Supplementary Environmental & Social Impact Assessment (ESIA) for Almaty Railroad Bypass Project, Kazakhstan

Biodiversity Management Plan

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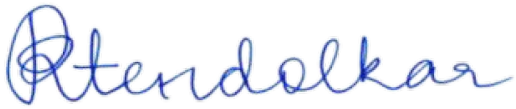

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1. INTRODUCTION

The Almaty Railroad Bypass or the Project is a critical greenfield railway infrastructure project between Kazybek Bek and Zhetygen across the districts of Talgar, Iliy, Karasai and Zhambyl. The Project involves developing a national railway as part of the Trans-Caspian International Transport Route (also referred to as the Middle Corridor[1]) designed to resolve the current railway overload and logistics bottleneck around the city of Almaty, while enhancing passenger and cargo transportation efficiency.

1.1 PURPOSE AND SCOPE

This document, the Biodiversity Management Plan (BMP), has been prepared by Environmental Resources Management (S) Pte Ltd ("ERM") for the Asian Infrastructure Investment Bank ("AIIB") and the International Finance Corporation ("IFC"), collectively referred to as the "Lenders", who are considering financing the construction and operation of the Almaty Railroad Bypass (the "Project"), which is under development by the Kazakhstan Temir Zholy Joint Stock Company (the "Developer" or "KTZ").

The Biodiversity Management Plan (BMP) establishes a framework for implementing mitigation measures and monitoring protocols to address identified impacts arising from the construction and operation of the project. It details the procedures and actions required for effective biodiversity management within the project area.

The following objectives apply in relation to the management of biodiversity:

- Reduce impacts of the Project on biodiversity values to first avoid, then minimise where possible and then restore, and as a last resort, offset impacts.
- Ensuring no net loss where natural habitats are converted or degraded.
- Respect the requirements of legally protected and internationally recognized areas of high biodiversity values by ensuring that any activities undertaken are consistent with the area's legal protection status and management objectives.
- Assess and manage Natural Habitats within KTZ controlled and managed areas in line with IFC PS requirements.
- Adopt practices that are practical and easily implemented whilst meeting the objectives of sustainably managing biodiversity.
- Compensate for residual impacts to biodiversity values through biodiversity offsets.
- Work with key stakeholders to restore biodiversity values.

1.2 PROJECT OVERVIEW

The Project involves the construction of railway bypass with a total track length of 130 km (of which approximately 75 km is the main track between Kazybek Bek and Zhetygen), five (5) stations including three (3) new and two (2) extended/modernised, two (2) main substations, three (3) switches to guide trains from one track to another, three (03) 500/220 kV

[1] The Trans-Caspian International Transport Route or the Middle Corridor is a multimodal transport corridor to enhance trade routes and local connectivity. The Middle Corridor starts from Southeast Asia and China, runs through Kazakhstan, the Caspian Sea, Azerbaijan, Georgia and further to European countries. https://middlecorridor.com/en/

substations: one existing substation at Kazybek Bek, a new substation to be constructed within the Zhana Arna station footprint, and an additional substation, PS-Alma-500, located outside the RoW. The PS-Alma-500 substation does not belong to KTZ and is not an associated facility for this project. The additional substation will be connected to the proposed Zhana Arna station via a 1.9km 220 kV OHTL (of which, about 500m is within the Project RoW). Additionally, one (1) single circuit 10 kV underground power transmission line spanning 73 Km, running parallel to the alignment will be within the Project RoW, 13 bridges, five (5) rail overpasses and one (1) road crossing (in addition to associated facilities as described in Main Report of the Supplementary ESIA).

1.3 APPLICABLE REGULATIONS AND GUIDELINES

Applicable laws, directives, policy and guidance for biodiversity impacts are outlined in **Table 1-1.**

TABLE 1-1: BIODIVERSITY APPLICABLE REGULATIONS AND GUIDELINES

Title	Year
Law	
Environmental Code of the Republic of Kazakhstan dated January 2, 2021 No 400-VI ZRK	2021
The Ecological Code of Kazakhstan (#400-VI, adopted January 2, 2021, with the last amendment on May 21, 2024)	2024
Law of the Republic of Kazakhstan about Protection, Reproduction and Use of Fauna No. 593-II.	2004
Law of the Republic of Kazakhstan on Specially Protected Natural Areas No. 175.	2006
Policy	
International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	2012
IFC Environmental and Social Performance Standards	2012
IFC Environmental, Health, and Safety Guidelines for Railways	2017
Guidance	
RSI "Almaty Regional Territorial Inspectorate of Forestry and Wildlife of the Committee of Forestry and Wildlife of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan" No20/14090[26]	2022
Model Rules for the Creation, Maintenance, and Protection of Green Spaces in Settlements, approved under Order No. 62 by the Minister of Ecology and Natural Resources of Kazakhstan	2023
Kazakhstan has been a Party to the Convention on the Conservation of Migratory Species (CMS) since May 1, 2006, and has signed several MOUs demonstrating its commitment to conserving migratory wildlife. These include agreements for the	2006

Title	Year
Siberian Crane (1998), Slender-billed Curlew (1994), Bukhara Deer (2002), Saiga Antelope (2006), and Birds of Prey (2024)	
IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets	2014
WBG EHS Guidelines for Electric Power Transmission and Distribution	2007
IUCN's Integrated Biodiversity Management Systems	2014
WBCSD Guidelines for Ecosystems and landscape Management	2011

1.4 STRUCTURE OF THIS BMP

The BMP includes the following components:

- **Biodiversity Management Plan (BMP)** outlining biodiversity mitigation actions to reduce impacts to biodiversity within the project area during construction and operation;
- **Biodiversity Monitoring and Evaluation Plan (BEMP)** outlining the requirements to monitor and assess the effectiveness of management measures and instigate corrective actions.

2. BIODIVERSITY MANAGEMENT PLAN

2.1 APPLICATION

This Biodiversity Management Plan (BMP) applies to activities during both construction and operation of the railway alignment within the Project RoW.

2.2 BIODIVERSITY MANAGEMENT ACTIONS

Biodiversity management actions are proposed in the ESIA prepared for the Project (ERM 2024). These mitigations and specific actions are to occur within the concession areas to reduce impacts to biodiversity values during the operation of the facilities.

The actions are to occur for the life of the Project operations. The tasks, mitigation actions and responsibilities are outlined in **Table 2-1**.

2.3 MONITORING AND EVALUATION

Monitoring and evaluation measures are to be implemented for all the biodiversity mitigation actions.

2.4 ROLES AND RESPONSIBILITIES

To ensure action ownership, each measure has been assigned to a particular designation within KTZ.

2.5 PLAN REVIEW AND UPDATE

The BMP is to be reviewed and updated on an annual basis with consideration of changes to project operations or areas where refinement is required. This is in line with the adaptive management approach under IFC PS 6. Annual changes to the BMP must be approved by the KTZ and the Lenders prior to implementation.

2.6 MITIGATION MEASURES

Based on the results of the ESIA, mitigation measures related to biodiversity management have been identified and summarised in **Table 2-1.** Based on the assessment undertaken during the ESIA, the following priority biodiversity values have been identified- the Common Hamster (IUCN Red List – Critically Endangered); Severtsov's Loach, Plain Thicklip Loach, Seven River's Minnow, Central Asian Tortoise, Asian Houbara, European turtle dove (all IUCN Red List – Vulnerable), and the endemic tulip species, *Tulipa buhseana* (IUCN Red List-Not Evaluated); migratory waterbirds such as the White headed duck, Common Pochard; and migratory and resident raptor species like Palla’s fish eagle, Steppe eagle, Egyptian Vulture etc. Additionally, the identified natural habitats included - the semi desert and riparian habitats.

The table of measures have been organized as follows:

- Planned activities as part of the Project development and associated impacts.
- Proposed additional mitigation measures for mitigating the identified impacts.
- Implementation schedule

- Key Performance Indicator (KPI) for each mitigation measure to allow monitoring of efficacy.
- Verification means detailing how the "KPI(s)" is measured and monitored.
    - Implementing Party proposes personnel responsible for implementation of each measure within the BMP, including the monitoring of efficacy.

As biodiversity is typically a multi-disciplinary subject, the roles and responsibilities for implementation of the BMP involves different teams and expertise such as E&S, Biodiversity and Environmental.

To support the effective implementation of the recommended biodiversity mitigation measures and the Biodiversity Management Plan, it is recommended that KTZ hire an ecologist for both the construction and the operation phase. The ecologist will oversee and monitor the application of these measures, ensure the BMP is executed as planned, and suggest updates based on site-specific observations and findings.

The actions provided in **Table 2-1** will potentially ensure no net loss of biodiversity values with emphasis on threatened faunal species and natural habitats. Monitoring and adaptive actions are provided in Section

The overall responsibility for each role is presented in **Table 2-1**.

TABLE 2-1: BIODIVERSITY MANAGEMENT PLAN MITIGATION MEASURES

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
Project construction and operation activities	Loss of terrestrial and riparian habitat and component ecological populations	Central Asian Tortoise Terrestrial birds Terrestrial mammals Restricted range tulips Natural terrestrial habitat	The Project will appoint an ecologist to oversee and monitor the implementation of biodiversity mitigation measures and the BMP, ensuring compliance and recommending updates based on site-specific observations.	Appointment of the Ecology Consultant Incorporate all actions assigned to the ecology consultant into the consultant's contract scope of work, ensuring implementation, monitoring, and compliance with mitigation measures. The ecology consultant will conduct pre-felling inspections of all trees designated for felling, assessing the presence of avifauna nests, mammals, herpetofauna, and other fauna that may inhabit the trees. If any fauna, including mammals, herpetofauna, birds, or bats, are detected, tree felling or transplanting will be postponed until the animal vacates the tree voluntarily, with a waiting period implemented if necessary. Active nests identified on any tree will remain undisturbed until nesting activities are complete and the young have fledged, with felling or transplanting only occurring after confirming that no active nests are present	Entire project footprint and RoW	KTZ Management	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual Inspection	Pre-Construction
Vegetation clearance	Vegetation clearance may cause habitat loss/modification	Central Asian Tortoise Terrestrial birds Terrestrial mammals Restricted range tulips Natural terrestrial habitat	Comply with tree inventory report of the ecology consultant	No trees apart from those identified by the ecology consultant will be felled	All areas of vegetation clearance especially focusing on the riverine habitat [43°37'20.50"N, 77° 4'47.64"E] where construction is yet to begin	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual Inspection	Pre-Construction
	Inadvertent loss of additional habitat		Demarcate areas to be cleared in advance with tape or fencing, to avoid inadvertent/ accidental additional clearing. Monitor habitat clearance closely during construction to minimize this risk.	0 ha cleared over the planned footprint as established in the Site Plan	All areas of vegetation clearance	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, Visual Inspection	Pre-Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			Prohibit clearing vegetation outside of designated areas by all Project staff, workers, all contractors and personnel engaged in/or associated with the Project.	Prohibition of vegetation clearance outside designated area is included in the Worker's Code of Conduct	All areas of vegetation clearance	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, visual inspection	Pre-Construction and Construction
Construction activities, including machinery movement, soil transport, and land disturbance during site preparation	Introduction and proliferation of Invasive Alien Species (IAS)		Conduct an assessment to identify existing IAS on site.	IAS survey report	All areas of construction, particularly natural habitats which will now be exposed to the potential proliferation of IAS	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual Inspection and reports	Pre-Construction
			Sourcing fill soil and construction materials from reputable suppliers to minimize contamination	Targeting 100% of materials sourced from verified suppliers	All areas of construction	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent	Work Protocol, Records and Reports	Construction
			Develop an Invasive Species Management Plan to manage invasive species within the Project area so that any introduction or proliferation does not impact natural habitats in the proximal areas. The measures to prevent the transmission of invasive species should be planed and implemented, e.g., the Project to install wheel wash bays to remove dirt and plant material from vehicle wheels before entering and leaving the Project area during the construction, limited access to construction sites to essential personnel only and establish designated access routes to reduce the spread IAS. The Invasive Species Management Plan will include the invasive monitoring program, associated timeline, and the recommendation for invasive removal, where appropriate	Invasive Species Management Plan is established; Monitoring should demonstrate no net increase in invasive species cover within the project area, with biannual surveys assessing species presence and control effectiveness during construction and first 2 years of operations and then annually. Corrective actions should be initiated within a month if invasive proliferation is detected, ensuring timely intervention and mitigation.	All areas of construction	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent	Work Protocol, Records and Reports	Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
Excavation and trenching	Wildlife and livestock fall and injury risks	Central Asian Tortoise Terrestrial mammals	Temporary fencing[2] should be installed only in areas where necessary, particularly around active quarries and large trenches, to mitigate fall and entrapment risks for target species. The fencing must be promptly removed once it is no longer required to prevent unnecessary barriers that could disrupt wildlife movement.	Temporary fencing in place and regularly inspected	Excavation sites, quarry areas	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual Inspection and BMP	Construction
	Fall and entrapment risks	Central Asian Tortoise Terrestrial mammals	Fencing, including a buried component, should be installed to prevent species such as foxes and the Central Asian tortoise from burrowing underneath. The fence should be buried at least 30 cm (12 inches) below ground, angled outward at 90 degrees, to block animals from digging beneath the structure. The lower portion of the fence should be smooth and free of sharp edges to prevent the Central Asian tortoise from becoming trapped or injured. Regular inspections must be conducted to ensure no animals are caught along the base of the fence.	Temporary fencing in place and regularly inspected	Excavation sites, quarry areas	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual Inspection and BMP	Construction
	Wildlife injury and mortality due to fall and entrapment risks	Central Asian Tortoise Terrestrial mammals	High-visibility markers, such as flags or reflective materials, should be placed at regular intervals along the fence to enhance its visibility for wildlife and minimize the risk of accidental collisions. The fence must be constructed using durable materials to ensure its structural integrity, maintaining an upright position and reducing the risk of collapse. Loose or damaged fencing materials or posts should be	Visibility markers in place and regularly inspected	Excavation sites, quarry areas	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, Visual inspection, reports	Construction

[2] Fence Height & Structure: The height of the fence should not exceed 1.2 meters (4 feet) to ensure that medium-sized mammals, such as foxes, can see the barrier clearly and avoid injury.

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			avoided, as they could impede wildlife movement.						
		Central Asian Tortoise Terrestrial mammals	Escape ramps or graded areas should be provided around trenches and quarries to allow tortoises and other wildlife to safely exit if they become trapped within fenced areas. These ramps should be designed to facilitate easy access and ensure that animals can escape without difficulty. Additionally, a routine maintenance schedule must be established, including adequate budget provisions, to ensure the long-term functionality of the fence. Deterioration of the structure can result in wildlife injuries or mortality, so prompt repairs are essential.	Establishment of exit ramps and routine maintenance schedule	Excavation sites, quarry areas	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)		Construction
		Central Asian Tortoise Terrestrial mammals	All vehicles operating in the fenced areas should adhere to a maximum speed limit of 20 km/h to minimize the risk of wildlife-vehicle collision.	100% of project personnel have received training	Excavation sites, quarry areas	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Training Plan, Work Protocol, Records and Reports	Construction
General construction activities	Habitat disturbance and degradation	Central Asian Tortoise Terrestrial mammals	If feasible, construction activities should be scheduled to avoid disturbances during critical periods, such as breeding and migratory seasons, to minimize impacts on local fauna. If avoidance is not practicable, phased construction should be implemented where sensitive areas are identified. If not still not feasible, alternative mitigation measures should be applied, including pre-construction inspections, close monitoring, and the deployment of noise and light reduction strategies to mitigate potential disturbances..	-	All areas of construction	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Project Design, Work Protocol	Pre-construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
		Terrestrial birds	Where ecology surveys identify breeding or nesting birds within the AoI, the ecologist will advise on the placement of temporary noise barriers or acoustic screens to mitigate disturbance impacts, if required, along with any other mitigation measure recommended on a case-by-case basis. Additionally, equipment should be regularly maintained for optimal performance, noise and vibration levels should be continuously monitored to ensure compliance with regulatory thresholds. Where feasible and required by the ecologist, construction activities should be limited during early morning (between 6-8 AM) and late evening (5-630 PM) hours to minimize disturbance.	Noise and vibration management plan is implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness.	All areas of construction	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol	Construction
		Central Asian Tortoise Terrestrial mammals	Set routes, consolidation of trips and no off-roading policies should be introduced by the EPC contractor to reduce the impact	Ensure that **the traffic (transportation) management plan (Construction ESMS 5.3.10)** is implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness	All areas of construction and access roads	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, Records and Reports	Construction
		Natural habitat	Topsoil that is disturbed should be stored separately for compensatory afforestation of trees lost from snow-breaks and restoring habitat along river beds for facilitating dispersal	Topsoil stored separately and covered	Excavation areas	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection	Construction
		Natural habitat	All vehicles transporting loose materials must be covered with tarpaulins to prevent dust spread and material loss. Minimize drop heights during loading/unloading operations	Ensure that the **air emissions management plan (Construction ESMS 5.3.6.1)** is implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness	All areas of construction and access roads	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, visual inspection	Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
		Natural habitat	Seed native tree and shrub species in disturbed areas during the monsoon season, and practice simultaneous revegetation with native species in areas with loose or unstable soil to prevent erosion. In consultation with the Forestry and Wildlife Department, identify additional areas for native plantation based on regulatory requirements and best practices.	**Restoration plan and implementation records**	Areas undergoing restoration	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Monitoring reports	Post-Construction
		Aquatic fauna	Hazardous materials should be stored away from natural drainage channels, and waste materials must be cleared promptly.	Ensure guidelines for hazardous waste management under the **waste management plan (Construction ESMS 5.3.7)** are implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness	All areas of construction and access roads	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol, visual inspection, reports and records	Construction
		Terrestrial mammals Terrestrial birds	In the event the contractor plans night-time construction or transportation activities, the ecologist should assess the segment and identify sensitive areas where mitigation measures for artificial lighting are required. Based on this assessment, the ecologist may recommend minimizing excessive lighting and ensuring that light sources are directed only to the site management area, using matt screens to prevent light spillage into external areas	Equipment installed as per recommendation of the ecologist, if required	All areas of construction and access roads	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Work Protocol	Construction
	Human-wildlife conflict	Terrestrial mammals	No hunting, trapping or injuring of local fauna should be communicated to the workforce through a workshop or formal training exercise.	100% of project personnel have received training	-	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Training Plan, Work Protocol, Records and Reports	Construction and post-construction
Bridge Construction	Sediment erosion impacting water	Aquatic fauna Natural riparian habitat	Silt fences, sediment traps, or barriers should be implemented around exposed soil areas and	Ensure recommendations part of storm water management under the Water and Wastewater Management Plan	River crossing sites	EPC Contractor/Subcontractor	KTZ Project Senior Environment/	Project design and visual inspection	Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
	quality and aquatic habitat		stockpiles to prevent sediment runoff into nearby water bodies. Drainage systems must be designed and maintained to handle runoff and prevent sediment transport into waterways. Weekly monitoring of drainage water quality (DO, TSS, turbidity, and pH) shall be conducted upstream and downstream to ensure barrier effectiveness. If elevated sediment levels are detected, corrective actions, including interim measures within 48 hours and permanent solutions within two weeks, shall be implemented with approval. Daily monitoring shall continue until parameters stabilize..	are implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness.			HSE Manager (or equivalent)		
		Aquatic fauna Natural riparian habitat	The water and wastewater plan under the pollution prevention plan should be implemented in compliance with regulatory requirements and best practices, with corrective actions taken if elevated sediment levels are detected, such as reinforcing sediment control barriers or adjusting site management practices.	Ensure recommendations part of the Water and Wastewater Management Plan are implemented with proper monitoring processes in place, followed by adaptive management based on observed effectiveness.	River crossing sites	EPC Contractor/Subcontractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection, water quality monitoring reports	Construction
Wildlife encounters during construction activities	Injuries or fatalities to wildlife	Central Asian tortoise Terrestrial mammals	A detailed procedure should be developed to manage wildlife incidents within the project area, with regular staff training on rescue and rehabilitation protocols. If an animal, such as a Central Asian tortoise, is found trapped, encountered accidentally, or enters the site, the local wildlife and forestry department should be contacted immediately for rescue, and untrained personnel must be	Rescue and rehabilitation protocols in place.	All construction zones and access roads	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Training Plan, Work Protocol, Records and Reports	Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			prohibited from intervening. A log should be maintained for all wildlife encounters, documenting species, condition, time, date, location, and relevant circumstances, along with photographic evidence where possible. The log should be promptly reported to relevant project management personnel. Consultation with wildlife experts should occur as needed. Project personnel can only participate in rescues if requested by the wildlife department, under their supervision. Health and safety protocols must include the use of PPE, vaccinations for rabies, and hand sanitization after handling animals.						
		Central Asian tortoise Terrestrial mammals	Post-incident, the Senior Environment/HSE Manager (or equivalent) should follow up with the Forest Department or a veterinarian to monitor the condition of rescued animals and confirm their release back into the wild. In case of wildlife injury or death, an investigation must be conducted, including interviews with witnesses, identification of contributing project activities, and the implementation of corrective actions. These corrective actions should be communicated to all staff and discussed during daily meetings to ensure proper understanding and compliance.	Post-Incident Protocol in place	All construction zones and access roads	EPC Contractor/Subcontractor and the hired ecologist	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Training Plan, Work Protocol, Records and Reports	Construction
Operation of the Railway Line	Risks to wildlife, including direct mortality from train collisions	Central Asian tortoise Terrestrial birds Terrestrial mammals	Maintain underpasses and culverts free of debris to ensure their continued use by wildlife.	Regular maintenance of underpasses and culverts	Cattle crossings, culverts	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Monitoring reports	Post-Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
		Central Asian Tortoise Terrestrial birds Terrestrial mammals Breeding aquatic birds Soaring raptors	Develop a wildlife monitoring plan for target species such as herpetofauna, medium-sized mammals, raptors, and ground-dwelling avifauna. Monitoring should be conducted for a minimum of three years after the start of railway operations to evaluate mortality estimates. Surveys should be prioritized during peak activity periods, such as dispersal, migration, and breeding seasons, ensuring alignment with species-specific cycles (e.g., surveying Central Asian Tortoises during active months like April-May). Systematic mortality surveys along railway tracks should record carcass locations, species, and suspected causes of death. Railway staff and local communities should be trained to report wildlife incidents, with an established reporting protocol for timely responses. Based on monitoring results, the mitigation plan should be updated regularly to address emerging risks, ensure measure effectiveness, and refine approaches according to species-specific needs.	Wildlife monitoring plan in place	Entire railway alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Wildlife monitoring and incident reports	Until 3 years post-operation
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Based on construction and operation monitoring data if there are any high-risk sections implement physical barriers such as wildlife fencing along those sections of the railway to reduce direct collisions, particularly for small mammals, reptiles, and birds.	Wildlife fencing installed	High-risk sections along the alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Inspection and maintenance reports	Based on monitoring data
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Install clear signage along the railway to raise awareness among train operators regarding	Signage installation	Entire railway alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/	Visual inspection and maintenance reports	Operation

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			wildlife presence and potential collision risks.				HSE Manager (or equivalent)		
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	In areas with high wildlife activity, consider adding wildlife friendly low-level lighting to tracks, especially near wildlife crossing points. This may enhance the visibility of animals at night and reduce collision risks, particularly for nocturnal species	Light equipment installed	Cattle crossings and other identified crossing zones	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection	Operation
	Habitat fragmentation, degradation and wildlife barriers	Central Asian Tortoise Terrestrial birds Terrestrial mammals	Minimize habitat fragmentation by the rail alignment by through restoration of natural vegetation along river and stream beds thereby providing alternate routes. This restoration will also compensate for the loss of 0.139 km^2 of riparian habitat	Area of river and stream bed vegetation restored	All river and stream crossings	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent	Periodic monitoring of restoration progress from assessing vegetation cover along river and stream beds.	Post-construction
		Central Asian Tortoise Terrestrial birds Terrestrial mammals Restricted range tulips	Implement control measures for invasive plant species that may be exacerbated by railway maintenance and disturbed soils	Invasive species control program	Entire railway alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Periodic invasive species monitoring	Operation
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Periodic reviews of habitat restoration success along riverbeds to facilitate dispersal and wildlife passage effectiveness, adjusting strategies as necessary	Habitat restoration success rate	Restoration areas	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Habitat review and adjustment records	Post-construction
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Based on ecological monitoring reports, and subject to identification and recommendations by the ecologist, sound attenuation measures such as soundproofing barriers should be implemented along ecologically sensitive railway sections, where feasible	Soundproofing measures implemented, as required	Identified sensitive railway stretches	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Monitoring reports	Operation
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Prohibit waste dumping along the corridor and surrounding areas, ensuring segregation by	Implement the waste management plan	Entire railway alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/	Waste management reports	Operation

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			type (e.g., organic, hazardous, recyclable) and transport to designated facilities for safe disposal, ensuring implementation of recommendations under the waste management plan.				HSE Manager (or equivalent)		
		Central Asian Tortoise Terrestrial birds Terrestrial mammals	Ban activities leading to soil or water contamination, including the open burning of waste, and implement robust waste management systems.	Implement pollution prevention plan	Entire railway alignment	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Waste management reports	Operation
		Aquatic fauna	Prohibit the discharge of solid or liquid wastes, including wastewater, oils, and residues from cleaning vehicles or equipment, into rivers, streams, or other water bodies.	Discharge prevention measures implemented. Ensuring implementation of pollution prevention plan focusing on water and waste management,	River crossings and other waterbodies	KTZ EHS team and contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Monitoring reports	Operation
Operation of the transmission line	Collision and electrocution risks	Soaring raptors	Install bird flight diverters on overhead transmission lines, particularly on the PS-Alma-500 and Zhana Arna 1.9 km OHTL. Assess the feasibility of installing diverters on realigned lines, especially near waterbodies. Diverters should be large, spaced 5-10 meters apart, and comply with local authority guidelines to enhance visibility and minimize collision risks.	Bird diverters installed	PS-Alma-500 and Zhana Arna 1.9 km OHTL.	KTZ EHS team and construction contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection	Project design and Construction
Operation of the transmission line	Collision and electrocution risks	Soaring raptors	Power line structures should maintain a minimum 60 cm clearance between likely perching areas (e.g., cross-arms) and energized conductors, with insulating tubing applied where spacing is insufficient. Strain poles should use insulator chains of at least 152 cm, based on the wingspans of common avifauna. Perch management should focus on modifying structures to prevent birds from perching near energized components by incorporating exclusion	Insulation and perch management requirements implemented	PS-Alma-500 and Zhana Arna 1.9 km OHTL.	KTZ EHS team and construction contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection	Project design and Construction

Activity	Potential Impacts	Biodiversity Values Potentially Impacted	Mitigation Measures recommended	KPI	footprint Relevan Area	Responsibility for implementation	Responsibility of supervision	Verification means	Timeframe for completion
			devices or deterrents on cross-arms, insulators, and pole tops.						
Operation of the transmission line	Carcass monitoring and reporting	Soaring raptors	Conduct regular surveys along transmission lines and railway corridors, training O&M teams to report carcasses to the EHS manager. Frequent incidents should trigger mitigation reviews. Establish clear carcass disposal protocols to prevent attracting scavengers. Long-term raptor monitoring should be conducted in collaboration with wildlife authorities, with data shared to refine strategies.	Carcass surveys conducted and incidents reported	PS-Alma-500 and Zhana Arna 1.9 km OHTL.	KTZ EHS team, ecologist, operations contractor	KTZ Project Senior Environment/ HSE Manager (or equivalent)	Visual inspection	Operation

3. ESTIMATED BMP BUDGET / COST

Based on the key mitigation measures described in **Table 2-1** an indicative budget has been developed in **Table 3-1** to support the economic/ financial modelling and planning of the Project.

The monitoring and capacity building budgeted for in **Table 3-1** is limited to the activities related to the restoration along stream and river beds for facilitating dispersal and wildlife crossings developed as part of the road and bridges.

TABLE 3-1: INDICATIVE BUDGET FOR BMP IMPLEMENTATION

Mitigation Measure	Timing	Estimated Cost (USD)	Justification
Ecology Consultant Appointment	Pre-construction	10,000	Covers consultant fees, field surveys, report preparation, and monitoring activities (for KTZ)
Temporary Fencing and Maintenance	Construction	20,000	Covers material costs, installation, maintenance, and removal of fencing (for contractor)
Invasive Species Management Plan and Implementation	Pre-construction and Ongoing	20,000	Covers survey, plan development, monitoring, and control measures (for KTZ)
Habitat Restoration and Re-vegetation	Construction and Post-construction	100,000	Covers soil preparation, plant procurement, planting, watering, and maintenance (for contactor)
Wildlife Monitoring and Mitigation	Construction and Post-construction	40,000	Covers field surveys, data analysis, report preparation, and implementation of mitigation measures like fencing and signage (for KTZ)
Training and Awareness Programs	Pre-construction and Ongoing	20,000	Covers training materials, workshops, and staff training (for KTZ)
Contingency	Throughout Project	30,000	To account for unforeseen circumstances and potential cost overruns.
Total		**250,000**	

4. MONITORING PROGRAMME AND ADAPTIVE MANAGEMENT

As the implementation of the BMP would involve multiple parties. KTZ shall establish a schedule for biodiversity audits or inspections, to be conducted at a minimum on a quarterly basis for the first year and then biannually for the next two years, with frequency adjusted thereafter based on the requirements of the recommendations made, involving the EPC Contractor to ensure that the conditions stipulated within this BMP and its applicable standards, procedures and guidelines are complied with. The audits and inspections should be conducted by the KTZ Project Manager in collaboration with the hired ecologist.

Inspections, monitoring and audits will be documented, and any corrective actions will be assigned owners and timescales for implementation. An action tracking database will be used by the KTZ Project Manager to coordinate the close out of any corrective actions in a timely manner.

Inspection, monitoring and audit findings, along with their respective improvement programmes, will be regularly reported to the KTZ Project Senior Environment/ HSE Manager.

The inspection requirements for each mitigation measure are provided in **Table 2-1**.

Table 2-1. also suggests monitoring of several faunal taxa. Given that there is no baseline in place providing information on pre-project abundances of each species, the monitoring should be focused around assessing presence or absence of a given species. If any species mentioned in this ESIA is consistently absent across the 3 years of monitoring, there is a need for adaptive action. This could involve seeking specialists for the concerned taxa, seeking advice for reasons for absence and altering or adding mitigation to ensure species recovery.

4.1 RECORD KEEPING AND AUDITING

All records will be stored safely and be readily accessible for auditing. It is recommended that A senior official from the KTZ Project will be designated to oversee and ensure the proper maintenance of all biodiversity and environmental management documentation. From reviewing the records if any mitigation is incomplete to address the impact at hand for a month, the issue must be escalated to the KTZ senior management

Types of records relevant to this BMP include:

- Monitoring, inspection and compliance reports/records.
- Registers of fauna disturbance, vegetation clearance and vehicle clean down.
- Records of erosion control measures.
- Records of wildlife-friendly fence installation, including inspection and maintenance logs.
- Induction and training records.
- Reports on environmental incidents, other environmental incidents non-conformances.
- Reports of incidents involving accidental wildlife deaths or injuries during construction and operation activities.
- Records of complaints and follow-up action.

4.2 UPDATES

This BMP is a "living" document to be reviewed and updated as additional information becomes available. Thus, the BMP will be updated each time detailed design and schedules for additional infrastructure become available that will necessitate a change or addition to the prescriptions and arrangements outlined in this BMP to ensure that such prescriptions and arrangements are compatible with the new designs. The BMP will also be updated once information from monitoring has been reviewed and evaluated, at a minimum once a year.

4.3 MANAGEMENT OF CHANGE

The process in place to manage changes impacting Environmental and Social aspects of the project should be integrated in the Project Environmental and Social Management System.

In relation to biodiversity impacts, of particular importance are the following potential triggers for changes:

- Design refinement or detailed design outcomes that affect biodiversity receptors.
- Changes in construction methodologies that may change effects on biodiversity receptors.
- Field obstacles or wildlife encounters during construction.
- Results of further field surveys and monitoring.
- Comments/concerns submitted by public/stakeholders/lenders.
- Changes in regulations or requirements by regulatory bodies.

Different Tiers of change will require different levels of approval by the Project Lenders. The Tiers should be defined by the impact severity prior to the implementation of mitigation, which will be determined using the methodology presented in the Project ESIA.

- **Tier 1 Changes** – Changes where the potential impact of the change prior to mitigation will be no more than **Moderate**.
- **Tier 2 Changes** – Changes where the potential impact of the change prior to mitigation will be **Substantial**. KTZ will inform lenders but will not need their approval to implement change
- **Tier 3 Changes** – Change were the potential impact of the change prior to mitigation will be **High** – KTZ seeks lenders approval for the change prior to implementing.

  The following changes will be considered as Tier 3 Changes.

  - Changes to the Project design and footprint or an activity that may result in a potential new High impact, or elevate an impact already assessed to a potential High impact. This includes any changes that may result in additional impacts on natural habitat.
  - Changes to commitments to mitigate or avoid potential impacts that may result in a potential new High impact.

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