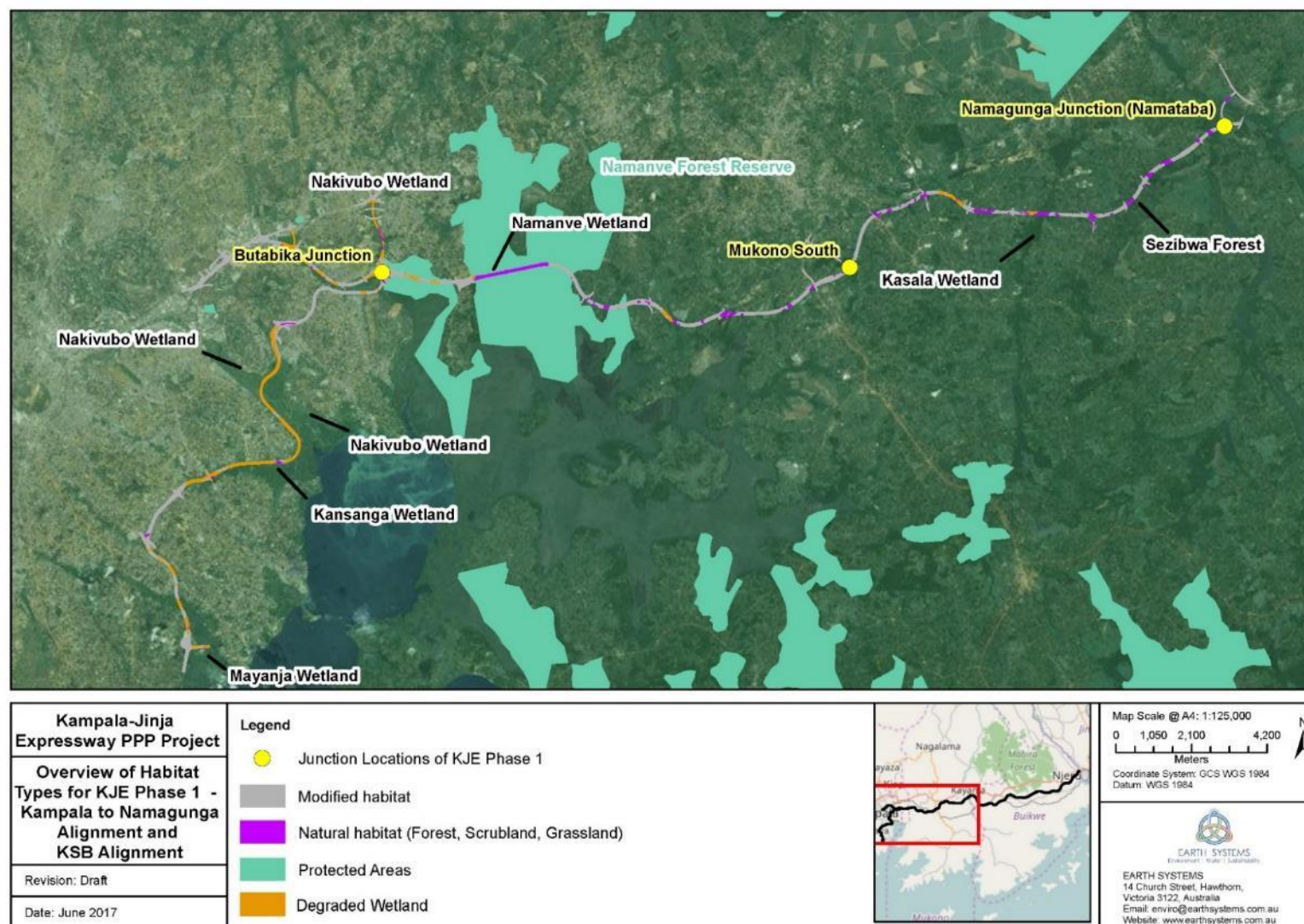


Figure 3-1: The presence of modified and natural habitats in the ROW

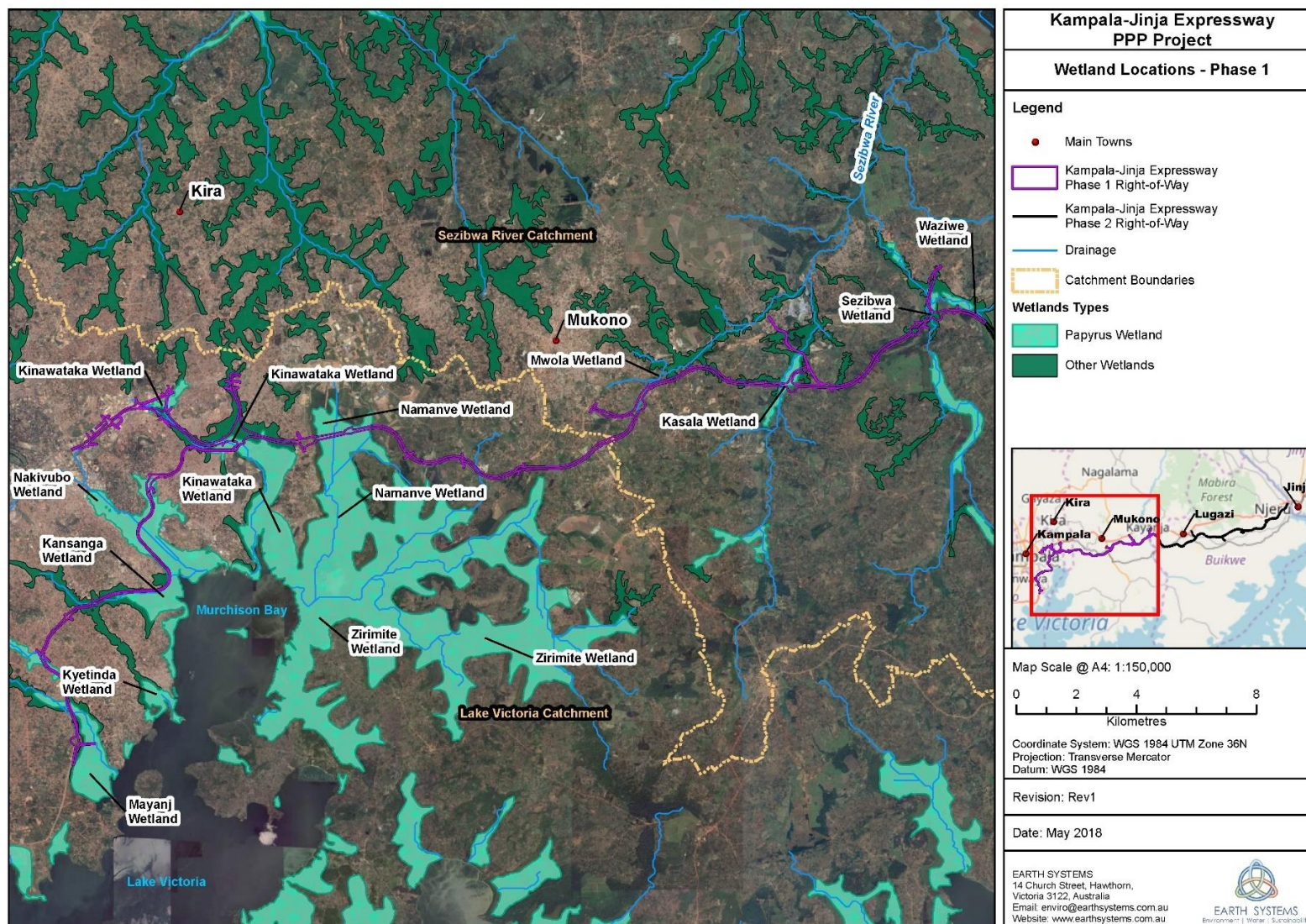


Figure 3-2: Wetland and aquatic habitats located in proximity to the ROW

3.1.1.2 Habitat Distribution and Condition

Habitat condition varies throughout the ROW. Baseline surveys and assessments, including satellite imagery analysis clearly show that large areas of natural habitat within the project area and surrounds are significantly impacted by anthropogenic activities that have resulted in habitat degradation, loss and fragmentation. This is likely to have increased the pressure on existing natural resources and protected areas in the vicinity of the Project in the last 10 years. These anthropogenic activities include habitat clearance for agro-pastoral activities, the development and expansion of settlements and industries, the establishment and upgrade of transport infrastructure and habitat degradation arising from the over-exploitation of natural resources.

3.1.1.3 Flora

Rare or Threatened Flora

Baseline flora surveys undertaken for the ESIA in 2017 identified the presence of 155 plant species from wetland habitats (i.e. Mayanja, Kansanga, Nakivubo, Namanve and Kasala) and forest habitats (i.e. Sezibwa forest) (refer Volume C). No Threatened species based on the IUCN Red List (2018) were recorded, however the global conservation status of most species recorded have not been assessed by the IUCN. None of the wetland and forest species identified during this survey are classed as endemic (Bulafu, 2018). It is likely that habitat quality within the ROW is too poor to support endemic Ugandan or globally threatened wetland species.

Previous studies in Namanve reported a number of endemic orchids (Bulafu, 2018). Among the species reported were *Cynorchis anacamptoides*, *Nervitia afzelii*, *Habenaria sp*, *Disa eminii*, *Satyrium crassicaule* and *S. niloticum*. These species grow only in modified swamps. In the surveys of the Project area conducted in 2017, only *Eulophia horsfallii* (a giant purple-flowered orchid) was recorded. It has restricted distribution in Uganda, only recorded in three other wetlands. It was occasionally recorded in Namanve and Kasala (Mbalala).

Legally Protected Species

Milicia excelsa was recorded in the field surveys conducted for the ESIA (Atacama, 2018; Plate 16-19) which is on Uganda's National Forestry Authority Reserved Species list and therefore protected from exploitation and threats to its habitats (Government of Uganda 2003, The National Forestry and Tree Planting Act 2003, Article 30, 1 & 2). Such species may not be cut, damaged, disturbed, removed, collected, transported, exported, purchased, sold or donated without written consent of the Minister of District Council (The National Forestry and Tree Planting Act 2003, Article 31, Section 4a & 4b). However, it is logged commercially especially for its quality timber and use as firewood and charcoal.

Milicia excelsa was occasionally found within subsistence agricultural gardens occasionally along the right of way in the Sezibwa area. The species is widely distributed in Uganda, found in Bunyoro and Masaka, and in the North and East in the districts of Mbale and Busoga. It is listed as Near Threatened (NT) on the IUCN Red List (2018).

Markhamia lutea was also recorded in the field surveys which is on the Uganda Forestry Authority Reserved list (see Plate 16-11). The species was recorded at 10 locations in the field surveys (Atacama, 2018). The species is widely distributed in Uganda and is mainly planted in homesteads where it is used for building poles.



Plate 3-3: *Milicia excelsa* at Sezibwa

Alien Invasive Species of Flora

Several alien invasive species of flora, as defined by IFC PS6 criteria (IFC, 2012) and listed on the Global Invasive Species Database (ISSG, 2017), were recorded in the vicinity of the ROW in surveys conducted in 2011 and 2017, namely *Mimosa pigra*, *Imperata cylindrical*, *Bidens pilosa* and *Lantana camara*. Water Hyacinth (*Eichhornia crassipes*) has also been recorded in several wetlands within the Project area including Nakivubo Wetland Kinawataka Wetland. These species are highly invasive and have been subsequently regarded as some of the world's worst invasive alien species. These species are aggressive competitors and as such are capable of progressively dominating and degrading natural habitats.

A total of seven species of invasive species were recorded in the 2017 surveys by Bulafu (2018). These belonged to seven genera and five families (Table 3-1).

Table 3-1: Invasive Species in the Proposed Project Area.

Family	Species	Life form	chainage	Site name
Moraceae	<i>Broussonetia papyrifera</i>	Tree	KJE 11+000→33+ 500 KSB 4+000→5+ 500	Sezibwa/Nakivubo (Bugolobi)/Kansanga
Fabaceae	<i>Mimosa pigra</i>	Shrub	KJE 9+ 200→11+ 000 KSB 13+800→17+ 787	Namanve, Mayanja (Munyonyo)
Fabaceae	<i>Senna spectabilis</i>	Tree	KJE 11+000→33+ 500	Sezibwa
Asteraceae	<i>Tithornia diversifolia</i>	Shrub	KSB 4+000→5+ 500 KJE 11+000→33+ 500	Nakivubo (Bugolobi)/Sezibwa/Kansanga (Ggaba)
Pontederiaceae	<i>Eichornia crassipes</i>	Herb	KSB 13+800→17+ 787	Mayanja (Munyonyo)
Veraceae	<i>Lantana camara</i>	Shrub	KJE 11+000→33+ 500	Sezibwa
Asteraceae	<i>Parthenium hysterophorus</i>	Herb	KSB 4+000→5+ 500	Nakivubo (Bugolobi)
Euphorbiaceae	<i>Ricinus communis</i>	Shrub	KSB 4+000→5+ 500 KJE 11+000→33+ 500	Kansanga (Ggaba), Nakivubo (Bugolobi), Kinawataka, Mayanja (Munyonyo)



Plate 3-4: *Mimosa pigra* growing at the side of the newly constructed Kampala-Entebbe Expressway (source: Bulafu 2018)



Plate 3-5: Paperbark Mulberry (*Broussonetia papyrifera*) growing in Mabira Forest CFR (source: Bulafu 2018)



Plate 3-6: Water Hyacinth (*Eichornia crassipes*) in Kibili wetland (source: Bulafu 2018)

3.1.2 Protected Areas

3.1.2.1 International Protected Areas

No international protected areas such as sites on the World Heritage List designated for natural values or Ramsar Wetlands occur in the direct vicinity of the Project.

The closest site of international significance is the Lutembe Bay Wetland System which is a Ramsar site designated in 2006, and occurs approximately 8 km south of the KSB alignment. The bay is known to support globally threatened species of birds, endangered Cichlid fish, rare butterfly species, regularly supports Palaearctic and Afrotropical migrant birds, breeding ground for Clarias and lungfish, supports huge congregations of individual species of birds and more than 1% of the White-winged Black Terns' population (Nature Uganda, 2005). The wetland is also considered an Important Bird Area (Birdlife International, 2018). Current threats to the wetland include the conversion of wetlands through cutting of papyrus for sale to local markets, and cultivation of crops within the wetland area by local residents.

3.1.2.2 National Protected Areas and Reserves

Approximately 26.4% of Uganda land is subject to some form of protection, which includes National Parks, nature reserves and other protected natural areas (Earth Trends, 2003). The location of statutory designated sites of conservation importance located within or near to the zone of influence of the Project are presented in Figure 3-3.

No National Parks, Wildlife Reserves or Wildlife Sanctuaries occur in the vicinity of the Project. Several Central Forest Reserves (CFRs) occur in the vicinity of the Project which are managed by National Forestry Authority (NFA) under the National Forestry and Tree Planting Act 8/2003. There are 506 designated Central Forest Reserves in Uganda which are generally managed to protect natural forest, develop plantations, and support tourism activities. The biodiversity of three of the key Central Forest Reserves for the Project are discussed below.

Namanve Central Forest Reserve

The proposed ROW intersects the Namanve Central Forest Reserve between KJE Chainage 9 + 000 and 11 + 500. Namanve forest was originally planned to be an urban forest that would help meet the need of the growing urban population in Kampala and the surrounding towns (URS, 2015). It was originally partly planted with eucalyptus for commercial use, however this plantation became degraded and over-harvested over time (URS, 2015). An analysis of satellite imagery also indicates that some parts of the protected area have been utilised for the development of Namanve Business Park.

A large proportion of the area enclosed by the Central Forest Reserve's boundaries is wetland habitat dominated by papyrus vegetation. The habitat forms a permanent wetland of high quality. Numerous settlement areas occur within and surrounding the wetlands within the reserve. Around the edges of swampy areas, sand exploitation and brick manufacturing are common activities (URS, 2015).

Mabira Central Forest Reserve

Mabira Central Forest Reserve and buffer zone were designated as a protected area in 1932 and covers c.29,000 ha (Birdlife International, 2017). The reserve is located approximately 11.5 km northeast from the end of the Phase 1 ROW, 54 km from Kampala and the southern boundary of the reserve lies 13 km from the shoreline of Lake Victoria. The entire reserve lies outside of the proposed Phase 1 ROW.

Mabira Central Forest Reserve is the largest remnant stand of semi-deciduous forest in central Uganda and supports dense tropical forests and papyrus (*Cyperus papyrus*) swamps which are of conservation importance (Birdlife International, 2017). Several tree species known to inhabit the reserve are of globally threatened or rare, namely: *Milicia excelsa* (IUCN listed: Lower Risk/near threatened); *Irvingia gabonensis* (IUCN listed: Lower Risk/near threatened); *Entandrophragma angolense* (IUCN listed Vulnerable); and *Lovoa swynnertonii* (IUCN listed Near Threatened; Birdlife International, 2017).

Langdale-Brown *et al.*, (1964) reported the reserve as supporting nine species found nowhere else in Uganda (i.e. six butterflies, one moth, one bird and one tree). Currently the reserve is known to support the nationally endangered short-palated fruit bat (*Casinycteris argynnis*; IUCN listed Least Concern; non-endemic) (The Wildlife Conservation Society, 2016) and Nahan's partridge (*Ptilopachus nahani*) which is listed by the IUCN as globally Endangered (Birdlife International, 2017). The forest also supports a mangabey population (*Lophocebus albigena* spp. *johnstoni*) which is likely to be confined to Uganda and classed as an Endemic species (Groves, 2007).

The reserve has been designated as an Important Bird Area (IBA) and supports 30% (over 300 species) of bird species found in Uganda. It is an important site in Uganda for avifauna associated with the Guinea-Congo biome such as Nahan's partridge (*Francolinus nahani*), fiery-necked nightjar (*Caprimulgus nigriscapularis*), grey-hooded capuchin babbler (*Phyllanthus atripennis*), grey longbill (*Macrosphenus concolor*) and Western crested-flycatcher (*Trochocercus nitens*) (Birdlife International, 2017).

The distinct vegetation types (sub-climax communities) of the reserve have been impacted by anthropogenic activities including over exploitation of natural resources (e.g. timber and non-timber resources), commercial logging, agricultural encroachment and habitat clearance for the development of plantations (Birdlife International, 2017).

Banda Tree Nursery

The Banda Tree Nursery is a small Central Forest Reserve area in Kampala, covering approximately 2.3 ha. Based on recent satellite imagery the actual nursery area established covers approximately 2.5 ha, and partly occurs outside the official area designated on the Government GIS layers of protected areas. The nursery is managed by the National Forestry Authority's (NFA) National Tree Seed Center (NTSC). The nursery supplies a range of services including advice, training and seeds/seedlings to small-large scale forestry and horticulture enterprises (supplying up to 2 million trees annually).

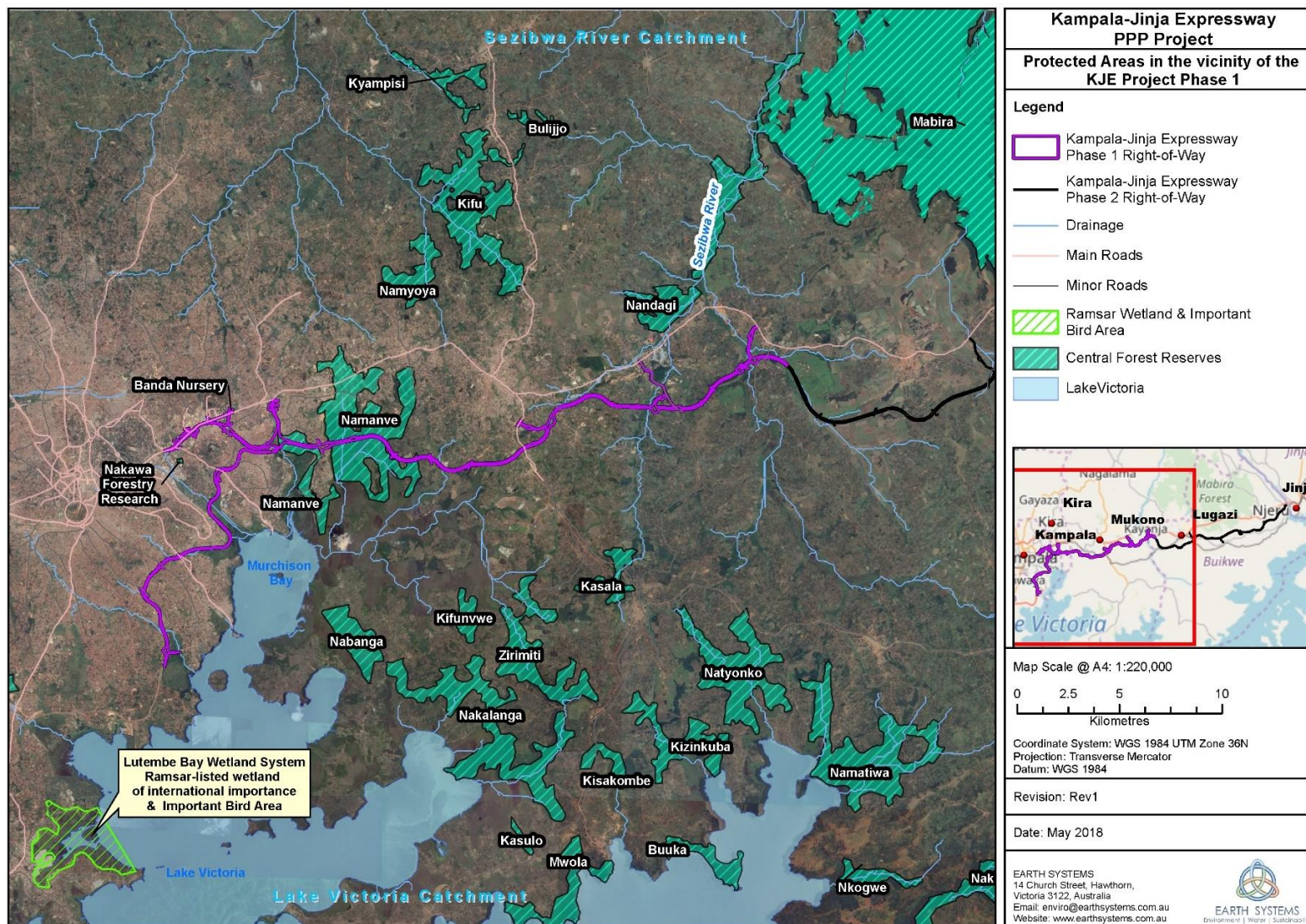


Figure 3-3: Protected areas located in the vicinity of the Project (Phase 1)

3.1.3 Fauna and Their Habitats

3.1.3.1 Fauna Habitats

The distribution and quality of fauna habitats varies throughout the ROW. Fauna habitats located within the ROW have been categorised into urban environments, agricultural environments, forest habitats, wetlands and other aquatic environments. Their importance for supporting fauna are discussed as follows:

Urban environments

The abundance and diversity of fauna is likely to be significantly lower in densely population urban environments such as Kampala compared to other habitats within the Project area, including agricultural landscapes. However, vegetation along road verges, parks, gardens, waste land, and culverted water courses within the city provide refuge to some species of birds and small mammals that have become habituated to high levels of disturbance. The majority of these species are common and widespread in urban environments in east Africa. For example, during the baseline assessment in 2017, ecologists recorded the presence of wetland birds and birds of prey in Kampala city (i.e. Marabou (*Leptoptilos crumenifer*), hadada ibis (*Bostrychia hagedash*), black kite (*Milvus migrans*), hamerkop (*Scopus umbretta*), cattle egret (*Bubulcus ibis*), common bulbul (*Pycnonotus barbatus*) and woodland kingfisher (*Halcyon senegalensis*). The majority of species are not of high conservation value. However, ecologists also confirmed the presence of hooded vultures (Critically Endangered) in Kampala. The city provides foraging habitat for vultures which scavenge for carrion along roads and in abattoirs (see Section 3.1.3.3).

Agricultural landscapes

Agro-pastoral land, fallow land and plantations located within the footprint of the Kampala-Jinja Mainline Expressway are likely to support birds and small mammals that are adapted to modified habitats and disturbance.

Forests

Within the ROW, forest habitats (i.e. closed forest and open forest/woodland) are only located within the proposed alignment for the Kampala-Jinja Mainline Expressway. The majority of these forest stands are highly fragmented, small sized and as such are unlikely to provide sufficient carrying capacity to support a high diversity and abundance of fauna (i.e. mammals and birds). These patches of forest are surrounded by agricultural landscapes which are likely to limit the movement of some medium to large sized mammals between forested areas. In comparative terms, the Sezibwa Forest (located within the mainline alignment between Mukono South and Namagunga Junction) is of the highest biodiversity value for fauna such as small to medium sized mammals and birds. This area of secondary forest is comparatively larger than other patches of forest located within the ROW and reportedly supports eastern black-and-white colobus (*Colobus guereza*) and other primates (Bulafu, 2018). The forest also supports several species of birds, none of which are forest specialists (i.e. variable sunbird (*Cinnyris venustus*), bronze mannikin (*Lonchura cucullata*), common bulbul (*Pycnonotus barbatus*) and great blue turaco (*Corythaeola cristata*).

Wetlands

Within the Lake Victoria Basin wetlands range from permanent swamps to highly seasonal or ephemeral swamps around open water bodies and along rivers. These wetlands are characterized by high diversity of flora and fauna (Wakwabi, Blirwa and Ntiba, 2006). Wetlands located within the Project Area are of variable habitat quality (see Section 3.1.1.2). Highly impacted wetlands located in the ROW (i.e. Mayaja, Kansanga, Nakivubo and Kinawataka) and less likely to support a high diversity and abundance of fauna than wetlands with relatively lower levels of disturbance (i.e. Namanve and Kasala).

Birds are usually a dominant and diverse component of wetlands. Omoding *et al.*, (1996) recorded 159 bird species in 38 families from 82 wetlands from wetlands in Uganda. Wetlands located within the footprint of the Kampala-

Jinja Mainline Expressway offer potentially suitable habitat to support a relatively wide diversity of birds including wetland specialists and water fowl (Section 3.1.3.3). The carrying capacity of the wetland located in the footprint of the Kampala Southern Bypass (i.e. Mayaja, Kansanga, Nakivubo and Kinawatak) and the may potentially have been reduced through habitat loss, degradation, fragmentation and high levels of disturbance near the wetland fringes. The majority of birds utilising wetland habitats in the ROW are unlikely to be of high conservation importance. However, the baseline assessment in 2017 confirmed the presence of the globally and nationally Endangered, grey crowned crane (*Balearica regulorum*) in the Namanve Wetland.

The Lake Victoria basin supports several species of amphibians, mammals, and reptiles. A total of 31 amphibians, 28 reptiles and 44 mammal species have been recorded from various sites in Lake Victoria basin. Most amphibians are reliant on aquatic environments during breeding and the early stages of growth (Omoding *et al.*, 1996). The inshore fringes of wetlands and littoral habitats provide important habitats for several species of reptiles. For example monitor lizard (*Varanus niloticus*) reportedly inhabit the Kansanga Wetland (URS, 2015)

The majority of mammals which utilise habitats in the Lake Victoria Basin are generalists and use wetlands and terrestrial habitats (i.e. forests) for refuge and to forage. Their habitat usage is partly dependent on the flooding patterns and many mammals move to drier areas during heavy rain (Wakwabi, Balirwa & Ntiba, 2006). Wetlands located in the ROW are highly unlikely to support a large diversity and abundance of large mammals, particularly those located within the Kampala Southern Bypass which are highly degraded with high levels of disturbance. However, the Kansanga wetland reportedly supports sitatunga or marshbuck (*Tragelaphus spekei*) which is highly adapted to wading through wetland vegetation and swimming in water (ICS, 2015). Higher quality wetlands in the footprint of Kampala-Jinja Mainline Expressway (i.e. Namanve) offer potentially suitable habitat to support sitatunga. The National Red List for Uganda (WCS, 2016) have classed sitatunga as Vulnerable as the geographic range of sitatunga is limited and the Ugandan population is known to be in a state of decline.

Other Aquatic Environments

The proposed ROW intersects several rivers and streams (see Chapter 15) including the Sezibwa River. Much of the riparian vegetation of the Sezibwa River has been cleared from along the eastern banks of the river and downstream aquatic habitats receive effluent from a sugar factory (Bulafu, 2018). This river is unlikely to support a high diversity and abundance of aquatic fauna but does provide some refuge to some species of fish (see Section 0). This river may potentially serve as a water resource for birds and mammals.

3.1.3.2 Mammals

The field surveys conducted by Atacama (2018) along the Phase 1 alignment identified direct and indirect evidence of a number of different mammals as shown in Table 3-2. Field surveys generally indicated a low abundance and diversity of mammals in the study area. Hunting was reported to be commonly conducted in the surveyed areas. No direct or indirect evidence of any threatened mammal species were recorded (based on National Conservation Status, as well as the IUCN Red List Status). Two species considered internationally Vulnerable (IUCN, 2018) were reported to occur in close to the Project area by local hunters; the Hippopotamus (*Hippopotamus amphibius*) and the Giant Pangolin (*Smutsia gigantean*). Both these species are also considered Vulnerable at the national level. Although the survey team did not directly observe any Pangolins during the survey, a local hunter reported the presence of Giant Pangolins in Kasaala (Mbalala) wetland. The hippopotamus was reported by hunters to occur within Mayanja wetland. While not globally threatened, indirect evidence of the Sitatunga (*Tragelaphus spekei*) was recorded which is also considered Vulnerable at the national level (see sections below for further information on Sitatunga).

Table 3-2: Recorded or reported mammal species, and their conservation status within and near the ROW (Atacama, 2018).

Common Name	Scientific names	National Conservation Status	IUCN Conservation Status
Sitatunga	<i>Tragelaphus spekii</i>	Vulnerable	Least Concern
Hippopotamus	<i>Hippopotamus amphibius</i>	Vulnerable	Vulnerable
Civet cat	<i>Civettictis civetta</i>	Least Concern	Least Concern
Genet	<i>Genetta genetta</i>	Least Concern	Least Concern
Edible rat	<i>Thryonomys swinderianus</i>	Least Concern	Least Concern
Bush Duiker	<i>Sylvicapra grimmia</i>	Least Concern	Least Concern
Giant Pangolin	<i>Smutsia gigantea</i>	Vulnerable	Vulnerable
Bush buck	<i>Tragelaphus scriptus</i>	Least Concern	Least Concern
Serval cat	<i>Leptailurus serval</i>	Least Concern	Least Concern
Vervet monkey	<i>Chlorocebus pygerythrus</i> ,	Least Concern	Least Concern
Red Tailed Monkey	<i>Cercopithecus ascanius</i>	Least Concern	Least Concern
Crested porcupine	<i>Hystrix indica</i>	Least Concern	Least Concern
Banded mongoose	<i>Mungos mungo</i>	Least Concern	Least Concern
Greater cane rat	<i>Thryonomys swinderianus</i>	Least Concern	Least Concern
Black backed jackal	<i>Canis mesomelas</i>	Least Concern	Least Concern
Grey-cheeked Mangabey	<i>Lophocebus albigena</i>	Least Concern	Least Concern
African palm civet	<i>Nandinia binotata</i>	Least Concern	Least Concern



a) Bush Duiker footprint (0480469, 0038505)



b) Sitatunga foot print (480416E, 38543N)



c) Vervet Monkey foot print (480371E, 38477'N)

Plate 3-7: Animal evidence observed in Kasaala (Mbalala) Wetland.

3.1.3.3 Birds

The baseline survey undertaken during the dry season in June 2017 (Bitebekezi, 2017) characterised the bird assemblages in the Sezibwa Forest, Nakivubo wetland and the Namanve Wetland while baseline survey undertaken during the wet season in December 2017 (Namukasa, 2018) characterised the bird assemblages in the Sezibwa Forest, selected agricultural farm, Kasala wetland, Nakivubo wetland, Kinawataka wetland, the Namanve Wetland, Kansanga wetland and Mayanja wetland. Globally significant concentrations of migratory species and / or congregatory species were not recorded within these survey sites.

In total, 42 species of bird were recorded in the Project area during dry season baseline surveys in 2017 (Bitebekezi, 2017). These birds are categorised as Least Concern by the IUCN Red List of Threatened Species (IUCN, 2018) and the National Red List for Uganda (WCS, January 2016) with the exception of the grey crowned crane which is listed as Endangered on the IUCN Red List (see further information on this species below). In the wet season surveys in 2017 a total of 106 species were identified (Namukasa, 2018). Similar to the dry season surveys most species recorded were classed as Least Concern, with the exception of the grey parrot (*Psittacus erithacus*) which was recorded in Kasaala wetlands and is classed as endangered on the IUCN red list (2018).

A total of 146 species of bird were reportedly recorded during baseline surveys in 2011 (URS, 2015). Many of these birds are thought to have been sighted in protected areas outside of the ROW. The full species list and their recorded locations have been omitted from the previous ESIs (URS, 2015) and as such should be made available and incorporated into this baseline assessment. A total of 74 species of birds were identified within and near the footprint of the Kampala Southern Bypass in 2013 including water bird non-specialist, grassland species, forest generalists and forest visitors (ICS, 2015).

Commonly sighted birds were: helmeted guinea fowl (*Numida meleagris*), African palm-swift (*Cypsiurus parvus*), angola swallow (*Hirundo angolensis*), hamerkop (*Scopus umbretta*), African open-billed stork (*Anastomus lamelligerus*), hadada ibis (*Bostrychia hagedash*), African fish eagle (*Haliaeetus vocifer*), long-crested eagle (*Lophaelatus occipitalis*), African wattled lapwing (*Vanellus senegallus*), Egyptian goose (*Alopochen aegyptiacus*), red-eyed dove (*Streptopelia semitorquata*), grey parrot (*Psittacus erithacus*), brown parrot (*Poicephalus meyeri*), great blue turaco (*Corythaëola cristata*), eastern grey plantain eater (*Crinifer zonurus*), Kampalaas' cuckoo (*Chrysococcyx*

Kampalaas) and didric cuckoo (*Chrysococcyx caprius*). The Nahan's partridge (*Ptilopachus nahani*) does not appear to have been sighted during this survey.

3.1.3.4 Reptiles

A total of 13 species, belonging to three orders, nine families and 11 genera, were recorded during the herpetofauna surveys conducted for the ESIA (Behangana, 2018; see full report in Volume C). Reptiles recorded at each site area shown in Table 3-3. Kasaala wetland (Mbalala-Wankobyia) was the most species-rich site with eight species recorded, followed by Mayanja Wetland (Kabili-Munyonyo) with seven species. The most widely distributed species recorded was the water cobra (*Naja melanoleuca*) recorded at four of the five sites. The blue-headed agama (*Acanthocercus atricollis*) and hissing sand snake (*Psammophis sibilans*) were also each recorded at three of the five sites. Most other species were recorded once or twice during the entire survey.

There were no reptile species of conservation concern recorded in the study area, although the global conservation status of some species recorded have not been evaluated by the IUCN (2018). The National Red List (WCS, 2016) categorizes all species recorded as Least Concern at the national scale.

Table 3-3: Reptile Species Richness for Surveyed Sites along the Phase 1 alignment (Behangana, 2018)

Count of Reptiles	Site name					
Species	Mayanja Wetland (Kabili-Munyonyo)	Sezibwa forest (Lukonge)	Kansanga wetland (Muyenga Bukasa)	Namanve wetland	Kasaala wetland (Mbalala-Wankoba)	Total
<i>Typhlops lineolatus</i>					1	1
<i>Acanthocercus atricollis</i>		2		3	2	7
<i>Bitis nasicornis</i>		1				1
<i>Bitis arietans</i>					1	1
<i>Dendroaspis jamesonii</i>	1					1
<i>Pelomedusa subrufa</i>		1				1
<i>Naja melanoleuca</i>	3		1	1	1	6
<i>Philopthamnus semivariatus</i>	1				1	2
<i>Psammophis sibilans</i>	1	2			1	4
<i>Python sebae</i>	1					1
<i>Trachylepis maculilabris</i>	1				1	2
<i>Trachylepis striata</i>					1	1
<i>Varanus niloticus</i>	2					2
Total	10	6	1	4	9	30





Plate 3.8 Examples of reptiles observed in the surveyed sites (Behangana, 2018)

3.1.3.5 Amphibians

A total of nine amphibian species, belonging to six families and six genera, were recorded during the amphibian surveys conducted for the ESIA in December 2017 (Atacama 2018). Species recorded are shown in Table 3-4 and Plate 3.1. Mayanja Wetland (Kabili-Kabwuma/Munyonyo) and Kasaala Wetland (Mbalala/Wankobyia) had the highest diversity with seven species each, while Sezibwa forest and wetland (Lukonge) and Kansanga (Muyenga-Bukasa) had three species each. Only two species were recorded at the Namanve site. *Phrynobatrachus natalensis* and *Ptychadena mascareniensis* were the most common species recorded in all the five sites while *Amietophrynus regularis* was recorded in three sites and the rest of the species were recorded once or twice.

No species of conservation concern at the national or global scales were recorded. The global conservation status of species recorded were all Least Concern (IUCN, 2018).

Table 3-4: Amphibian Species Richness of the Surveyed Sites along the KJE (Atacama, 2018)

Count of Amphibia	Site					
Species	Mayanja Wetland (Kabili-Munyonyo)	Sezibwa Forest (Lukonge)	Kasanga (Muyenga Bukasa)	Namanve Wetland	Kasaala (Mbalala/Wankobyia)	Total
<i>Amietophrynus regularis</i>	1		1		1	3
<i>Hoplobatrachus occipitalis</i>	3				1	4
<i>Hyperolius cinnamomeoventris</i>					1	1
<i>Hyperolius kivuensis</i>	1				1	2
<i>Hyperolius viridiflavus</i>	1				1	2
<i>Phrynobatrachus acridoides</i>	1					1
<i>Phrynobatrachus natalensis</i>	1	1	1	3	2	8
<i>Ptychadena mascareniensis</i>	3	2	1	3	1	10
<i>Xenopus victorianus</i>		1				1
Total	11	4	3	6	8	32



Xenopus victorianus tadpoles at 484768 E, 40020 N



Amietophrynus regularis at 456555E, 26033N



Hyperolius viridiflavus at 456552N, 26034E



Hyperolius cinnamomeoventris at 480498N, 38634E



Phrynobatrachus natalensis at 465587N, 36849E



Hoplobatrachus occipitalis at 456555N, 26033E

Plate 3-9 Amphibian species observed with in the survey sites (Atacama, 2018)

3.1.3.6 Fish

Nine species of fish were recorded in the surveys conducted by by Namyalo (2018; see full report in Volume C). The geographical scope of the study was limited to selected aquatic sites along the Phase 1 alignment stretch including Sezibwa River, Mayanja wetland, Kansanga Wetland (Bukasa), Nakivubo wetland (Bugolobi), Kinawataka wetland, Namanve wetland and Kasaala (Mbalala) wetlands. No species of conservation concern were identified in the surveys, with all species being classed as Least Concern on the IUCN Red List.

The additional baseline surveys undertaken in 2011 confirmed the presence of four fish species (i.e. *Protopterus aethiopicus*, *Clarias galiepinus*, *Clarias casonnii* and *Oreochromis leucostictus*) and 1 genus (*Barbus* sp) within the search area (Table 3-5). All captured fish were small in size indicating of over exploitation of fish stocks, as adult fish are more sought after by fishermen. An assessment of the biodiversity significance of these species is limited as the fish are not included in the National Red List for Uganda (WCS, 2016). Furthermore, only *Oreochromis leucostictus* has been assessed for global significance by the IUCN (2018) and is categorised as Least Concern.

Table 3-5: Fish species identified in aquatic habitats in the vicinity of the Project (ICS, 2015).

Site Name	Identified Fish Species				
	<i>Protopterus aethiopicus</i>	<i>Clarias galiepinus</i>	<i>Clarias casonnii</i>	<i>Oreochromis leucostictus</i>	<i>Barbus</i>
KJE-Aqua14			+		+
KJE-Aqua15 - Sezibwa River		+	+	+	+
KJE-Aqua16 - Kasala stream		+	+		+
KJE-Aqua17			+		+
KJE-Aqua18					
KJE-Aqua19			+		+
KJE-Aqua20					
KJE-Aqua21	+		+		+

3.1.3.7 Alien Invasive Fauna

Coptodon rendalli (formerly *Tilapia rendalii*) is an invasive fish species recorded in the fish study by Namyalo (2018). *C. rendalii* is a herbivorous species feeding on algae and other plant material. It was introduced to Uganda for aquaculture stocking, and algae and weed control in aquaculture production systems (ponds).

The baseline assessment in 2017 also confirmed the presence of the guppy (*Poecilia reticulata*) in the Nakivubo wetland & Mayanja wetlands. *P. reticulata* is listed as an alien invasive species on the Global Invasive Species Database (ISSG, 2017) which is native to Brazil, Guyana, Venezuela and the Caribbean Islands. This small benthopelagic fish is a popular aquarium species that has been widely introduced into areas to control mosquito populations. It can occupy a wide range of aquatic habitats (including fresh and brackish water). *P. reticulata* is a carrier of exotic parasites (i.e. nematodes and tapeworms) and is believed to play a role in the decline of several threatened and endangered species.

Other alien invasive species of fish, including the Nile perch (*Lates niloticus*), which are known to be present in the Lake Victoria Basin were not observed during the baseline surveys in 2011 and 2017.

The Nile perch (*Lates niloticus*) is a large freshwater fish that can grow up to 2 m in length with a weight of 200 kg and two metres in length. It is listed on the Global Invasive Species Database (ISSG, 2017), that was introduced to Lake Victoria in 1954 and has since contributed to the extinction of more than 200 endemic fish species in the Lake Victoria Basin through predation and competition for food.

3.1.4 Existing Threats to Biodiversity

Habitat quality and species diversity in the ROW and surrounding environment has been significantly impacted by anthropogenic disturbance. The region has had a long history of human habitation and thus agricultural land use has featured prominently in the area. Existing threats to biodiversity in Uganda and the ROW are listed as follows:

- ▶ The clearance of habitat for the development of agricultural land (e.g. cropping, livestock and apiary), settlements, roads and tracks (refer to Plate 16-17). Clearing is most extensive around existing settlements and adjacent to protected areas and wetlands. Within Kampala city, the wetland areas are heavily degraded largely due to urbanisation and illegal encroachment of settlements, agricultural land and clay extraction for brick manufacturing (Plate 16-18 and 16-19);
- ▶ Use of fire for the clearing of land for agro-pastoral activities and as a management tool. Bushfires have contributed to the large-scale degradation and destruction of habitats within the region. Altered fire regimes have been known to change habitat and flora composition, including changes to microclimate, soil composition and soil stability;
- ▶ Forest clearance in Uganda has been occurring for centuries however increased rates of habitat clearance are increasing pressure on natural resources. Forest are being cleared for timber, charcoal, firewood, grazing, subsistence farming and the development of settlements and industries. An estimated tropical high forest cover in Uganda has gone from 12 % in 1900 to less than 3 % in 1987, with an estimated additional 2% loss every year. The majority of forest clearance occurs on public land, however some clearance is undertaken illegally in protected areas. Areas most affected are the unprotected tropical high forests, woodland and bush (The Jane Goodall Institute Uganda, 2017). Timber extraction for charcoal production was noted in the Study Area in rural areas to the east of the Phase 1 alignment;
- ▶ Overexploitation of non-timber products has caused the degradation of some ecosystems surrounding the ROW. For example, the extraction of Papyrus canes and clay from the wetland ecosystems, for the production of mats and bricks respectively, has led to the severe degradation in some sections of wetland habitats;
- ▶ The development of large industrial projects poses a risk to biodiversity near Kampala City where development is occurring rapidly. For example, the Namanve wetland is currently being impacted by the development of the Namanve Industrial Park to the north and other future projects planned along its central area and southern borders (e.g. Bukasa Port, Standard Gauge Railway);
- ▶ Within urban areas, the production of waste can lead to environmental degradation when it is deposited in aquatic and terrestrial environments. Within Kampala City, waste is regularly deposited into ecosystems near the ROW. Wastewater and sewage enters into the wetland habitats as well as solid wastes such as plastic, litter and cardboard;
- ▶ The accidental or intentional introduction of alien invasive species (i.e. *Mimosa pigra*, *Imperata cylindrical*, *Bidens pilosa*, *Eichhornia crassipes*). At present, these species appear to have a relatively restricted distribution in the Project Area (Plate 16-20). However, there is the potential for the distribution of these species to become more widespread with an increase in human activity / in-migration and also a potential for other alien invasive species to be introduced into the area; and
- ▶ Hunting is a major threat to fauna and particularly large mammals such as sitatungas (*Tragelaphus spekii*) that are targeted by the local hunters. It was report by local villagers that the number of sitatunga in Mayanja and Namanve has drastically decreased over the past 10 years due to hunting.
- ▶ Uganda is a major transit country for East Africa's illegal wildlife trade and was among the eight countries implicated as having significant involvement in the global illegal ivory trade during the 16th Conference

of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) held in March 2013.



Plate 3-10: Clearance of wetland habitat for agriculture / settlement development in the project area (source: Bulafu, 2018)



Plate 3-11: Loss of wetland habitat for making clay bricks



Plate 3-12: Yam crops planted in the Mayanja Wetland (source: Bulafu, 2018)



Plate 3-13: Rubbish and water hyacinth (*Eichhornia crassipes*) in the Kinawataka Wetlands

3.1.5 Summary of Priority Habitats and Species

Habitats present in the ROW and surrounding environs is fragmented and degraded by human activities. In addition, fauna species are under constant threat from habitat loss and other sources of anthropogenic disturbance. Nonetheless, the baseline assessment identified several priority habitats and species of conservation importance for the Project. A summary of the known features of priority habitats and species are presented in Table 3-6. Additional information on critical habitat qualifying features is provided in Chapter 4.

Table 3-6: Priority habitats and species for the Project

Type of Risk Receptor	Priority Biodiversity Values	IUCN Status	National Threat Status	Confirmed presence in ROW
Legally Protected Areas	Namanve Central Forest Reserve			+
Priority Natural Habitats (and fauna habitats)	Wetlands			+
	Forest habitats			+
Large Mammals	Sitatungas or marshbuck (<i>Tragelaphus spekii</i>)	LC	VU	
Birds	Hooded vulture (<i>Necrosyrtes monachus</i>)	CR	EN	+
	Grey parrot (<i>Psittacus erithacus</i>)	EN	VU	+
	Grey crowned crane (<i>Balearica regulorum</i>)	EN	EN	+
	Saddle-billed stork (<i>Ephippiorhynchus senegalensis</i>)	LC	VU	
Reptiles	Blanding's tree snakes (<i>Toxicodryas blandingii</i>)	NA	VU	
	Cape file snake (<i>Gonionotophis capensis</i>)	LC	VU	

Key: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC=Least Concern

4. CRITICAL HABITAT ASSESSMENT

4.1 Critical Habitat-qualifying Features

The determination of Critical Habitat is made on a project by project basis. Critical Habitats are defined by IFC (2012) as the following areas with high biodiversity value:

- ▶ Habitat of significant importance to Critically Endangered and/or Endangered² species (Criterion 1) which can be natural or modified in nature;
- ▶ Habitat of significant importance to endemic and/or restricted-range species (Criterion 2);
- ▶ Habitat supporting globally significant concentrations of migratory species and/or congregatory species (Criterion 3);
- ▶ Highly threatened and/or unique ecosystems (Criterion 4); and
- ▶ And/or areas associated with key evolutionary processes (Criterion 5).

Performance Standard 6 (PS6; IFC, 2012) defines quantitative thresholds for Criterion 1 to 3. If these thresholds are exceeded an area qualifies as Critical Habitat status. Criterion 4 and 5 are qualitatively assessed. PS6 also defines two 'tiers' of Critical Habitat, with quantitative thresholds for criteria 1-3.

In addition to these five main criteria, Protected Areas and Internationally Recognised Areas will also often qualify for Critical Habitat designation. Critical Habitat may also qualify on a case-by-case basis (i.e. areas required for the reintroduction of globally rare or threatened species). Designation of an area as Critical Habitat is independent of the state of the habitat as some Critical Habitat-qualifying species may be present even in heavily degraded Modified habitat (IFC, 2012).

Should the Project wish to demonstrate alignment with PS6 and Critical Habitat status is confirmed, the requirements of IFC PS6 paragraph 17 apply:

- ▶ "No other viable alternatives within the region exist for development of the Project on modified or natural habitats that are not critical;
- ▶ The Project does not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values;
- ▶ The Project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- ▶ A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management programme."

In addition, if offsets are used, the Project should demonstrate a net gain for Critical Habitat-qualifying biodiversity / features.

Critical Habitat-qualifying features (i.e. habitats and species) were determined using all available information sources including data from field surveys of the Project Footprint and its surroundings conducted for the ESIA, a review of the literature and use of biodiversity databases. Information pertaining to non-angiosperm tree flora, reptiles, amphibians, fish and invertebrates is limited for the Project region. In particular, conservation assessments by the IUCN Red List of Threatened Species (2018) have not been conducted for many species to

² As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.

identify their global conservation status. Therefore, it is possible that Critical Habitat-qualifying features are missed due to a paucity of background information and conservation status assessments.

Table 4-1: Quantitative thresholds for Tiers 1 and 2 of Critical Habitat Criteria 1 -3 (IFC, 2012)

Criteria	Tier 1	Tier 2
1. Critically Endangered (CR) / Endangered (EN) Species	<p>(a) Habitat required to sustain ≥ 10 percent of the global population of a CR or EN species / subspecies where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species.</p> <p>(b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.</p>	<p>(c) Habitat that supports the regular occurrence of single individual of a CR species and/or habitat containing regionally important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/ subspecies.</p> <p>(d) Habitat of significant importance to CR or EN species that are wider ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>(e) As appropriate, habitat containing nationally / regionally important concentrations of an EN, CR or equivalent national/regional listing.</p>
2. Endemic/ Restricted Range Species	<p>(a) Habitat known to sustain ≥ 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g., a single-site endemic).</p>	<p>(b) Habitat known to sustain ≥ 1 percent but < 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>
3. Migratory/ Congregatory Species	<p>(a) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.</p>	<p>(b) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent but < 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment.</p> <p>(c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteriam5 or 6 for Identifying Wetlands of International Importance.</p> <p>(d) For species with large but clumped distributions, a provisional threshold is set at ≥ 5 percent of the global population for both terrestrial and marine species.</p> <p>(e) Source sites that contribute ≥ 1 m percent of the global population.</p>

4.1.1 Discrete Management Unit Definition

The Critical Habitat Assessment is conducted for a defined area referred to as the 'Discrete Management Unit' (DMU). The DMU is defined by IFC Performance Standard 6 (2012) as "An area with a definable boundary within which the character of biological communities and/or management issues have more in common with each other than they do with those in adjacent areas." It should be noted that this area can be defined as an area with an actual management boundary (e.g. legally protected areas) but can also be defined as an area with a defined ecological definable boundary (e.g. watershed, intact forest patch, etc.). The determination of the DMU will

depend on the species or subspecies of concern, and the ecological context in which they occur. Multiple DMUs can be defined to ensure all potential Critical Habitat-qualifying species are considered, however for clarity and consistency the preference is to keep the number of DMUs to as low number as possible.

4.1.2 DMU for the Project

The DMU used for the Critical Habitat Assessment is shown in Figure 4-1. With consideration of the ecological context of the Project, and the characteristics of the potential Critical Habitat-qualifying species. It was identified that one DMU would be applicable to the different species groups identified. The DMU is based on the major catchment boundaries intersecting the Project area (catchments of the Lwajali River and Sezibwa River), with the southern border of the DMU being the edge of Lake Victoria. This DMU was considered the most ecologically meaningful discrete area for flora and fauna in the vicinity of the Project as there are no other significant barriers nearby that would limit flora/fauna movement.

Priority and other potential Critical Habitat-qualifying habitat and species that were identified for the Project were screened against the criteria to assess the potential presence of Critical Habitat in the Project footprint and its surroundings in the sections below. In accordance with standard practice, if potential Critical Habitat-qualifying species or habitat could be considered within multiple criteria, such as an Endangered species also being a migratory species, they were assessed against the thresholds within the highest priority criterion (i.e. lowest number criterion).

Species range data from the IUCN (2018) was used to calculate the proportion of the species range intersecting the appropriate DMU in ArcGIS to assist in determining whether the species qualifies as Critical Habitat under the various criteria outlined in Table 4-1. Species range data for most species was able to be viewed on the IUCN Red List website (<http://www.iucnredlist.org/>).

4.2 Criterion 1: Critically Endangered and/or Endangered species

Globally Critically Endangered and Endangered species were considered within the assessment of Criterion 1. Globally threatened species' statuses were sourced from the IUCN (2018). The national Ugandan Red List of Threatened Species (WCS 2016) was used for national statuses. Where species were classed by the IUCN as Not Assessed, or Data Deficient, the potential for the species to have Critical Habitat was still considered with reference to the information provided in the national Ugandan Red List of Threatened Species (WCS 2016) and other literature sources.

No globally or nationally Critically Endangered or Endangered amphibian or reptile species were identified during surveys or literature searches as potentially inhabiting the DMU.

4.2.1 Mammals

No globally Critically Endangered or Endangered mammal species were identified as present or likely to occur in the habitat of, and surrounding, the Project within the DMU. However, three species listed as Data Deficient by the IUCN (2018) have been identified and are nationally Critically Endangered and Endangered mammal species that may occur in the DMU area (Table 4-2). Trevor's mops bat (*Mops trevori*) and moon shrew (*Crocidura selina*) are both Endangered at the national level, while the Samburu pipistrelle bat (*Neoromicia helios*) is classed as Critically Endangered at the national level (WCS 2016).

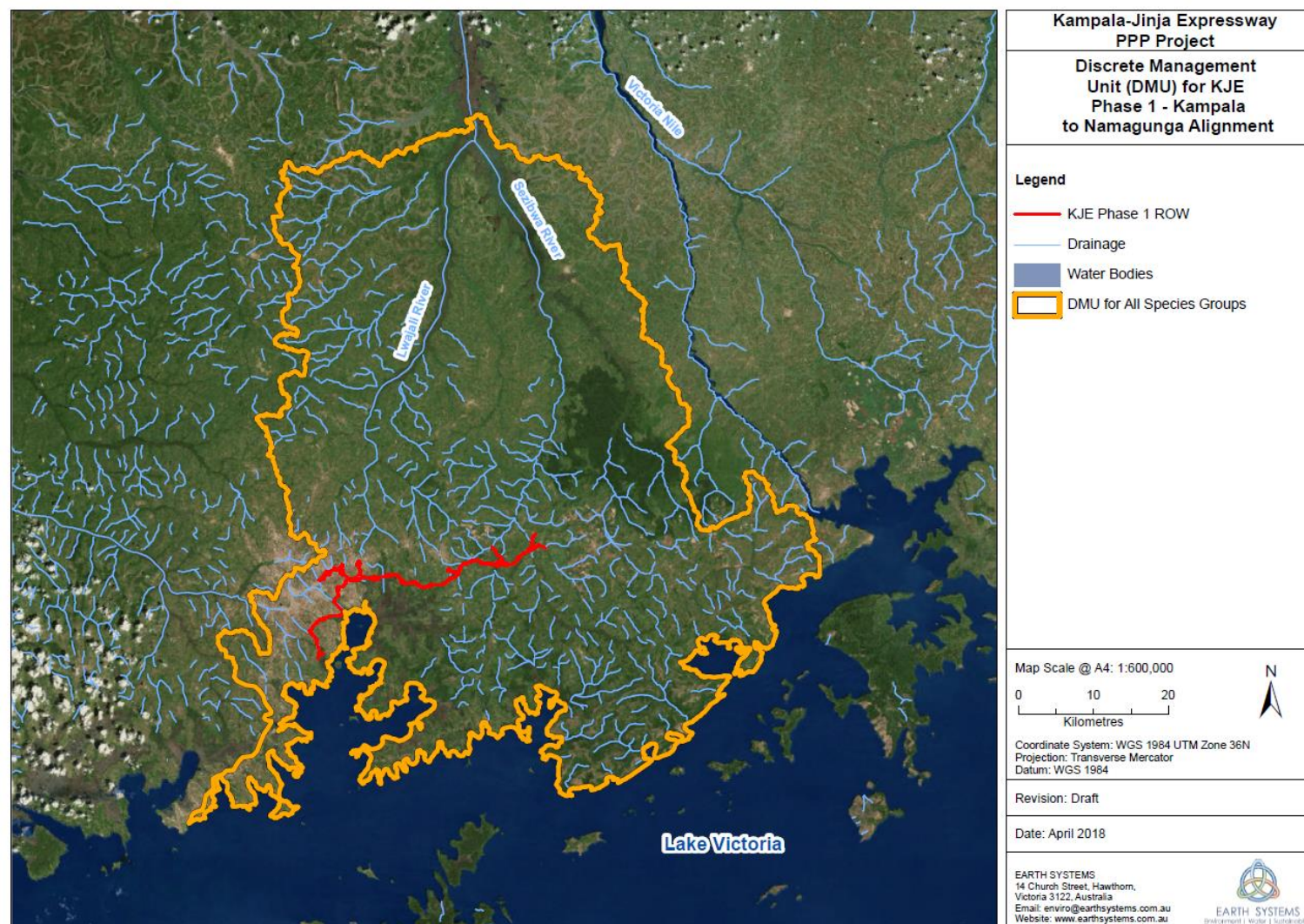


Figure 4-1 Discrete Management Unit (DMU) used for the Critical Habitat Assessment

The distributions of the Trevor's mops bat and Samburu pipistrelle bat are sufficiently large so that the DMU constitutes <1% of their respective ranges. Thus, the habitat within the DMU for these two species qualifies as Tier 2 Critical Habitat.

The moon shrew is considered as globally Data Deficient and nationally Endangered as the species is uncommon in Uganda (Gerrie and Kennerley 2016). Moon shrews are currently considered as a Ugandan endemic (although unverified locations occur in Kenya) and were first identified as a separate species in the 1980s, with the type locality of Mabira CFR (Dippenaar 1989). The species is likely threatened by forest fragmentation in Uganda (Gerrie and Kennerley 2016). While there is significant uncertainty about the moon shrew's conservation status and distribution, the shrew is thought to be restricted to a small range of overlapping the area of the Project DMU and to the north-west (Gerrie and Kennerley 2016). The moon shrew has only ever been recorded at three sites in Uganda and has not been recorded since 1989 (Thorn and Kerbis 2009, WCS 2016). Nonetheless, in line with the precautionary principle, the moon shrew should be considered as a Critical Habitat-qualifying species for the Project. Notably, none of the sites where the species has been recorded are directly impacted by the Project and the Project Footprint does not contain high quality forest habitats such as where the species has previously been recorded.

Table 4-2 Critically Endangered or Endangered mammal species assessed for Critical Habitat Tier 1 or Tier 2

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status
Chiroptera						
Molossidae	Trevor's mops bat	<i>Mops trevori</i>	<1	2	DD	EN
Vespertilionidae	Samburu pipistrelle bat	<i>Neoromicia helios</i>	<1	2	DD	CR
Eulipotyphla						
Soricidae	Moon shrew	<i>Crociodura selina</i>	Unknown	Unknown	DD	EN

Key: CR – Critically Endangered; EN – Endangered; VU – Vulnerable; LC – Least Concern; NT – Near Threatened; DD – Data Deficient

4.2.2 Birds

Eight globally Critically Endangered or Endangered bird species were identified as present or likely to occur in the habitat of the DMU (

Table 4-3). In particular, hooded vultures (*Necrosyrtes monachus*) and grey crowned-crane (*Balearica regulorum*) have reportedly been seen on a daily basis in some villages along the alignment, outside of urban areas. Grey crowned-cranes are more likely to be seen walking along the ground (heavy-bodied) than the hooded vultures, which prefer to soar while hunting. Other species that may be seen walking in non-urban areas (e.g. wetlands) include the Madagascar pond-heron (*Ardeola idae*). The raptors (Accipitriformes) are less likely to be seen on the ground but may be seen flying over or perched in large trees, power poles or on cliffs. The other bird species are more likely to be seen in the reserves, such as Namanve CFR.

All eight bird species have extensive ranges and the DMU constitutes less than 1% of their total ranges (Table 4-3). Therefore, the habitat within the DMU qualifies as Tier 2 Critical Habitat for all eight species.

Table 4-3 Critically Endangered or Endangered bird species assessed for Critical Habitat Tier 1 or Tier 2

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status
Accipitriformes						
Accipitridae	Steppe eagle	<i>Aquila nipalensis</i>	<1	2	EN	-

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status
	White-backed vulture	<i>Gyps africanus</i>	<1	2	CR	EN
	Hooded vulture	<i>Necrosyrtes monachus</i>	<1	2	CR	EN
	Lappet-faced vulture	<i>Torgos tracheliotos</i>	<1	2	EN	CR
Gruiformes						
Gruidae	Grey crowned-crane	<i>Balearica regulorum</i>	<1	2	EN	EN
Passeriformes						
Acrocephalidae	Basra reed-warbler	<i>Acrocephalus griseldis</i>	<1	2	EN	-
Pelecaniformes						
Ardeidae	Madagascar pond-heron	<i>Ardeola idae</i>	<1	2	EN	EN
Psittaciformes						
Psittacidae	Grey parrot	<i>Psittacus erithacus</i>	<1	2	EN	VU

Key: CR – Critically Endangered; EN – Endangered; VU – Vulnerable; LC – Least Concern; NT – Near Threatened

4.2.3 Fish

Three globally Critically Endangered fish species were identified as potentially within the DMU (Table 4-4). The three fish species have not been assessed for national conservation statuses. The three species are largely restricted to the Lake Victoria basin, but are extinct or very rare in much of their respective ranges and restricted to satellite lakes and waterbodies (FishBase team RMCA and Geelhand 2016, Twongo et al. 2006a, Twongo et al. 2006b). The three species are threatened by overfishing and introduced competitors, such as the Nile perch (*Lates niloticus*) and Nile tilapia (*Oreochromis niloticus*). Current estimates of the three fish species' distributions result in the DMU constituting less than 1% of their total ranges (Table 4-4). Thus, the DMU's habitat qualifies as Tier 2 Critical Habitat for these three fish species based on available information. This assessment is based on IUCN's mapped distribution, however, it appears that assessors believe that the three species may only be found in small satellite lakes with very restricted estimated extent of occurrences (e.g. *Oreochromis variabilis* to <100 km², Twongo et al. 2006b). Further assessment by Ichthyologists with expertise in these species and Lake Victoria endemics would be required to confirm the Tier 2 status of these species. In line with the Precautionary Principle, these species should be considered Critical Habitat-qualifying species for the provision of offsets until further determination is made.

Table 4-4 Critically Endangered or Endangered fish species assessed for Critical Habitat Tier 1 or Tier 2

Order	Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status
Cypriniformes	Cyprinidae	Ningu	<i>Labeo victorianus</i>	<1	2	CR
Perciformes	Cichlidae	Singidia tilapia	<i>Oreochromis esculentus</i>	<1	2	CR
		Victoria tilapia	<i>Oreochromis variabilis</i>	<1	2	CR

Key: CR – Critically Endangered. Note: Assessment based on mapped distribution not estimated extent of occurrence

4.2.4 Insects

No Endangered or Critically Endangered insects were identified for which sufficient information is available to confirm if they have Critical Habitat within the DMU. However 17 nationally Endangered or Critically Endangered butterflies (Insecta: Lepidoptera) have been recorded within the Mabira CFR or other forested areas within the DMU. These species have not been assessed for their global conservation statuses (IUCN, 2018). The distribution

ranges of these butterfly species are not publicly available and therefore a quantitative assessment of the percentage of their respective distributions overlapping with the DMU was impossible at this time. Further assessment could be conducted by Lepidopterists with expertise in these species to confirm the Critical Habitat assessment for these species. In line with the Precautionary Principle, these species should be considered Critical Habitat-qualifying species for the provision of offsets until further determination is made.

Table 4-5 Critically Endangered or Endangered insect species assessed for Critical Habitat Tier 1 or Tier 2

Family	Scientific Name	DMU %	Tier	Ugandan Red List Status
Hesperiidae	<i>Caenides dacena</i>	UNK	UNK	EN
Lycaenidae	<i>Anthene alberta</i>	UNK	UNK	CR
	<i>Cephetola cepheia</i>	UNK	UNK	CR
	<i>Dixeia dixeyi</i>	UNK	UNK	EN
	<i>Epitola carilla</i>	UNK	UNK	CR
	<i>Epitola catuna</i>	UNK	UNK	EN
	<i>Epitolina catori</i>	UNK	UNK	CR
	<i>Liptena opaca</i>	UNK	UNK	CR
	<i>Micropentila mpigi</i>	UNK	UNK	CR
	<i>Micropentila victoriana</i>	UNK	UNK	CR
	<i>Mimacraea fulvaria</i>	UNK	UNK	EN
	<i>Omipholidotos ntebi</i>	UNK	UNK	EN
	<i>Pentila umangiana</i>	UNK	UNK	EN
	<i>Spindasis crustaria</i>	UNK	UNK	CR
	<i>Tanuetheira timon</i>	UNK	UNK	EN
Nymphalidae	<i>Euptera elabontas</i>	UNK	UNK	CR
	<i>Euryphura albimargo</i>	UNK	UNK	EN

Key: UNK – Unknown, undeterminable; CR – Critically Endangered; EN – Endangered; N/A – Not Applicable

4.2.5 Flora

No globally Critically Endangered or Endangered flora species were identified as present or likely to occur in the habitat within the DMU. However, two species for which the global conservation status has not been assessed by the IUCN (2018) were identified during surveys outside of the Project area which could have Critical Habitat within the DMU - *Mikania microptera* and *Sabicea entebbensis* (Table 4-6). Both these species are classed as nationally Endangered (WCS 2016).

Detailed range information is lacking for the two identified flora species, thus these species will need to be assessed by an international plant biodiversity specialist organisation (e.g. Royal Botanic Gardens, Kew, UK) to make a formal determination as to whether they are Tier 1 or Tier 2 Critical Habitat-qualifying species. In line with the Precautionary Principle, these species should be considered Critical Habitat-qualifying species for the provision of offsets until further determination is made.

The only known area where *Mikania microptera* occurs in the vicinity of the DMU is on the very edge of the DMU in Entebbe Municipality (WCS 2016). The species has also been recorded in Kibale National Park in the west of Uganda (WCS 2016) and several sites in Tanzania (JSTOR, 2018). *Sabicea entebbensis* is known from at least two locations in the vicinity of the DMU; Entebbe (Kitubulu Forest) and Kyagwe (Nakiza Forest) (WCS 2016). However notably, none of the known sites for these two species occur close to the Project Footprint.

Table 4-6 Critically Endangered or Endangered flora species assessed for Critical Habitat Tier 1 or Tier 2

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status
Magnoliopsida: Asterales						
Asteraceae	-	<i>Mikania microptera</i>	UNK	UNK	N/A	EN
Magnoliopsida: Gentianales						
Rubiaceae	-	<i>Sabicea entebbensis</i>	UNK	UNK	N/A	EN

Key: UNK – Unknown, undeterminable; CR – Critically Endangered; EN – Endangered; VU – Vulnerable; LR – Lower Risk; NT – Near Threatened; N/A – Not Assessed

4.3 Criterion 2: Endemic and/or restricted-range species

Endemic, biome-restricted or restricted-range species were assessed from species known to occur in the Project Footprint and the surroundings (i.e. field surveys), and those species known to occur within the Mabira CFR and other nearby reserves. Information on endemics and some restricted-range species was sourced from the Ugandan Red List of Threatened Species and published reports, while restricted-range and biome-restricted bird species were assessed from records from BirdLife International. Any species with distributions known to overlap with the DMU was considered for analysis.

Eighty-nine endemic, restricted-range and biome-restricted species were found to have overlapping distributions with the DMU or known to have populations within the DMU (Table 4-7). Most of these species are considered as globally being of Least Concern. Those species that do not have this conservation designation of Least Concern are discussed below.

Seven endemic or restricted-range butterflies (Insecta: Lepidoptera) have been recorded within the Mabira CFR or other forested areas within the DMU. These species have not been assessed for the global conservation status, whereas the Ugandan Red List of Threatened Species has designated them all as Data Deficient. The distribution ranges of these seven butterfly species is not publicly available and therefore a quantitative assessment of the percentage of their respective distributions overlapping with the DMU was impossible at this time. Further investigations by Lepidopterists with expertise in these species would need to be undertaken to clarify the Critical Habitat status.

Five ecoregion endemic fish species (Actinopterygii) have overlapping ranges with the DMU. All five species are considered as of Least Concern by the IUCN (Table 4-7). One of the fish, Neumayer's barb (*Barbus neumayeri*), has a range that covers the DMU, yet the DMU constitutes less than 1% of its total distribution. Thus the habitat within the DMU does not qualify as either Tier 1 or 2 for the Neumayer's barb. The other four fish species have smaller distributions and the DMU constitutes less than 5% of their respective distributions. Therefore, the habitat within the DMU qualifies as Tier 2 for Criterion 2 for dark stonebasher (*Pollimyrus nigricans*), *Oreochromis leucostictus*, Egyptian mouthbrooder (*Pseudocrenilabrus multicolor*) and Allauad's catfish (*Clarias alluaudi*).

No endemic or restricted-range reptiles were identified during searches. However, one endemic frog was identified as having a range that overlapped the DMU (Mwanza frog *Xenopus victorianus*). The Mwanza frog has a relatively large range and therefore the DMU constitutes less than 1% of its distribution. Hence, the DMU does not qualify as Critical Habitat for the endemic Mwanza frog.

Seventy-four endemic, restricted-range and biome-restricted bird species were identified, or being likely to occur, within the DMU. The majority of these species (68) have large distributions and are globally of Least Concern, and the percentage overlapping with the DMU is less than 1% (Table 4-7). Thus, the habitat within the DMU does not qualify as either Tier 1 or 2 for these 68 species. Although the DMU constitutes more than 1% of the other six bird species respective ranges, the DMU is less than 10% of their ranges. Therefore, the habitat within the DMU

qualifies as Tier 2 Critical Habitat for six bird species; Nahan's partridge (*Ptilopachus nahani*), Carruthers's cisticola (*Cisticola carruthersi*), papyrus canary (*Crithagra koliensis*), papyrus gonolek (*Laniarius mufumbiri*), northern brown-throated weaver (*Ploceus castanops*) and Toro olive greenbul (*Phyllastrephus hypochloris*). The Nahan's partridge is globally Vulnerable due to severe population declines and fragmented habitat and is known to inhabit Mabira CFR (Dranzoa et al. 1999). The papyrus gonolek is considered as Near Threatened due to population declines and losses of papyrus swamps (IUCN, 2018).

One endemic shrew, dark shrew (*Crocidura maurisca*), was found to have an overlapping distribution with the DMU. The dark shrew is considered as globally of Least Concern, but locally Vulnerable (Table 4-7). The endemic shrew's range is relatively large and therefore the DMU constitutes less than 1% of its total distribution. Hence, the habitat in the DMU does not qualify as either Tier 1 or Tier 2 for the dark shrew.

One endemic primate is known to occur in Mabira CFR, the Ugandan mangabey (*Lophocebus ugandae*) (Groves 2007). The phylogeny and status as a separate species was under review during the last IUCN assessment (2007/2008), therefore the species has not been assessed by the IUCN for its Estimated Extent of Occurrence or conservation status. The Ugandan mangabey is still included within the IUCN assessment of the grey-cheeked mangabey (*L. albigena*). The endemic primate has been listed as Vulnerable in the Ugandan Red List of Threatened Species. It is therefore difficult to assess the percentage of the Ugandan mangabey's distribution that overlaps with the DMU and this will require additional information and/or expert knowledge to make this assessment.

Table 4-7 Endemic and/or restricted-range species assessed for Critical Habitat and either Tier 1 or Tier 2

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status	Status
Insecta: Lepidoptera							
Hesperiodea	-	<i>Borbo kaka</i>	UNK	UNK	N/A	DD	RR
Lycaenidae	-	<i>Hypocopelates ugandae</i>	UNK	UNK	N/A	DD	E
	-	<i>Iolais yalae (bansana)</i>	UNK	UNK	N/A	DD	E
	-	<i>Thermoniphas albocaerulea</i>	UNK	UNK	N/A	DD	E
Nymphalidae	-	<i>Euryphura vansomereni</i>	UNK	UNK	N/A	DD	E
Nymphalidae	-	<i>Neptis clareii</i>	UNK	UNK	N/A	DD	E
Riodinidae	-	<i>Abisara simulacris</i>	UNK	UNK	N/A	DD	E
Actinopterygii: Cypriniformes							
Cyprinidae	Neumayer's barb	<i>Barbus neumayeri</i>	<1	N/A	LC	-	EE
Actinopterygii: Osteoglossiformes							
Mormyridae	Dark stonebasher	<i>Pollimyrus nigricans</i>	<5	2	LC	-	EE
Actinopterygii: Perciformes							
Cichlidae		<i>Oreochromis leucostictus</i>	<5	2	LC	-	EE
	Egyptian mouthbrooder	<i>Pseudocrenilabrus multicolor</i>	<5	2	LC	-	EE
Actinopterygii: Siluriformes							
Clariidae	Allauad's catfish	<i>Clarias alluaudi</i>	<5	2	LC	-	EE
Amphibia: Anura							
Pipidae	Mwanza frog	<i>Xenopus victorianus</i>	<1	N/A	LC	-	E
Aves: Accipitriformes							
Accipitridae	Cassin's hawk-eagle	<i>Aquila africana</i>	<1	N/A	LC	-	BR
Aves: Bucerotiformes							
Bucerotidae	Grey-cheeked hornbill	<i>Bycanistes subcylindricus</i>	<1	N/A	LC	-	BR
Phoeniculidae	Forest scimitarbill	<i>Rhinopomastus castaneiceps</i>	<1	N/A	LC	-	BR

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status	Status
Aves: Caprimulgiformes							
Apodidae	Cassin's spinetail	<i>Neafrapus cassini</i>	<1	N/A	LC	-	BR
	Sabine's spinetail	<i>Rhaphidura sabini</i>	<1	N/A	LC	-	BR
Caprimulgidae	Fiery-necked nightjar	<i>Caprimulgus pectoralis</i>	<1	N/A	LC	-	BR
Aves: Columbiformes							
Columbidae	Afep pigeon	<i>Columba unicincta</i>	<1	N/A	LC	-	BR
Aves: Coraciiformes							
Alcedinidae	White-bellied kingfisher	<i>Corythornis leucogaster</i>	<1	N/A	LC	-	BR
	African dwarf-kingfisher	<i>Ispidina lecontei</i>	<1	N/A	LC	-	BR
Coraciidae	Blue-throated roller	<i>Eurystomus gularis</i>	<1	N/A	LC	-	BR
Meropidae	Cinnamon-chested bee-eater	<i>Merops oreobates</i>	<1	N/A	LC	-	RR
Aves: Galliformes							
Odontophoridae	Nahan's partridge	<i>Ptilopachus nahani</i>	<10	2	VU	-	BR
Phasianidae	Forest francolin	<i>Peliperdix lathamii</i>	<1	N/A	LC	-	BR
Aves: Gruiformes							
Rallidae	White-spotted flufftail	<i>Sarothrura pulchra</i>	<1	N/A	LC	-	BR
Aves: Passeriformes							
Cisticolidae	Buff-throated apalis	<i>Apalis rufogularis</i>	<1	N/A	LC	-	BR
	Olive-green camaroptera	<i>Camaroptera chloronota</i>	<1	N/A	LC	-	BR
	Yellow-browed camaroptera	<i>Camaroptera supercilialis</i>	<1	N/A	LC	-	BR
	Carruthers's cisticola	<i>Cisticola carruthersi</i>	<2	2	LC	-	BR
Estrildidae	White-breasted nigrita	<i>Nigrita fusconotus</i>	<1	N/A	LC	-	BR
Fringillidae	Papyrus canary	<i>Crithagra koliensis</i>	<2	2	LC	-	BR
Leiotrichidae	Black-lored babbler	<i>Turdoides sharpei</i>	<1	N/A	LC	-	BR
Locustellidae	White-winged swamp-warbler	<i>Bradypterus carpalis</i>	<1	N/A	LC	-	BR
Macrosphenidae	Grey longbill	<i>Macrosphenus concolor</i>	<1	N/A	LC	-	BR
	Yellow longbill	<i>Macrosphenus flavicans</i>	<1	N/A	LC	-	BR
	Green crombec	<i>Sylvietta virens</i>	<1	N/A	LC	-	BR
Malaconotidae	Bocage's bush-shrike	<i>Chlorophoneus bocagei</i>	<1	N/A	LC	-	BR
	Lowland sooty boubou	<i>Laniarius leucorhynchus</i>	<1	N/A	LC	-	BR
	Papyrus gonolek	<i>Laniarius mufumbiri</i>	<2	2	NT	-	BR
Monarchidae	Red-bellied paradise-flycatcher	<i>Terpsiphone rufiventer</i>	<1	N/A	LC	-	BR
	Western crested-flycatcher	<i>Trochocercus nitens</i>	<1	N/A	LC	-	BR
Muscicapidae	Dusky-blue flycatcher	<i>Bradornis comitatus</i>	<1	N/A	LC	-	BR
	Sooty flycatcher	<i>Bradornis fuliginosus</i>	<1	N/A	LC	-	BR
	Blue-shouldered robin-chat	<i>Cossypha cyanocampter</i>	<1	N/A	LC	-	BR
	Grey-throated tit-flycatcher	<i>Fraseria griseigularis</i>	<1	N/A	LC	-	BR
	Lowland akalat	<i>Sheppardia cyornithopsis</i>	<1	N/A	LC	-	BR
Nectariniidae	Little green sunbird	<i>Anthreptes seimundi</i>	<1	N/A	LC	-	BR
	Green-throated sunbird	<i>Chalcomitra rubescens</i>	<1	N/A	LC	-	BR
	Red-chested sunbird	<i>Cinnyris erythrocerus</i>	<1	N/A	LC	-	BR
	Superb sunbird	<i>Cinnyris superbus</i>	<1	N/A	LC	-	BR
	Blue-throated brown sunbird	<i>Cyanomitra cyanoalaema</i>	<1	N/A	LC	-	BR
Nicatoridae	Western nicator	<i>Nicator chloris</i>	<1	N/A	LC	-	BR

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Ugandan Red List Status	Status
Oriolidae	Western black-headed oriole	<i>Oriolus brachyrynchus</i>	<1	N/A	LC	-	BR
Paridae	Dusky tit	<i>Melaniparus funereus</i>	<1	N/A	LC	-	BR
Pellorneidae	Scaly-breasted illadopsis	<i>Illadopsis albipectus</i>	<1	N/A	LC	-	BR
	Brown illadopsis	<i>Illadopsis fulvescens</i>	<1	N/A	LC	-	BR
Pittidae	Green-breasted pitta	<i>Pitta reichenowi</i>	<1	N/A	LC	-	BR
Platysteiridae	Chestnut wattle-eye	<i>Dyaphorophya castanea</i>	<1	N/A	LC	-	BR
	Jameson's wattle-eye	<i>Dyaphorophya jamesoni</i>	<1	N/A	LC	-	BR
Ploceidae	Red-headed malimbe	<i>Malimbus rubricollis</i>	<1	N/A	LC	-	BR
	Northern brown-throated weaver	<i>Ploceus castanops</i>	<2	2	LC	-	BR
	Vieillot's black weaver	<i>Ploceus nigerrimus</i>	<1	N/A	LC	-	BR
	Yellow-mantled weaver	<i>Ploceus tricolor</i>	<1	N/A	LC	-	BR
Pycnonotidae	Honeyguide greenbul	<i>Baeopogon indicator</i>	<1	N/A	LC	-	BR
	Red-tailed bristlebill	<i>Bleda syndactylus</i>	<1	N/A	LC	-	BR
	Red-tailed greenbul	<i>Criniger calurus</i>	<1	N/A	LC	-	BR
	Plain greenbul	<i>Eurillas curvirostris</i>	<1	N/A	LC	-	BR
	Grey greenbul	<i>Eurillas gracilis</i>	<1	N/A	LC	-	BR
	White-throated greenbul	<i>Phyllastrephus albicularis</i>	<1	N/A	LC	-	BR
	Toro olive greenbul	<i>Phyllastrephus hypochloris</i>	<2	2	LC	-	BR
	Leaf-love	<i>Pyrhurus scandens</i>	<1	N/A	LC	-	BR
Scotocercidae	Green hylia	<i>Hylia prasina</i>	<1	N/A	LC	-	BR
Stenostiridae	Dusky crested-flycatcher	<i>Elminia nigromitrata</i>	<1	N/A	LC	-	BR
Sturnidae	Purple-headed starling	<i>Hylopsar purpureiceps</i>	<1	N/A	LC	-	BR
	Chestnut-winged starling	<i>Onychognathus fulgidus</i>	<1	N/A	LC	-	BR
Turdidae	Rufous flycatcher-thrush	<i>Stizorhina fraseri</i>	<1	N/A	LC	-	BR
Vangidae	African shrike-flycatcher	<i>Megabyas flammulatus</i>	<1	N/A	LC	-	BR
Aves: Piciformes							
Indicatoridae	Cassin's honeybird	<i>Prodotiscus insignis</i>	<1	N/A	LC	-	BR
Lybiidae	Yellow-spotted barbet	<i>Buccanodon duchaillui</i>	<1	N/A	LC	-	BR
	Speckled tinkerbird	<i>Pogoniulus scolopaceus</i>	<1	N/A	LC	-	BR
	Yellow-throated tinkerbird	<i>Pogoniulus subsulphureus</i>	<1	N/A	LC	-	BR
	Hairy-breasted barbet	<i>Tricholaema hirsuta</i>	<1	N/A	LC	-	BR
Picidae	Brown-eared woodpecker	<i>Campethera caroli</i>	<1	N/A	LC	-	BR
	Buff-spotted woodpecker	<i>Campethera nivosa</i>	<1	N/A	LC	-	BR
	Yellow-crested woodpecker	<i>Dendropicos xantholophus</i>	<1	N/A	LC	-	BR
Mammalia: Eulipotyphla							
Soricidae	Dark shrew	<i>Crocidura maurisca</i>	<1	N/A	LC	VU	E
Mammalia: Primates							
Cercopithecidae	Ugandan mangabey	<i>Lophocebus ugandae</i>	UNK	UNK	N/A	VU	E

Key: UNK – Unknown, undeterminable; VU – Vulnerable; LC – Least Concern; NT – Near Threatened; DD – Data Deficient; N/A – Not Applicable; BR – Biome Restricted; E – Endemic; EE – Ecoregion Endemic; RR – Range Restricted

4.4 Criterion 3: Globally significant concentrations of migratory species and/or congregatory species

Migratory and/or congregatory species were assessed from those known to occur in the Project Footprint and the surroundings (i.e. field surveys), and those species known to occur within the surrounding reserves. Any migratory and/or congregatory species that could be assessed under Criteria 1 or 2 due to their threatened or endemic status were considered within those criteria and not within Criterion 3. No migratory mammals were determined to be within the DMU. Little is known of reptilian and amphibian migratory species in the area and therefore these taxa could not be fully assessed. Therefore, it may be necessary to seek specialist input regarding the presence of non-mammal / bird migratory / congregatory species to further confirm findings.

Twenty-one migratory and/or congregatory bird species were observed or known to occur within the DMU (Table 4-8). An analysis of the percentage of their ranges that overlapped with the DMU was conducted to determine the presence of Critical Habitat Tier 1, Tier 2, or absence of Critical Habitat (IFC, 2012). All of the 21 migratory and/or congregatory bird species have <1% of their known global range intersecting with the DMU. Many of the bird species have very wide distributions and all have been listed as globally of Least Concern because their current populations and distributions are stable and/or do not qualify as higher status categories. One of the bird species was the very wide-ranging black kite (*Milvus migrans*). The black kite occurs over much of Africa, Eurasia and Australia (BirdLife International, 2016a). Similarly, cattle egrets (*Bubulcus ibis*) and little egrets (*Egretta garzetta*) occur over multiple continents. Many of the other species are distributed over much of sub-Saharan Africa. Therefore, the habitat within the DMU does not qualify as Tier 1 or Tier 2 Critical Habitat for these 21 migratory and/or congregatory bird species (Table 4-8).

Table 4-8 Migratory and/or congregatory species and biodiversity features assessed for Critical Habitat and either Tier 1 or Tier 2

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Status
Accipitriformes						
Accipitridae	Black kite	<i>Milvus migrans</i>	<1	N/A	LC	CM
Caprimulgiformes						
Apodidae	Little swift	<i>Apus affinis</i>	<1	N/A	LC	M
	White-rumped swift	<i>Apus caffer</i>	<1	N/A	LC	M
Charadriiformes						
Jacaniidae	African jacana	<i>Actophilornis africanus</i>	<1	N/A	LC	C
Laridae	White-winged tern	<i>Chlidonias leucopterus</i>	<1	N/A	LC	CM
	Grey-headed gull	<i>Larus cirrocephalus</i>	<1	N/A	LC	CM
Scolopacidae	Common sandpiper	<i>Actitis hypoleucos</i>	<1	N/A	LC	CM
Ciconiiformes						
Ciconiidae	African openbill	<i>Anastomus lamelligerus</i>	<1	N/A	LC	CM
	Marabou	<i>Leptoptilos crumenifer</i>	<1	N/A	LC	C
Columbiformes						
Columbidae	Laughing dove	<i>Spilopelia senegalensis</i>	<1	N/A	LC	M
Galliformes						
Phasianidae	Common quail	<i>Coturnix coturnix</i>	<1	N/A	LC	M
Passeriformes						
Acrocephalidae	Olivaceous warbler	<i>Iduna pallida</i>	<1	N/A	LC	M
Motacillidae	Western yellow wagtail	<i>Motacilla flava</i>	<1	N/A	LC	CM
Phylloscopidae	Willow warbler	<i>Phylloscopus trochilus</i>	<1	N/A	LC	M

Family	Common Name	Scientific Name	DMU %	Tier	IUCN Red List Status	Status
Pelecaniformes						
Ardeidae	Grey heron	<i>Ardea cinerea</i>	<1	N/A	LC	CM
	Black-headed heron	<i>Ardea melanocephala</i>	<1	N/A	LC	CM
	Cattle egret	<i>Bubulcus ibis</i>	<1	N/A	LC	CM
	Little egret	<i>Egretta garzetta</i>	<1	N/A	LC	CM
Scopidae	Hamerkop	<i>Scopus umbretta</i>	<1	N/A	LC	C
Threskiornithidae	Hadada ibis	<i>Bostrychia hagedash</i>	<1	N/A	LC	C
Suliformes						
Phalacrocoracidae	Long-tailed cormorant	<i>Microcarbo africanus</i>	<1	N/A	LC	C

Key: LC – Least Concern; N/A – Not Applicable; C – Congregatory; CM – Congregatory and Migratory; M – Migratory

4.5 Criterion 4: Highly threatened and/or unique ecosystems

The Guidance Note for PS6 (IFC, 2012b) states that “*highly threatened or unique ecosystems are those (i) that are at risk of significantly decreasing in area or quality; (ii) with a small spatial extent; and/or (iii) containing unique assemblages of species including assemblages or concentrations of biome-restricted species*”.

Ecosystems located within the Project Footprint are largely human-modified or significantly disturbed habitat (e.g. papyrus swamps) and based on the flora and habitat studies conducted for the ESIA (Balafu, 2018) these habitats are not considered particularly unique and are unlikely to qualify under Criterion 4.

The greater DMU encompasses several reserves such as Mabira CFR. Mabira CFR contains medium to high altitude moist semi-deciduous forest that has been impacted by selective logging and human disturbance (Fuller et al. 2003). Within this semi-deciduous forest, there were at least six distinct types during a 2003 survey of Nahan’s francolin in Mabira CFR. These forest types were colonising, mixed, *Cynometra*, *Cynometra*-mixed, *Maesopsis*-mixed and swamp-forest (Fishpool and Evans 2001). To conclusively determine whether these or other habitat types within the CFR qualify as Critical Habitat Criterion 4, the status and current extent of the forest types within the protected area would need further investigation by specialists (e.g. Kew Gardens) to determine their uniqueness and rarity. As per Section 4.7 the whole of Mabira CFR is considered Critical Habitat, and therefore further investigation of habitats within the CFR in relation to Criterion 4 is not warranted.

4.6 Criterion 5: Areas associated with key evolutionary processes

According to the Guidance Note for PS6 (IFC, 2012b), the two key factors defining this criterion are ‘*the physical features of a landscape*’ and ‘*subpopulations of species that are phylogenetically or morphogenetically distinct*’. Although key evolutionary processes may operate at various spatial scales, in the context of PS6 these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g. an individual mountain that may have acted as a glacial refugium and thus hosted the evolution of a suite of endemic species). No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement. Based on the literature review, no landscapes or subpopulations near the Project are likely to qualify under Criterion 5 since the area has been significantly altered by a long history of human habitation and intensive agriculture.

4.7 Protected Areas and Internationally Recognised Areas

IFC (2012) state that internationally and/or nationally recognised areas of high biodiversity value will likely qualify as Critical Habitat. No internationally recognised areas occur within the DMU. Several nationally designated protected areas occur in the DMU, particularly Mabira CFR. Mabira CFR is the largest (310 km²) of the nationally protected reserves that intersect with the DMU. Most of the other reserves are less than 30 km².

The international (IUCN) conservation status of Mabira CFR is unknown, however it is a nationally recognised area of high biodiversity value and is known to support globally significant populations of fauna including numerous threatened species (refer Section 3), it is likely that the reserve qualifies as Critical Habitat on this basis.³ No other reserves in the vicinity of the Project are known to support a high diversity of threatened species and are therefore not expected to qualify as Critical Habitat based on available information.

³ The definitive determination of this would need to be made independently by specialists at the IFC.

5. SUMMARY OF POTENTIAL PROJECT IMPACTS

5.1 General Biodiversity Impacts

Habitat condition varies throughout the ROW. Baseline surveys and assessments clearly identified that natural habitats located within the ROW are significantly impacted by anthropogenic activities resulting in habitat degradation, loss and fragmentation and remnant patches of higher quality habitat are under threat.

No international protected areas or nationally significant protected areas such as National Parks, Wildlife Reserves or Wildlife Sanctuaries occur in the vicinity of the Project. The main protected area impacted by the Project is the Namanve Central Forest Reserve, with the ROW potentially resulting in disturbance to approximately 65 ha of the reserve. While the vegetation of this reserve is significantly disturbed by human activities, the ROW will impact approximately 22 ha of relatively high-quality papyrus wetlands. A small area of the Banda Tree Nursery (approx. 1 ha) in Kampala will also be directly impacted by the ROW, which is also a designated Central Forest Reserve. Mabira Central Forest Reserve and other protected areas in Cambodia will not be directly impacted.

In total, vegetation clearance and the construction of the Project is expected to result in the loss of approximately 156.6 ha of natural habitat (i.e. wetlands, forest and scrubland) and 436.2 ha of modified habitat, including the clearance of approximately 72.8 ha of degraded/cultivated wetland and 33.4 ha of higher quality wetland from the ROW. The higher quality wetlands impacted by the Project occur mainly in the Namanve CFR. The hydrology of some wetlands will be partially restored during the Operations phase in areas where viaducts are constructed, which will minimise long term impacts on key wetlands such as those within the Namanve CFR. All natural habitats to be removed from the ROW have been directly disturbed by anthropogenic sources in some way, but some retain important biodiversity values. For example, some individuals of the Nationally protected plant *Milicia excelsa* were recorded within the ROW and are expected to be impacted by the Project. There is also the potential for endemic orchids such as *Eulophia horsfallii* to be impacted.

With implementation of the proposed mitigation measures, vegetation disturbance for the Project is expected to be limited to the area of the ROW, and there are expected to be very limited areas temporarily disturbed outside of the ROW for the Project. Temporary accommodation camps will be required outside the ROW during the construction phase, however in line with the mitigation measures proposed these should be located away from protected areas and other priority habitats.

Habitat clearance and disturbance arising from noise, vibration, airblast, light-spill, human activity etc. generated during construction will result in the displacement of fauna and the permanent loss of a small proportion of habitat for nationally and / or globally rare or threatened birds and mammals (i.e. hooded vultures, grey crowned crane, saddle-billed stork and sitatungas).

There is a significant risk of accidental mortality and injury to mammals, birds, reptiles and amphibians as a result of collision with vehicles using the expressway during operation. Additionally, the proposed road will fragment habitats and is likely to act as a barrier limiting the local movement of fauna in some areas. The construction of viaducts in some areas such as the Namanve CFR will reduce the overall impacts on fauna movement.

5.2 Potential Impacts on Critical Habitat

A general assessment of potential impacts on identified Critical Habitat features is provided below. A more detailed baseline assessment of potential impacts/losses for each target species will be required in the process of setting targets for offsets as part of the implementation of biodiversity offset strategy (refer Sections 9.4 and 9.5.5).

5.2.1 Impacts on Critical Habitat-qualifying Species

The Critical Habitat Assessment process outlined in Chapter 4 identified a large number of species that qualify as having Critical Habitat within the 'Discrete Management Unit' (DMU) area that includes the Project Footprint and a large area of habitat in the surrounding region (see Figure 4-1).

The habitat use and likelihood of occurrence in the Project Footprint of each Critical Habitat-qualifying species recorded is identified in Table 5-2. The likelihood of utilisation of habitat within or near Project Footprint is assessed for each species to assist in determining the key potential impacts of the Project on the Critical Habitat-qualifying features.

As shown in Table 5-2, habitats used by Critical Habitat-qualifying species that are 'confirmed' or 'likely' to occur in the vicinity of the Project and will potentially be impacted include:

- ▶ **Wetlands** – providing habitat for birds including grey crowned crane, northern brown-throated weaver, Basra reed-warbler and Madagascar pond-heron as well as fish including blue spotted tilapia and Allauad's catfish;
- ▶ **Papyrus wetlands** - as a subset of general wetlands, these areas of higher quality wetlands provide habitat for birds including the Carruthers's cisticola, papyrus canary and papyrus gonolek, as well as fish including the Egyptian mouthbrooder;
- ▶ **Forest** – providing habitat for the grey parrot and Toro olive greenbul. The Toro olive greenbul may also occur in wetlands and shrublands, but forests are considered the most important habitat for the species;
- ▶ **Rivers/streams** – Sezibwa River provides habitat for the dark stonebasher fish that was recorded downstream of the ROW. Streams may also host Allauad's catfish, although it was only recorded in wetlands in the field surveys; and
- ▶ **Settlement areas** – providing potential habitat for hooded vultures.

The Project has the potential to impact on Critical Habitat both directly and indirectly. The key potential impacts on Critical Habitat-qualifying species and their habitats are summarised below.

5.2.1.1 Direct Habitat Loss

Habitat mapping within the Right-of-Way (ROW) was conducted using recent satellite imagery and is presented in the ESIA Report (refer Volume B, Chapter 16). The potential direct impacts of the Project on key habitats used by Critical Habitat-qualifying species within the ROW for the Project are summarised in Table 5-1. Clearance will result in the loss of approximately 106.2 ha of wetland from the ROW, of which 33.3 ha is degraded and 39.5 ha is partially cultivated. Some wetlands within the ROW will be rehabilitated following the construction of viaducts over the wetlands (e.g. at Namanve CFR), which will reduce the residual impacts on wetlands. The Project will also result in the clearance of 20.3 ha of forest (closed forest and open forest/woodland) and 3.6 ha of aquatic habitats (i.e. rivers and streams). Approximately 50.3 ha of vegetation with lower biodiversity value (i.e. scrubland, fallow land and urban forest) will also be removed from the ROW, although these areas are not likely to provide important habitat for the critical habitat qualifying species identified. Additionally, a large area of settlements including urban areas will be lost due to the Project (totalling approximately 120.0 ha). Notably none of the known feeding or roosting sites for the hooded vulture in Kampala (e.g. abattoirs) will be impacted by the Project.

Table 5-1: Land Use / Habitat types within the ROW for key habitats utilised by Critical Habitat-qualifying species

Vegetation / Habitat	Area within ROW (Hectares)					
	Phase 1 Mainline	% Phase 1 Mainline	KSB Section	% KSB	Total Phase 1	% Phase 1
Settlement Area	68.9	14.4%	51.1	44.1%	120.0	20.2%
Closed Forest	4.6	1.0%	0.0	0.0%	4.6	0.8%
Open Forest / Woodland	15.7	3.3%	0.0	0.0%	15.7	2.6%
Degraded Wetland	25.7	5.4%	7.6	6.6%	33.3	5.6%
Wetland - Partially Cultivated	17.6	3.7%	22.0	19.0%	39.5	6.7%
Wetland - Papyrus	31.4	6.6%	2.0	1.7%	33.4	5.6%
Drainage	2.2	0.5%	1.4	1.2%	3.6	0.6%

5.2.1.2 In-migration, increased access and urbanisation

During the Pre-Construction and Construction Phase, Project-induced in-migration and urbanisation is expected to lead to an increase in the exploitation of natural resources (i.e. papyrus, herbs, grasses and timber) and habitat clearance (natural and modified) due to increased urbanisation and agro-pastoral activities. In-migration may also increase pressure on the natural resources of the protected areas near the Project (i.e. Namanve CFR). This has the potential to increase habitat loss and degradation in the vicinity of the Project for Critical Habitat-qualifying species. Increased natural resource collection is expected to be concentrated in natural habitats within the vicinity of settlements, but may extend to protected areas. Forest stands are most likely to be targeted for fruit and timber collection and wetlands are likely to be targeted for papyrus and clay extraction.

The construction of the expressway will improve accessibility to the Namanve Central Forest Reserve (CFR) that may stimulate illegal exploitation of timber and non-timber forest products. If unregulated, this may further contribute to habitat degradation and a decline in Critical Habitat-qualifying species. Impacts arising from increased access to sensitive biodiversity areas (e.g. Namanve CFR) are expected to be partially mitigated by the construction of a fence along the boundary of the expressway. However, access to the Namanve CFR may potentially be gained at Junction 6 of the expressway (located near the reserve) that serves the Bukasa area on the outskirts of Kampala.

5.2.1.3 Invasive Species

Several invasive species have been recorded in the vicinity of the ROW (i.e. *Mimosa pigra*, *Imperata cylindrica*, *Bidens pilosa*, *Lantana camara* and *Eichhornia crassipes*). These species are aggressive competitors and are capable of progressively dominating areas of terrestrial and aquatic habitats (i.e. wetlands, streams and rivers) used by Critical Habitat-qualifying species. Without control, there is a risk that the movement of heavy machinery, vehicles and human activities may spread these species through the transfer of seeds and rhizomes from currently affected areas to new receptor sites. There is also a risk that the introduction of people, vehicles and goods from outside the area of the Project could result in the introduction of non-native and/or invasive plant species. Such plants can pose a threat to the floristic diversity of Critical Habitats by out competing native species. This risk is expected to be greatest during the Construction phase when soil disturbance and heavy vehicle movements will peak.

5.2.1.4 Aquatic Ecology

During the Construction Phase, surface water quality is expected to be negatively impacted by suspended sediments generated from earthwork activities (e.g. habitat clearance, top-soil removal, stockpiling etc.). The ingestion of water with a high sediment content may adversely affect the health of fauna in habitats directly

downstream of the Project, potentially including wetlands and the Sezibwa River that have been identified as providing habitat for Critical Habitat-qualifying species.

Once constructed, the roadway will act as an obstruction to existing hydrology, with potential loss of perennial and/or ephemeral flow downstream of raised roadway sections, and interception of surface water flows in cutting sections. This could result in the loss of downstream aquatic habitats and species, and may result in the loss of water resources for some species. The drainage structures integrated into the Project design are expected to reduce these impacts. The expected impact to aquatic habitats and species during construction from adverse changes in hydrology and water quality is expected to be of Minor significance prior to mitigation.

In the absence of appropriate management, pollution of surface and ground water through accidental spills or seepages of hydrocarbons, oils, greases, tar, asphalt and/or chemical surfactants during construction could contaminate receiving waters and terrestrial habitats.

5.2.1.5 Noise, Vibration and Airblast

Noise emissions from the construction of the Project, which may affect Critical Habitat-qualifying species, will primarily be associated with the clearance of land, earthworks and hauling of construction materials. Some noise is expected during the Construction phase associated with excavation of rock, road cuttings and construction of overpasses. Construction noise is anticipated to be localised and short-term, and will progress with the construction of the Project roads (see Chapter 11 of the ESIA). Ground-borne vibrations are also expected to be generated during the Pre-Construction and Construction Phase from grading, excavation, heavy vehicle traffic and the use of pumps and generators. It is anticipated that local quarries will be utilised during construction for excavation of rock. The primary impacts of blasting will be excess noise generation, airblast, and ground vibrations. Unmitigated airblast could cause disturbance to fauna within 1–2 km of the blast site. However, blast vibrations are predicted to be imperceptible beyond 300 m of the blast site and are below Australian Standard maximum PPV (10 mm/s) beyond 50 m of the blast site (see Chapter 11 of the ESIA).

Without mitigation measures, it is likely that many fauna species will actively avoid the ROW and surrounding habitat during Construction and into the Operations phase, particular in rural environments. However, some birds currently utilising habitats within and near settlements, including the highly-populated Kampala city, are accustomed to extensive human activity and high ambient noise / vibration levels and as such may not be displaced from existing habitats (e.g. hooded vultures). Noise and vibration is however predicted to cause localised displacement of mammals and birds from their habitats in the Namanve Central Forest Reserve.

5.2.1.6 Air Quality Impacts on Biodiversity

Localised air quality impacts are expected to occur within approximately 50 m of the ROW (depending on weather conditions) during the Pre-Construction and Construction Phase (see Chapter 10). Fugitive dust emissions, measured as particulate matter of varying particle size (e.g. PM₁₀ and PM_{2.5}) will be generated by land clearance and earthwork activities along the proposed expressway, access roads and at material sourcing sites (e.g. borrow pits, quarries).

The magnitude of impacts to fauna arising from the inhalation of these emissions (dust and air pollutants) is dependent on the quantity, composition, respiratory rates and health of fauna. Emissions can cause irritation and impairment of respiratory functions, skin irritation and vision impairment of fauna. Potential impacts may be cumulative in nature. Pollutants could also be ingested (for example when deposited on plants or fruit which is then consumed) and then adversely affect the health of fauna. Impacts to Critical Habitat-qualifying fauna from dust and air pollutants during pre-construction and construction are not expected to be significant, as most fauna is expected to move away from construction areas due to noise and increased human activity.

5.2.1.7 Vehicle Collision with Fauna

During Operations, the volume and speed of vehicle traffic will significantly increase compared to the Pre-construction and Construction Phase, particularly along the eastern section of the KJE mainline. There is a significant risk of accidental mortality and injury to birds as a result of collision with vehicles, which may include Critical Habitat-qualifying species. The risk of collisions is greater at the end of the KJE mainline alignment, compared to the start of the KJE alignment and along the KSB. Hooded vultures are particularly vulnerable as they are more likely to be hit by a vehicle while feeding on carrion on the road or beside the road. The grey crowned crane may also be vulnerable to vehicle collisions due to its relatively large body size and resulting low manoeuvrability for taking off when cars approach.

5.2.2 Impacts on Highly threatened and/or Unique Ecosystems

No impacts on Critical Habitat areas associated with Highly threatened and/or Unique Ecosystems (i.e. those qualifying under Criteria 4) are expected, as no such areas have been identified close to the Project Footprint.

5.2.3 Impacts on Areas Associated with Key Evolutionary Processes

No impacts on Critical Habitat areas associated with key evolutionary processes (i.e. those qualifying under Criteria 5) are expected, as no such areas have been identified close to the Project Footprint.

5.2.4 Impacts on Critical Habitat-qualifying Protected Areas or Internationally Recognised Areas

No protected areas or internationally recognised areas qualifying as Critical Habitat will be directly impacted by the Project. The only protected area in the broad vicinity of the Project identified as likely to qualify as Critical Habitat is the Mabira CFR (see Section 4.7). Impacts from Phase 1 of the Project are not expected to be significant due to the large distance of this protected area from the Project Footprint. The reserve is located approximately 11.5 km northeast from the eastern end of the Phase 1 ROW.

Further details of potential impacts of the Project on biodiversity are provided in chapter 16 of the ESIA Report (Volume B) and the proposed strategy for offsetting impacts on Critical Habitat is provided in Chapter 9 of this Biodiversity Action Plan.

Table 5-2 Analysis of Critical Habitat-qualifying species for the Project

Scientific Name	Common Name	IUCN Red List Status (2018)	Ugandan Red List Status	Qualifying Critical Habitat criteria	Tier	Recorded in field surveys for ESIA? (star indicates recorded only in interviews)	Main Habitat Requirements / Preferences	Likelihood of utilisation of habitat within or near Project Footprint	Justification for Likelihood Assessment
Mammals									
<i>Crocidura selina</i>	Moon shrew	DD	EN	1	UNK	No	Forest specialist	Unlikely	The moon shrew has only been recorded at three sites in Uganda all within high quality forest areas, and has not been recorded since 1989. The Project Footprint does not intersect any large areas of high quality forest habitat likely to support this species.
<i>Lophocebus ugandae</i>	Ugandan mangabey	N/A	VU	2	UNK	No	Forest	Unlikely	Has not been recorded close to Project Footprint. Recorded in the forests along the northern and northwestern shores of Lake Victoria, including Mabira Forest
<i>Mops trevori</i>	Trevor's mops bat	DD	EN	1	2	No	Has been recorded from lowland forest, and may be a forest-savanna mosaic specialist	Low	The IUCN estimated range of the species does not intersect the Project Footprint.
<i>Neoromicia helios</i>	Samburu pipistrelle bat	DD	CR	1	2	No	No data*	Low	The IUCN estimated range of the species does not intersect the Project Footprint.
Birds									
<i>Acrocephalus griseldis</i>	Basra reed-warbler	EN	N/A	1	2	No	Breeds in aquatic vegetation in or around shallow fresh or brackish water, still or flowing	Likely	Part of extant (passage) range intersects Project Footprint. Project Footprint contains suitable habitat.
<i>Aquila nipalensis</i>	Steppe eagle	EN	N/A	1	2	No	Inhabits areas of steppe and semi-desert	Possible occasional visitor	Range includes the whole of Uganda. Usually inhabits steppe and semi-desert which do not occur in vicinity of Project.
<i>Ardeola idae</i>	Madagascar pond-heron	EN	EN	1	2	No	Principally inhabits freshwater wetlands	Likely	Extant (non breeding) range covers the Project Footprint. Project Footprint contains suitable habitat.
<i>Balearica regulorum</i>	Grey crowned-crane	EN	EN	1	2	Yes	Generally widely spread in all habitats but tend to avoid forests	Confirmed	Recently recorded in field surveys in the vicinity of the ROW

Scientific Name	Common Name	IUCN Red List Status (2018)	Ugandan Red List Status	Qualifying Critical Habitat criteria	Tier	Recorded in field surveys for ESIA? (star indicates recorded only in interviews)	Main Habitat Requirements / Preferences	Likelihood of utilisation of habitat within or near Project Footprint	Justification for Likelihood Assessment
<i>Cisticola carruthersi</i>	Carruthers's cisticola	LC	-	2	2	No	Occurs in papyrus swamps	Likely	Extant (resident) range covers the Project Footprint. Project Footprint contains suitable habitat.
<i>Crithagra koliensis</i>	Papyrus canary	LC	-	2	2	No	Papyrus swamps and nearby cultivated areas	Likely	Extant (resident) range covers the Project Footprint. Project Footprint contains suitable habitat.
<i>Gyps africanus</i>	White-backed vulture	CR	EN	1	2	No	Primarily a lowland species of open wooded savanna, particularly areas of <i>Acacia</i> .	Possible occasional visitor	Extant (resident) range includes the whole of Uganda. No areas dominated by <i>Acacia</i> recorded in Project footprint.
<i>Laniarius mufumbiri</i>	Papyrus gonolek	NT	-	2	2	No	Confined to papyrus swamps and beds	Likely	Papyrus wetlands occur in Project Footprint. Extant (resident) range includes the Project Footprint.
<i>Necrosyrtes monachus</i>	Hooded vulture	CR	EN	1	2	Yes	Often associated with human settlements north of the Equator, but is also found in open grassland, forest edge, wooded savanna, desert and along coasts	Confirmed	Recently recorded in field surveys in the vicinity of the ROW. Also recorded in long-term monitoring program at various sites in Kampala.
<i>Phyllastrephus hypochloris</i>	Toro olive greenbul	LC	-	2	2	No	Forest are most important, but wetlands and shrublands also suitable	Likely	Extant (resident) range includes the Project Footprint. Project Footprint includes suitable habitat, though few areas of forest present in Footprint.
<i>Ploceus castanops</i>	Northern brown-throated weaver	LC	-	2	2	Yes	Wetland specialist	Confirmed	Recently recorded in ESIA field surveys in the Namanve Wetland
<i>Psittacus erithacus</i>	Grey parrot	EN	VU	1	2	Yes	Forest generalist	Confirmed	Recently recorded in field surveys in the vicinity of the ROW
<i>Ptilopachus nahani</i>	Nahan's partridge	VU	-	2	2	No	Found in lowland primary forest	Unlikely	Recorded in Phase 2 bird surveys near Mabira CFR which is a substantial distance from the Phase 1 Project Footprint. Known to inhabit Mabira CFR. No primary forest occur within or close to the Project Footprint.

Scientific Name	Common Name	IUCN Red List Status (2018)	Ugandan Red List Status	Qualifying Critical Habitat criteria	Tier	Recorded in field surveys for ESIA? (star indicates recorded only in interviews)	Main Habitat Requirements / Preferences	Likelihood of utilisation of habitat within or near Project Footprint	Justification for Likelihood Assessment
<i>Torgos tracheliotos</i>	Lappet-faced vulture	EN	CR	1	2	No	Inhabits dry savanna, arid plains, deserts and open mountain slopes. Also found at the edge of forests.	Possible occasional visitor	Extant (non breeding) range includes Project Footprint. Project Footprint does not contain their preferred habitat.
Fish									
<i>Clarias alluaudi</i>	Alluaud's catfish	LC	-	2	2	Yes	Occurs in rivers, streams, swamps and lakes	Confirmed	Recorded in Kasaala (Mbalala) Wetland and Namanve Wetland in the field surveys for the ESIA
<i>Labeo victorianus</i>	Ningu	CR	N/A	1	2	No	Lakes*	Very Unlikely*	Literature review indicates may only be found in small satellite lakes of Lake Victoria with very restricted estimated extent of occurrence. Distribution uncertain.
<i>Oreochromis esculentus</i>	Singidia tilapia	CR	N/A	1	2	No	Lakes*	Very Unlikely*	As above
<i>Oreochromis leucostictus</i>	Blue spotted tilapia	LC	-	2	2	Yes	Lagoon specialist. Also occurs in wetlands.	Confirmed	Recorded in Mayanja Wetland and Namanve Wetland in the field surveys for the ESIA
<i>Oreochromis variabilis</i>	Victoria tilapia	CR	N/A	1	2	No	Lakes*	Very Unlikely*	Literature review indicates may only be found in small satellite lakes of Lake Victoria with very restricted estimated extent of occurrence. Distribution uncertain.
<i>Pollimyrus nigricans</i>	Dark stonebasher	LC	-	2	2	Yes	Shallow and muddy bottom waters	Confirmed (downstream)	Recorded in Sezibwa River in ESIA surveys
<i>Pseudocrenilabrus multicolor</i>	Egyptian mouthbrooder	LC	-	2	2	Yes	Occurs among submerged plants and in open water zones enclosed by papyrus swamps	Confirmed	Recorded in Mayanja Wetland, Kansanga Wetland and Namanve Wetland in the field surveys for the ESIA
Insects									
<i>Abisara simulacris</i>	-	DD	E	2	UNK	No	Forest*	Possible*	Butterfly species recorded within the Mabira CFR or other forested areas within the DMU. While there is significant diversity regarding their distribution and habitats, may occur in forested areas within Project Footprint.

Scientific Name	Common Name	IUCN Red List Status (2018)	Ugandan Red List Status	Qualifying Critical Habitat criteria	Tier	Recorded in field surveys for ESIA? (star indicates recorded only in interviews)	Main Habitat Requirements / Preferences	Likelihood of utilisation of habitat within or near Project Footprint	Justification for Likelihood Assessment
<i>Anthene alberta</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Borbo kaka</i>	-	DD	RR	2	UNK	No	Forest*	Possible*	As above
<i>Caenides dacena</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Cephetola cepheia</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Dixeia dixeyi</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Epitola carilla</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Epitola catuna</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Epitolina catori</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Euptera elabontas</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Euryphura albimargo</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Euryphura vansomerani</i>	-	DD	E	2	UNK	No	Forest*	Possible*	As above
<i>Hypocopelates ugandae</i>	-	DD	E	2	UNK	No	Forest*	Possible*	As above
<i>Liptena opaca</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Lolaus yalae (bansana)</i>	-	DD	E	2	UNK	No	Forest*	Possible*	As above
<i>Micropentila mpigi</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Micropentila victoriae</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Mimacraea fulvaria</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Neptis clareii</i>	-	DD	E	2	UNK	No	Forest*	Possible*	As above
<i>Omipholidotos ntebi</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Pentila umangiana</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above

Scientific Name	Common Name	IUCN Red List Status (2018)	Ugandan Red List Status	Qualifying Critical Habitat criteria	Tier	Recorded in field surveys for ESIA? (star indicates recorded only in interviews)	Main Habitat Requirements / Preferences	Likelihood of utilisation of habitat within or near Project Footprint	Justification for Likelihood Assessment
<i>Spindasis crustaria</i>	-	N/A	CR	1	UNK	No	Forest*	Possible*	As above
<i>Tanuetheira timon</i>	-	N/A	EN	1	UNK	No	Forest*	Possible*	As above
<i>Thermoniphas albocaerulea</i>	-	DD	E	2	UNK	No	Forest*	Possible*	As above
Flora									
<i>Mikania microptera</i>	-	N/A	EN	1	UNK	No	Forest*	Unlikely*	Previously recorded in forest habitats. None of the known sites for the species occur close to the Project Footprint. Not recorded in field surveys. Significant uncertainty exists regarding distribution and habitats in which it occurs.
<i>Sabicea entebbensis</i>	-	N/A	EN	1	UNK	No	Forest*	Unlikely*	As above

6. BIODIVERSITY MANAGEMENT TARGETS AND ACTIONS

6.1 Avoidance

The first step in the mitigation hierarchy is to avoid impacts. Avoidance measures are largely implemented in the design phase.

6.1.1 Target A: Avoid habitat loss and degradation

Action 1: Design Project components to avoid impacts on large areas of terrestrial, wetland and aquatic habitat and species:

- ▶ Ensure the Project footprint is designed to be as spatially compact as is feasible to reduce impacts on biodiversity and habitats;
- ▶ Avoid siting access roads, the main expressway, ancillary infrastructure and construction infrastructure within areas of high quality habitat or priority biodiversity features where feasible (e.g. forested habitat, wetland habitat);
- ▶ Ensure final design includes the development of the Namanve Central Forest Reserve viaduct (and other planned viaducts in other wetlands) to facilitate fauna movement;
- ▶ Ensure Project design includes appropriate drainage and pollution control structures to prevent impacts on hydrology and water quality (e.g. viaducts, culverts, drainage channels, wastewater treatment systems, oil/water separators);
- ▶ Locate temporary accommodation camps away from protected areas and other priority habitats where feasible; and
- ▶ Avoid areas important for priority species where feasible.

Action 2: Avoid impacts to priority habitats during clearance:

- ▶ Identify no-go zones, such as wetlands, natural habitat and designated protected areas;
- ▶ Clearly delineate and mark no-go zones on maps and on-the-ground;
- ▶ Ensure staff and personnel are fully aware of these zones (e.g. during inductions) and the prohibitions on disturbing these areas; and
- ▶ Avoid disturbance to waterways through establishment of buffer zones in riparian areas and pre-clearance checks.

Action 3: Avoid introduction of invasive plant species:

- ▶ An invasive species prevention protocol should be implemented to prevent the introduction and transfer of invasive species. This should include the avoidance of affected areas by staff and vehicles where possible. A record should be kept of all affected areas; and
- ▶ Only non-invasive local/indigenous species should be used for revegetation.

6.1.2 Target B: Avoid disturbance to fauna

Action 1: Avoid introduction of pests:

- ▶ Adhere to organic waste management procedures to avoid attracting pests as outlined in the ESMMP (Volume D).

Action 2: Avoid disturbance to fauna from artificial lighting:

- ▶ Avoid using artificial lighting where possible as this causes disturbance to priority habitats and species;
- ▶ Avoid the use of lighting on the primary access road where possible; and
- ▶ Use capped and directional lighting where possible.

Action 3: Avoid disturbance to fauna through noise, vibration and air blast:

- Avoid disturbing priority species during peak sensitive times (i.e. dusk, dawn and during the morning) by blasting during the afternoons only.

Action 4: Avoid adversely impacting fauna and their habitats through spills of hazardous materials:

- ▶ Avoid spills of hydrocarbons and other hazardous materials (e.g. paints, solvents etc.) through adherence to Hazardous Materials Management as outlined in the ESMMP (Volume D).

6.2 Minimisation and Management

The second step in the mitigation hierarchy is to minimise adverse Project-related impacts on terrestrial habitats, flora, fauna and aquatic biodiversity in and around the Project.

6.2.1 Target C: Minimise habitat loss and degradation

Action 1: Minimise disturbance to remnant/retained habitats adjacent to the Project footprint:

- ▶ Ensure appropriate permits and approvals are obtained from the Government of Uganda for disturbance of vegetation for the Project (e.g. Permit to Carry Out a Regulated Activity in a Wetland/River Bank/Lake Shore);
- ▶ Clearly mark protected/priority flora species in the field to be retained (e.g. using flagging tape). Personnel and contractors must be instructed to protect vegetation that has been marked;
- ▶ Clearly delineate vegetation to be removed to minimise disturbance to surrounding habitats;
- ▶ Minimise access, disturbance to land and clearing of vegetation to solely the footprint, to prevent unnecessary ground disturbance and to protect areas of known high biodiversity conservation value;
- ▶ The ROW and existing roads should be used to access the construction sites wherever possible;
- ▶ Develop, maintain and utilise Vegetation Clearing Permits to ensure that there are clear, written guidelines for clearing, what is to be cleared and what is to be retained and maintain records of all completed permits (e.g. can be developed as, or within, a Standard Operating Procedure (SOP));
- ▶ Retain vegetation in the areas surrounding the Project footprint by pruning instead of total clearance in accordance with safety clearance requirements;
- ▶ Access roads should not be placed in areas of forested or wetland vegetation. However, if there are no alternate options the width of these roads should be kept to the minimum possible distance;
- ▶ Maintain large, hollow-bearing trees wherever feasible;
- ▶ Vegetation and topsoil removal should be minimised to the extent practicable by retaining trees and vegetation or clipping/pruning tree branches rather than complete removal of trees.

- ▶ Use of fire or herbicides to clear vegetation to be prohibited;
- ▶ Ensure appropriate management of wetland habitats during construction to minimise disturbance and vegetation clearance. This should include the placement of access roads outside of wetland areas wherever possible, prevention of sedimentation of wetlands and waterways, the decommissioning of temporary infrastructure in wetland areas (e.g. access roads along edges of ROW for the construction of viaducts) and the effective removal of remaining construction wastes to prevent the use of these materials for wetland reclamation;
- ▶ Minimise impacts on Banda Tree Nursery where feasible (note direct impacts on the nursery are expected to be compensated for via the implementation of the Resettlement and Livelihood Restoration Plan, refer Volume D).

Action 2: Minimise erosion, pollution, dust and suspended sediments:

- ▶ Schedule major earthworks and grading operations for early in the dry season. Avoid conducting earthworks in the wet / rainy season or periods of high intensity rainfall wherever possible;
- ▶ Confine vehicle movement to designated access routes and roads. Vehicles should use the ROW to access the construction sites wherever possible;
- ▶ Maintain root systems (wherever practical) in areas to be cleared of vegetation, to maintain soil stability by cutting vegetation at ground level;
- ▶ Minimise dust and other air pollution emissions by using equipment with industry standard reduction systems and comply with applicable standards, where practicable;
- ▶ Employ dust suppression (e.g. water spraying) on roads and in construction areas during the dry season to minimise generation of wind-blown dust;
- ▶ Install erosion and sediment control structures such as silt fences and sediment ponds at suitable locations to filter or collect eroded sediments from turbid runoff, where necessary; and
- ▶ Implement all commitments outlined in the ESMMP (Volume D) regarding management and monitoring of erosion, dust, hydrology and water quality.

Action 3: Minimise invasive species introduction and spread:

- ▶ Implement an eradication program to remove existing and new introduced and/or invasive species, particularly along roadsides and construction sites, as well as continuously checking existing disturbed areas and newly disturbed areas for seedlings/saplings;
- ▶ Mechanical clearing or thinning should generally be preferred to the use of herbicides for vegetation maintenance in sensitive locations because it is less likely to damage desirable regenerating vegetation and soil seed banks;
- ▶ Prohibit the use of fire for invasive species control/eradication as this encourages weed species growth rather than suppress them;
- ▶ Consider eradication programs for pest fauna species (e.g. rats);
- ▶ Control measures for weed management should include wash down facilities, controlled access to designated areas, ongoing monitoring and personnel training;
- ▶ Disposal of wastes (during construction) in appropriate receptacles (e.g. landfill) and should be covered to prevent wind-blown litter, odours, and to limit access by native fauna and pest species;

- ▶ Conduct continuous awareness raising, training and site inspections regarding introduction and invasion of invasive fauna and spread of diseases; and
- ▶ Ensure re-planting of roadside strips and other areas to be revegetated using indigenous and locally native species that are non-invasive.

6.2.2 Target D: Minimise disturbance to fauna

Action 1: Reduce the likelihood and severity of injury or death caused by vehicle/machinery collisions:

- ▶ Avoid driving at dusk, dawn and at night when not essential for Project construction;
- ▶ Strict implementation of speed control measures, as well as warnings at animal crossings (i.e. forested and rural areas). Speed control measures should also be applied along all access roads to reduce the risk of incidents during construction;
- ▶ Reduce speed limits in areas of likely animal crossings and adhere to Ugandan traffic and road laws during construction;
- ▶ Conduct sensitive habitat clearance along the expressway – clearing habitat in a progressive manner and always allowing a path of natural vegetation / uncleared land by which fauna can move to other suitable areas of habitat i.e. do not conduct clearing in a way that creates islands of natural habitat;
- ▶ Move roadkill on Project roads and the main expressway to the sides of roads so that carrion-eaters (e.g. vultures, marabou storks) are not hit by other vehicles during construction or during operation;
- ▶ Develop wildlife injury and mortality reporting procedures, including providing identification kits (e.g. photographs, descriptions) of priority fauna, emergency care advice and any relevant phone numbers for additional wildlife care if necessary; and
- ▶ Conduct sensitive habitat clearance in wetland areas to allow wetland birds to move away from sites before land clearance. Avoid vegetation clearance in primary bird nesting periods (i.e. wet season) where feasible. In order to prevent birds nesting in the wetland areas that are to be cleared, install devices such as CDs, bird scaring kites or netting over the relevant areas.

Action 2: Minimise the severity of noise and vibration:

- ▶ Ensure all noise generating activities are within legal noise limits and disturbance levels kept to a minimum and restricted to operational areas;
- ▶ Avoid use of noisy machinery and vehicles at dusk, dawn and at night where practical;
- ▶ Ensure roads are well maintained with the highway surface in good condition to help reduce noise pollution;
- ▶ Implement a revegetation scheme that takes into account the use of vegetation as a barrier to noise pollution. Revegetation should be prioritised in areas of the ROW close to sensitive receptors (see Revegetation Plan, Volume D).

Action 3: Mitigate artificial lighting disturbance:

- ▶ Install capped and directional lighting to minimise impacts on surrounding fauna, where practical;
- ▶ Provide natural buffers (e.g. trees) to minimise light dispersal from stationary lights and vehicle headlights; and
- ▶ Provide gaps in expressway lighting in sensitive ecological areas (e.g. Namanve wetland, Kasala wetland) to reduce ecological impact.

Action 4: Minimise unauthorised access to the habitats adjacent to the ROW (e.g. stopping for resource extraction on expressway shoulders), protected areas and/or wetlands:

- ▶ Periodic patrolling of the expressway for illegal activity. Cooperate with the government authorities to prevent illegal settlements, infilling of wetlands and illegal resource extraction in wetland areas, protected areas and within the revegetated land owned by UNRA;
- ▶ Establish signage identifying illegal activities in the ROW, and in any protected areas or wetlands traversed by the expressway; and
- ▶ Fencing should be provided along the whole expressway to prevent unauthorised access from individuals outside the ROW and vehicles not entering at designated entry/exit points.

Action 5: Limit and prohibit natural resource collection, hunting and fishing by personnel alongside the ROW:

- ▶ Develop, implement and communicate site procedures to minimise and/or restrict access to designated areas during construction and operation;
- ▶ Prohibit construction and maintenance staff and contractors from hunting, fishing, buying or trading of wildlife as well as the collection of aquatic resources, timber and NTFPs to help conserve existing fauna and forest resources, particularly in forest patches and wetlands; and
- ▶ Conduct environmental education and awareness programs for all Project staff and contractors (e.g. through staff inductions). This will improve the understanding of the importance of forest resources for local communities, and ensure that the prohibitions and penalties regarding hunting, wildlife trade and the collection of other forest resources are widely known.

Action 6: Implement all other measures outlined in Table 7-1 and the ESMMP.

6.3 Rehabilitation and Revegetation

After mitigation and management, restoration and rehabilitation activities in and around the Project should be undertaken in accordance with the mitigation hierarchy to further reduce residual impacts on biodiversity and ecosystem services. Further detail on revegetation for the Project is provided in the Revegetation Plan (Volume D).

6.3.1 Target E: Restore habitats and priority flora in and around the ROW to reduce residual impacts

Action 1: Establish a seed store and plant database:

- ▶ A consistent supply of quality seed should be maintained for use during progressive revegetation. Seed should be collected from the local area or purchased off-site (if inadequate seed stock is available). Seed purchased off-site should be from similar elevations / region and should be weed-free, to the extent possible.
- ▶ Seed collectors should be suitably trained or qualified to correctly identify the plant species from which seeds are collected.
- ▶ Seeds should be collected in a sustainable manner from plants in multiple local sub-catchments to maximise genetic diversity and from healthy, robust individuals with desirable characteristics.

- ▶ The criteria for seed storage and germination will vary according to the species' requirement however all seed should be cleaned before storage to remove as much debris and chaff as possible and should be stored in dry and insect/vermin-proof containers.
- ▶ Seeds purchased off-site should be bought from reputable merchants to avoid contamination with weed species and non-viable seed.
- ▶ Seed containers should be clearly labelled with details of the species, date collected or purchased and collection location (including elevation). This information should also be inputted into a seed storage database.

Action 2: Establish a nursery:

- ▶ Construct and maintain a nursery with sufficient capacity and range of native species to sustain the Project's revegetation program. The nursery should be supplemented by commercially supplied native seed mixes or seedlings, if necessary.
- ▶ A nursery inventory, purchasing and planting schedule should be maintained to anticipate planting requirements at least eighteen months in advance of anticipated planting.
- ▶ The nursery inventory and the purchasing and planting schedule should be evaluated each year prior to the onset of the dry season to prepare for planting prior to the onset of wet season rains.
- ▶ The seedling inventory requirements should account for yearly die-off of planted seedlings, with stock available for replacement plantings (determined during monitoring).

Action 3: Restore, rehabilitate and revegetate terrestrial habitat within the Project Footprint:

- ▶ Ensure topsoil is stockpiled separately during vegetation clearance for use in revegetation activities (or transferred directly to areas requiring progressive revegetation);
- ▶ Progressively rehabilitate Project-disturbed areas in a systematic, efficient and timely manner. Rehabilitation should be 'like-for-like or better' to compensate for the loss of habitat from the Project Footprint;
- ▶ Re-establish an ecosystem that functions in a similar manner (or better) than that which existed before disturbance (e.g. wetlands);
- ▶ Create vegetated areas alongside road slip-lanes, embankments and within the ROW to develop a "green" corridor either side of the expressway;
- ▶ Maximise the use of these rehabilitation areas for noise, visual and environmental buffers along the ROW in line with the Revegetation Plan;
- ▶ Flora of differing structural characteristics and successional stage should be selected to promote quick establishment and provide a diverse, resilient floristic assemblage of multiple canopy layers (i.e. herbaceous, shrub and tree cover). This should include a mix of trees, shrubs, annual grasses, perennial grasses, annual forbs, perennial forbs, sedges and rushes;
- ▶ Use native species of local provenance to establish self-sustaining vegetative communities sourced from local seed banks;
- ▶ In areas close to wetland habitats, utilise flora species favoured by wetland bird species for nesting. In other areas of the alignment, consider the use of fruit bearing tree species that should attract canopy dwelling bird species;

Action 4: If possible, restore and replace any lost flora of conservation significance with newly planted seedlings throughout the life of the Project:

- ▶ Collect, relocate and propagate indigenous species; and
- ▶ Incorporate rare and legally protected species into planting programs (e.g. local orchid species, *Milicia excelsa* and *Markhamia lutea*).

Action 5: Restore “natural” water bodies and wetlands within and around the ROW:

- ▶ Revegetate wetland areas, with a focus along discharge lines downstream of the ROW;
- ▶ Use native wetland species of local provenance to establish self-sustaining vegetative communities sourced from local seed banks or from the Project nursery;
- ▶ Remove all temporary construction infrastructure built in wetland areas (e.g. access roads along edges of ROW required for viaduct construction) and revegetate the wetland areas affected; and
- ▶ Follow best practise for wetland plant re-establishment.

Action 6: Implement other measures as per the Revegetation Plan (Volume D).

6.4 Monitoring, Evaluation and Adaptive Management

Implementation of a monitoring and evaluation program is required to assess the effectiveness of the mitigation measures and to inform the requirement for adaptive management. A proposed set of monitoring actions and indicators for adaptive management has been developed based on the mitigation measures designed for the Project. The proposed monitoring measures are summarised in Table 8-1 and the key monitoring targets and actions are outlined below.

6.4.1 Target F: Monitoring and Adaptive Management Measures

Action 1: Monitor the restriction of vegetation clearance to demarcated areas in and around the ROW:

- ▶ Ensure adherence to the Vegetation Clearing Permit process;
- ▶ Ensure that no vegetation has been removed in non-demarcated areas (if so, these must be rehabilitated) during land clearance activities;
- ▶ Ensure no vegetation is damaged / removed in the vegetated areas surrounding the Project footprint during operations.

Action 2: Implement habitat monitoring programs in and around the ROW:

- ▶ Pre and post-construction assessments of habitat distribution and quality;
- ▶ Five-yearly during concession period, conduct visual interpretation of satellite imagery to map/gauge habitat changes in distribution, loss and rehabilitation for the life of the Project with independent evaluation and reporting to UNRA/NEMA;
- ▶ Develop and distribute vegetation monitoring questionnaires / field survey data sheets to personnel for use during routine maintenance to report on habitat quality;

Action 3: Monitor impacts on fauna, particularly priority fauna:

- ▶ Develop wildlife injury and mortality reporting procedures for construction and maintenance personnel, including providing identification kits (e.g. photographs, descriptions) of priority fauna, emergency care advice and any relevant phone numbers for additional wildlife care;
- ▶ Develop wildlife monitoring databases detailing results of monitoring, injuries and other relevant information and should be maintained for the life of the Project

- ▶ Assess wildlife monitoring data against key performance criteria.

Action 4: Perform regular monitoring for the spread of pests and weeds:

- ▶ Monitor the spread and distribution of pests and weeds throughout the life of the Project;
- ▶ Monitor invasive species colonisation during routine maintenance of the ROW and related Project structures;
- ▶ Increase invasive species eradication measures where high risk weeds are detected in new areas;
- ▶ Establish a reporting system for personnel to report any encounters or locations of known pests and weeds;
- ▶ Make available key pest and weed identification kits (with photographs) to all personnel and contractors.

Action 5: Track and evaluate the implementation of the actions outlined in the BAP:

- ▶ Track the implementation of management and monitoring actions outlined in the BAP to ensure all measures are implemented effectively and on schedule;
- ▶ Periodically analyse monitoring data to evaluate the success of biodiversity management actions implemented against existing commitments;
- ▶ Improve measures that are determined to be ineffective.

Action 6: Establish success criteria for the revegetation and restoration of non-operational areas:

- ▶ Develop detailed success criteria for re-vegetation and habitat restoration (e.g. species diversity and density) and include them in the updates of the Revegetation Plan.
- ▶ Periodically monitor and evaluate the success of re-vegetation and habitat restoration activities.

The specific details of the proposed monitoring program are provided in Chapter 8.

7. SUMMARY OF MANAGEMENT AND MITIGATION MEASURES

A summary table of management and mitigation measures relating to Targets A-E is provided in Table 7-1 on the following page. Measures in the table are tailored specifically for each Project Phase and Project activity / impact. The key relevant target(s), potentially impacted biodiversity features and priority values for each are also specified. Specific measures relating to monitoring (Target F) are provided in Chapter 8.

Table 7-1 Proposed avoidance, management, mitigation and restoration measures to minimise impacts on the ecological characteristics at most risk from Project-related activities

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
Pre-Construction and Construction Phases				
Vegetation Clearance	A, C	Habitat and flora	Forested areas (e.g. near Sezibwa forest) and wetland habitats passed by the Expressway (e.g. Namanve wetland).	<p>Ecologically sensitive areas should be avoided wherever feasible. Rest areas, toll stations etc. should not be sited near sensitive ecological areas e.g. wetlands, high quality forest.</p> <p>Avoid the placement of access roads, the main expressway, ancillary infrastructure and construction infrastructure within areas of high quality habitat or priority biodiversity features (e.g. forested habitat, wetland habitat). If there are no possible alternatives the width of access roads should be kept to a minimum.</p> <p>Ensure the Project footprint is designed to be as spatially compact as is feasible to reduce impacts on biodiversity and habitats.</p> <p>Ensure appropriate permits and approvals are obtained from the Government of Uganda for disturbance of vegetation for the Project (e.g. Permit to Carry Out a Regulated Activity in a Wetland/River Bank/Lake Shore).</p> <p>Develop and implement a Vegetation Clearance Permit system to record, manage and ensure only vegetation that is removed is necessary for the Project.</p> <p>Clearly mark protected/priority flora species in the field to be retained as No-Go Zones (e.g. using flagging tape). Personnel and contractors must be instructed to protect vegetation that has been marked.</p> <p>Minimise impacts on Banda Tree Nursery where feasible (note direct impacts on the nursery are expected to be compensated for via the implementation of the Resettlement and Livelihood Restoration Plan, refer Volume D).</p> <p>Vegetation and trees to be cleared should be clearly marked before clearance to minimise impact areas.</p> <p>Minimise access, disturbance to land and clearing of vegetation to solely the footprint, to prevent unnecessary ground disturbance and to protect areas of known high biodiversity conservation value. Vegetation removal outside required footprint should be prohibited.</p> <p>Existing roads and the ROW should be utilised to access construction sites wherever possible.</p> <p>Maintain large, hollow-bearing trees wherever feasible.</p> <p>Prohibit the use of fire and herbicides to clear vegetation</p> <p>Ensure topsoil is stockpiled separately during vegetation clearance for use in revegetation activities (or transferred directly to areas requiring progressive revegetation)</p> <p>Consult with relevant government departments and NGOs regarding the presence of threatened flora and avifauna species. If possible, retain threatened tree species identified in buffer areas during habitat clearance activities.</p> <p>Identify no-go zones, such as wetlands, natural habitat and designated protected areas. Clearly delineate and mark no-go zones on maps and on-the-ground.</p>

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				A valuation of all affected trees should be conducted and compensated according to measures in the RLRP . This will include trees removed within protected areas.
				Vegetation and topsoil removal should be minimised to the extent practicable by retaining trees and vegetation or clipping/pruning tree branches rather than complete removal of trees. If possible, retain roots in the ground to reduce erosion and to facilitate rapid revegetation.
				An ecologist should be on call during habitat clearance work to provide assistance / advice regarding any biodiversity issues if required.
	A, C	Wetlands and Aquatic Biodiversity	Wetland habitats passed by the alignment (e.g. Kinawataka, Namanve, Kasala)	Avoid the placement of access roads, the main expressway, ancillary infrastructure and construction infrastructure within areas of permanent, ephemeral wetlands or waterways wherever possible.
				Areas of wetland vegetation to be disturbed should be clearly marked before land is cleared.
				Prioritise the retention of wetland and riparian flora where practicable.
				If location in wetland habitats is unavoidable, minimise the size of the Project design in wetland areas to reduce the amount of wetland habitat clearance required.
				Development of the Namanve Central Forest Reserve viaduct to facilitate fauna movement (and viaducts in other areas of wetland passed by the KJE and KSB alignments).
				Conduct sensitive habitat clearance in wetland areas to allow wetland birds to move away from sites before land clearance.
				Avoid vegetation clearance in primary bird nesting periods (i.e. wet season) where feasible.
				In order to prevent birds nesting in the wetland areas to be cleared install devices such as CDs, bird scaring kites or netting over the relevant areas.
				Implement appropriate erosion and sediment control measures as outlined in the Water Management Plan for the Project (Volume D).
	A, C	Fauna	Forested areas (e.g. near Sezibwa forest) and wetland habitats passed by the Expressway (e.g. Namanve wetland).	Minimise loss of large, hollow-bearing trees and prune these wherever feasible
				Prohibit site staff and contractors from hunting, fishing and egg collecting in areas surrounding the Project footprint.
				Progressive and sensitive clearing of vegetation in a controlled manner (to allow mobile fauna to move away from clearance areas) giving priority to manual clearing near sensitive vegetation, steep terrain, and along local waterways.
Fencing	C, D	Habitats and flora	ROW	Ensure installation of fencing/barriers is prioritised in sensitive biodiversity areas along the expressway to restrict access and resource use. Fencing is also likely to reduce roadkill. Priority areas include the area of Namanve CFR (fencing unlikely to be required in areas where viaducts constructed). The Namanve CFR area is from chainage KJE 6+500 to 8+400 and 9+000 to 12+000 (refer Figure 3-3). The other key sensitive biodiversity area is Sezibwa Forest which intersects alignment from chainage KJE 31+200 to 31+700.

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				During construction, fence off likely entry points to the Project footprint or similarly create physical barriers to prevent unauthorised access (e.g. concrete bollards).
				Fencing should also be installed along roadsides and embankments restricting access to revegetated zones surrounding the road.
Worker management during construction / impacts on surrounding ecosystems.	C, D	Habitat and flora	ROW	Locate temporary accommodation camps away from protected areas and other priority habitats where feasible
				Prohibit site staff and contractors from collecting and trading timber and other NTFPs obtained during land clearance.
				UNRA will be responsible for the workers hired to work on the Project. Site supervision should be conducted regularly to ensure that workers are abiding by land clearance guidelines and not harvesting products from the surrounding area.
				Government authorities (e.g. UNRA, NEMA, MoWE) should have access to the Project site during construction, to help monitor and manage biodiversity impacts
				Alternative timber sources should be provided for construction to prevent the risk of timber being extracted from forested areas near the ROW.
Wildlife/Vehicle Conflict	C, D	Fauna	Active construction sites, borrow pits, quarries and access roads.	Adhere to Ugandan traffic and road laws during construction
				Strict implementation of speed control measures, as well as warning signs at construction sites and along all access roads to reduce the risk of incidents during construction.
				Driver awareness training to be conducted.
				Regularly remove roadkill on Project access roads and the main expressway to the sides of roads so that carrion-eaters (e.g. vultures, marabou storks) are not hit by other vehicles during construction (inspection of Project roads to be conducted at least weekly)
				Avoid driving at dawn, dusk or night in the construction site near priority fauna habitats or when not essential for construction. Construction and transportation within the ROW should be prohibited at night.
Erosion and Sediment Control / Water Quality	C, D	Habitats and flora / wetlands and aquatic biodiversity	Active construction sites near wetland areas or waterbodies.	Implement Erosion and Sediment control measures as outlined in the ESMMP including the measures outlined below.
				Ensure Project design includes appropriate drainage and pollution control structures to prevent impacts on hydrology and water quality (e.g. viaducts, culverts, drainage channels, wastewater treatment systems, oil/water separators)
				Schedule major earthworks and grading operations for early in the dry season. Avoid conducting earthworks in the wet / rainy season or periods of high intensity rainfall wherever possible
				Avoid ground disturbance works within 50 m of a river, stream or wetland unless necessary
				If possible, cut vegetation just above ground-level and retain stumps and root systems to minimise exposure of soil to erosional processes.
				Divert upstream surface runoff from a worksite (e.g. construction areas, quarries) away from exposed areas

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				Install erosion and sediment control structures such as silt fences and sediment ponds at suitable locations to filter or collect eroded sediments from turbid runoff, where necessary
				Re-vegetation of riparian areas and wetland areas with low profile vegetation (e.g. native grass) to promote rapid establishment of vegetation.
				Retain ground-cover and low-profile vegetation. Minimise removal of groundcover and topsoil, where practicable
				Revegetation and ground stabilisation works on exposed areas should be conducted as soon as possible after works are completed in line with the revegetation scheme with priority rehabilitation and revegetation undertaken in high risk areas, such as steep slopes (e.g. embankments) and sites close to rivers, creeks and wetlands;
				To prevent impacts to wetlands, watercourses aquatic ecology and animal passage: <ul style="list-style-type: none"> Construction of bridges or viaducts across major watercourses/wetlands; Construction of culverts at minor watercourses; Works in/near wetlands should only be conducted during the dry season.
				Works through wetland areas should be undertaken in collaboration with the Wetlands Management Department for guidance on sustainable management of the ecosystems
				For any in-stream works carried out (e.g. for bridges, culverts), the worksite should be operated as a closed system to the extent possible to avoid pollution of surrounding surface water, and appropriate erosion and sediment control measures should be employed as per the ESMMP .
				Construction materials, equipment and chemicals should be stored away from flood prone waterways/drainage lines and inundation areas during the rainy season to avoid accidental release to the natural environment.
Dust, Noise, Light and Air Pollution	C, D	Habitats and flora / fauna	Active construction sites	To prevent or minimise impacts to water sources and aquatic ecology where water for construction purposes is abstracted: <ul style="list-style-type: none"> Minimise water usage; Vary water sources along the alignment; Avoid water abstraction from wetlands; Limit water abstraction to wet season.
				Capped and directional lighting to be installed along the expressway.
				The use of artificial lighting and low wattage bulbs in ecologically sensitive areas should be minimised (e.g. Namanve wetland).
				Minimise dust and other air pollution emissions by using equipment with industry standard reduction systems and comply with applicable standards, where practicable.
				Avoid use of noisy machinery and vehicles at dusk, dawn and at night where practical.
				Ensure all noise generating activities are within legal noise limits and disturbance levels kept to a minimum and restricted to operational areas.
				Ensure roads are well maintained with the highway surface in good condition to help reduce noise pollution.

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				Implement a revegetation scheme that takes into account the use of vegetation as a barrier to noise pollution. Revegetation should be prioritised in areas of the ROW close to sensitive receptors (see Revegetation Plan, Volume D).
				Confine vehicle movement to designated access routes and roads. Vehicles should use the ROW to access the construction sites wherever possible.
				Implement measures outlined in the ESMMP to reduce noise and air quality impacts associated with the Project including: <ul style="list-style-type: none"> • Employ dust suppression (e.g. water spraying) on roads and in construction areas during the dry season to minimise generation of wind-blown dust; • Construction activities to be conducted in accordance with national noise standards/guidelines; • Use low emission trucks and mechanical equipment; and • Use sound suppression equipment around major noise emitting machinery
Training	C, D	Habitats and flora	N/A	Provide employee training and awareness programmes regarding biodiversity for all Project staff and contractors (e.g. through staff inductions). This will improve the understanding of the importance of forest/wetland resources, revegetated areas surrounding the ROW, awareness of no-go zones, training on the recognition of invasive species, and an understanding of prohibitions regarding resource extraction.
Invasive Species management	A, C, D	Fauna	Active construction sites	Disposal of wastes (during construction) in appropriate receptacles (e.g. landfill) and should be covered to prevent wind-blown litter, odours, and to limit access by native fauna and pest species;
		Flora		Invasive flora species spread should be minimised by implementing the following preventative controls: <ul style="list-style-type: none"> • Use of local non-invasive plant species for revegetation purposes; • Compliance with the wash-down procedures for vehicles and equipment entering worksites and site access control; • Avoid the transfer and introduction of invasive flora through controlled vehicle use in affected areas / wheel washing to remove seeds and rhizomes; and • Implement an invasive species eradication program within the Project Footprint. • Inspect sites that are sources of construction materials such as borrow pits to ensure that they are free of any invasive species. • Source Murram and subsoil from licensed (by NEMA/District Local Governments) sources according to set contractual environmental and social procedures, • Report any identified invasive species to District local government for long term management.
Accidental release of oil/hydrocarbons/waste during construction.	C	Wetlands and Aquatic biodiversity	Active construction sites, vehicle storage areas, asphalt plant, access roads	Implement waste management measures as outlined in the ESMMP .
Construction Decommissioning & Operations				
	E			Implement the Revegetation Plan for the Project to create a green corridor lining most of the Expressway (see Revegetation Plan, Volume D).

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
Land Clearance and Revegetation		Habitats and flora	Land surrounding the main expressway, revegetated zones	Ensure re-planting of temporarily disturbed areas within the Project footprint and surroundings uses indigenous and locally native species that are non-invasive. Species should be selected in consultation with local committees and may include fruit trees for canopy bird species. Threatened tree species should be considered for the planting scheme where appropriate.
				Vegetative communities in rural areas disturbed during Project construction and operations should be restored where feasible, in a 'like-for-like' manner. Rehabilitation and revegetation should favour re-creation of these habitats to the extent practicable. In areas of degraded vegetation and urban areas passed by the ROW, revegetation should be utilised to improve green/vegetative cover in the landscape and reduce detrimental environmental and social impacts caused by the road's construction and operation.
				Establish roadside vegetation along the expressway. From the edge of the road area to the boundary of the right-of-way, vegetation to be structured with smaller plants near the road and larger trees further away to provide habitats for a wide variety of plants and animals.
				Monitor and maintain rehabilitated / revegetated areas to ensure effectiveness of planting and landscaping.
				Employ remedial measures (e.g. replanting dead or damaged trees or other vegetation types), as required.
				Creation / restoration of key wildlife corridors where feasible connecting areas of existing habitat (e.g. forest, wetlands).
				Native flora of differing structural characteristics and successional stage should be selected to promote quick establishment and provide a diverse, resilient floristic assemblage of multiple canopy layers (i.e. herbaceous, shrub and tree cover). This should include a mix of trees, shrubs, annual grasses, perennial grasses, annual forbs, perennial forbs, sedges and rushes.
				Plant selection for rehabilitation of roadsides near wetland habitat should consider species of known habitat/biodiversity value. This should include trees utilised as nesting habitat for wetland bird species.
				Construct and maintain a nursery and seed store with sufficient capacity to sustain the revegetation program. The nursery should be supplemented by commercially supplied native seed mixes or seedlings, if necessary. Weed free seed sources should be procured to the extent that is possible.
				Implement Project offsetting and supporting conservation actions strategy to provide further benefits to biodiversity in the areas surrounding the Project (see Section 9).
				Use of specific herbicides (for weed control) should be pre-authorised, and usage instructions strictly followed. Application of herbicides should not be permitted during or just before rain events. Mechanical clearing or thinning should generally be preferred to the use of herbicides for vegetation maintenance in sensitive locations because it is less likely to damage regenerating vegetation and soil seed banks.
Decommissioning of construction infrastructure	C, E	Habitats and flora	Ancillary infrastructure sites	Use native wetland species of local provenance to establish self-sustaining vegetative communities sourced from local seed banks or from the Project nursery.
				Revegetate wetland areas affected by construction activities and remove any excess sediment/construction material from wetland sites.
				Removal of access bridges and construction infrastructure in wetland areas and other natural habitat passed by the alignment. Revegetate where appropriate.
				Decommissioning of ancillary infrastructure including equipment storage areas, material stockpiles, access roads and asphalt plants.

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				All areas of stockpiled excess material (e.g. gravel, soil, rocks) should be removed from the Project sites following the completion of construction to prevent communities utilising the material for the continued infilling of wetlands.
Pruning and vegetation management during ROW maintenance	C	Habitats and flora	ROW	<p>ROW vegetation should be regularly maintained using appropriate methods relative to the site's environmental sensitivity.</p> <p>Use of specific herbicides (for weed control) should be pre-authorised, and usage instructions strictly followed. Application of herbicides should not be permitted during or just before rain events.</p> <p>Retain as much vegetation in roadside areas as safe clearances will allow whilst still ensuring driver safety.</p> <p>Mechanical clearing or thinning should generally be preferred to the use of herbicides for vegetation maintenance in sensitive locations because it is less likely to damage regenerating vegetation and soil seed banks.</p>
Degradation of vegetated areas (e.g. wetlands) alongside the ROW.	C, D, E	Habitats (e.g. forests, wetlands)	ROW	<p>Disturbed areas should be progressively rehabilitated when feasible as soon as practicable after completion of works, with priority rehabilitation and revegetation undertaken in high risk areas such as steep slopes and areas close to drainage lines and watercourses.</p> <p>Periodic patrolling of the Project roadside vegetation and surrounding areas for illegal activity. Cooperate with the government authorities to prevent illegal settlements, infilling of wetlands and illegal resource extraction in wetland areas, protected areas and within the revegetated land owned by UNRA.</p> <p>Invasive species should be managed with the following management measures:</p> <ul style="list-style-type: none"> Implement an eradication program to remove existing and new introduced and/or invasive species, particularly along roadsides and construction sites, as well as continuously checking existing disturbed areas and newly disturbed areas for seedlings; Prohibit the use of fire for invasive species eradication as this encourages weed species growth rather than suppression; Consider eradication programs for pest fauna species (e.g. rats); Control measures for weed management should include wash down facilities, controlled access to designated areas, ongoing monitoring and personnel training; and Conduct continuous awareness raising, training and site inspections regarding introduction and invasion of alien fauna and spread of diseases. <p>Maintain secure fences along the expressway to prevent unauthorised vehicular or pedestrian access to the expressway and vegetated areas within the ROW.</p> <p>Ensure the Water Management Plan for the Project continues to be implemented effectively (Volume D).</p> <p>Establish signage identifying illegal activities along the expressway (e.g. timber collection), and particularly in any protected areas or wetlands passed by the expressway.</p>
Wildlife/Vehicle Conflict	D	Fauna	Main expressway	<p>Develop wildlife injury and mortality reporting procedures, including providing identification kits (e.g. photographs, descriptions) of priority fauna, emergency care advice and any relevant phone numbers for additional wildlife care if necessary.</p> <p>Fencing off the expressway in areas where there is a high roadkill incidence of mammals and ground dwelling birds. For example in areas where mammals (e.g. antelopes) are found occasionally on the expressway, install 'deer fencing' or other safeguards.</p>

Project Activity / Impact	Key Relevant Target(s)	Potentially Impacted Biodiversity Features	Priority Values	Proposed Mitigation and Management Measures
				The enforcement of speed limits during the road usage in the Operations phase. This may mean reducing speed limits in areas of high wildlife/vehicle conflict.
				Remove any carcasses from wildlife collisions from the expressway as soon as possible, to prevent further safety incidents and potential collisions with scavengers (e.g. vultures, black kites). Inspections and removals to be conducted at least weekly along the expressway.
				Install signs at potential wildlife crossing points to alert drivers to the potential dangers e.g. Sezibwa forest where medium/large mammals were observed in ESIA surveys.
Dust, Noise, Light and Air Pollution	D	Fauna	Main expressway	<p>Implement dust, noise, light and air pollution control measures as outlined in the ESMMP including:</p> <ul style="list-style-type: none"> • Ensure all noise generating activities are within legal noise limits and disturbance levels kept to a minimum and restricted to operational areas; • Ensure roads are well maintained with the highway surface in good condition to help reduce noise pollution; • Implement a revegetation scheme that takes into account the use of vegetation as a barrier to noise pollution. Revegetation should be prioritised in areas of the ROW close to sensitive receptors (refer Revegetation Plan, Volume D); • Install capped and directional lighting to minimise impacts on surrounding fauna, where practical; • Provide natural buffers (e.g. trees) to minimise light dispersal from stationary lights and vehicle headlights; and • Provide gaps in expressway lighting in sensitive ecological areas (e.g. Namanve wetland, Kasala wetland) where practicable to reduce ecological impact.

8. BIODIVERSITY MONITORING PROGRAM

Biodiversity should be monitored at two spatial scales:

- ▶ Habitat-level – e.g. change in the total area of a particular habitat type, habitat quality, location of habitat boundaries and success of rehabilitation measures;
- ▶ Species level – e.g. change in the presence, location, number of wildlife collision incidents, diversity, numbers of invasive species.

Habitat and species should be monitored to identify any significant or noticeable changes (see Table 8-1). The proposed monitoring program has been developed to provide:

- ▶ Method – key techniques to be used;
- ▶ Frequency – how often the particular monitoring method is to be undertaken;
- ▶ Location – main locations within the ROW and surrounds to be monitored, for example, natural habitat patches;
- ▶ Component – biodiversity value/feature to be monitored;
- ▶ Indicators of change – key values/variables to be monitored for deleterious and beneficial changes;
- ▶ Thresholds – qualitative and/or quantitative measures to indicate a change that requires action. Thresholds are designed to provide an early warning system;
- ▶ First response/s – key actions that can be undertaken immediately to mitigate impacts and/or investigate causes of change. First response is similar to the principle of first aid, often being the quick action to remove or mitigate further risk or threat; and
- ▶ Adaptive responses – short-term and long-term actions that will be required to ensure impacts are mitigated and management measures are continuously improved.

Information collected during this monitoring should be used to enact responses, but also to determine the success and effectiveness of mitigation and management measures. Key performance criteria for the success of these measures to be assessed during the monitoring program are summarised in Table 8-2.

A separate monitoring program will need to be developed at the detailed design stage to monitor the success of offsetting and supporting conservation actions outlined in Chapter 9. This is discussed in Section 9.9.

Table 8-1 Proposed biodiversity monitoring program

Method	Frequency	Locations	Component	Indicator	Threshold	First Response/s	Adaptive Response
Habitat-Monitoring							
Monitoring of land clearance in the ROW	Construction – regular monitoring	Project Footprint	Adherence to ROW boundaries	Areas of land cleared	Land cleared outside of demarked areas	Determine cause, e.g. Project-related, local community.	Project related causes should be managed according to their type. For example: it may be that the workforce were unaware of the clearance boundaries and they should therefore be trained accordingly. Boundaries for clearance may need to be more clearly marked, or clearance activities supervised.
Monitoring of the Project Footprint	Operation - quarterly	Project Footprint Buffer	Rehabilitation	Level of vegetation / land use within the ROW	Land utilised for personal use within the ROW (e.g. agriculture, livestock, logging); a reduction in vegetation in the ROW.	Determine cause and individual/organisation responsible, e.g. Project-related, local community.	If appropriate, enhance protection measures along the ROW (e.g. more regular patrols). Conduct community awareness programs regarding the vegetation and permitted land use in buffer areas. If repeated offences occur, notify the local authorities.
Satellite imagery analysis of habitat types. (5-yearly)	Pre and post construction Five yearly during operations	ROW + 500 m (with particular focus where access to and from the expressway is granted e.g. junctions)	Habitat area	Change in total area of a particular habitat type (e.g. forest, wetlands)	Significant (>5%) reduction in total area between surveys	Assess Vegetation Clearance permit – has over-clearance for the Project footprint caused the decline? Determine cause, e.g. Project-related, drought, resource exploitation, agricultural encroachment, wetland reclamation, settlement development.	Patrol key areas (in consultation with government) to target resource exploitation (i.e. a continuous presence is often enough to deter) Increase habitat rehabilitation/restoration efforts of key areas (e.g. alongside the ROW, wetlands)
Satellite imagery analysis of habitat types (5-yearly)			Habitat distribution	Change in location of habitat boundaries (e.g. forest, wetlands)	Noticeable change of boundaries between surveys		Increase habitat rehabilitation/restoration efforts of key areas (e.g. wetland, forest areas). Inform relevant authorities where habitat degradation has been identified and to target illegal resource exploitation.
Satellite imagery analysis of habitat quality. (5-yearly) Reports of habitat quality undertaken during routine maintenance			Vegetation structure / floristic composition	Change in habitat quality	Noticeable deterioration in quality of one or more habitat types between surveys/reports	Determine cause, e.g. Project-related, drought, resource exploitation	Project-related causes should be managed according to their type, e.g.: Material/waste caused quality decrease – increase protective and preventative measures for spills and leaks

Method	Frequency	Locations	Component	Indicator	Threshold	First Response/s	Adaptive Response
Invasive Species Monitoring							
Reports undertaken during routine maintenance to monitor the presence and distribution of pests and weeds.	Ongoing	In the entire Project area focussing particularly on vegetated roadside areas.	Invasive species	Change in presence, location, area, numbers of invasive species	Presence of a new invasive species Increase in number and/or distribution of one or more invasive species at one site Increase in the number of sites infested with invasive species	Quarantine sites, if possible Begin eradication procedures, e.g. manual weeding, chemical application (e.g. add bright coloured dye to chemical to easily identify sprayed sites) Determine invasion source if possible (e.g. vehicles)	If invasive species outbreaks become problematic, increase wash-down procedures for vehicles and personnel footwear between sites Increase frequency of invasive species control measures (e.g. daily/weekly checks of invasion sites)
Monitoring of invasive species colonisation during routine maintenance and from reports from Project workers.	Construction and Operation	Project revegetated areas and nearby aquatic ecosystems.	Invasive species	Rapid establishment of large numbers of invasive species.	Rapid increase in number and/or distribution of an invasive species at more than one site		
Wildlife-Incident Monitoring							
Wildlife incidence reporting – recording number of deaths, injuries, species, date, time, location, cause of death.	Construction / Operations – conducted as required.	Construction – access roads, construction sites Operation – main expressway	Wildlife-human events	Change in the number, type or frequency of interactions / injuries / deaths	>1 wildlife death or injury per day per 5 km (due to Project activities) OR >2 wildlife deaths or injuries within a week per 5 km (includes bird/bat strike)	Implement wildlife first aid Seek veterinary / medical / expert care, if possible	Consider installing roadkill deterrence measures at key crossing points / high roadkill incidence sites (whatever is feasible): <ul style="list-style-type: none"> Fencing off the expressway areas where there is a high roadkill incidence of mammals and ground dwelling birds. Maintain existing fences. Culverts that can double as animal tunnels under the road Install signs of wildlife crossing points to alert drivers to the potential dangers; and If problems become extreme, consider changes to the speed limit in these areas.
					Death or injury of a priority species (from Project-related cause, vehicle) during construction or Expressway operation	Determine cause Report to government agencies Seek veterinary / medical / expert care, if possible	Increase monitoring of wetlands (or other habitats) to determine the extent of use by the affected species. Ensure habitat is being cleared with respect to sensitive habitat clearance and in line with relevant procedures.

Method	Frequency	Locations	Component	Indicator	Threshold	First Response/s	Adaptive Response
During routine site visits record fauna species seen within the ROW	Ongoing	ROW	Wildlife-human events	Occurrence of rare / threatened / priority species Changes in biodiversity identified in the ROW.	Noticeable change in the type of interactions with wildlife (i.e. conflict, encounters, seen in the ROW)	Investigate causes – e.g. human error, increased number of wildlife, breeding season.	<p>If the particular change represents a risk to human safety, implement safety measures to reduce the risk.</p> <p>If the noticed change is a reduction in priority fauna species – inform the relevant government authorities.</p>
Threat Monitoring							
Monitoring of poaching / hunting incidents noted by staff / reported by communities	Construction and Operations – during routine site visits	Project footprint buffer and surrounding land.(especially in wetlands)	Other threats (logging, resource exploitation, fire, hunting)	Change in extent and/or nature of threats	Significant/noticeable increase in the number of poaching / hunting incidences in areas surrounding the ROW.	Determine possible causes, e.g. Increased accessibility Decreases in income from other income sources	<p>Patrol key areas (in consultation with government) to target resource exploitation where it occurs.</p> <p>Install and repair fencing along the edge of the ROW if required.</p> <p>Investigate initiatives to find alternative income sources</p> <p>Promote sustainable harvesting during community education programs.</p>
Visual monitoring of resource exploitation in habitats surrounding the ROW.					Significant/noticeable increase in the number and extent of resource exploitation events (e.g. logging, charcoal, Papyrus) along the expressway.		
Visual monitoring and recording of fire events in habitats surrounding the ROW.		Project footprint buffer and surrounding land.			Significant/noticeable increase in the number and extent of human and naturally caused fires.	Determine possible causes, e.g. Drought conditions Change in agricultural practices surrounding the ROW.	<p>Promote sustainable & safe agricultural practices surrounding the ROW to relevant communities.</p> <p>Initiate fire-fighting and fire prevention where appropriate.</p>
Rehabilitation / Revegetation Monitoring							
Visual monitoring of the success of vegetation establishment in areas to be revegetated.	<p>Construction – ongoing (at least weekly)</p> <p>Operation – during routine maintenance and after strong</p>	Project footprint (and other revegetated areas e.g. wetlands, junctions, roundabouts)	Revegetation	The success of vegetation establishment	<p>Areas of failed establishment where vegetation has died or poorly established.</p> <p>Areas where soil has not stabilised by vegetation and / or been washed away / damaged during high rainfall events.</p>	Establish cause of failure. This could include: inadequate planting technique, high rainfall events, poor soil quality, herbivory, harvesting by local communities.	<p>Revegetate areas where revegetation was unsuccessful taking measures to ensure the cause of the previous failure is combatted. This may include:</p> <ul style="list-style-type: none">Erosion and sediment control measuresProtection from herbivoryThe maintenance and creation of fencing to protect the vegetation.

Method	Frequency	Locations	Component	Indicator	Threshold	First Response/s	Adaptive Response
	wet season rains						
Visual inspection of levels of degradation in revegetated areas	Operation			Removal of vegetation from ROW areas	Evidence of land clearance, logging activity and charcoal production within the revegetated zones.	Determine cause and individual/organisation responsible, e.g. Project-related, local community.	If appropriate, enhance protection measures along the roadsides (e.g. more regular patrols). Conduct community awareness programs regarding the vegetation and permitted land use in the ROW. If repeated offences occur, notify the local authorities. Revegetate damaged / affected areas
Monitoring of invasive species	Monitor invasive species in the revegetated areas as is outlined above for Invasive Species monitoring.						
Monitor the rate of vegetation establishment and the success of revegetation regarding growth rates, erosion control etc.	Construction / Operations	Project footprint buffer (and other revegetated areas e.g. wetlands, junctions, roundabouts)	Revegetation	Growth rates, species failing to establish, poor erosion control, difficulty obtaining seed/seedlings.	Poor rates of growth of particular species in the planting scheme Poor erosion control provided by some vegetative communities. Inadequate supply of particular stock for revegetation.	Establish likely causes e.g. : Poor soil quality Species unsuitable for revegetation on roadside Particular species Extreme weather events	Amend planting scheme to ensure rapid successful establishment of vegetative communities. This may include changes to: <ul style="list-style-type: none">• Timing of planting• Species utilised in revegetation efforts• Planting methodology
Monitor vegetation to ensure driver visibility / safety	Operations		Revegetation	Height of vegetation, visibility around corners.	Visibility of drivers on the expressway is blocked by vegetation Overhanging branches on the expressway.	Remove and maintain vegetation appropriately e.g. remove overhanging / dead branches, mow roadside verges.	If the problem is a general problem with the revegetation scheme i.e. large trees placed too close to the expressway, the revegetation program can be modified accordingly.
Monitoring of litter / waste revegetated areas	Operations		Revegetation	Litter presence in the revegetated zones	High levels of litter on the roadside and in revegetated areas.	Remove litter in regular patrols Identify likely causes.	If necessary, put measures in place to reduce littering at the roadside. This could include public awareness campaigns and/or signs on the expressway.
Biodiversity Management and Mitigation Measures Monitoring							
Track the implementation of management and mitigation measures outlined in this document ensuring all are implemented and on schedule. Analyse monitoring data accordingly (see Table 8-2).							Review BAP as appropriate.
Offsetting Monitoring							
The offset monitoring program is discussed in Section 9.							

Table 8-2 Key performance indicators and criteria for achievement of BAP targets (achievement of targets to be regularly evaluated as part of monitoring program)

Target	Key Performance Indicator / Criteria	Assessment Timing / Frequency	Consequence for Non-Performance
A1: Design Project components to avoid impacts on large areas of terrestrial, wetland and aquatic habitat and species	Project does not impact on large areas of natural habitat	Pre-construction	Offset and compensate for any loss of natural / Critical Habitat
A2: Avoid impacts to priority habitats during clearance of ROW and construction	No-go zones established and maintained Habitats within no-go zones are unaffected by construction activities No loss of habitat area or quality / condition	Pre-construction / Construction	If identified early in the process, modify construction methodologies to remove effects. Restore habitat quality if impacts have occurred.
A3: Avoid introduction of invasive plant species	An invasive species prevention protocol developed prior to construction No new invasive species detected in the ROW (+50 m)	Pre-construction / Construction / Operations	As per Adaptive Management in Table 8-1
B1: Avoid introduction of pests	No new pest species detected in the ROW (+50 m)	Construction / Operations	As per Adaptive Management in Table 8-1
B2: Avoid disturbance to fauna from artificial lighting	Capped and directional lighting installed where possible and appropriately and maintained Road lighting minimised within Namanve CFR area	Pre-construction / Construction / Operations	Lighting to be replaced with appropriate lighting, and maintained appropriately.
B3: Avoid disturbance to fauna through noise, vibration and air blast	Project monitoring does not detect any significant exceedances of relevant noise and vibration standards	Construction / Operations	Review of mitigation measures. Additional monitoring if required.
B4: Avoid adversely impacting fauna and their habitats through spills of hazardous materials	No spills affecting natural habitats	Construction / Operations	Remediation of impacts. For a significant spill, immediate review of relevant management measures and procedures to further lower risks.
C1: Minimise disturbance to remnant/retained habitats adjacent to the Project footprint	No loss of habitat area or quality / condition outside of designated areas Existing roads and the ROW are being used to access the construction sites wherever possible. Appropriate maintenance and utilisation of vegetation clearance permits.	Ongoing	If identified early in the process, modified construction methodologies to remove effects. Restore habitat quality if impacts above those expected have occurred.
C2: Minimise erosion, pollution, dust and suspended sediments	No loss of habitat area or quality / condition surrounding the ROW (including aquatic habitat and wetland areas)	Ongoing	Modify the implementation of erosion control and dust control measures to reduce the risk of habitat degradation.

Target	Key Performance Indicator / Criteria	Assessment Timing / Frequency	Consequence for Non-Performance
	Dust control measures are effectively implemented and land clearance conducted utilising methodologies that minimise erosion levels. No significant pollution events or landslides.		
C3: Minimise invasive species introduction and spread	No new invasive species detected in the ROW (+50 m) No new sites of invasive species colonisation. No significant increases in invasive species distribution and abundance	Ongoing	As per Adaptive Management in Table 8-1
D1: Reduce the likelihood and severity of injury or death caused by vehicle/machinery collisions	No animals (including mammals, wetland birds, ground dwelling birds) killed by Project construction activities	Construction	Consider installing roadkill deterrence measures at key crossing points / high roadkill incidence sites. E.g.: <ul style="list-style-type: none"> Fencing off the expressway especially in areas where there is a high roadkill incidence of mammals and ground dwelling birds. Maintain existing fences. Culverts that can double as animal tunnels under the road Install signs of wildlife crossing points to alert drivers to the potential dangers; and Consider installation of bird deterrents in key areas. If problems become extreme, consider changes to the speed limit in these areas.
	During operation of expressway: Less than 50 animals killed on expressway per year (number to be reviewed following monitoring) Less than 50 animals injured on expressway per year (number to be reviewed following monitoring)	Operations	
D2: Minimise the severity of noise and vibration	No significant complaints through the Grievance Mechanism (i.e. it is assumed any impacts affecting humans will affect fauna) Incorporation of noise and light mitigation measures during project construction.	Construction / Operations	Review and better the implementation of noise and vibration mitigation measures at construction sites (e.g. noise reduction systems) and along the expressway (e.g. vegetation)
D3: Mitigate artificial lighting disturbance		Operations	Review the appropriate implementation of mitigation measures along the expressway.
D4: Minimise unauthorised access to the ROW (including vegetated buffer), protected areas (e.g. stopping for resource extraction on expressway shoulders) and wetlands.	No loss of condition and resources within areas alongside the ROW. Including: <ul style="list-style-type: none"> No further degradation of wetland areas surrounding the expressway, particularly around access points to the road (e.g. junctions) No further degradation of protected areas and forested habitat surrounding the Project footprint. 	Construction / Operations	As per Adaptive Management in Table 8-1

Target	Key Performance Indicator / Criteria	Assessment Timing / Frequency	Consequence for Non-Performance
	<ul style="list-style-type: none"> No removal of flora from revegetated areas in the project ROW 		
D5: Limit and prohibit natural resource collection, hunting and fishing by personnel alongside the ROW	No hunting, resource collection or fishing by personnel in areas alongside the Project footprint.	Construction / Operations	As per Adaptive Management in Table 8-1
E1: Establish a seed store and plant database	Seed store and plant database established prior to vegetation clearance	Pre-construction	Cease vegetation clearance until a seed store and plant database are established prior to vegetation clearance works for each area
E2: Establish a nursery	Nursery for revegetation established prior to construction	Pre-construction	Prioritise establishment of nursery and monitor implementation
E3: Restore, rehabilitate and revegetate habitat surrounding the Project (e.g. ROW \pm 50 m) that has been disturbed/cleared during pre-construction/construction, but is unnecessary for operation	Rehabilitated habitat resembles a forested habitat in structure and floristic assemblage (e.g. canopy density, tree species diversity)	Quarterly during construction. Annually during operations (i.e. Project life)	Ensure successful restoration efforts by reviewing the revegetation scheme and updating where appropriate. This may include changes to: <ul style="list-style-type: none"> Timing of planting Species utilised in revegetation efforts Planting methodology
E4: Restore and replace any lost threatened flora with newly planted seedlings throughout the life of the Project	The utilisation of native threatened flora species in the revegetation program. And the successful establishment of these species in revegetated areas.	Annually during operations (i.e. Project life)	
E5: Restore "natural" water bodies and wetlands within and around the Project	Rehabilitated habitat resembles archetype in structure and floristic assemblage (e.g. species diversity, inundation regime). Focussing particularly on wetlands passed by the ROW (e.g. Namanve, Kasenge, Kasala)	Annually during operations (i.e. Project life)	

9. BIODIVERSITY OFFSET STRATEGY

9.1 Introduction

The Project is committed to best practice and avoiding, minimising and restoring impacts on biodiversity. However, it is recognised that even with the implementation of best practice management measures, the Project will have an impact on biodiversity values including Critical Habitat-qualifying species (refer Section 5.2). Consequently, to meet international standards UNRA will need to implement a Biodiversity Offset Strategy to compensate for Project-associated impacts after all previous steps of the mitigation hierarchy have been considered and no alternatives are available. The primary objective of biodiversity offsetting for the Project will be to achieve a 'net gain' of biodiversity for priority biodiversity features potentially affected by the Project.

9.2 Consideration of Mitigation Hierarchy

Offsets should only be applied once the mitigation hierarchy has been appropriately implemented. As outlined in IFC Performance Standard 6 "for the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied." To demonstrate the application of the mitigation hierarchy for the Project, each aspect of the hierarchy applied for the Project is summarised below.

9.2.1 Avoidance

Avoidance of impacts is the first step in the mitigation hierarchy. In the biodiversity context, this refers to the measures taken to avoid creating impacts from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity (BBOP, 2012).

Specific avoidance measures that should be implemented to prevent impacts, as much as feasible, on priority species and habitats (and non-priority biodiversity) are outlined in Section 6.1.

In addition, throughout the design and feasibility study process, a number of different alternatives for the road design have been considered for the Project. The analysis of alternatives is provided in Chapter 4 of the ESIA Report.

Alternatives were considered to ensure optimum design outcomes balancing social, environmental and economic considerations. Alternatives evaluated included those related to the road alignment, use of viaducts, use of tunnels, and the option of upgrading existing roads to avoid establishing a new alignment (with bypasses around settlement areas).

Key avoidance measures relevant to biodiversity that were implemented in the design phase for the Project included:

- ▶ Impacts on wetlands and forested areas were considered in the analysis of alternatives, and impacts on these areas avoided where possible, while balancing social impacts and economic considerations;
- ▶ Phase 1 route was modified to avoid impacts on Kasenge forest which is a key biodiversity area for phase 1;
- ▶ Phase 2 route was significantly realigned to avoid direct impacts on Mabira Central Forest Reserve, which is known to provide habitat for a range of threatened species.

Further details regarding the consideration of Project alternatives are provided in the ESIA report.

9.2.2 Minimisation

The minimisation step of the mitigation hierarchy is considered to include all the measures taken to reduce the duration, intensity and / or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible (BBOP, 2012).

A significant number of biodiversity management controls have been developed to minimise potential impacts during the pre-construction, construction and operation phases of the Project (refer Section 6.2 and Table 7-1). These cover the following aspects:

- ▶ Ensuring a minimal impact footprint during vegetation clearance;
- ▶ Minimising the risk of invasive species introduction;
- ▶ Minimising disturbance to fauna through noise, vibration and air blast;
- ▶ Minimising the risk of vehicle collisions with fauna;
- ▶ Reducing disturbance to fauna from artificial lighting;
- ▶ Minimising impacts on flora and fauna from dust;
- ▶ Minimising potential impacts on aquatic fauna through measures to minimise increases in suspended sediments and other water quality issues;
- ▶ Minimise the risk of habitat degradation and disturbance to fauna in protected areas; and
- ▶ Minimise natural resource use and poaching (e.g. through access restrictions and prohibitions on hunting for Project staff).

9.2.3 Restoration and Rehabilitation

One of the last steps in the mitigation hierarchy is restoration and rehabilitation. Restoration and rehabilitation of the Project Footprint and any nearby areas disturbed during construction will minimise the impacts as much as possible and will significantly reduce the requirement for offsetting. Temporarily disturbed areas and roadsides within the ROW are expected to be restored and rehabilitated with natural habitat types and self-sustaining ecosystems. Successful rehabilitation will create native terrestrial habitats, increasing biodiversity and ecosystem services within and surrounding the Project Footprint.

The proposed targets, actions and mitigation measures for restoration and rehabilitation for the Project are provided in Section 6.2 and Table 7-1. The key rehabilitation measures/principles in relation to biodiversity are:

- ▶ Progressively rehabilitate Project-disturbed areas in a systematic, efficient and timely manner. Rehabilitation should be 'like-for-like or better' to compensate for the loss of habitat from the Project Footprint;
- ▶ Re-establish an ecosystem that functions in a similar manner (or better) than that which existed before disturbance (e.g. wetlands and riparian vegetation);
- ▶ Create vegetated areas alongside road slip-lanes, embankments and within the ROW to develop a "green" corridor either side of the expressway;
- ▶ Maximise the use of these rehabilitation areas for noise, visual and environmental buffers along the ROW in line with the Revegetation Plan;
- ▶ Flora of differing structural characteristics and successional stage should be selected to promote quick establishment and provide a diverse, resilient floristic assemblage of multiple canopy layers (i.e.

herbaceous, shrub and tree cover). This should include a mix of trees, shrubs, annual grasses, perennial grasses, annual forbs, perennial forbs, sedges and rushes;

- ▶ Use native species of local provenance to establish self-sustaining vegetative communities sourced from local seed banks; and
- ▶ Revegetate wetland areas, with a focus along discharge lines downstream of the ROW.

9.3 Biodiversity Offsetting

According to the ICMM IUCN (2012, Independent report on biodiversity offsets) there are two main types of offsets:

1. **Restoration offsets** that restore, enhance or establish biodiversity; and
2. **Adverted loss offsets** that avert biodiversity loss and protect existing biodiversity from further threats including fire, overexploitation and deforestation.

Offsets are measurable positive conservation outcomes on biodiversity features that are attributed to Project activities, and whose magnitude outweighs that of the residual adverse biodiversity impacts. Offsets require investments in conservation management protection where the results of these investments can be quantified. Offsetting is based on systematic biodiversity accounting based on the explicit calculation of biodiversity losses and gains at matched impact and offset sites.

As outlined in IFC Performance Standard 6:

A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in Critical Habitats. The design of a biodiversity offset must adhere to the “like-for-like or better” principle and must be carried out in alignment with best available information and current practices. When a client is considering the development of an offset as part of the mitigation strategy, external experts with knowledge in offset design and implementation must be involved.

Supporting conservation actions are a range of other compensatory measures to protect and improve biodiversity, but are not quantifiable and are therefore difficult to directly attribute to a project's actions. These types of actions are often used in addition to averted loss and restoration offsets to support a region's conservation measures.

It is proposed that UNRA will utilise a combination of offsets with measurable conservation outcomes as well as and supporting conservation actions to ensure there is a 'net gain' of biodiversity in the vicinity of the Project. These actions should secure additional outcomes that would not have occurred without the Project, use a scientific and rigorous approach, target species and habitats that have been impacted by the Project, and also apply the precautionary principle and other principles outlined in IUCN Policy on Biodiversity Offsets (IUCN, 2016a).

9.3.1 General Offset Design Requirements

General Principles

Offsets must align with international good practice, such as the multi-stakeholder Business and Biodiversity Offsets Programme (BBOP 2012), to be considered as “offsets”. The following principles are based on those developed by the multi-stakeholder *Business and Biodiversity Offsets Program* (BBOP, 2012) and those outlined in the *IUCN Policy on Biodiversity Offsets* (IUCN, 2016):

- ▶ **Adherence to the mitigation hierarchy:** Biodiversity offsets are only appropriate for projects that have vigorously applied the mitigation hierarchy and considered a full set of alternatives. The mitigation hierarchy outlines that all efforts should be made to avoid impacts, minimise impacts and restore/rehabilitate impacted areas, before offsetting is considered as an option.
- ▶ **Exchanging biodiversity / Equivalence:** Biodiversity gains from offsets must be 'like for like or better'. This means that the loss of biodiversity should be offset only by an ecologically equivalent offset (e.g. the loss of gallery forest habitat should be addressed with offset measures aimed at similar forest ecosystems). In some specific cases, it may be possible to offset the loss of biodiversity by utilising a higher priority species/habitat in offsetting measures. It may also be possible to utilise 'averted loss offsets' which are measures that improve the state of existing biodiversity, but these should be used with caution and dependant on the context (e.g. rates of habitat loss, threatening processes, the potential for successful restoration).
- ▶ **Limits to what can be offset:** Biodiversity offsets should only be implemented where appropriate. In certain circumstances residual impacts on biodiversity (after completing the avoidance, minimization and rehabilitation steps of the mitigation hierarchy) cannot be offset. Additionally, there are some components of biodiversity for which impacts could theoretically be offset, but with a high risk of failure.
- ▶ **Landscape context:** Offsets should be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services;
- ▶ **Additionality:** An offset needs to provide a new contribution to the conservation of biodiversity. Conservation gains will be clearly attributable to the Project's actions and will be demonstrably above and beyond results that would have occurred if the offset had not taken place. If offsets are inadequately designed, there is a risk they can displace other conservation actions that would have taken place in the absence of the offsetting scheme. If this is a large risk, that offset is not applicable for an offsetting strategy;
- ▶ **Precautionary approach:** Estimates of gains and losses should be conservative and include a margin of safety proportional to the risks involved in offset delivery;
- ▶ **Timeframe / Long-term outcomes:** Biodiversity offsets should use an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as the Project's residual impacts being offset and preferably in perpetuity;
- ▶ **Stakeholder participation:** Offsets should be based upon appropriate, extensive and transparent stakeholder consultation;
- ▶ **Uncertainty:** Biodiversity offsetting strategies must account for uncertainty in their design by documenting assumptions, data gaps and the sources of any data utilised. If uncertainty is high, research should be conducted to demonstrate the success (net gains) of an offsetting action before Project impacts occur;
- ▶ **Monitoring:** Baseline surveys must be undertaken before offsets and impacts are initiated. Surveys should then be conducted after implementation to monitor the losses and gains due to the project and associated offsetting strategy; and
- ▶ **Transparency:** The design, implementation and monitored outcomes of biodiversity offsets should be transparent, and communicated in the public domain.

The four major technical principles of offset design are Equivalence, Additionality, Limits and Long-term outcomes.

While biodiversity offsets must align with the above criteria and provide measurable benefits to biodiversity in the target area, supporting conservation actions do not have to strictly align to these criteria. However it is recommended that actions align with these principles as much as feasible to maximise the potential benefits to biodiversity. Supporting conservation actions such as capacity building, education and research can be extremely important but are not considered during the calculation of the core offset (or gain), unless they result in quantifiable on-the-ground conservation outcomes. In other words, supporting conservation actions can have similar benefits for biodiversity as direct offsets but because the benefits they provide are difficult to quantify, they cannot be considered true 'offsets'.

Offset types can vary, but generally involve:

- ▶ *Undertaking positive management interventions to restore an area or stop degradation:* improving the conservation status of an area of land by restoring habitats or ecosystems and reintroducing native species. Where proven methods exist or there are no other options, reconstructing or creating ecosystems. Also, reducing or removing current threats or pressures by, for instance, introducing sustainable livelihoods or substitute materials.
- ▶ *Averting risk:* Protecting areas of biodiversity where there is imminent or projected loss of that biodiversity; entering into agreements such as contracts or covenants with individuals in which they give up the right to convert habitat in the future in return for payment or other benefits now.
- *Providing compensation packages* for local stakeholders affected by the development project and offset, so they benefit from the presence of the project and offset and support them" (BBOP 2012).

9.3.1.1 IFC Performance Standard 6

As per Section 2.2.1, the environmental and social policies and procedures of the IFC are widely regarded as *de facto* international standards for the environmental and social management of resource development projects. Best practice guidance regarding the provision of offsets is provided in IFC Performance Standard 6 (PS6) and associated guidance documents.

The general requirements for use of offsets as part of the mitigation hierarchy aligning with PS6 are as follows:

- ▶ Offsets may only be considered as a means for compensating residual impacts after all appropriate avoidance, minimisation and restoration measures have been considered;
- ▶ Projects operating within Critical Habitat can only implement offsets if it can be demonstrated that (i) no other viable development alternatives exist, (ii) the Project does not lead to measurable adverse impacts upon those species for which Critical Habitat was designated (iii) there is no net reduction in the population of any Critically Endangered or Endangered species (iv) a long-term and robust monitoring and evaluation programme is developed;
- ▶ Offsets should involve measurable outcomes that can be reasonably expected to result a net gain of biodiversity (Critical Habitat) or no net loss of biodiversity (Natural Habitat);
- ▶ Offsets should involve biodiversity gains that are of the same type as losses, or of higher conservation value (i.e. like for like or better);
- ▶ Offsets should prevent an overall loss in ecosystem function as well as biodiversity; and
- ▶ Offsets should be designed in conjunction with experts in offset design.

These requirements are broadly encompassed in the general offset and supporting conservation actions design principles.

9.3.2 Stakeholder Consultation for Offsets

Stakeholder consultation and support is integral to ensure the success of offsetting, and is key to the design and implementation phases. Key stakeholders that could be consulted as part of the development and implementation of the Biodiversity Offset Strategy include:

- ▶ Government of Uganda (and particularly the NFA and Wetland Management Department);
- ▶ NGOs active in the vicinity of the Project area (e.g. Nature Uganda); and
- ▶ Biodiversity experts; and
- ▶ Local communities regarding the use of ecosystem services.

Consultation with these stakeholders regarding the development of the Biodiversity Offset Strategy is ongoing.

9.4 Calculation of Offsets

The following sections outline the proposed methodology for calculating the required offsets using a robust biodiversity accounting technique, an impact analysis and a brief discussion of the offset actions to be undertaken in candidate offset sites. The calculation of residual impacts, offsets and selection of offsets will require further consultation with the Government, NGOs and other key stakeholders. During the refinement of the BAP and the Offsetting Strategy, a detailed Scoping and Screening analysis will be undertaken and the analysis will consider the suitability of habitat for each priority species to be impacted. In addition, a precautionary approach and risk calculation of offsetting will be conducted in accordance with international guidance.

9.4.1 Offset Methodology

Offset calculation for the Project should be developed using a habitat-based approach that takes into account the suitability of the habitat for priority species and habitats. The final design and implementation of the offsetting process should include the following six stages:

- ▶ **Scoping:** Identification of the residual impacts to habitats and the habitats for priority species, quantification of the residual impacts and estimation of offset requirements.
- ▶ **Site Screening:** Candidate offset sites are screened to produce a short list.
- ▶ **Offset Site Evaluation and Selection:** A more detailed evaluation process, entailing stakeholder engagement that leads to the identification of the final offset sites and governance framework.
- ▶ **Feasibility Study:** Verify biodiversity gains; define the mechanisms and business / financial plan for the delivery of gains.
- ▶ **Development and Implementation of a stand-alone Biodiversity Offset Strategy (detailed report) including an Offset Management Plan:** Provision of a detailed strategy and plan to address implementation, roles and responsibilities, monitoring and evaluation.
- ▶ **Evaluation:** Periodic evaluation and monitoring of the value of the offset site as an offset (e.g. habitat composition and condition).

9.4.1.1 Scoping

Scoping aims to produce an estimate of the offset requirements based on an assessment of residual impacts and estimates of biodiversity gains. There are four main stages involved in the estimation of offset size. The approaches and results associated with each of these stages are presented in and are discussed in more detail below.

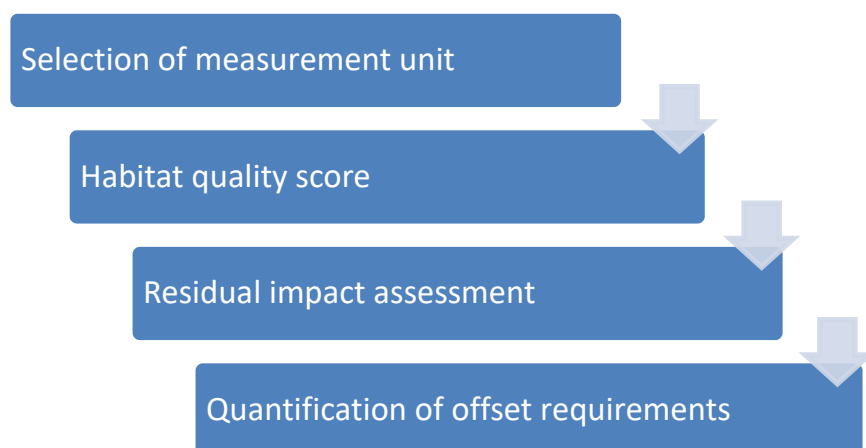


Figure 9-1 Generalised biodiversity offset scoping process

Selection of Measurement Unit

In alignment with BBOP (2012), a currency (or metric) should primarily be used to provide a basis for quantifying the impacts on priority species (and their habitats) / priority habitats. There are a number of options however, quality hectares is considered a suitable metric that takes into account both the area and the condition of the habitats for priority species that will be impacted by the Project.

1 Quality Hectare (QH) = 1 hectare (ha) and the quality of the habitat (%)

This is a standard metric that has been used by a number of mining projects as part of their offset accounting processes.

Habitat Quality Score

Satellite imagery and specialist knowledge is used to inform an assessment of the habitat condition within the zone of influence and the adjoining landscapes. Areas of habitat are assigned a Habitat Quality Score from high quality to very low quality according to the level of disturbance.

Residual Impact Assessment

The residual impact assessment should assess and categorise the quality and area of habitat loss using baseline studies and visual interpretation of imagery. The result of the residual impact assessment will be the area of habitat lost and to be offset, categorised by habitat type and quality.

Quantification of Offset Requirements

Offsets are then calculated for each species / habitat to be offset using the chosen metric. There will be risks associated with any chosen offsets and offsets may not be 100% successful. Therefore, offsets are often designed to be of sufficient size, cover several different offset methods (e.g. averted loss and restoration) and include several different offset types to address sources of uncertainty or risk. To minimise the risk of offsets failing, an offset risk factor or multiplier is applied to the offset requirement value.

9.4.1.2 Site Screening and Selection

The screening phase aims to produce a short-list of candidate offset sites. Sites should be screened according to biological, logistical and socio-economic criteria including:

- ▶ Presence of priority biodiversity features: sites where priority biodiversity features are present (or can be re-introduced) are appropriate. (EQUIVALENCE)
- ▶ Possibility of generating additional biodiversity gains: if a site is already well-managed and not threatened it will be unlikely to produce additional biodiversity gains (e.g. a protected area). Alternatively, gains would be difficult to produce at a site that is already highly degraded. (ADDITIONALITY)
- ▶ Security of investment: some sites may be unsecure tenures or the existing natural resource use is not commensurate with conservation and thus not all sites may be appropriate for offsets. The tenure or legal status may also influence the length of time for which a site can be designated an offset site. (PERMANENCE)

Candidate offset sites should be located near to the Project area but not within the 'impact zone', so that it is within the same ecoregion and climatic zone. Based on the outcomes of this step, candidate offset site(s) for the Project would be selected in consultation with relevant stakeholders.

9.4.1.3 Identification of Offset Actions

An analysis of candidate offset sites should be undertaken to identify potential gains that may be achieved through averted loss and enhanced quality / restoration. This is essential to demonstrate sufficient biodiversity gains from the candidate offset sites that will be clearly attributable to the Project's actions and above and beyond results that would have occurred if the offset had not taken place. The predicted biodiversity gains required by the offset program should be quantified, and size of the offset areas should be calculated.

9.4.1.4 Offset Feasibility Study

A detailed feasibility assessment would be undertaken following selection of the offset site(s). This assessment would verify the appropriate biodiversity gains that can realistically be achieved, and define the mechanism for producing these gains. The process of ensuring these gains would entail an element of environmental and socio-economic field work and stakeholder consultation. The results of the assessment may change the timing or magnitude of biodiversity gains expected. The feasibility study should also include a detailed financial assessment, since offsetting would require long-term funding in order to achieve biodiversity gains.

9.4.1.5 Monitoring and Evaluation

Monitoring and evaluation are an essential component of the Offset Strategy. A program should be developed and implemented to track whether activities are executed as planned. And to assess the results of offset actions so that the balance of losses and gains can be measured. These results will be fed back into the offsets strategy through a process of evaluation.

9.4.1.6 Offset Management Plan

To support the implementation of the Biodiversity Offset Strategy, an *Offset Management Plan* should be prepared that provides the details of offset program implementation including activities, schedule of works, biodiversity status monitoring and evaluation of biodiversity gains, roles and responsibilities.

9.4.1.7 Governance and Funding

A governance structure and potential partners (i.e. for the implementation, management and governance of the offset program) should be identified through consultation with stakeholders. Funding models should also be explored to ensure that the offset program is appropriately supported throughout the life of the Project and is sustainable in perpetuity.

9.5 Biodiversity Offsetting Approach for the KJE PPP Project

Biodiversity offset policies around the world are often based on the principle of 'Like-For-Like or better' (BBOP, 2012). In accordance with this principle, the proposed Biodiversity Offset Strategy has been tailored to compensate for the specific adverse residual impacts on biodiversity and Critical Habitat-qualifying features for the Project. The key residual impacts of the Project on biodiversity and Critical Habitat are summarised in Section 5 and further detailed in the ESIA report for the Project (Volume B). In order to achieve a net gain for Critical Habitat for all of the potentially affected Critical Habitat-qualifying species, and provide supplementary benefit to other biodiversity values affected by the Project, it is proposed that the offset program could include a package of offsets consisting of the following key activities:

- ▶ Offset Activity 1 – Grey Crowned Crane Habitat Protection and Enhancement;
- ▶ Offset Activity 2 – Grey Parrot Habitat Protection and Enhancement;
- ▶ Offset Activity 3 – Aquatic Habitat Protection and Enhancement; and
- ▶ Supporting Conservation Actions.

A summary of each of these proposed offset activities is provided below.

9.5.1 Offset Activity 1 – Grey Crowned Crane Habitat Protection and Enhancement

The grey crowned crane was selected as a focus species for the offset program as it can be considered an umbrella species to provide protection and recovery of wetlands. As described in section 5.2.1.1 the direct loss of wetlands from the Project will be a key impact on habitat used by Critical Habitat-qualifying species, with vegetation clearance resulting in the loss of up to 106.2 ha of wetland within the ROW.

Wetland habitat protection and enhancement, indicated by a net gain in grey crowned crane habitat area, will also offset impacts on Critical Habitat-qualifying species and other locally important biodiversity in the wetland areas targeted. Other wetland species that would be expected to benefit would include the Critical Habitat-qualifying northern brown-throated weaver, Basra reed-warbler and Madagascar pond-heron as well as wetland fish including blue spotted tilapia and Allauad's catfish. The grey crowned crane is listed as Endangered according to the IUCN red list and also has notable cultural significance because it is the national bird of Uganda. The species is commonly sighted and was directly recorded in the field surveys for the ESIA at Mayanja Wetland, Kansanga Wetland and Namanve wetland. As it also uses other non-forest habitat types, the offsetting activities for this species could also include habitats surrounding wetland areas, which will also benefit other species in these areas.

The offsets for the grey crowned crane will also benefit species potentially utilising papyrus swamps, such as the three Critical Habitat-qualifying birds - Carruthers's cisticola, papyrus canary and papyrus gonolek. To ensure these species are accounted for in the offset program, this offset activity should include a measure of general bird diversity in papyrus swamps in addition to crane population and habitat indicators.

Wetland habitats of high quality crossed by the Project Footprint include the Namanve CFR and the Kasala wetland. The Namanve CFR currently has limited resources available for management. In Kasala wetland, protection measures could also be enhanced. Both wetlands contain high quality papyrus vegetation and are under threat from numerous human activities including housing encroachment, brickmaking, backfilling for industrial development. Other more degraded wetlands along or near the alignment could also be selected as offset sites where gains in habitat quality can be achieved (e.g. Kansanga wetland).

9.5.2 Offset Activity 2 – Grey Parrot Habitat Protection and Enhancement

Based on a similar approach to offset activity 1, the grey parrot was selected as a focus species to provide protection and recovery of species in forest habitats. Forests were identified as Critical Habitats as they provide, or potentially provide, habitat for a range of Critical Habitat-qualifying species (refer Section 5.2.1.1). The Project will result in the direct loss of forest habitat, as well as potential indirect impacts such as those associated with increased urbanisation and resource use in the vicinity of the Project (see Section 5.2).

Forest habitat protection and enhancement, indicated by a net gain in grey parrot habitat area, will also offset impacts on other Critical Habitat-qualifying species that are likely to utilise forests such as the Toro olive greenbul. It would also enhance habitat availability and suitability for other Critical Habitat-qualifying forest species with a lower likelihood of occurrence in the vicinity of the Project including the Trevor's mops bat, moon shrew, Ugandan mangabey and Nahan's partridge. Additionally, offsetting potential impacts on the grey parrot could also serve to offset potential impacts on the two Critical Habitat-qualifying flora species identified (*Mikania microptera* and *Sabicea entebbensis*), although their presence in the vicinity of the Project is uncertain.

The Sezibwa Forest and Kasenge Forest are some of the highest quality patches of closed forest located in proximity to the Project Footprint. The restoration of degraded areas of forest within or close to these areas could provide an offsetting opportunity for areas of forested habitat lost due to the construction of the Expressway. This could involve the planting of native forest species and threatened flora species not currently found in the landscape. A habitat rehabilitation approach could also link this forested area to roadside vegetation established for the Project and provide a corridor which some fauna species may utilise to travel across the landscape. Creation of habitat corridors between these two forests and other forest would increase the connectivity of the landscape, increasing genetic exchange and decreasing fragment isolation. Patrols could also be established to prevent further degradation of the area.

While some distance from the Project, given the biodiversity significance of the Mabira CFR, offsets for forest habitat could also be considered in this protected area. This could include measures to reduce encroachment or degradation of forest on the southern edge of the Mabira CFR (buffer zone), which will be close to the Phase 2 alignment of the overall KJE PPP Project.

Further details on potential offset actions, and the process of identifying them, are provided in Section 9.5.4.

9.5.3 Offset Activity 3 – Aquatic Habitat Protection and Enhancement

Offset activity 3 is proposed to have two key components covering the niches of Critical Habitat-qualifying aquatic species potentially affected by the Project, but both will focus on enhancing and protecting habitat for these species:

- ▶ **Component A. Offsets for wetland fish.** This component of the offset program should target the three Critical Habitat-qualifying wetland fish species that were identified as likely to be directly impacted by the Project due to loss of wetlands - the blue spotted tilapia, Egyptian mouthbrooder and Allauad's catfish (refer Section 5.2.1.1 and 5.2.1.4). These species were recorded in Mayanja Wetland, Kansanga Wetland and Namanve Wetland during the field surveys for the ESIA. While Offset Activity 1 also covers wetlands, it does not specifically address the niches for these species. A specific aquatic habitat protection program for wetlands is therefore required. Offsetting these species will also benefit other aquatic species in wetlands (e.g. other fish, amphibians, insects). Monitoring of fish diversity and population dynamics will be used as indicators of change. Threat indicators should also be measured as part of the set of indicators to determine averted losses.
- ▶ **Component B. Offsets for the dark stonebasher.** The dark stonebasher is a Critical Habitat-qualifying fish recorded in the Sezibwa River downstream of the Project. As the construction of the Project has the

potential to affect the water quality of the river, offsets are required to ensure a net gain in Critical Habitat. Offsetting this species will also benefit other aquatic species in the Sezibwa River catchment. While only recorded in wetland habitats in the ESIA surveys, the Critical Habitat-qualifying Allauad's catfish can also utilise river habitat and would likely benefit from this component of the offset program. Monitoring fish diversity and population dynamics will be used as key indicators of change, as part of a set of indicators. A river health monitoring framework could also be established to assess the health of the river as an integrated ecosystem (including riparian habitat) and identify key areas where the health of the river could be improved to achieve net gains.

The offset program for wetland fish (Component A) could target some wetlands within Kampala or on the urban fringe. These habitats provide important ecosystem services to the city but are currently highly degraded and facing a number of severe threats. Restoration of these habitats could provide numerous benefits for biodiversity and ecosystem services and could be achieved through an offset program. Such a program could: revegetate degraded areas of wetland, increase patrols for illegal activity in wetland environments, conduct invasive species eradication programs and/or support alternative livelihoods for people currently utilising the wetlands for a source of income (e.g. agriculture, brick manufacture, papyrus harvesting).

Further details on potential offset actions are provided in the section below.

9.5.4 Potential Offset Actions for Offset Activities

As part of the initiation and implementation of the offset program, a suite of different potential offset actions will be investigated for their success to provide a gain for each offset activity. Potential offset actions could include:

- ▶ Rehabilitation and revegetation of degraded or cleared habitat areas (e.g. wetland fringes for Activity 1). Specific actions forming part of this activity could include:
 - Re-establishment of vegetation and landforms where required;
 - Propagation and planting of local species to establish natural vegetation and habitat; and
 - Control of invasive plants.
- ▶ Protection of wildlife and habitats via increased ranger patrols. This will also assist in averting loss of vegetation/habitat by protecting like-for-like or better habitat from human disturbances;
- ▶ Provision of alternative livelihoods for people utilising Critical Habitats as a source of income;
- ▶ Watershed management and protection measures such as protection or revegetation of riparian areas (e.g. for Sezibwa River catchment in Activity 3);
- ▶ Rehabilitation of habitat in the greater landscape and creation of habitat corridors to decrease fragment isolation and increase genetic exchange, ultimately increasing landscape connectivity of targeted offset sites;
- ▶ Provision of artificial nesting sites for cranes, fish and other important species and ensure structures or sites are protected from predation and human exploitation;
- ▶ Community education campaigns, particularly those that engage locals to protect and monitor important species (i.e. a sense of ownership often increases likelihood of protection);
- ▶ Other suitable measures.

It is likely that multiple sites / actions will be selected to ensure all impacted habitat types are incorporated and that sufficient gains can be achieved. The suite of offset sites and actions for each activity should be identified via consultations with key stakeholders and then outlined in the stand-alone Biodiversity Offset Strategy detailed

report and Offset Management Plan prepared. The success of the actions in achieving net gains would then be tested in the feasibility studies conducted in the first year of implementation (refer Section 9.4.1.4).

9.5.5 Potential Gains from Offset Actions

Targets for gains should be set for each offset activity. Gains from the candidate offset sites will potentially include:

- ▶ Gains from averted loss of habitat, for example compared to future scenarios without the Project;
- ▶ Gains from increased populations indicated by, for example, an increase in breeding pairs of cranes;
- ▶ Gains from averted mortality of the target species, a decrease from baseline; and
- ▶ Gains from enhanced habitat quality / restoration, for example measured through satellite imagery time-series.

To demonstrate sufficient biodiversity gains from the candidate offset sites to achieve a net gain for biodiversity, an ecological baseline will be necessary at offset sites. This is essential to demonstrate that conservation gains will be clearly attributable to the Project's actions and above and beyond results that would have occurred if the offset had not taken place.

For each target species and habitat, the ecological baseline should be established by:

- ▶ Conducting additional field surveys of offset sites to estimate existing populations of the target species present and their seasonal variability.
- ▶ Detailed mapping of existing habitat and estimating the rate of habitat loss and degradation for the species through analysis of historical satellite imagery and using these rates to project future rates of habitat loss and degradation in the absence of offset activities. Changes and trends in threats to habitat should be taken into account in the calculations.

Once the baseline is established, the predicted biodiversity gains resulting from each of the offset actions should be quantified, and size of the offset areas required should be calculated. Consultation and ground-truthing will be required to confirm their suitability.

The primary indicator of the net gains in habitat at the offset activities will likely be the number of Quality Hectares in the offset sites (refer to Section 9.4.1). These will be verified through interpretation of satellite imagery and field surveys. In line with current best practice for offset monitoring, a set of indicators would be used to monitor gains. For example, changes in populations of the key species in response to habitat changes should also be monitored via surveys. Additional threat indicators can also be developed for each activity to assess the gains achieved from averted losses.

9.5.6 Supporting Conservation Actions

Supporting conservation actions are often used in conjunction with biodiversity offsetting strategies, and do not offer a direct compensation (in space and time) for residual Project-related impacts, but are expected to lead to a benefit for biodiversity at the local, national and international scales. Supporting conservation actions include activities such as education programs, and supporting applied conservation initiatives and research. These actions are likely to be beneficial for biodiversity management and conservation, but it is often difficult to quantitatively measure the success of such activities, particularly within the Project lifespan, hence these actions do not meet key international criteria for offsetting.

Potential supporting conservation actions that could be implemented by the KJE PPP Project include:

- ▶ Green Corridor Project / Roadside Revegetation;

- ▶ Supplementary Feeding for the Hooded Vulture;
- ▶ Support for Existing Conservation Areas;
- ▶ Research Support;
- ▶ Support for Alternative Livelihoods; and/or
- ▶ Additional Education, Training and Awareness.

Whether supporting conservation actions are implemented, and which are selected, will depend on the outcomes of further consultations with UNRA, other Government agencies, NGOs and other key stakeholders (refer Section 9.3.2).

To facilitate stakeholder consultations, the potential options identified are described in the sections below.

9.5.6.1 KJE Green Corridor Project / Roadside Revegetation

As per the mitigation hierarchy, after avoidance and minimisation measures have been employed, rehabilitation and revegetation should be conducted for the Project in areas cleared of existing vegetation. This is likely to have several key benefits including benefits for:

- ▶ Visual amenity / Aesthetic impacts of the expressway (both for road users and surrounding communities);
- ▶ Biodiversity conservation;
- ▶ Erosion and sediment control;
- ▶ Noise pollution management; and
- ▶ Particulate matter and dust management.



Figure 9-2: Schematic diagram of the proposed revegetation scheme in areas with a fully revegetated areas along the Expressway.

This scheme would go above and beyond the requirements of standard revegetation for the Project and aims to create a green corridor along the majority of the expressway. This will likely have many benefits to biodiversity in the urban environment. For example, if appropriately implemented, the scheme will include:

- ▶ The re-establishment/creation of nesting habitat for a variety of bird species;
- ▶ The creation of green space and large trees in the city environment of Kampala;
- ▶ Benefits to Critical Habitat-qualifying fauna and other priority fauna through creation of suitable habitat;
- ▶ Utilisation of threatened species in the replanting scheme if appropriate;
- ▶ Potential habitat links / biodiversity corridor between areas of forested habitat and wetlands in the rural environment; and
- ▶ Where appropriate, the provision of fruiting trees and shrubs that can provide food resources to canopy bird species.

Habitat will be recreated in a like-for-like manner where appropriate. Along particular sections of the alignment, areas of previously degraded land (e.g. cleared land, fallow land) will be converted into an ecosystem with higher shrub and tree cover – likely providing benefits to biodiversity and ecosystem services.

Although the scheme may provide many benefits for biodiversity, it should be noted that there are limitations to such a revegetation scheme when considering biodiversity. The scheme will aim to recreate a forest like habitat along much of the expressway but due to the close proximity of the revegetated areas to the Expressway, the habitat will be subject to several degrading processes such as noise and air pollution from traffic. As a consequence, the habitat created will not be of a quality comparable to other high quality forested areas (e.g. Mabira) close to the alignment.

9.5.6.2 Supplementary Feeding for Hooded Vulture

As hooded vultures can utilise a range of habitats, the offsets provided for other species outlined in Sections 9.5.1 to 9.5.4 will also benefit hooded vultures. Providing specific offsets for the Critical Habitat-qualifying hooded vultures was also considered. While hooded vultures can utilise a broad range of habitats, in the vicinity of the Project they are mostly associated with settlement areas. Kampala is considered the stronghold for the species in Uganda (see specialist report). The monitoring program in Kampala indicated that they primarily feed at abattoir sites in Kampala, and roost on nearby electricity pylons. The Project is not expected to impact on any of the known areas used for feeding or roosting for this species.

The primary risk to the species from the Project is expected to be from the potential for vehicle collisions when the vultures feed on roadkill along the expressway. This risk is expected to be minimised through regular removal of roadkill from the expressway as part of the mitigation measures proposed for the operations phase (refer Section 7). As part of the overall offset package for the Project, supporting conservation actions could include establishing supplementary feeding stations using carcasses found in the environment to assist in ensuring the Project does not significantly impact this species. Establishing feeding stations also has the potential to result in increased populations.

9.5.6.3 Support for Existing Conservation Areas

UNRA could provide financial and/or logistical support to existing Government or NGO conservation initiatives surrounding the Project Footprint. This could potentially include supporting conservation activities in nearby protected areas (e.g. Mabira, Namanve). Potential options for conservation areas where support could be provided include:

- ▶ Mabira Central Forest Reserve;
- ▶ Namanve Central Forest Reserve;
- ▶ Sezibwa Forested area; and
- ▶ Conservation initiatives in wetlands surrounding Kampala.

Supporting actions could include:

- ▶ Needs assessment of the protected areas / habitat areas (i.e. what management measures are required for adequate protection?, if required);
- ▶ Further baseline surveys and monitoring of biodiversity and threats to biodiversity in areas of habitat near the ROW;
- ▶ Provision of equipment and materials to organisations conducting research;
- ▶ Promotion of tourism in protected and areas of cultural interest (e.g. Mabira ecotourism, Sezibwa falls); and
- ▶ Development of sustainable financial income activities.

All activities should be undertaken based on close consultation and partnership with other relevant government authorities (e.g. UNRA, NEMA).

9.5.6.4 Research Support

UNRA could provide financial and/or logistical support to academic institutions and/or individual researchers conducting biodiversity research in areas surrounding the ROW. This could involve supporting research into the ecology of the wetlands surrounding Kampala and/or Lake Victoria, or research into priority fauna potentially impacted by the Project (e.g. grey crowned crane).

9.5.6.5 Support for Alternative Livelihoods

UNRA could provide educational, financial and logistical support to local communities to promote alternative livelihoods (e.g. alternatives to: wetland conversion to agriculture, brick manufacturing, harvesting of timber for charcoal production, agriculture in wetland/protected areas etc.) to reduce biodiversity threats in the region. This could involve: alternative energy and cooking fuel projects, promotion of best practise farming techniques, poultry or bee keeping projects and/or village-based agro-forestry/conservation programs that support biodiversity.

9.5.6.6 Additional Education, Training and Awareness

Another approach could be for UNRA to further support the education of local communities about sustainable management of resource areas and protection of roadside vegetation, protected areas and wetlands areas throughout and surrounding Kampala. This could include components targeted to particular community groups such as farmers, fisherman, construction workers etc. Education and training programs could include such topics as an understanding of ecosystem services provided by wetlands, biodiversity awareness (the presence of Uganda's national bird) and best practice farming techniques.

9.6 Potential Partnerships and Funding Opportunities

It is expected that the offset program for the Project will be implemented in partnership with one or more partner organisations. Several organisations are active conducting biodiversity conservation initiatives across Uganda. Government and non-governmental partners will be vital for the success of any conservation scheme. Potential partners could include:

- ▶ Uganda Wildlife Authority;
- ▶ Wildlife Conservation Society;
- ▶ Uganda Conservation Foundation;
- ▶ Uganda Wildlife Education Centre;
- ▶ African Conservation Foundation;
- ▶ Makerere University;
- ▶ Nature Uganda;
- ▶ Nature and Livelihoods NGO; and/or
- ▶ ECOTRUST.

9.7 Identification of Specific Offset Sites

Offset sites for offset activities for the Project will be identified in consultation with stakeholders such as the Management Team for the Namanve CFR and NGOs working in the area.

Factors that will be considered in selection of offset sites will include:

- ▶ Identifying offset sites with potential for the targeted net gains to be achieved, for example those with degraded or cleared vegetation present that can be rehabilitated, and areas that of conservation importance but under threat;
- ▶ Ensuring sites are at an appropriate scale to achieve targets (this will be assessed via the process of establishing ecological baselines, and estimating net gains for specific areas as a result of management actions);
- ▶ Inclusion of wetlands and closed forest near to the Project (to ensure the habitat requirements of Activities 1-3 are met), but of a sufficient distance to avoid Project-related impacts;
- ▶ Offset sites that take into account known distributions/survey locations for the target species;
- ▶ Consultations with the National Forestry Authority (NFA) and other Government agencies regarding the need to allocate areas of the Namanve CFR to offsetting activities, and avoid other developments in these areas e.g. urbanisation, industry, business or plantations.

9.8 Indicative Schedule for Offset Program

The schedule for the offset program will be dependent on the offsetting activities selected. The Project is expected to be constructed over a period of five (5) years. The overall time period proposed for achievement of net gains from the offsets implemented for the Project is proposed to be from commencement of Project construction to 4 years post-construction. A number of tasks to initiate the implementation of the Biodiversity Offset Strategy will also be undertaken prior to construction to establish the offsetting activities. The total process for the implementation of the biodiversity offset program is initially planned over a period of 10 years. This timeline will need to be reviewed once final offset activities and offset sites are selected.

Following this initial 10 year period, annual ongoing monitoring of the offset sites would be required over the life of the Project (i.e. on an ongoing basis) to ensure the net gains achieved are maintained in perpetuity.

An overall schedule for the implementation of the offset program is provided in Table 9-1. It is expected this schedule would be refined during the implementation of the activities planned.

Table 9-1 Summary schedule for implementation of biodiversity offset program

Year of Offset Program	Key Tasks / Activities
Year 1 (Prior to construction)	<ul style="list-style-type: none"> • Consultations with NFA and other stakeholders such as NGOs to confirm offset strategy, offset sites, activities and governance framework. • Establishment of additional baseline information for species to be included in the offset program where required (e.g. detailed habitat mapping, additional baseline surveys in selected offset sites) • Preparation of the stand-alone Biodiversity Offset Strategy detailed report, including a proposed Offset Management Plan (with monitoring activities, schedules, budgets etc) • Commence Feasibility Study for offsets to trial all activities, verify biodiversity gains, and refine the mechanisms and business / financial plan for the delivery of gains • Nursery establishment

Year of Offset Program	Key Tasks / Activities
Year 2 (at commencement of construction)	<ul style="list-style-type: none"> Undertake initial staff and ranger training programs Completion of Feasibility Study for offsets Revision of Biodiversity Offset Strategy and Offset Management Plan as required
Years 3-9 (Construction, Construction decommissioning and start of Operations)	<ul style="list-style-type: none"> Implementation of offset activities Ongoing monitoring and evaluation. Verification of net gains at key milestones. Review of offset program where required
Year 10 (post achievement of net gains)	<ul style="list-style-type: none"> Final verification of net gains Final reporting
Ongoing	<ul style="list-style-type: none"> Annual monitoring /patrols / maintenance of offset sites to maintain offsets in perpetuity

9.9 Biodiversity Offset Program Reporting

Following further consultation with stakeholders, a stand-alone *Biodiversity Offset Strategy* (detailed report) should be prepared for the Project including an Offset Management Plan. The updated Biodiversity Offset Strategy will provide information on the biodiversity values to be impacted, identify the specific offset activities selected to compensate for this impact, actions needed to deliver these offsets and strategies to ensure that the offsets provide a benefit to biodiversity now and into the future. The Biodiversity Offset Strategy detailed report will demonstrate:

- ▶ The final selection of offset activities to form the offset package, and why these were selected.
- ▶ The results of the net gain accounting and quantification of offsets, including estimated net gains from each offset action;
- ▶ Detailed information about the proposed offset sites, and the process of site selection;
- ▶ Monitoring and evaluation program to gauge the effectiveness of the strategy, including a governance structure;
- ▶ Development of a database to track offsets and supporting conservation actions, their progress, success and economic efficiency;
- ▶ Offset program with a detailed timeline and budget for the successful delivery of the offset strategy; and
- ▶ Funding options to ensure that offsets can be maintained in perpetuity.

It is expected that the completion of the stand-alone *Biodiversity Offset Strategy* (including an Offset Management Plan) will be coordinated by the successful private sector contractor/concessionaire engaged for the construction of the Project following the award of the contract. The documents should be prepared by consultancies or NGOs with specialist expertise in development of offset programs to and international standard.

10. IMPLEMENTATION

10.1 Roles and Responsibilities

The roles and responsibilities and monitoring systems for the delivery of mitigation and management measures for the Project are detailed in the Environmental and Social Management and Monitoring Plan (ESMMP, Volume D) and a summary which relates to biodiversity management is presented below.

10.1.1 Internal

The BAP and ESMMP will need to be implemented by appropriate staff, while sufficient financial resources, equipment and support systems will be available to ensure the two plans' success. The responsibility of Project contractors and suppliers will be defined through standard terms and conditions of contracts that are consistent with the commitments of the ESMMP and BAP. It is the responsibility of all UNRA staff and contractors to comply with the requirements set out in the ESMMP and BAP.

UNRA will be responsible for the establishment of a suitably experienced and qualified environment team to implement the ESMMP and BAP. This team will include an UNRA staff and specialist consultants as required.

Roles and responsibilities for key UNRA staff are provided below.

10.1.1.1 UNRA Project Director

The key role of UNRA will be to monitor and support the implementation of the BAP. In line with the responsibilities outlined in the ESMMP, the UNRA Project Director would be responsible for the following points:

- ▶ Ensure that appropriate resources are allocated to the implementation of the BAP and biodiversity offset program for the Project;
- ▶ Oversee the implementation of the BAP, and the finalisation of the Biodiversity Offset Strategy for the Project (to be commissioned by the construction contractor, see Section 10.1.1.4);
- ▶ Review and approve any significant revisions to the BAP and Biodiversity Offset Strategy, as well as the Construction Contractor/Concessionaire's CEMP;
- ▶ Check that UNRA staff are appropriately trained in environmental awareness;
- ▶ Sign off close-out of any significant biodiversity related incidents; and
- ▶ Have overall responsibility for environmental and social compliance.

10.1.1.2 UNRA Project Officers

As the biodiversity management and offsetting requirements of the Project are extensive and complex, it is recommended that a dedicated UNRA Biodiversity Officer is allocated to coordinate the biodiversity aspects of the Project. This Biodiversity Officer would:

- ▶ Check that the required management and monitoring actions identified in the BAP are undertaken, and participate in all field activities related to biodiversity management and monitoring;
- ▶ Coordinate internal staff and engage specialist consultants as required to ensure that the BAP is regularly reviewed and updated as required;
- ▶ Check that relevant stakeholders are consulted and provide input into the development of the biodiversity plans and procedures for the Project where appropriate;

- ▶ Support the contractor/concessionaire in the development and implementation of the biodiversity offset program;
- ▶ Conduct biodiversity monitoring and engage specialist consultants as required to ensure the monitoring program is effectively implemented; and
- ▶ Ensure that any adaptive management actions required are actioned appropriately.

Given the scale and complexity of the biodiversity management program for the Project, the key skills and experience recommended for the UNRA Biodiversity Officer would include:

- ▶ A postgraduate qualification in ecology;
- ▶ Experience with implementation of biodiversity management and monitoring programs for large development Projects;
- ▶ Experience with the application of international standards for biodiversity (e.g. IFC standards);
- ▶ Experience with Government and community stakeholder consultations;
- ▶ Experience with development and implementation of biodiversity offset programs also preferred.

10.1.1.3 UNRA Project Engineers / Environmental and Social Specialists.

With respect to the BAP, UNRAs Project Engineers and Environmental and Social Specialists would:

- ▶ Check that the requirements in the BAP are incorporated into the contract specification for construction.
- ▶ Check that the requirements of the BAP and contract specification are addressed by the construction contractor's CEMP and that they include monitoring, surveillance and auditing (with engagement from external specialists to assist in this review where required).
- ▶ Log environmental incidents in UNRAs incident reporting system.
- ▶ Prepare surveillance plans for each construction contract and complete regular assessment/review of the environmental risks and amend the surveillance plan as necessary to reflect the risks.
- ▶ Conduct and record surveillance and audits of works to check compliance with the contract specification and the contractor's CEMP.

10.1.1.4 Construction Contractor / Concessionaire

The Construction Contractor / Concessionaire will be responsible for the direct implementation of the BAP. Key responsibilities of the contractor related to biodiversity are outlined below. The contractor(s) should:

- ▶ Develop a CEMP in line with the Project's ESMMP and BAP prior to construction, providing greater detail as to how the environmental and social management requirements set out in the ESMMP and BAP will be met. This will be done to the satisfaction of UNRA's Project Director.
- ▶ Effectively implement and manage the CEMP and BAP to the satisfaction of UNRAs Project Director.
- ▶ Coordinate the preparation of the stand-alone Biodiversity Offset Strategy (detailed report) for the Project (including Offset Management Plan) by an appropriately qualified consultant or NGO.
- ▶ Coordinate and support the implementation the offset activities by the partnership organisation.
- ▶ Engage specialist advice on environmental and ecological issues where required (e.g. through hiring qualified consultants where required).

- ▶ Review and update the CEMP, BAP and Biodiversity Offset Strategy for the Project (including Offset Management Plan) during construction if any significant changes occur.
- ▶ Check that Contractor's staff and subcontractors have been appropriately trained in environmental awareness, are fully informed of the CEMP and understand the required measures for environmental and social compliance and performance. This will include an awareness of biodiversity within and surrounding the Project area and an understanding of the ecological impacts of the Project.
- ▶ Prior to the Operations phase, develop an OEMP containing all relevant measures provided in the ESMMP and BAP, and implement these measures during Operations (until the end of the concession period). This will be done to the satisfaction of UNRA's Project Director.
- ▶ Implement all other environmental and social responsibilities in the ESMMP.

It is recommended that key staff of the Construction Contractor / Concessionaire involved in coordinating the implementation of the BAP have similar qualifications to those recommended for the UNRA Biodiversity Officer (see Section 10.1.1.2).

10.1.2 External

Monitoring of project impacts (focussing particularly on biodiversity) is expected to involve at least the following Government authorities:

- ▶ National Environment Management Authority (NEMA)
- ▶ Ministry of Water and Environment (MoWE)
- ▶ Ministry of Tourism, Wildlife and Antiquities (MTWA)
- ▶ Uganda Wildlife Authority (UWA)
- ▶ National Forestry Authority (NFA)
- ▶ Wetlands Management Department (WMD)

Local government authorities will be involved where possible for the monitoring of impacts on ecosystems, flora and fauna. A Memorandum of Understanding (MoUs) should be established where required to ensure roles and responsibilities for monitoring are clearly defined and agreed between the various stakeholders involved (see Section 10.3).

Communities will also be involved in monitoring activities where appropriate, such as through relevant groups such as Local Environment Committees and/or Road Committees.

10.1.2.1 Specialist Inputs

National and international ecological specialists will continue to provide guidance and support to the design and implementation of the biodiversity management and monitoring measures as is required over the life of the Project, including the implementation of the biodiversity offsets program.

10.1.2.2 Partners

The implementation of the offset activities may be delivered by a partnership organisation (refer Section 9.6). Consultation would be required to identify potential partners.

10.2 Capacity Building

UNRA will ensure specific environmental training that is relevant to the roles and responsibilities of all employees is provided, inclusive of an initial induction for any on-site work. This includes the Project Officers and Project Environmental Specialists who will receive specific training to ensure that they can fulfil their responsibilities for overseeing the implementation of the BAP. Training may include species identification, survey / monitoring techniques, equipment use and data analysis. The training should be conducted by experienced consultant ecologists and national ecological specialists as appropriate.

Staff responsible for the rehabilitation and revegetation, including seed collectors and nursery staff, will be suitably trained or qualified. Training will include species identification and collection, seed storage, plant propagation and management.

All relevant staff involved in monitoring activities also receive training where appropriate. This is likely to include the following:

- ▶ Monitoring techniques, including: use, calibration and maintenance of field monitoring equipment, sample collection, labelling and transport;
- ▶ Review and interpretation of monitoring results; and
- ▶ Record keeping and reporting procedures, including using standard forms and databases.

A Site Induction Manual will be prepared and distributed to all staff and contractors summarising the relevant environmental and social requirements, responsibilities, and work procedures.

10.3 Implementation of Management Program

To support the implementation of the BAP and the management actions outlined, the following will be required to be developed prior to the commencement of the Construction Phase:

- ▶ Construction contractor/concessionaire should develop a CEMP incorporating the management and monitoring measures in the BAP (to be approved by the UNRA Project Director);
- ▶ The CEMP developed should include detailed procedures for implementation of all key management measures (e.g. Standard Operating Procedures - SOPs). The SOPs should clearly outline the required timing, responsibilities and detailed methods for implementation of each management measure;
- ▶ Budgets and commitments for each key biodiversity management and monitoring measure should be clearly specified in the CEMP;
- ▶ Maps should be produced to support the implementation of management and monitoring measures where needed. For example:
 - Maps of 'no-go zones' for construction activities;
 - Approved areas for vegetation clearance;
 - Ecologically sensitive areas and sections of the alignment for artificial lighting to be minimised (e.g. Namanve Wetland);
 - Priority areas for rehabilitation / revegetation; and
 - Maps of monitoring sites.
- ▶ Required databases, forms, recording sheets, registers etc for the implementation of the BAP should be established; and

- ▶ Where required, agreements should be established with Government authorities and organisations/ NGOs for the implementation of the measures outlined (e.g. An MoU with the NFA is recommended for tree clearance works and monitoring; An MoU with the Wetlands Management Department is also recommended to ensure efficient collaboration).

The detailed planning required for the Biodiversity Offset Program is discussed in Section 9.9.

10.4 Implementation of Monitoring Program

As part of the CEMP developed by the construction contractor/concessionaire, a detailed monitoring and evaluation program (including step-by-step monitoring procedures) will need to be developed and implemented to ensure that existing management measures are implemented effectively, and to identify the need for adaptive management (e.g. with a Biodiversity Monitoring Manual). This will include the implementation of the monitoring activities outlined in Chapter 8.

The monitoring program will include detailed methodologies/procedures for monitoring each of the identified indicators of change and assessing results against thresholds and targets to alert the Company that mitigation measures need to be adapted and revised or that additional biodiversity management measures are required. Stakeholder consultation and ground-truthing may be required to confirm the suitability of indicators before inclusion into the program. National and international ecological specialists should be engaged to provide guidance and support to the design and implementation of the biodiversity monitoring activities as required over the life of the Project.

A separate monitoring and evaluation program will also need to be developed for the Project's biodiversity offset program as part of the Offset Management Plan. This program should be maintained for the life of the expressway to ensure that offset gains are maintained, and improved if possible.

During the Construction Phase, monitoring data from the general biodiversity monitoring program (see Chapter 8) shall be reviewed and updated on a quarterly basis, or when necessary, and the results communicated to all relevant personnel. These reports should be provided for review to the Project Director and relevant Project Officer at UNRA.

10.5 Reporting Commitments

UNRA's environmental and social reporting commitments are detailed in the ESMMP (Volume D).

The results of monitoring of the BAP measures will be compiled into the monthly, quarterly and annual reports produced for the Project. These reports should be provided to the Project Director and Project Officer at UNRA for review. The reports will be produced quarterly during the Operations phase of the Project.

These reports will outline the success of the BAP management measures, and any issues or incidents observed in the monitoring program. Corrective actions with timelines should be identified where required.

10.6 Updating the BAP

This BAP will be reviewed on an annual basis in alignment with the ESMMP (Volume D), or if there are any significant changes to the Project design or procedures. The review should be conducted by qualified staff or external specialists as appropriate. Any major revisions will require approval from the UNRA Project Director.

10.7 Performance Review and Auditing

UNRA has established policies and procedures for auditing and review of their projects. These will be implemented for the KJE PPP Project as appropriate. UNRA will undertake internal and external audits for the Project as outlined in the ESMMP.

10.8 Next Steps

10.8.1 General Next Steps

The following steps are recommended to commence implementation of the BAP:

- ▶ Ongoing engagement with the relevant Government agencies and local communities regarding the biodiversity aspects of the Project;
- ▶ Following award of the concession, the construction contractor/concessionaire should develop a CEMP incorporating the management and monitoring measures in the BAP, which includes detailed procedures for implementation (e.g. SOPs);
- ▶ Where required, agreements should be established with Government authorities for the implementation of the management and monitoring measures outlined (e.g. via MoUs);
- ▶ Consultation and validation with key stakeholders to fully assess and select appropriate offsetting for the Project and to develop the Biodiversity Offset Strategy detailed report, including an Offset Management Plan (see section below);
- ▶ Costs estimations and schedule for the implementation of the BAP to be refined to ensure that adequate funds are budgeted to implement the BAP effectively, including the final biodiversity offset strategy;
- ▶ UNRA to develop internal monitoring procedures in accordance with the BAP monitoring requirements (with specialist support as required); and
- ▶ Update the BAP periodically over the Project life.

10.8.2 Next Steps for Implementation of Biodiversity Offset Strategy

The following steps are required to commence implementation of the proposed Biodiversity Offset Strategy:

- ▶ Consultation and validation with key stakeholders to fully assess and select appropriate offsetting for the Project. This should include engagement with:
 - Government of Uganda (and particularly the NFA and Wetland Management Department);
 - NGOs active in the vicinity of the Project area; and
 - Biodiversity experts.
- ▶ Additional surveys / habitat mapping of offset sites for species to be included in the offset program where required to establish a baseline for offsets, once offset sites selected;
- ▶ Preparation of a stand-alone Biodiversity Offset Strategy (detailed report), including an Offset Management Plan (with schedules, budgets etc). The Offset Management Plan will need to include detailed procedures for the ongoing monitoring and evaluation of the offset program;
- ▶ Implementation of a Feasibility Study for offsets to trial all activities, verify biodiversity gains, and refine the mechanisms and business / financial plan for the delivery of gains;

- ▶ Ongoing consultation and collaboration with key stakeholders as required; and
- ▶ Regular updates of the Biodiversity Offset Strategy and Offset Management Plan as required during implementation.

11. PRELIMINARY COST ESTIMATE

Sufficient resources will be required to ensure that the management and monitoring measures outlined in the BAP can be successfully implemented. The Project is designed as a PPP (Public Private Partnership) Project with a Private Sector developer expected to undertake the final design, finance, build, operate, maintain and finally transfer the Expressway to the Government of Uganda / UNRA. UNRA will be responsible for providing a clear right of way to the private developer that will enable construction of the Expressway.

Under this agreement much of the environmental and social costs will be borne by UNRA until the right of way is transferred to the Private developer under the PPP agreement. UNRA will then have a monitoring and auditing role to ensure that environmental and social safeguards are met during construction and operation.

The final design of the Expressway will also have an influence on environmental and social costs, including those associated with the implementation of the BAP. Detailed budgets are expected to be prepared in consultation with key stakeholders prior to the commencement of the Construction Phase. Specific budgets should be allocated to each key management and monitoring measure outlined in the BAP where appropriate.

The BAP implementation budget does not include general environmental and social management and monitoring costs which are captured in the ESMMP (refer Volume D). The implementation budget also does not cover environmental and social mitigation costs related to biodiversity that are expected to be captured in the design specifications of the Project. These costs include:

- ▶ Construction of viaducts;
- ▶ Capped and directional lighting;
- ▶ Noise control barriers;
- ▶ Dust mitigation (e.g. road watering);
- ▶ Fencing;
- ▶ Drainage structures to prevent flooding and erosion;
- ▶ General rehabilitation and revegetation including landscaping and revegetation of the expressway;
- ▶ Weeding / Invasive species eradication; and
- ▶ Rehabilitation of construction material quarries and borrow pits.
- ▶ Costs associated with resettlement, compensation or livelihood restoration (e.g. restoration of livelihoods due to impacts on ecosystem services). These are covered under the Resettlement and Livelihood Restoration Plan (Volume D).

The concession period for the Project is expected to be 30 years. The budget estimates are based on a 2 year pre-construction (pre-concession) period, 5 year construction period and a 25 year operational period. During the operational period there is expected to be regular maintenance carried out on the Expressway.

Apart from the cost assumptions described above, environmental and social management costs associated with the general implementation of the BAP for the KJE Project are presented in Table 11-1 below. A separate indicative budget is provided for the biodiversity offsetting program in Table 11-2.

General BAP implementation costs will be highest during the pre-construction and construction period. Annual costs during construction area approximately USD 120,000 per year while during operations, costs are expected to be significantly lower at approximately USD 60,000 per year. Total costs for the general implementation of the BAP as identified in the budget over the 32 year period are **USD 2,402,925** which represents an average cost of

approximately USD 75,000 per year and includes a 5% contingency. This cost estimate will need to be reviewed and updated during detailed design.

Table 11-1 General Biodiversity Action Plan Implementation Budget for Pre-Concession and Concession Period*

Aspect	Cost per Project Phase (USD)			Total
	Pre-Construction (2-years)	Construction (5 years)	Operations (25 years)	
Staffing / Stakeholder Consultations				
Human Resources – UNRA Biodiversity Officer (annual)	30,000	30,000	15,000	585,000
Human Resources – Contractor / Concessionaire	Covered by ESMMP budget			
Staff Biodiversity Training (annual)	10,000	5,000	2,000	95,000
Staff Vehicle / Transport (annual)	10,000	10,000	7,500	257,500
Computers / Communication / Reporting (annual)	5,000	5,000	2,000	85,000
Monitoring Equipment (capital)	1,000	-	-	1,000
Monitoring Equipment (annual)	-	500	500	15,000
Biodiversity Management Systems				
Specialist support for review/update BAP and relevant procedures (annual)	20,000	10,000	5,000	215,000
Internal/external audits	Covered by ESMMP budget			
Key Biodiversity Measures				
Biodiversity Monitoring / Surveys (specialist inputs - annual)	20,000	20,000	10,000	390,000
GIS Mapping of Habitat (5 yearly x 6)	-	-	-	75,000
Invasive species eradication program	Operational Cost			
Weekly patrols of expressway to remove roadkill to help ensure that threatened species (e.g. hooded vultures) are not hit by vehicles	-	5,000	5,000	150,000
Revegetation / Restoration				
Nursery for revegetation	Operational Cost			
General revegetation/restoration of disturbed areas. Planting and maintenance of roadside vegetation	Operational Cost			
Additional revegetation in accordance with Revegetation Plan - e.g. green corridors, wetlands at discharge points (capital – once off)	20,000	-	-	20,000
Additional revegetation/restoration in accordance with Revegetation Plan (annual)		30,000	10,000	400,000
Contingency				
Contingency (5%)	-	-	-	114,425
Grand Total (over 32 years)	-	-	-	2,402,925

***Table Notes:**

Capital costs are once off costs only. Costs associated with biodiversity offsetting are not included in this table (refer to Table 11-2). The BAP implementation budget does not include general environmental and social management and monitoring costs which are captured in the ESMMP (e.g. waste management, water, air and noise monitoring). The implementation budget does not cover biodiversity mitigation costs that are expected to be captured in the design specifications and operational costs of the Project. These costs include: Construction of viaducts; Noise control barriers; Fencing; Drainage structures to prevent flooding and erosion; Landscaping and revegetation of construction areas and the expressway; Rehabilitation of construction material quarries and borrow pits where required; Dust suppression; Roadside vegetation maintenance (e.g. weeding, pruning, mowing, replanting); Invasive species eradication program; Capped and directional lighting. Costs are not adjusted for inflation.

The indicative budget for the establishment of the biodiversity offsets for the Project (Table 11-2) indicates that the total cost of offsetting activities over the 10 years of the offset program for Phase 1 will be approximately **USD 1,450,000** including a contingency of USD 100,000. This budget will need to be updated following further consultation with stakeholders regarding the offset management strategy and selection of final offsetting activities and sites.

The budget does not include any funding provided by the Project for any 'supporting conservation actions' selected to form part of the offset package. The budget for these actions would need to be confirmed through stakeholder consultations but would be estimated to be in the order of USD 30-50,000 per year for the duration of the offset program.

At the end of the initial 10 year period, all the main offset activities such as revegetation/rehabilitation of wetlands and forest areas and community engagement are expected to be complete. Following this 10 year period, annual ongoing monitoring of the offset sites would be required over the life of the Project to ensure the net gains achieved are maintained and improved if possible. More regular patrols of offset sites may also be required. The cost of this monitoring (including any corrective actions required) is proposed to be covered by the general BAP implementation budget outlined in Table 11-1 during the concession period.

Table 11-2 Indicative Budget for Initiation of Biodiversity Offsetting Activities*

Year of Offset Program	Key Tasks / Activities	Budget Component	Indicative Budget (USD)
Year 1 (Prior to construction)	<ul style="list-style-type: none"> Consultations with NFA and other stakeholders such as NGOs to confirm offset strategy, offset sites, activities and governance framework. Establishment of additional baseline information for species to be included in the offset program where required (e.g. detailed habitat mapping, additional baseline surveys in selected offset sites); Preparation of the stand-alone Biodiversity Offset Strategy (detailed report), including a proposed Offset Management Plan (with monitoring activities, schedules, budgets etc) Commence Feasibility Study for offsets to trial all activities, verify biodiversity gains, and refine the mechanisms and business / financial plan for the delivery of gains Nursery establishment 	Human Resources (UNRA – monitoring and support)	\$10,000
		Human Resources (Contractor –implementation/coordination)	\$40,000
		Specialist Inputs (national or international consultants)	\$150,000
		Implementation Partner Inputs	\$50,000
		Nursery Establishment	\$30,000
		Other Expenses/ Equipment	\$20,000
		Total	\$300,000
Year 2 (at commencement of construction)	<ul style="list-style-type: none"> Undertake initial staff and ranger training programs Completion of Feasibility Study for offsets Revision of Biodiversity Offset Strategy and Offset Management Plan as required 	Human Resources (UNRA – monitoring and support)	\$10,000
		Human Resources (Contractor –implementation/coordination)	\$30,000
		Specialist Inputs	\$50,000
		Implementation Partner Inputs	\$30,000
		Nursery	\$20,000
		Other Expenses/ Equipment	\$10,000
		Total	\$150,000
Annual Cost Years 3-9 (Construction, Construction decommissioning)	<ul style="list-style-type: none"> Implementation of offset activities (e.g. habitat protection and restoration) Ongoing monitoring and evaluation. Verification of net gains at key milestones. 	Human Resources (UNRA – monitoring and support)	\$10,000
		Human Resources (Contractor –implementation/coordination)	\$10,000

Year of Offset Program	Key Tasks / Activities	Budget Component	Indicative Budget (USD)
and start of Operations)	<ul style="list-style-type: none"> Review of offset program where required 	Specialist Inputs	\$20,000
		Implementation Partner Inputs	\$30,000
		Nursery	\$20,000
		Other Expenses/ Equipment	\$10,000
		Total	\$100,000
Year 10 (Post achievement of net gains)	<ul style="list-style-type: none"> Final verification of net gains Final reporting Establishment of ongoing monitoring program for offset sites 	Human Resources (UNRA – monitoring and support)	\$10,000
		Human Resources (Contractor –implementation/coordination)	\$10,000
		Specialist Inputs	\$120,000
		Implementation Partner Inputs	\$50,000
		Nursery	-
		Other Expenses/ Equipment	\$10,000
		Total	\$200,000
Contingency (overall)	Contingency for unexpected costs or slower achievement of biodiversity gains than expected	NA	\$100,000
Grand Total (over 10 years)	-		\$1,450,000
Ongoing Monitoring/Patrols/ Maintenance	Annual monitoring / patrols / maintenance of offset sites to maintain offsets	Covered by general BAP implementation budget	

***Table Notes:**

Costs are indicative and will need to be updated following further consultation with stakeholders regarding the offset management strategy and selection of final offsetting activities and sites.

Contingency amount is added to the overall total.

Auditing of offset activities is covered by the ESMMP budget.

The budget does not include any funding provided for 'supporting conservation actions'.

Costs are not adjusted for inflation.

12. REFERENCES

- AbiSaid, M. & Dloniak, S.M.D. 2015. *Hyaena hyaena*. The IUCN Red List of Threatened Species 2015: e.T10274A45195080. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T10274A45195080.en>. Downloaded on 24 April 2018.
- African Development Bank (AfDB) 2013a, African Development Bank Integrated Safeguards System: Policy Statement and Operational Safeguards, AfDB, https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/December_2013_-_AfDB%E2%80%99S_Integrated_Safeguards_System_-_Policy_Statement_and_Operational_Safeguards.pdf
- Assessment, M. E. (2005). Millennium ecosystem assessment. Ecosystems and human wellbeing: a framework for assessment Washington, DC: Island Press.
- Bahaa-el-din, L., Mills, D., Hunter, L. & Henschel, P. 2015. *Caracal aurata*. The IUCN Red List of Threatened Species 2015: e.T18306A50663128. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T18306A50663128.en>. Downloaded on 24 April 2018.
- Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., ... & Kinzig, A. P. (2012). Biodiversity loss and its impact on humanity. *Nature*, 486(7401), 59.
- Dippenaar, N.J. and Meester, J.A.J. 1989. Revision of the *luna-formosa* complex of Afrotropical *Crocidura* Wagler, 1832 (Mammalia: Soricidae). *Annals of the Transvaal Museum* 35: 1-47.
- Dranzoa, C.; Nkwasi, J.; Sande, E. 1999. Additional surveys of Nahan's Francolin *Francolinus nahan* in the tropical rainforests of Uganda. *Bulletin of the African Bird Club* 6(1): 52-55.
- FishBase team RMCA & Geelhand, D. 2016. *Labeo victorianus*. The IUCN Red List of Threatened Species 2016: e.T60318A47182908. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T60318A47182908.en>. Downloaded on 24 April 2018.
- Fishpool, L. D. C. & Evans, M. I. 2001. Important Bird Areas in Africa and Associated Islands. BirdLife Conservation Series No. 11.
- Gerrie, R. & Kennerley, R. 2016. *Crocidura selina* (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T5593A115076180. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T5593A22303358.en>. Downloaded on 24 April 2018.
- Groves, C. P. (2007). The endemic Uganda mangabey, *Lophocebus ugandae*, and other members of the *albigena*-group (*Lophocebus*). *Primate Conservation*, 22(1), 123-128.
- Infra Consulting Services Limited (ICS) 2015a, Kampala Southern Bypass. Part 4 Assessment of External Impacts: Volume 4a - Environmental and Social Impacts, Prepared for Uganda National Roads Authority
- Infra Consulting Services Limited 2015b, Kampala-Jinja Road Capacity Improvement Study: Part 4a Assessment of External Impacts - Volume 4a Environmental and Social Impacts, Prepared for Uganda National Roads Authority
- IUCN (2003), Integrating Wetland Economic Values into River Basin Management, Case Studies in Wetland Valuation #7, Nakivubo Swamp Uganda: Managing Natural Wetlands for the Ecosystem Services.
- Pomeroy & Tushabe (2008), The State of Uganda's Biodiversity 2008, Sixth Biennial Report, Makerere University Institute of Environment and Natural Resource
- Reed-Smith, J., Jacques, H. & Somers, M.J. 2015. *Hydrictis maculicollis*. The IUCN Red List of Threatened Species 2015: e.T12420A21936042. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T12420A21936042.en>. Downloaded on 24 April 2018.

- Richard Fuller, Perpetra Akite, John Bosco Amuno, Claire Flockhart, John Martin Ofwono, Gil Proaktor & Richard Ssemmanda (2003). Recovery of the Nahan's francolin: Decline of a globally threatened bird in the forests of central Uganda, World Pheasant Association; Durham, UK
- Thorn, Erik & Kerbis, Julian. 2009. Small mammals of Uganda. BONNER ZOOLOGISCHE MONOGRAPHIEN Nr. 55/2009
- Tilbury, C.R. 2010. Chameleons of Africa: An Atlas, Including the Chameleons of Europe, the Middle East and Asia. Edition Chimaira, Frankfurt.
- Trape, J.-F., Trape, S. and Chirio, L. 2012. Lézards, crocodiles et tortues d'Afrique occidentale et du Sahara. IRD Editions, Marseille.
- Twongo, T.K., Bayona, J.D.R. & Hanssens, M. 2006. *Oreochromis esculentus*. The IUCN Red List of Threatened Species 2006: e.T15457A4587658. <http://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T15457A4587658.en>. Downloaded on 24 April 2018.
- Twongo, T.K., Bayona, J.D.R. & Hanssens, M. 2006. *Oreochromis variabilis*. The IUCN Red List of Threatened Species 2006: e.T15458A4587788. <http://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T15458A4587788.en>. Downloaded on 24 April 2018.
- USAID, Uganda Biodiversity and Tropical Forest Assessment, 2006

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