

Project description:

The Modogashe-Habasweini-Samatar road is a 68km section of the 540km A13 road that runs from Modogashe town through Habasweini, Lagh Boghol, Leheley, Wajir, Elwak, Rhamu to Mandera town in North-Eastern Kenya to be developed in the Republic of Kenya. The Project will include construction of the following permanent structures: (i) above ground structures such as bridges, and overpasses; and (ii) hydrotechnical structures that include new culverts and the repair of existing culverts, storm water drains, etc. n estimated 125 structures will be affected along the entire project corridor. These structures are found within the towns of Modogashe and Habasweini. An estimated 7 electricity poles will be affected in Habasweini town carrying low voltage electricity lines. Temporary site facilities such as quarries and borrow pits, camp sites and storage areas, crushers, concrete batching plants and asphalt plants, and access roads will also be installed for the construction phase of the Project.

The Rhamu - Mandera A13 road – 75 Km Long in Mandera County.

The proposed road project by Kenya National Highways Authority (KeNHA) is a part of the LOT 3 - annuity road project in Kenya under the Public Private Partnership (PPP) which entails construction of the 68 km class B road from Modogashe town through Habasweini town to Samatar.

Function and use of a Biodiversity Management Plan:

This Biodiversity management Plan (BMP) forms part of a suite of management plans under the Project's Environmental Monitoring Plan (EMP), and will be implemented as part of the Project's Environmental and Social Management Plan (ESMP).

It is an operational document which details how the Project will implement the required biodiversity mitigation measures identified in the Supplementary Biodiversity Impact assessment (MIGA 2021), and the current biodiversity impact assessment study, and any additional recommended mitigation measures for the Critical Habitat-qualifying biodiversity, Natural Habitat, and stakeholder priority biodiversity identified in the Critical Habitat Assessment, and the currently Updated Biodiversity Impact Assessment. The tracker is designed to be an auditable document by the Project owners and/or by third parties e.g. Project partners, and therefore each mitigation measure has a unique identification number and the key party responsible for its implementation are defined as well as the monitoring and/or verification requirements and an implementation schedule.

Biodiversity impacts will be greatest during the construction phase of the Project, and therefore the BMP focuses on construction phase mitigation measures. High level measures are also outlined for the operational phase but compensation (offset) actions will be developed in separate plans.

ID	Impact	Stage of the Mitigation Hierarchy	Mitigation measure	Details of the measure	Priority biodiversity associated with the measure	Responsible party	Start time	End time	Frequency	Means of verification	Other MP/Procedures where mitigation addressed (including associated ref. no.)
BMP01	Terrestrial habitat loss and fragmentation	Avoidance	Ensure that the terrestrial Critical and Modified (Natural) Habitat is avoided wherever feasible	<p>Assess the potential to relocate infrastructure components such as borrow pits, material source areas, quarries, and access roads away from areas of terrestrial Critical habitats Key steps:</p> <ol style="list-style-type: none"> 1. Overlay the GIS spatial layers of identified Critical Habitat as stipulated in the Biodiversity Impact Assessment, as captured in the Biodiversity Action Plan(BAP), with the road corridor that forms the project infrastructure footprint. 2. Identify where the material source sites, borrow pits, quarries and access roads overlap with the Critical Habitat. 3. Assess the suitability of Relocation Action Plan (RAP) alternative locations in areas of Critical Habitat to locate new settlements and infrastructure components. 4. If no alternative locations and the Critical habitat is available, consider micro-siting of infrastructure in the detailed design phase to minimise impacts to Critical Habitat. 5. Keep a record of the type of infrastructure that is relocated/microsited, the type of Critical Habitat that was avoided and the area of impact that was avoided. 6. Deduct the total avoided areas of each habitat type from the residual impact figures to reduce the offset target 7. If additional borrow pits, material source areas and quarries are required to meet a change in source material requirements during construction, a supplemental environmental and social assessment of the new quarry pits / sand harvest areas should be undertaken, appropriate mitigation measures developed following the mitigation hierarchy and residual impacts quantified to establish any offset requirements. 8. The selection for alternative sites for material source sites, borrow pits, quarries, new settlements or infrastructural development should aim at area within minimal disturbances within project area as outlined in the approved Project's Facilities/Site Management Plan that also includes site selection criteria and decommissioning of facilities at the end of the project life time. 	Modified (Natural) and Critical terrestrial Habitat	KeNHA Environmental Lead	Before commissioning of the project	Before and during construction (if additional material sourcing is needed) (note:- Supplemental ESIA required if additional material sourcing is needed)	Once	<p>Maps identifying areas where relocation of infrastructure components has been carried out.</p> <p>Maps described above to be included in material sourcing and Quarry Management Plan</p> <p>Supplement Environmental & Social Impact Assessment report where additional material sourcing is done</p>	<p>EMP (Section 7.6 and 9.3) Modogashe-Samatar, and Rhamu-Mandera roads respectively; Residual Impact Evaluation (SECTION 4.2) Kenya Road Annuity Project Lot 3 Supplementary Biodiversity Assessment(2017). BAP report</p>

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BMP02	Breeding and migratory stop-over disturbance by construction activities	Avoidance & minimization	Project construction activities where possible to avoid sensitive periods for breeding biodiversity. If possible, facilitate normal biodiversity breeding functioning during construction by temporarily halting activities or by relocating accessways by circumventing the sensitive areas where practicable.	<p>Construction activities where possible should be planned to mitigate adverse effects for the following sensitive periods for biodiversity where possible:</p> <p>i). Project activity schedule should be designed to avoid the breeding or peak of breeding season of threatened or restricted birds (various EN species as captured in BAP report) and fish species (Boji plains nothobranch, Ewaso nyiro barb, Ewaso nyiro labeo), which breed mainly during the wet seasons, and gregarious mammals like Beisa oryx and Reticulated giraffes. Further activities should be designed to avoid areas with CH aquatic plant species ii) With consultation and guidance of Biodiversity (species/taxa) experts, deter breeding of the species especially birds, fish and other taxa where breeding is likely to set in while construction activities are going on and option to stop the work is not feasible, iii). Using experts confirm presence of breeding species prior to start of construction activities and if breeding individuals are confirmed, then work scheduled in the area should be delayed to allow fledgling in case of birds or giving birth and exit from breeding grounds, in case of mammals iv). In case of both a seasonal or seasonal aquatic breeders, which use both up and down streams, bypasses with flowing water should be created to maintain connectivity of the water ecosystem. Adhere to design specifications for culverts to accommodate hydrological capacity and avoid perching of water. used.</p> <p>2. Maintain the water quality by ensuring the water quality management plan is adhered to through avoidance of waste discharge into aquatic environments or storm water discharge. Provide bypass lines to discharge downstream of the Critical Habitats. Ensure that water quality tests are done quarterly during the construction phase. Monitor the water quality after project completion twice in a year to ensure that no pollutants exist in the aquatic environment for the first three years of project operation. Strictly adhere to the recommended design for the trunk road drainage system which incorporates adequate storm water drains, culverts and bridges for trunk road. Ensure that the constructed drainage facilities are not blocked and allow the flow of water and interconnectivity of the aquatic habitat.</p>	No priority biodiversity, this measure is applicable to wider biodiversity values	KeNHA Environmental Lead; Biodiversity Expert	Prior to construction	End of construction	During specified periods: Quarterly	Visual inspections Site inspection reports	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively.; Residual Impact Evaluation (SECTION 4.2) Kenya Road Annuity Project Lot 3 Supplementary Biodiversity Assessment(2017); BAP Report

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BMP03	Habitat and species disturbance by site personnel and contractors	Minimisation	Ensure that site personnel and contractors undergo environmental awareness training and comply with regulations to minimise impacts to biodiversity	Develop environmental awareness training according to the EMP to ensure that: 1. Site personnel are aware of the rules, procedures and prohibitions relevant to the mitigation of impacts on biodiversity (to include for example: limiting access of personnel to undisturbed areas of Modified (Natural) Habitats to minimize habitat degradation, restriction of personnel movements to designated roads and paths, prohibition of hunting and adhering to, speed limits on roads). 2. Enforce compliance and institute appropriate or prescribed legal measures for site personnel and contractors who neglect or violate the rules, procedures and prohibitions 3. Develop an induction course to train new site personnel and sub- contractors upon their arrival about the rules, procedures and prohibitions. Further, the training should include: identification and importance of priority biodiversity features, and the understanding of the penalties for non-compliance. reinforce the training through reminders in toolbox talks before commencement of works.	All priority biodiversity (and wider biodiversity values)	KeNHA Environmental Lead	Before commissioning of the project	End of construction	Continuously	Visual inspections. Induction program includes environmental awareness training. Records of staff and contractors receiving environmental awareness training. Set of rules enforced & SOPs followed to minimize biodiversity disturbance.	EMP (Section 7.6 and 9.3) Modogashe-Samatar, and Rhamu-Mandera roads respectively.; Residual Impact Evaluation (SECTION 4.2) Kenya Road Annuity Project Lot 3 Supplementary Biodiversity Assessment(2017) Environmental awareness training procedure/plan under the Construction Environmental Management Plan in the EMP. BAP Report
BMP04	Habitat fragmentation and species mortality	Minimisation	Ensure planned culverts, tunnels and bridges are designed in consideration of common wildlife movements across the road i.e., should allow safe crossing.	Liaise with project proponent to ensure the engineers' design of road infrastructure targeting safe wildlife movement across the road are well implemented. This include; 1. Bridges - Where provided in the road upgrading designs, ensure the bridges over rivers, streams or large laggas maintain landscape connectivity including riparian habitat by enabling the movement of small terrestrial animals or aquatic wildlife underneath them. In the case of temporary lagga crossings where no bypass section is possible, ensure that the crossings maintains connectivity between the upstream and downstream river environment by including sluices, pipe culverts (as recommended for temporary drainage facilities by the structural engineer), with an appropriate void ratio to accommodate hydrological capacity and avoid perching of flow. 2. Culverts; where possible, adapt box-culverts (or as recommended by the structural engineer)to enable terrestrial species passage e.g. by adhering to the engineering designs for the facility that would be adequate for a trunk road to enable the dry passage of terrestrial mammals even during periods of high water levels. 3. Ensure the highway has appropriate speed bumps/rumble strips that would slow traffic in animal crossing hotspots through the advice of the biodiversity expert to enable safe crossing especially for the CH species like the Giraffes and Oryx. This would minimise wildlife collisions during the operational lifetime of the highway. 4. Ensure speed control measures are incorporated in the design and installation of motorist warning via road signage in habitats frequently utilized by common wildlife including slow moving (e.g., reptiles), fast moving (e.g Gerenuks, Grant, gazelles) and threatened species (Reticulated giraffe and Beisa oryx). 5. Where the road passes through the Ewaso Ng'iro flood plain, adhere recommendations for drainage design as discussed in BMP 02	All biodiversity values	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase); Biodiversity Expert	Prior to construction	End of operation (Note: Monitoring of wildlife crossings to go on even after end of project)	Continuously	Road design plans Visual inspections Site inspection reports	EMP (Section 7.6 and 9.3) Modogashe-Samatar, and Rhamu-Mandera roads respectively.); Residual Impact Evaluation (SECTION 4.2) Kenya Road Annuity Project Lot 3 Supplementary Biodiversity Assessment(2017) BAP report

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BMP05	Habitat and species disturbance by construction activities	Minimisation	Minimise direct species mortality and disturbance during construction of infrastructure components	Direct species mortality and disturbance should be minimised by taking the following measures: 1. If the unlikely encounter with a CH aquatic fish species, found to be stranded in any remaining small ponds specifically in the Ewaso river floodplain, or temporary swamps (see main report) in the Rhamu-Mandera road, in sections that will undergo regulation or diversion works, the species should be safely transported to temporary safe havens/or constructed pool nearest areas of suitable habitat that will not be directly impacted by the construction activities with help of the project biodiversity experts. Upon completion of the specific task in this environment, the species should be placed in its Modified (Natural) Habitat. 2. Implement vehicle speed limit reductions on access roads to minimise wildlife-vehicular collisions. 3. Restrict the road clearance to earmarked road reserve to reduce or minimise the elimination of biodiversity e.g., invertebrates and soil organisms 4. Control noise, water systems (surface and underground) and soil pollution (through proper disposal of liquid and solid waste) as provided in the ESMP to minimize impact on habitat quality, behavior and physiology of sensitive wildlife species, breeding population, aquatic species and subterranean fauna. Follow the water management plan for water quality verification in aquatic environments.	All biodiversity values	KeNHA Environmental Lead	Prior to construction	End of construction	Continuously	Visual inspections Site inspection reports	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively; Emergency preparedness and response under the construction environment management plan. BAP report
BMP06	Aquatic species mortality due to riverine habitat degradation, fragmentation and loss	Minimisation	Minimize bank destabilization and dredging of streams, rivers and Lagga's to reduce bank erosion, deterioration of water quality and risk of dying of aquatic species	The risk of interference and subsequent mortality of the aquatic species (e.g CH fish as stipulated in BMP 02) endangered plant species (Ethulia scheffleri, Sphaeranthus samburuensis, Sclerocarya gillettii, Lagarosiphon hydrilloide)-all found in the Lorian swamp area- should be addressed by ensuring minimal soil removal from the water channels banks during bridges or culvert constructions or in order to reduce bank destabilization, increased siltation, water ecosystem pollution and habitat quality deterioration, which may suffocate or smother water organisms.	The aquatic species indirectly impacted	KeNHA Environmental Lead (to subcontract a species expert) (Construction phase) KeNHA Environmental Manager (Operation phase)	Prior to construction	End of operation	Continuously	Feasibility study Pre-disturbance surveys for aquatic organisms Site inspection reports	Updated Biodiversity Impact Assessment

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BMP07	CH species temporary disturbance due to clearance of Acacia spp and Salvadora persica habitat (Note the Open grassland and wooded grassland habitat will not be significantly affected due to the sparse cover,easily recoverable after rains).	Minimisation	Implement pre-disturbance surveys to confirm the presence/absence of Critical Habitat-qualifying species, existing Wildlife corridor (Rhamu-Mandera road)effect and general landscape connectivity by wildlife in the Project area and minimise project impact on wildlife habitat use and mobility	Pre-disturbance surveys by biodiversity expert is recommended in the shrubland Habitat that has a variety of acacias preferred by the Reticulated Giraffe and herbaceous vegetation that constitute key browse for Beisa Oryx . Prior to undertaking any development activities, to assess for the presence of Reticulated giraffe and Beisa Oryx; If this species are encountered, mitigation actions should be provided by the expert to minimize impacts to the species and the mitigation measures provided should be integrated into this Biodiversity Action Plan (BAP).	Terrestrial Modified (Natural) Habitats (Open and wooded grasslands within project areas, Lolian swamp floods plains etc) use as Migratory corridors,dispersal and breeding areas	KeNHA Environmental Lead;Biodiversity expert	Prior to construction	End of construction	Once	Pre-disturbance surveys of species habitat use & presence data <i>Distribution data of critical habitat qualifying species</i>	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Updated Biodiversity Impact Assessment
BMP08	Habitat disturbance by third parties (Other persons (pedestrians and motorists) who are not construction staff)	Minimisation	Prevent habitat disturbance by third parties	Develop and implement measures to minimise impacts by third parties, specifically: 1. Limit pedestrian, equipment and vehicle access to construction sites through designated bypass routes and appropriate entry and exit points (to be captured in the Traffic Management Plan). 2. Ensure the risk of population influx is managed (via the HR policy and labour relations plan or policy approved for this project) and if influx is detected measures are put in place to prevent habitat disturbance	Terrestrial Modified (Natural) Habitats	KeNHA Environmental Lead	Prior to construction	End of construction	Continuously	Implementation of the traffic management plan Implementation of the HR policy and labour relations plan Visual inspection	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Soil Erosion and restoration to include decommissioning plans for the operational areas and their facilities

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BM 09	Modified (Natural) Habitat degradation due to poor waste management	Minimisation	Implement appropriate waste management and disposal measures	<p>Develop and implement solid and liquid waste management protocols in the waste and hazardous materials management and; the water quality management plan/procedures to ensure solid and liquid waste generated from construction work and Project facilities is stored at designated areas and disposed of appropriately. Key measures relevant for biodiversity to include are:</p> <ul style="list-style-type: none"> - Prohibit the direct disposal of solid and liquid waste into the environment and adhere to NEMA guidelines on waste disposal for environmental protection and sustainability - Ensure only NEMA licensed/approved facilities for solid and liquid waste disposal are used, and ensure the waste management plan is strictly adhered to for all outbound waste. For hazardous waste ensure the MSDS protocols are strictly adhered to. - Establish wastewater treatment systems and septic systems in the Project facilities (preferably pit latrines, mobile toilets, biodigester, conservancy tanks or other systems approved by UN, WHO and Ministry of health for rural settings and for temporary base camp use for the personnel). 	All Modified (Natural) Habitats	KeNHA Environmental Lead	Prior to construction	End of construction	Continuously	<p>Implementation of the</p> <ol style="list-style-type: none"> 1. the waste management and hazardous materials management plan 2. the water quality management plan/procedures <p>Water quality monitoring results</p>	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Waste management, hazardous materials management, and water quality management procedures/plans under the respective EMPs; BAP Report
BMP10	Habitat degradation due to reduction in air quality	Minimisation	Implement pollution control measures to reduce air pollutant emissions	<p>Develop and implement air pollution control measures in the Air Quality Management procedures following the EMP. Key measures relevant for biodiversity to include are:</p> <ul style="list-style-type: none"> - Dust suppression (e.g. watering with water bowsers) on roads and construction sites to control localized dust emissions. - Enclose or cover stockpiles of stripped surface material, eg. sand and soil to reduce airborne fugitive dust particulates. - Regular measurements of air quality and records update in relation to mitigation measures used. 	All biodiversity values	KeNHA Environmental Lead	Prior to construction	End of construction	Continuously	<p>Implementation of the air quality management procedures</p> <p>Air quality monitoring results</p>	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Air quality management plan/procedures under the Construction EMPs; BAP report

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BMP1 1	Wildlife disturbance due to machinery operations, vibrations, and noise emission	Minimisation	Implement pollution control measures to reduce noise and vibration emissions/generation from machinery operations	<p>Develop and implement noise and vibration control measures in the noise and vibration, and quarry management plan/procedures following the ESMP. Key measures relevant for biodiversity to include are:</p> <ul style="list-style-type: none"> - Installation of silencers or mufflers as well as portable acoustic/noise barriers around, construction equipment, where applicable. - For quarrying activities, sites should be operated and monitored to comply with national and international standards and align with good international industrial practice (relevant good practice guidelines include IFC, EHS Guidelines for Construction Materials Extraction (2007)) - Where applicable, Install temporary acoustic/noise barriers (e.g. walls or vegetation) along the road right-of-way, paying special attention to areas close to sensitive biodiversity receptors. 	All biodiversity values	KeNHA Environmental Lead	Prior to construction	End of construction	Once	<p>Noise and vibration, and quarry management plan/procedures following the EMP</p> <p>Site inspection reports</p> <p>Noise measurement results</p>	<p>EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Noise and vibration plan/procedures following the Construction Environmental Management Plan. Quarry Management Plan; BAP report</p>

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BMP12	Introduction and spread of invasive species during construction	Minimisation	Minimise the spread of existing invasive species and prevent introduction of new invasive species in project area utilising best construction industry practices	<p>Implement management practices for soil movement and disposal. Key measures relevant for biodiversity to include:</p> <ul style="list-style-type: none"> - Carry out soil seedbank studies and soil composition analyses on soil collection areas to check for presence of invasive species infestation. - Ensure collection of soil for use during construction is done in areas not prone to invasive species to curb further spread of the invasive species. - Treatment of collected soil that may be infested with invasive species to control invasive species infestation. - Proper management of soil collection areas to curb infestation of the soil by invasive species. - A CSR recommendation: Revegetating of extremely disturbed areas with desired native plant species to curb dominance of invasive species that may colonize the area. This is an important area of augmenting offsets to net-gain status of recovered Habitat by the contractor. -Excavation machines coming from other construction sites should be cleaned thoroughly and disinfected to avoid introduction of new invasive species -Top soil removed from excavations sites should be stored and used to rehabilitate the quarry sites, borrow pit areas and other degraded sites, which could be quick targets for colonization by the invasive species. -Project management and personnel should be sensitized on the invasive species and their ecological impacts to minimize human dispersal of such species within and outside project area 	All biodiversity values	KeNHA Environmental Lead; Biodiversity Expert in liaison with relevant institutions(KFS, KEFRI, NMK)	Prior to construction	End of construction	Continuously	Invasive species management plan Visual inspections Site inspection reports	EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Environmental awareness training plan/procedures under the Construction Environmental Management Plan (EMP) Site decommissioning Plan under the Construction Environmental Management Plan (EMP); Invasive Species Management Plan under the Biodiversity Management and Monitoring Plan Soil erosion and restoration Plan. BAP report

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BMP13	Aquatic habitat degradation due to reduction in water quality	Minimisation	Implement appropriate control measures to reduce aquatic habitat degradation and monitor outcomes	<p>Ensure that relevant management plans (e.g. the water quality management plan, the spill response and pollution prevention procedures (SRPP) and the soil erosion, and restoration plans/procedures) as exemplified in the EMP; contain the following mitigation measures relevant to aquatic biodiversity both within the aquatic systems and the larger catchment area:</p> <ol style="list-style-type: none"> 1. To prevent soil erosion and sedimentation of river habitat, standard good practice mitigation measures to minimise erosion and sedimentation risks (e.g. silt fences and traps, bunding and /or covering of stockpiles, restoration of banks or sections close to the river). Particular attention should be paid to construction areas upstream of the Ewaso Ng'ro River, and River Daua i.e. the borrow area or material acquisition sites. 2. Develop a Method Statement for construction works within or in the vicinity of watercourses (Ewaso Ng'ro river, Lorian swamp ; the lowland that floods along the Rhamu-Mandera road viz; The seasonal swamps/temporary wetlands that form from Didima, Guediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu and the streams that drain into River Daua); this should include detailed control measures e.g. the use of sediment traps/booms to manage soil erosion and associated sedimentation impacts on the Laggas. Connectivity between tributaries and the Ewaso Ng'ro river should be maintained to support the movement of aquatic species, if temporary diversions are put in place, they must have a similar flow rate to the tributaries natural flow and not have any physical barriers to species movement upstream or downstream. In instances where instream works require the placement of temporary crossing structures which include pipe culverts, sluices where applicable, or any other similar facility, an appropriate openness ratio should be applied to the facilities ensuring they do not result in perched flows, but maintain connectivity between the upstream and downstream sections of the river. 3. Carry out re-fueling of all vehicles and machinery a minimum 50 m from any watercourse, drain or channel leading to a water course to minimise water pollution from accidental spills. 4. Undertake construction water quality monitoring along the Galana Gof, Ewaso N'giro flood plain, Samatar water pan, Habaswein earthdams, and boreholes in the project area, in accordance with good practice to ensure the adequacy of control measures in place and support adaptive management. Instream water quality indicators should include suspended sediment and turbidity, and in situ water quality parameters such as Electrical Conductivity, Total Dissolved Solids, pH and dissolved oxygen during construction with development of thresholds to trigger adaptive management actions should the parameters increase significantly due to instream works. 5. For aquatic fauna that could be threatened e.g the CH- fish species, refer to BMP 06 	Ewaso Ng'iro Floodplain and the seasonal swamps/temporary wetlands that form from Didima, Guediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu and several streams that drain into River Daua--plus their associated aquatic Fauna (under review)	KeNHA Environmental Lead; Biodiversity Expert	Prior to construction	End of construction	Continuously	<p>Visual inspections</p> <p>Site inspection reports</p> <p>Method Statement for construction works within or in the vicinity of watercourses verified to include water pollution control measures</p> <p>Water quality measurement results</p>	<p>EMP (Section 7.6 and 9.3) Modogashe Samatar, and Rhamu-Mandera roads respectively. Hazardous material management, water quality management, waste management, Site Closure Plan, spill response and pollution prevention plans/procedures, under the Construction Environmental Management Plan (EMP) Soil Erosion and restoration Plan, including unique disturbed localized components; BAP report</p>

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BMP14	Loss of CH qualifying vegetation, including nationally protected plant species	Avoidance and Minimisation	Preserve top soil and collect seeds for rehabilitation and conservation purposes and road designs to divert from know stands of such species	Ensure the Soil Erosion and Restoration Plan contain the following biodiversity measures: 1. A procedure for removal and appropriate storage of topsoil to preserve the natural seed bank it contains for future rehabilitation activities. 2. Collection and appropriate seed bulking (e.g. in a nursery) cuttings, or plants of nationally protected and CH qualifying flora if encountered, prior to vegetation clearance activities for use during rehabilitation activities. A prefeasibility survey to be undertaken by the biodiversity expert in known hotspots like the Lorian swamp area. 3. Where practical, and where this occurs, collected seeds of the limited range distributed flora should be deposited at the KEFRI office/Garissa who will liaise with NMK-National Gene Bank , for genetic conservation purposes. 5. Pre-construction photos and records of the landscape and morphology for restoration	Terrestrial Modified (Natural) Habitats and plant species	KeNHA Environmental Lead	Prior to construction	End of construction	Once	Implementation of the Soil, Erosion, restoration and Landscape management plan (SERL) Visual inspections of soil storage	EMP (Section 7.6) Soil Erosion, Restoration/Decommissioning Plan, including individual SERL Plans for each temporary infrastructure component; BAP Report
BMP15	Terrestrial habitat loss and fragmentation due to construction activities	Restoration/ Rehabilitation	Rehabilitate areas of terrestrial Modified (Natural) Habitat that are lost or degraded during the construction period	Ensure that Soil erosion and restoration plans prepared for each infrastructure component (camps, site facilities, borrow pits, quarries, batching plant, and asphalt plants) to define the rehabilitation measures that will be undertaken for each area. Biological rehabilitation measures should include: 1. Technical rehabilitation should be undertaken prior to biological rehabilitation to ensure conditions (slope, top soil etc) are appropriate for biological rehabilitation 2. Technical and biological rehabilitation should be prioritised in disturbed areas that are at risk of erosion and adjacent to aquatic habitat e.g. areas of a slope such as the road embankment and borrow pits to minimise loss of topsoil and sediment run-off into rivers by implementing erosion controls such as silt traps, bunding of stockpiles, earth berms etc. 3. Use only native species that are associated with the habitat type undergoing restoration; Liaise with Kenya Forestry Research Institute (KEFRI) for the acquisition of plant material that may be required to ensure that sufficient plants supply for rehabilitation work at the right time. 4. Monitoring of revegetated areas should be continued for at least 10 years using indicators that monitor the establishment, survival and growth of species in revegetated areas to determine revegetation success and adaptively manage re-vegetation effort as required. Spot weeding should be carried out and replacement of dead plants effected.	Lorian Swamp floodplain, the seasonal swamps/temporary wetlands that form from Didima, Guediye, Gingro, Hafadi, Jirma, Shafshafe to Handadu and several streams that drain into River Daua and are infested with prosopis juliflora.	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase)	Construction	Operation	Continuously	Visual inspections Site inspection reports Rehabilitation monitoring reports	EMP (Section 7.6 and 9.3) Modogashe-Samatar road and Rhamu-Mandera road respectively Soil Erosion, restoration/decommissioning Plan, including individual decommissioning plans for each temporary infrastructure component; BAP report

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BMP16	Terrestrial and riverine habitat loss, degradation and fragmentation due to development of infrastructure components	Offset	Design and implement offsets to compensate for residual impacts and achieve a no net loss for Modified (Natural) Habitat, and net gain for Critical Habitat.	Design and implement biodiversity offsets to compensate for residual impacts and achieve a no net loss for Modified (Natural) Habitat, and net gain for Critical Habitat; (Follow recommendations of the BAP document). Develop and implement an offset program based on the following approach: 1. Assess the feasibility of offset options and activities with specialists, key stakeholders, and relevant government organizations 2. Carry out required field surveys and stakeholder engagement to support the development of detailed design of agreed offset activities, and fill data gaps to fully understand feasibility 3. Confirm the no net loss/net gain potential of the offset activities to ensure sufficient gains can be achieved to achieve the offset targets (loss/gain accounting update) 4. Hold meetings with key stakeholders to define the management actions for the offset activities and agree approach 5. If required develop a full Offset Management Plan including development of a detailed budget and financing for the offset and a monitoring and evaluation plans to track implementation of activities and outcomes for identified priority biodiversity, and terms of reference and budgets for implementation partners 6. Offset implementation 7. Periodic evaluation and progress reviews.	Modified (Natural) Habitat - Greater Ewaso Ng'iro Catchment Critical Habitat - Ewaso Ng'iro floodplain, Lorian Swamp, River Daua floodplain	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase) Biodiversity Expert	Before commissioning of the project	End of operation	Continuously	Offset Management Plan and monitoring reports; offset net gain of lost hectareage as recommended by the Biodiversity expert-based on Quality Metrics that will be directly affected by the road ROW alignment.	Soil Erosion, restoration/decommissioning Plan, including individual decommissioning plans for each temporary infrastructure component; BAP Report
BMP17	Terrestrial and riverine habitat loss, degradation and fragmentation due to development of infrastructure components	Monitoring and evaluation	Design and implement a long-term biodiversity monitoring program, assess the effectiveness of mitigation measures and to adaptively manage responses to Project impacts.	Design and implement an appropriate Biodiversity Monitoring and Evaluation Plan (BMEP). It should include: - Thresholds will be developed for key indicators such as vegetation cover for the terrestrial habitats and measures for hydrology, water quality (physical and chemical), habitat integrity, geomorphology and biological (fish) for the freshwater habitat. - Undertake additional baseline surveys to fill in any gaps in the monitoring baseline to support monitoring of the status of biodiversity values during the life of the project with key focus on mega-herbivores (particularly Reticulated giraffes and Beisa Oryx), and aquatic endemic biodiversity (Plants and Fish: BM02 and BM06). - Undertake construction, post construction and post restoration surveys to show trends in the indicators and highlight where additional intervention may be needed	Modified (Natural) Habitat - Greater Ewaso Ng'iro North catchment; Greater Eastern Afrotropical Ecoregion Critical Habitat - Lorian swamp, Ewaso River floodplains; Daua River floodplains	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase) /Biodiversity expert	Before commissioning of the project	Post restoration	Continuously	BMEP trend analysis Visual inspections Monitoring reports Photo inventory	EMP (Section 7.6 and 9.3) Modogashe-Samatar road and Rhamu-Mandera road respectively; BAP report

ID	Impact	Stage of the Mitigation Hierarchy	Mitigation measure	Details of the measure	Priority biodiversity associated with the measure	Responsible party	Start time	End time	Frequency	Means of verification	Other MP/Procedures where mitigation addressed (including associated ref. no.)
BMP18	Terrestrial and riverine habitat loss, degradation and fragmentation due to operation of infrastructure components	Minimisation	Prepare an operation-phase Biodiversity Management Plan for handover from Contractor to KeNHA	Prepare an operation-phase Biodiversity Management Plan as part of hand over from the contractor to KeNHA to support efficient and effective implementation of biodiversity mitigation measures when the highway is in operation.	All biodiversity values	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase) Biodiversity Expert	Project handover to KeNHA	Before start of operation	Once	Operation-phase Biodiversity Management Plan	EMP (Section 7.6 and 9.3)Modogashe-Samatar road and Rhamu-Mandera road respectively; BAP Report
BMP19	Injury to wildlife through road hits and death due to increased traffic	Minimisation	Implement road hits and roadkill management plan during construction and operations to ensure effective wildlife mitigation measure	The road hits and roadkill management plan should include: 1. A road hits/kill baseline survey where data collected will be used in estimating the frequency of accidents and roadkill and relevant hotspots and; traffic counts to determine how variation of traffic will affect the number of road hits/kills. Monitoring to be continued during the operation phase of the project to establish the efficacy of road hits/kill minimization strategies that may include realignment or modification of the road hits/kill hotspots. 2. Road hit/kill mitigation trials. This will take advantage of the data collection from the baseline surveys to develop cost-effective and environment friendly mitigation road hit/kill mitigation measures including installation of signage to alert drivers on wildlife crossing areas, installation of audible rumble strips and roadside clearing to reduce incidents of animal foraging and sheltering close to the road. 3. Community awareness programs. Community awareness on the road use should be disseminated through local language spoken in the region (Somali) and media outlets targeting communities living along the road as well as road users. 4). CSR-recommendation: Consider development of wildlife water sources at safe distance both sides of the road to minimise wildlife movements and criss-crossing the road in search for water (e.g., sinking of boreholes or construction of earth pans, or sand dams in rechargeable areas in consultation with Water Resources Authority (WRA).	All biodiversity values	KeNHA Environmental Lead (Construction phase) KeNHA Environmental Manager (Operation phase); Biodiversity Expert	Project handover to KeNHA	Before start of operation	Continuously	Road kill data Roadkill hotspots Animal crossing points Traffic count data Mitigation measures; road signages, rumble strips etc	EMP (Section 7.6 and 9.3)Modogashe-Samatar road and Rhamu-Mandera road respectively. Project BMP and ERP within EMP; BAP report

ID	Impact	Stage of the Mitigation Hierarchy	Mitigation measure	Details of the measure	Priority biodiversity associated with the measure	Responsible party	Start time	End time	Frequency	Means of verification	Other MP/Procedures where mitigation addressed (including associated ref. no.)
BMP20	Escalation of human-wildlife conflict including human injury	Minimisation and avoidance	Develop plan to mitigate existing or new form of human wildlife conflict and enforce the regulation that control such conflict	The human conflict mitigation plan should include; i) Feasibility study to identify the nature of human-wildlife conflict leading to human injury or death, wildlife killing for different reasons (e.g., bushmeat, trade on game trophies, retaliation attack by project personnel, snake bites etc), ii). Project personnel sensitization program on the likely causes and nature of conflict and how to resolve them., iii). Monitoring (during and post construction period) and control of potential smuggling of unique or valuable species for trade and consumptive/nonconsumptive utilization of wildlife contrary to CITES and National Wildlife Act, (2013) and enforce the stipulated prohibitive measure to deter such acts. iv) Given wildlife threat especially risk of snakebite, consult with biodiversity experts to understand the venomous snake in the project area, their behavior, avoidance strategies and the availability of the right antivenom at site to ensure maximum protection or treatment to project personnel and locals in case a bite occurs within the project area. Recommendation: Liaise with the Bio-Ken Snake Farm, Mtwapa who have the expertise and stockpile of anti-venom of all major snakes in Kenya, and also hire out their staff to find snakes and place them elsewhere out of the work area and camps (within their habitats).	All Biodiversity values	KeNHA KeNHA Environmental Lead (Pre, Construction & operational phases).	Pre-project Implementation	During operation Phase	Continuously	Survey report on potential human-wildlife conflict; Human-wildlife conflict resolution plan; Staff sensitization program & report on human wildlife conflict; Public health records	EMP (Section 7.6 and 9.3) Modogashe-Samatar road and Rhamu-Mandera road respectively, BAP report

ID	Impact	Stage of the Mitigation Hierarchy	Mitigation measure	Details of the measure	Priority biodiversity associated with the measure	Responsible party	Start time	End time	Frequency	Means of verification	Other MP/Procedures where mitigation addressed (including associated ref. no.)
BMP2 1	Disruption of the ecosystem Services	Minimisation & avoidance	Develop and implement Ecosystem Services Impacts Mitigation Plan in the project target areas	<p>The Ecosystem Services Impact mitigation Plan should include: a) Cultural Services <i>i)</i> . Project proponent should consider and minimize the project or infrastructural developments in areas utilized by the locals for recreation (aesthetic importance), cultural practices or rituals (e.g., grave sites, sites of worship etc) to maintain that cultural value of the ecosystems. <i>ii)</i> . Material source area and waste dump pits within the landscape should be rehabilitated with the pre-project existing native plant species to restore the site naturalness for sustained aesthetic value. b). Provisioning service s: - <i>i)</i> .If encountered, project should minimise disturbance of Acacia -Commiphora-Salvadora vegetation stand that are critical in provision of gum arabica, toothbrush, medicine and shade for the wellbeing of local livelihoods, <i>ii)</i> . Utilization of the locally available natural resources/materials sources for the project e.g., sand, murrum etc. should be controlled to ensure sustainable utilization of such non-renewable resources considering the needs of the same by locals. <i>iii)</i> Undertake pre-project survey on edible wild plant foods in the project area and avoid interfering with them where applicable. <i>iiii)</i> Monitor the illegal trade in wildlife parts, and plant species eg., Sandalwood and Aloe species plants etc) and enforce the CITES regulation prohibiting collection of such organisms. <i>iv)</i> Ensure minimal disturbance and non-barrier effect on wildlife and livestock to Lorian swamp and wildlife dispersal area between Malka Mari and Galare National parts and community conservancies (Captured in BAP report)identified as grazing refuge during periods of dry season . c) Regulatory Services : - <i>i)</i> Miminise the direct or indirect disturbances to critical habitats (e.g., Lorian swamp, Ewaso Ngiro Catchment area, riverine habitats of the Rhamu-mandera road corridor); and protected areas and community conservancies, which play key role in local climate modification and sustainability of ecological interactions. <i>ii)</i> project engineers to avoid or minimise project activitie (e.g., vegetation clearance, traversing through established and continous Acacia-Commiphora stands, which play critical role as carbon sinks and in nutrient cycling. <i>d).</i> Supporting services : - Adhere to engineering design in culvert construction and install gabbions in erroded waterways to minimise loosening of soil and vegetation removal on rivers or stream banks as well as preventing bank erosion for continued bank stabilization and mininimising flood risks. <i>ii)</i> . Projects design to avoid wildlife dispersal areas, breeding grounds and crossings, and where applicable migratory corridors for sustenance of continous ecological functions and posterity</p>	All Biodiversity values	KeNHA KeNHA Environmental Lead (Pre, Construction & operationa phases). Biodiversity Expert	Pre-project Implementation	During Operational Phase	Continously	Plan for Ecosystems Services Impact mitigation	EMP (Section 7.6 and 9.3)Modogashe-Samatar road and Rhamu-Mandera road respectively; BAP report

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