

# Kyrgyz Republic: Environmental and Social Impact Assessment (ESIA) - Tyup-Karakol Road

Biodiversity Management Plan

April 2022



# Notice

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## Client signoff

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# Acronyms

AOI	Area of Influence
BMP	Biodiversity Management Plan
CH	Critical Habitat
CHA	Critical Habitat Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Con	Construction
CR	Critically Endangered
D	Design
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
ECOW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EN	Endangered
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
EU	European Union
FS	Feasibility Study
GHG	Greenhouse gas
GIP	Good International Practice
ha	Hectares
HGV	Heavy Goods Vehicle
IBA	Important Bird and Biodiversity Area
IUCN	International Union for Conservation of Nature
KDTP	Survey Institute Kyrgyzdorttransproyekt
km	kilometre
LC	Least Concern
LHS	Left hand side
m	Metre
m3	Cubic metre
NEAP	National Environmental Action Plan
O&M	Operation and Maintenance
Op	Operation
PBF	Priority Biodiversity Feature
PC	Pre-construction
PIP	Priority Investment Program
PIU	Project Implementation Unit
PRs	Performance Requirements
RHS	Right hand side
RoW	Right of Way
RTCs	Road traffic collisions
SAEPF	State Agency for Environmental Protection and Forestry
SEP	Stakeholder Engagement Plan

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework on Climate Change
WHO	World Health Organisation

# 1. Introduction

This Biodiversity Management Plan (BMP) has been prepared for the Tyup-Karakol Road Project (the Project) in the Kyrgyz Republic. The BMP forms part of the Environmental and Social Impact Assessment (ESIA) disclosure documents for the Project and has been prepared in accordance with European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy (ESP) 2014 and Performance Requirement (PR) 6. It focuses on the requirements for mitigation for the Project. This BMP will sit within the Project Environmental and Social Management and Monitoring Plan (ESMP) which sets out roles and responsibilities for Project implementation.

## 1.1. Background

The EBRD is considering providing finance to the Kyrgyz Republic (the Borrower), for the benefit of the Ministry of Transport and Communications (MoT or Client), for the approximately 32 km Tyup-Karakol Road section of the Balykchy-Karakol Road (the Project). The Balykchy-Karakol Road is part of the 440-kilometre (km) Issyk Kul Lake ring road, the rehabilitation/upgrading of which is a priority project for the Kyrgyz Republic government and is supported by a number of International Financing Institutions. The site of the EBRD Project is shown in Figure 1-1.

The Balykchy-Karakol Road is designated as an international route, providing linkage with Kazakhstan via the border at Karkyra. The road is of strategic importance for the country, linking the two cities of Balykchy and Karakol and their vicinities including Issyk Kul Lake. As well as being economically important as a tourist destination, the Issyk Kul basin is important for its agricultural production, food processing and mineral extraction. Karakol is a renowned and growing centre for skiing, trekking, mountaineering and also hosts several health resorts.

Dynamic development during the past decade has been accompanied by steady growth in passenger and cargo traffic. Improved interregional connectivity and rising tourist inflows have resulted in traffic growth of around 60% since 2010. However, the road has not been properly repaired for the last 30-35 years due to lack of financing and is now inadequate for the today's traffic making it highly dangerous. Typical defects noticed are frequent deep cross cracks, deep rutting, subsidence, and potholes.

Rehabilitation/upgrading will not only improve road safety but also facilitate trade and tourist relationship of Kyrgyzstan, Kazakhstan, and China, giving opportunities for both national and regional development and further improvement of transport services. After completion of the Project, the road should comply with the Category II international technical standard.



Figure 1-1. Project site<sup>1</sup>

<sup>1</sup> The green section has been financed by State budget. The works are complete. The purple section will be financed by the Islamic Bank of Development. The loan has been signed; the works have not started yet. The EBRD section is the red section on the Eastern side of the lake (black circle). The financing of the Southern section in red is not decided yet.



The EBRD financed road section between Tyup and Karakol has been classified as Category A in terms of EBRD 2014 Environmental and Social (E&S) Policy since the Project could result in significant adverse environmental and/or social impacts.

A Feasibility Study (FS) for the entire 440 km long ring road was updated in 2018 by the Survey Institute Kyrgyzdortransproyekt (KDTP) on behalf of the MoT for the road section between Korumdu and Karakol, including the Project road. A Technical Due Diligence Consultant, EGIS, has been engaged by EBRD under a separate consultancy, who have provided a technical and economic review of the FS.

## 1.2. Objectives

The key objective of this BMP is to ensure compliance of the Project with the EBRD's 2014 ESP and PR6 and Kyrgyz environmental standards in managing identified ecological risks and impacts of the Project at each Project stage i.e., during pre-construction, construction/post-construction handover and operation.

The specific objectives of the BMP are:

- To ensure that ecological mitigation measures identified in the Project that need to be developed within the overall Project Environmental and Social Management Plan (ESMP) are set out for each stage of the Project;
- To set out measures for monitoring that need to be developed within the Project ESMP;
- To set out the impacts of the Project in relation to EBRD PR6 and critical habitats;
- To ensure that a detailed Construction ESMP will be developed and operated according to EBRD requirements (including PR6 and critical habitats) and Kyrgyz legislation and standards; and
- To ensure that the roles and responsibilities in relation to implementation of mitigation and monitoring measures are identified.

The mitigation hierarchy will be applied which includes measures taken to manage biodiversity risk. This includes avoiding impacts to biodiversity from the outset of development activities and, where this is not possible, to implement measures that would minimise, then reinstate and, as a last resort, offset any potential residual adverse impacts.

This BMP follows the '*Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning*<sup>2</sup>. Management is defined as any actions that correspond to the four elements of the mitigation hierarchy, as described below:

- Avoidance: actions taken to fully prevent impacts to biodiversity values, such as changing the spatial design of a project to prevent impacts in specific locations;
- Minimization: actions taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided;
- Rehabilitation/restoration: actions taken to return areas to beneficial use and if possible, assist in the recovery of the ecosystem that has been degraded, damaged, or destroyed; and
- Biodiversity offset: measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and ecosystem services.

## 1.3. Scope

This BMP identifies:

- Mitigation measures and management actions;
- Ecological monitoring requirements;

<sup>2</sup> Hardner, J., R.E. Gullison, S. Anstee, M. Meyer (2015) Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning. Prepared for the Multilateral Financing Institutions Biodiversity Working Group.(accessed 20<sup>th</sup> April 2020)

- Auditing, monitoring and reporting procedures; and
- Roles in respect of management, monitoring and compliance.

It covers Project-related pre-construction, construction and operational activities.

This BMP is a dynamic document that will be adapted and updated as and when new information becomes available throughout the lifespan of the Project to ensure its relevancy.

## 1.4. Intended Users

The aim of this BMP is to communicate to Project personnel the potential ecological issues associated with the Project and the mitigation measures and monitoring requirements that are required to be implemented during pre-construction, construction and operation of the Project. Its requirements are applicable to all Project personnel, including the MoT, Road Design Consultant(s), Construction Contractor(s), Subcontractors, site visitors and/or Operation and Maintenance (O&M) Contractors.

## 1.5. Management of this Plan

This Project BMP has been prepared as part of the ESIA process to meet EBRD ESP 2014 and PRs. It will be held by the MoT and will form part of the tender documentation for Construction Contractors.

The Construction Contractor will be required to follow this BMP and prepare a detailed Construction ESMP (CESMP), incorporating the requirements of this BMP for approval by the MoT and the proposed Project Implementation Unit (PIU) Consultant who will be engaged to assist with Project implementation.

At least three months prior to the operation phase, the requirements of this BMP for the operation phase will be incorporated into the Project O&M ESMP by the MoT with support from the PIU.

## 2. Project Description and Phases

### 2.1. Introduction

A Feasibility Study (FS) was prepared in 2018 by KDTP for the MoT. It covers the entire Balykchy-Karakol-Balykchy Ring Road. The EBRD section between approximately km 184.5 and km 216.7 is included in the FS.

In 2020/21, a review of the FS and design options was undertaken by EGIS and a draft final report prepared in June 2021 with various recommendations on the design.

An optioneering of the bypass options around Tyup village was also undertaken in 2020 and an Optioneering Report was prepared (EGIS and Atkins, December 2020) to review the technical, economic, environmental and social impacts of these options. Following issue of the Optioneering Report, in early 2021, the MoT expressed the preference for the Town Option and therefore this BMP is considering this as the final route.

The Project description has been developed through a review of the 2018 FS and the EGIS Technical Inception Report (October 2020) and Technical and Economic Due Diligence Report Draft Final (June 2021). The Project will be subject to further detailed design by consultants engaged by MoT and therefore the description that follows, and the assumptions in this ESMP, are based on the design currently available and will require review and, as necessary, updating, following detailed design.

#### 2.1.1. Project Scope

The Project scope, as reported in the FS and Due Diligence Report, is:

- Complete reconstruction of the existing 32.2 km Category III road and widening to 4 x 3.5 m lanes Category II standard with 2.6 m wide paved median and 2 m unpaved shoulders on rural sections (outside Tyup)
- Construction of 4 x 3 m lanes with reduced median through Tyup
- Street lighting, walkways, and covered drainage on urban sections
- Construction of a separate 3 m wide bike path outside urban sections
- Partial demolition and widening of the existing three span Tyup River Bridge
- Widening of the three span Jergalan River Bridge
- Replacement of all drainage structures
- Relocation of utilities
- Construction of 640,000 m<sup>3</sup> of embankment with imported material
- Installation of 21.6 km of New Jersey barriers
- Provision for construction of eight bus stops and one vehicle repair pit
- Planting of 13,000 trees and 2,400 shrubs

There are no specific details of junction improvements.

Note that the above scope may be amended during the detailed design phase.

### 2.2. Project Route

The route of the EBRD Project is along the existing Karakol-Tyup Road, as shown in Figure 2-1. The Project start and end points are shown in Figure 2-2.



Figure 2-1. Road section to be financed by EBRD



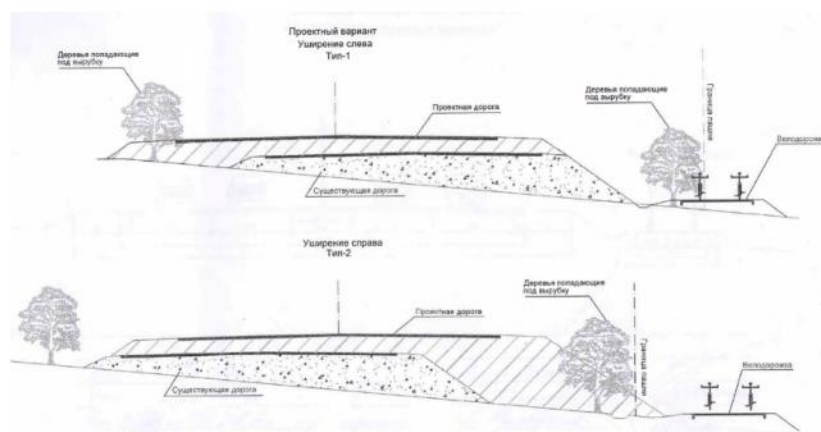
Figure 2-2. Project start and end points

### 2.2.1. Road widening

As reported in the FS, alternative methods for widening the existing road are either retaining the existing centreline (symmetrical widening) or widening to one side (asymmetrical widening).

A typical cross-section is presented in the 2018 FS. It shows options for asymmetrical widening to the west/ left side (LHS) or west/ right side (RHS) of the existing centreline. Existing bridges would be widened on the RHS. Although not dimensioned, it is estimated that asymmetrical widening would shift the centreline by about 2-3 m.

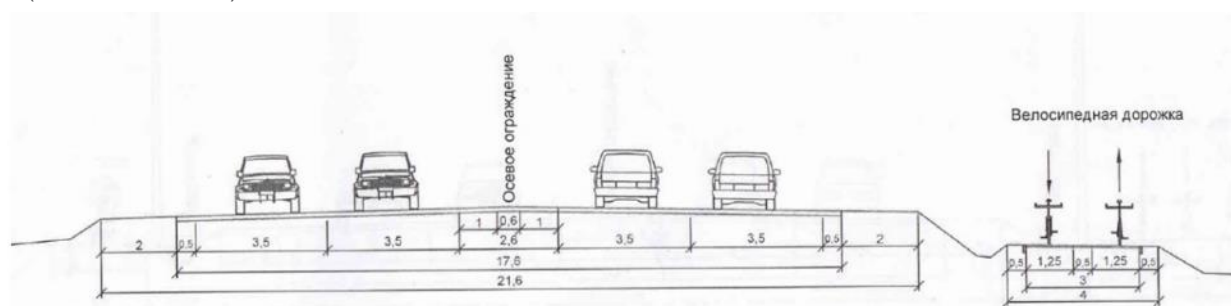




**Figure 2-3. Typical asymmetrical widening cross section**

Non-urban sections of the new road will be 21.6 m wide between shoulders. Considering that the embankment is 0.5-3.0 m high, the total construction width would be around 35 m (outside areas of higher embankment).

A limit (not dimensioned) is shown on the sketches below.



**Figure 2-4. Cross-section outside settlements**



**Figure 2-5. Cross-section with separate bike path**

In Tyup town, based on discussions with EGIS and existing constraints and without a separate bike path, it has been assumed that the total width to be developed would be 20 m (i.e., 10 m either side of the centreline).

For the purposes of the ESIA and this ESMP, the project has assumed a total footprint as:

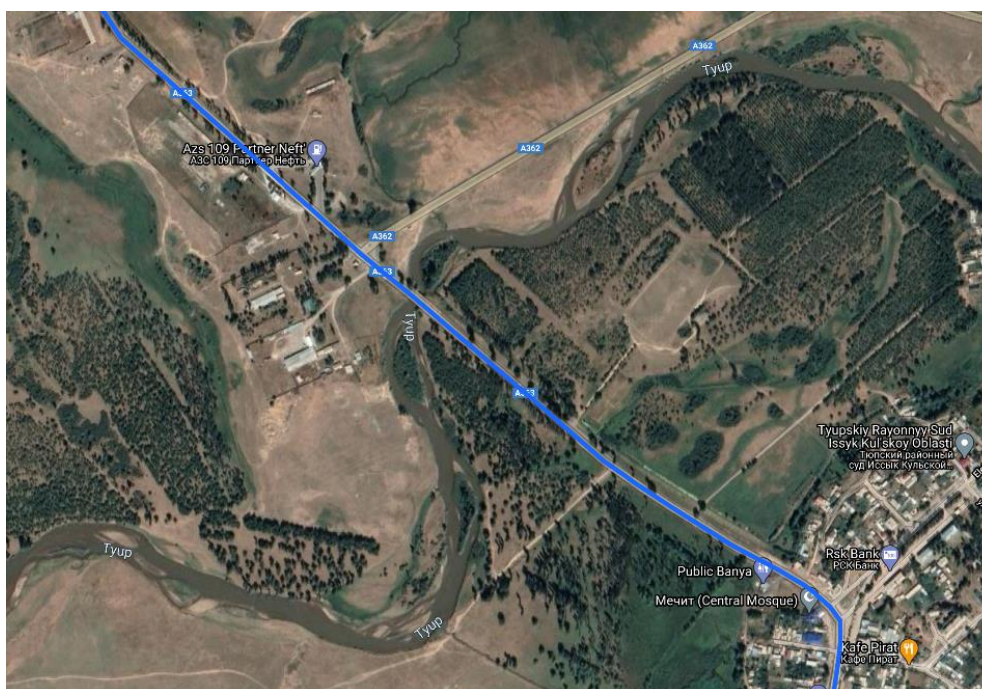
- In non-urban areas i.e., outside of Tyup, a likely total construction width of up to 35 m, i.e., 17.5 m either side of the centreline. This includes the carriageway and shoulder.
- In Tyup, a symmetrical widening of 20 m wide, or 10 m either side of the centreline. This includes the carriageway and shoulder.

## 2.2.2. Bridges

The FS proposes two existing bridges (Tyup and Jergalan) be widened on the RHS to accommodate the additional carriageway and that a small bridge in poor condition be replaced, as follows; the location of these bridges is reported in Table 2-1 and shown in Figure 2-6 to Figure 2-8.

**Table 2-1. Feasibility study bridge information**

Name	Km location	Total length (m)	Total span (m)	Number of spans	Comments
Tyup River Bridge	188+742	50.2	45	3 (12+21+12)	Originally built as a single lane bridge in the 1960's, it was widened in 1986. Old bridge to be partially demolished and extended on RHS to carry new carriageway, footpaths, and bike lane.
Channel Bridge	202+519	6.7	5	1	No structure could be found at the given location during the technical site visit, nor is any structure visible there on Google Earth. The only 'bridge' seen near this location is approx. 900 m before the given location, crossing an irrigation canal. To be reconstructed.
Jergalan River Bridge	206+95	59.2	54	3 (18+18+18)	Existing bridge to be extended on RHS to carry new carriageway, footpaths, and bike lane. The year of construction is not mentioned in the FS, but the current bridge appears to be a replacement for an old bridge visible just upstream.



**Figure 2-6. Tyup Bridge and planned widening**





Figure 2-7. Indicative location of the 'unnamed' Canal Bridge



Figure 2-8. Jergalan (or Dzhergalan) River Bridge

### 2.2.3. Drainage structures

All 36 existing drainage structures are to be replaced apart from one box culvert which is to be extended. It is noted that there are several irrigation canal crossings along the alignment.

### 2.2.4. Services

There are no specific details for provision of parking and rest areas along the route. However, given the short length of the section between the two towns, presence of several filling stations and absence of viewpoints/sites of particular interest, the technical due diligence did not report any strong justification for construction of dedicated rest areas.

### 2.2.5. Bike path

A 3 m wide separated bike path (total construction width probably around 6 m) is shown in the FS alongside the route outside the urban areas. A separate bike path would be required outside of town due to the speed limits being more than 40 kph. Whether a bike path is constructed and whether it is positioned on the LHS or RHS will be considered during detailed design.

### 2.2.6. Pavement design

Options for pavement design include Conventional Asphalt Concrete and Stone mastic asphalt (SMA). EGIS undertook a review of this design and have proposed that the use of SMA be reviewed during detailed design. If construction is technically feasible it would offer advantages in terms of long term durability and temperature variation which is likely to increase as a result of climate change.

## 2.3. Project Phases

### 2.3.1. Detailed design and pre-construction

The MoT has overall responsibility for delivery of the Project and will be assisted in this role by the PIU Consultant. A Construction Contractor will be appointed to construct the Project.

The MoT will appoint a Design Consultant to develop the detailed design of the Project. This will determine whether the road widening is symmetrical or asymmetrical and various other details of the design.

Road safety design measures have been proposed during the current review phase, and it is anticipated that the final design will incorporate the recommendations made, including the requirement for roundabouts and urban design in the villages/towns to ensure road safety and pedestrian crossings are in place.

As part of the final design, any additional surveys identified in the ESIA Report and recorded in the ESMP, such as ecology and displacement surveys, should be completed by the MoT or the PIU Consultant, and the national EIA should be prepared and submitted to the local environmental regulatory authority for approval. Additional surveys will essentially be required where the design deviates from the assumptions made during the preparation of the current ESIA and this BMP.

### 2.3.2. Construction

At the time of writing, no information is available on whether the Construction Contractor will use camps and on any details of other temporary sites such as works areas and haul/access roads. Contractors will therefore be required to select sites on the basis of minimal E&S impacts, avoiding, or if this is not possible, minimising, involuntary displacement. They will also be required to assess final sites chosen so that, where necessary, additional mitigation measures can be applied to reduce adverse impacts. To ensure that these measures are followed, the Construction Contractor will be required to:

- (i) undertake an environmental and social screening of any temporary sites (e.g., workers' accommodation camp, lay down areas, etc.), to the approval of MoT and EBRD;
- (ii) undertake pre-construction surveys such as ecology surveys, as outlined in the ESMP; and
- (iii) develop a detailed set of management plans that form the CESMP; building on the requirements of the Project ESMS and Project ESMP.

Furthermore, no specific details are available of the workforce or equipment required during the construction phase, as this will be determined by the Construction Contractor. However, typical site installation and preparatory work for road projects includes:

- Development of the lay down areas, work sites and construction camps
- Mobilisation and installation of the crushing and concrete plant
- Mobilisation of supplies and materials necessary for construction (vehicles, trucks, construction equipment)
- Temporary signage and the setting up of deviations where necessary
- General cleaning, clearing, and cutting of trees where necessary
- Installation of drainage.



It is currently considered that no additional temporary roads will be required by the Project. Haul roads may be required; however, it is likely that Construction Contractor will use the existing road footprint as their haul road. This will be confirmed once the Construction Contractor is commissioned.

- Bulldozers
- Graders
- Dump trucks
- Mechanical shovels on wheels or on track
- Finisher
- Sweeper
- Pneumatic compactors
- Cylinder compactors
- Water tanks
- Fuel tanks
- Planers / milling machines
- Loaders
- Concrete mixer
- Generators
- Mobile crane
- Mixer trucks
- Pumps
- Vibrating plate
- Compressors
- Circular saw
- Painting equipment

- The field of gravel “Ichkesuu”, km 183+000, to left 5.0 km
- The field “Karabotakskoe”, km 186+000, to left 1.0 km
- The field “Tasma”, km197+200, to left 1.5 km
- Reserve of soil “Sary-Topurak”, km 197+200, to right 0.3 km
- Basic field “Aksuyskoe”, km 216+000, to left 10.0 km

The figure consists of two maps of the Karakoram region in China, illustrating the proposed Silk Road Economic Belt route. The left map shows the route from Kashgar to Urumqi, and the right map shows the route from Urumqi to Beijing. The route is highlighted in orange and passes through several key locations, including Kashgar, Kizilsu, Tashkent, and Urumqi. The maps also show major roads, rivers, and geographical features like the Karakoram mountains and the Tianshan mountains.

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### 2.3.3. Operation and Maintenance Phase

The year of opening of the road has been identified currently as 2024. No details are currently available on O&M activities however, these typically include routine maintenance and unplanned maintenance such as clearing the road and repairing potholes.

#### Road design life

The road has been designed for a 20-year lifespan.

#### Road speeds

The current speed limit on the existing road is 90 km/hour outside urban areas, and it is anticipated that this will increase to 110 km/hour for the newly widened road except for the urban sections, where the speed limit will be 40 km/hour.

#### Road safety audit

A Road Safety Audit should be undertaken Post Construction to confirm recommendations accepted during the design stage Road Safety Audit have been implemented.

A further Road Safety Audit should be undertaken 12 months post opening and then periodically thereafter to assess road traffic collisions along the road and identify any trends/blackspots that required remedial actions.

## 3. Relevant legislation and compliance

### 3.1. Introduction

This section outlines the relevant national environmental legislation and standards and EBRD requirements with which the BMP complies.

It covers:

- EBRD Environmental and Social Policy (ESP) and Performance Requirements (PRs);
- Relevant European Union (EU) environmental standards;
- Relevant international conventions to which the Kyrgyz Republic is a signatory;
- Kyrgyz Republic institutional framework; and
- Kyrgyz Republic environmental and social legislation.

### 3.2. EBRD Requirements

EBRD financed projects are expected to be designed, implemented and operated in accordance with the EBRD's ESP which requires compliance with ten Performance Requirements and relevant EU standards and national law, of which two are considered to be relevant to biodiversity.

#### 3.2.1. Environmental and Social Policy

The EBRD's ESP and related Performance Requirements (see Section 3.2.2), guide the EBRD's commitment to promoting "environmentally sound and sustainable development" in the full range of its investment activities. The 2014 Policy is relevant to this Project and aims to ensure that issues such as environmental and social sustainability, the rights of affected workers and communities and compliance with relevant regulatory requirements and good international practice are built in at every relevant stage of the project cycle.

#### 3.2.2. Project Categorisation

The EBRD's ESP categorises projects (A, B or C) to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required. Categorisation should be commensurate with the nature, location, sensitivity and scale of the project, and the significance of its potential adverse future environmental and social impacts. Past and present environmental and social issues and risks associated with project-related existing facilities are subject to environmental and social appraisal regardless of the categorisation.

Appendix 2 of the ESP provides an indicative list of types of projects which would be categorised as Category A. This list applies to "greenfield" or major extension or transformation-conversion projects in the categories listed which are examples of projects that could result in potentially significant adverse future environmental and/or social impacts and therefore require an ESIA.

The Project is considered to fall within EBRD Category A which means that a comprehensive EISA of the Project must be undertaken.

Within the Category A list of projects, the following is listed:

*6. Construction of lines for long-distance railway traffic; airports with a basic runway length of 2,100 metres or more; motorways, express roads, and new roads of four or more lanes, or realignment and/or widening of existing roads to provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length.*

The project comprises the widening of the 32 km Tyup-Karakol Road section of road. This meets the criteria above, as such this Project is classed as a Category A project. As required under EBRD requirements, for a Category A projects, there is need for a comprehensive ESIA, followed by public disclosure for a minimum period of 120 days.

#### 3.2.3. EBRD Performance Requirements

The Project must comply with the EBRD PRs. The PRs provide a solid base from which the sustainability of business operations can be delivered. Where possible, projects should avoid adverse impacts on workers,

communities, and the environment. If avoidance is not possible, negative impacts should be reduced, mitigated or compensated for, as appropriate.

The PRs identified as relevant to the biodiversity issues associated with the Project are summarised in Table 3.1.

**Table 3.1. Summary of EBRD Performance Requirements and their relevance to biodiversity issues associated with the Project**

Performance Requirement	Summary and Objectives	Areas covered	Relevance
PR1: Assessment and Management of Environmental and Social Impacts and Issues	<p><u>Summary</u></p> <p>This PR applies to all projects directly financed by the EBRD and defines the importance of a systematic approach to the management of the environmental and social impacts associated with project activities and operations.</p> <p>The PR provides guidance on the client's responsibilities for managing and monitoring environment and social issues and how these will be assessed in relation to the Bank's Policy.</p> <p><u>Objectives</u></p> <ul style="list-style-type: none"> <li>identify and evaluate environmental and social impacts and issues of the project</li> <li>adopt a mitigation hierarchy approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities</li> <li>promote improved environmental and social performance of clients through the effective use of management systems</li> </ul> <p>develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant PRs.</p>	<ul style="list-style-type: none"> <li>ESIA</li> <li>Environmental and Social Management System (ESMS)</li> <li>Environmental and Social Policy</li> <li>Environmental and Social Management Plan</li> <li>Organisational capacity and commitment</li> <li>Supply chain management</li> <li>Project monitoring and reporting</li> </ul>	<p>The project comprises the widening of 32 km of the Tyup-Karakol Road. This meets the criteria for Category A projects, as such this Project is classed as a Category A project.</p> <p>As required under EBRD requirements, for a Category A projects, there is need for a comprehensive ESIA, followed by public disclosure for a minimum period of 120 days.</p>
PR3: Resource Efficiency and Pollution Prevention and Control	<p><u>Summary</u></p> <p>Projects must meet good international practice (GIP) with regard to resource efficiency and pollution prevention and control that are essential elements of environmental and social sustainability. The objectives of this PR are to identify project-related opportunities for energy, water and resource efficiency improvements and waste minimisation; to adopt the mitigation hierarchy approach; and to promote the reduction of project-related greenhouse gas emissions.</p> <p><u>Objectives</u></p> <ul style="list-style-type: none"> <li>identify project-related opportunities for energy, water and resource efficiency improvements and waste minimisation</li> <li>adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project</li> <li>promote the reduction of project-related greenhouse gas emissions</li> </ul>	<ul style="list-style-type: none"> <li>Resource efficiency</li> <li>Pollution prevention and control</li> <li>Greenhouse gases</li> <li>Water</li> <li>Waste</li> <li>Safe use and management of hazardous substances and materials</li> <li>Pesticide use and management</li> </ul>	<p>Construction works may give rise to pollution through increased traffic, general construction practices, working near water, and construction wastes.</p> <p>During operation the road may give rise to air pollution through increased traffic and pollution to surface water bodies through road drainage runoff.</p>
PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<p><u>Summary</u></p> <p>This PR covers the conservation of biodiversity and sustainable management of living natural resources, and the balance with the potential for utilising the multiple economic, social and cultural values of biodiversity and living natural resources. It recognises the importance of maintaining core ecological functions of ecosystems and the biodiversity they support.</p> <p><u>Objectives</u></p> <ul style="list-style-type: none"> <li>Protect and conserve biodiversity using precautionary approach</li> </ul>	<p><u>Conservation of biodiversity</u></p> <ul style="list-style-type: none"> <li>Assessment of issues and impacts</li> <li>Biodiversity conservation requirements</li> <li>Legally protected and internationally recognised areas of biodiversity value</li> <li>Invasive alien species</li> </ul> <p><u>Sustainable management of living natural resources</u></p> <ul style="list-style-type: none"> <li>Assessment of issues and impacts</li> </ul>	<p>Vegetation clearance will be required for the Project footprint. Impacts may also occur from increased traffic, noise and air emissions, both in construction and operation. There are a number of designated sites in the Project Area, including the United Nations Educational, Scientific</p>

- Adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity

Promote good international practice (GIP) in the sustainable management and use of living natural resources

- Crop and livestock production
- Fisheries and aquaculture
- Natural and plantation forestry
- Use of biomass fuel and biofuel production
- Supply chain
- Genetically Modified Organisms (GMOs)

and Cultural Organization (UNESCO) Issyk-Kul biosphere reserve, Ramsar Wetland of International Importance, and Important Bird and Biodiversity Areas (IBAs).

### 3.2.4. Critical Habitats and Priority Biodiversity Features Assessment

EBRD PR 6 defines the most sensitive biodiversity features as 'critical habitat', i.e. areas identified that hold the highest tier of irreplaceable (existing in few places) and vulnerable (at high risk of being lost) biodiversity features<sup>3</sup>. Critical habitat comprises one of the following criteria:

- (i) Highly threatened or unique ecosystems (Ecosystems that are at risk of significantly decreasing in area or quality; have a small spatial extent; and/or contain concentrations of biome-restricted species);
- (ii) Habitats of significant importance to endangered or critically endangered species (Areas supporting species at high risk of extinction (critically endangered or endangered) on the IUCN Red List of threatened species or equivalent national/regional systems);
- (iii) Habitats of significant importance to endemic or geographically restricted species (Areas holding a significant proportion of the global range or population of species qualifying as restricted-range under Birdlife or IUCN criteria).
- (iv) Habitats supporting globally significant migratory or congregatory species (Areas that support a significant proportion of a species' population, where that species cyclically and predictably moves from one geographical area to another (including within the same ecosystem), or areas that support large groups of a species' population that gather on a cyclical or otherwise regular and/or predictable basis).
- (v) Areas associated with key evolutionary processes (Areas with landscape features that might be associated with particular evolutionary processes or populations of species that are especially distinct and may be of special conservation concern given their distinct evolutionary history); or
- (vi) Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical) (Ecological functions without which critical biodiversity features could not persist).

Priority biodiversity features have a high, but not the highest, degree of irreplaceability and/or vulnerability. These comprise the following criteria:

- (i) threatened habitats (Habitats considered under pressure by national, regional or international assessments. These include natural and priority habitats identified under the EU Habitats Directive (Annex I));
- (ii) vulnerable species (Species listed by the International Union for Conservation of Nature (IUCN) or any other national/regional lists (such as national Red Lists) as Critically Endangered and Endangered (for which Critical Habitat has not been triggered), Vulnerable (VU) or equivalent. These include animal and plant species of community interest identified under the EU Habitats Directive (Annex II) and species listed under the EU Birds Directive Annex 1);
- (iii) significant biodiversity features identified by a broad set of stakeholders or governments (Key Biodiversity Areas and Important Bird and Biodiversity Areas; nationally and internationally important species or sites for conservation of biodiversity; many areas meeting natural habitat definitions of other international financial institution); and
- (iv) ecological structure and functions needed to maintain the viability of priority biodiversity features described above (Where essential for priority biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species).

The presence of Critical Habitat and Priority Biodiversity Features that may be impacted by the Project requires a greater level of scrutiny by the ESIA process, especially with respect to mitigation and, potentially, offsetting or compensation. PR 6 requires that an assessment of Critical Habitat and Priority Biodiversity Features is therefore undertaken.

<sup>3</sup> Available at: <https://www.ebrd.com/environment/pdf-guidance-note-ebrd-performance-requirement-6.pdf>. Accessed July 2020.



### 3.3. Relevant EU Directives/Legislation

The EBRD ESP requires the Project to meet all relevant EU substantive environmental standards. The key relevant EU Directives to the BMP are as follows:

#### 3.3.1. Directive 2011/92/EU Environmental Impact Assessment, amended in 2014 by Directive 2014/52/EU

The most relevant EU Directive in relation to the Project is EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by 2014/52/EU (the EIA Directive). This Directive improves the level of environmental protection, with a view to making business decisions on public and private investments more sound, predictable, and sustainable in the longer term. EIA is required for all projects in Annex I and for Annex II projects, national authorities must decide whether an EIA is needed. It also strengthens the need for effective public participation in decision-making, protection and promotion of cultural heritage and strengthen public access to information.

A review against the EIA Directive requirements has been undertaken, to assess whether the Project is listed in Annex I or II of the EIA Directive. The following is applicable in Annex, and therefore requires an EIA in accordance with the Directive:

*“Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road or realigned and/or widened section of road would be 10 km or more in a continuous length” (Annex I, Article 4(1), Paragraph 7(c)).*

#### 3.3.2. EU Directive 2000/60/EU Water Framework Directive

The objective of this Directive is to establish a framework for protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. *Inter alia*, it is aimed at an effective use of water resources and will ensure that all aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands meet 'good status' by 2015.

#### 3.3.3. EU Directive on the Conservation of Wild Birds (2009/147/EC)

The EU Directive on the conservation of wild birds (2009/147/EC), referred to as the Birds Directive, is relevant. Article 1 applies the Directive to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies. It covers the protection, management and control of these species and lays down rules for their exploitation; and applies to birds, their eggs, nests and habitats. Article 5 requires the protection of nests and eggs and prohibits deliberate disturbance of these birds particularly during the period of breeding and rearing, in so far as disturbance would be significant having regard to the objectives of this Directive.

#### 3.3.4. Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on Public Access to Environmental Information

The purpose of the Directive is to ensure that environmental information is systematically available and distributed to the public. The Directive requires Member States to ensure that public authorities are required to make the environmental information they hold available to any legal or natural person on request.

#### 3.3.5. EU Waste Framework Directive

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. Waste legislation and policy of the EU Member States shall apply as a priority order the following waste management hierarchy:



Figure 3-1. Waste management hierarchy according to Waste Management Framework Directive

The Directive introduces the "polluter pays principle" and the "extended producer responsibility".

## 3.4. Relevant International Conventions

### 3.4.1. Aarhus Convention

The Aarhus Convention establishes several rights of the public (individuals and their associations) with regard to the environment. This Convention provides for:

- **Access to environmental information.** The right of everyone to receive environmental information that is held by public authorities. Applicants are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession.
- **Public participation in environmental decision-making.** The right to participate in environmental decision-making. Arrangements are to be made by public authorities to enable the public affected and environmental non-governmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment. These comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it.
- **Access to justice.** The right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general.

### 3.4.2. The Espoo Convention on Environmental Impact Assessment in a Transboundary Context, 1991

The Espoo Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

### 3.4.3. Relevant international conventions to which the Kyrgyz Republic is signatory

Kyrgyzstan has signed or ratified the following international agreements and protocols aimed at the protection of the environment, that can be considered relevant to this project (Table 3-3). Ratification of international legal acts involves implementation of international requirements into the national legislation and harmonization of the Kyrgyz legislation with international legislation. However, this process can be slow in Kyrgyzstan given that conventions need to be translated into national laws, a process that can be time consuming and complicated.

Table 3-2. Relevant international conventions

Convention	Year	Summary	Relevant Kyrgyzstan law
United Nations Framework Convention on Climate Change	2000	Combating global climate change and its consequences. This convention establishes an overall framework for intergovernmental efforts to tackle this challenge. It recognizes that the climate system	Law of the Kyrgyz Republic on accession dated January 14, 2000, No. 11.

Convention	Year	Summary	Relevant Kyrgyzstan law
		is a common resource whose stability may be affected by emissions of carbon dioxide and other greenhouse gases.	
Kyoto Protocol to the United Nations Framework Convention on Climate Change	2003	This protocol commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that (part one) global warming is occurring and (part two) it is extremely likely that human-made CO2 emissions have predominantly caused it. The Kyoto Protocol was adopted in Kyoto, Japan on 11 December 1997 and entered into force on 16 February 2005. There are currently 192 parties (Canada withdrew from the protocol, effective December 2012) to the Protocol.	Ratified by the Law of the Kyrgyz Republic of January 15, 2003 No. 9
Aarhus Convention on access to information, public participation in decision-making and access to justice on environmental issues	2001	<p>To support the protection of human rights to a healthy environment and wellbeing, access to information, public participation in decision-making and access to justice on issues related to the environment.</p> <p>The Aarhus Convention establishes a number of rights of the public (individuals and their associations) with regard to the environment. This Convention provides for:</p> <ul style="list-style-type: none"> <li>– Access to environmental information. The right of everyone to receive environmental information that is held by public authorities. Applicants are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession.</li> <li>– Public participation in environmental decision-making. The right to participate in environmental decision-making. Arrangements are to be made by public authorities to enable the public affected and environmental non-governmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment. These comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it.</li> </ul> <p>Access to justice. The right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general.</p>	Law of the Kyrgyz Republic on accession dated January 12, 2000, No. 5
Montreal Protocol on Ozone Depleting Substances	2000	A treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.	Ratified by the Law of the Kyrgyz Republic of January 15, 2000, No. 16 (the same day as Vienna Convention)
Vienna Convention for the Protection of the Ozone Layer	2000	Multilateral agreement that provides frameworks for international reductions in the production of chlorofluorocarbons due to their contribution to the destruction of the ozone layer and resulting increase in the threat of skin cancer.	Law on ratification by the Parliament of Kyrgyz Republic of 15.01.2000 №16
Stockholm Convention on Persistent Organic Pollutants	2006	<p>The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.</p> <p>The Stockholm Convention requires its parties to take measures to eliminate or reduce the release of POPs into the environment.</p>	Law of the Kyrgyz Republic on ratification of 19.07.2006. No. 114
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1996	<p>The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes.</p> <p>Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics, as well as two types of wastes defined as "other wastes" - household waste and incinerator ash.</p>	<p>Resolution of the Legislative Assembly of the Parliament of the Kyrgyz Republic on accession dated January 18, 1996. No. 304-1.</p> <p>Resolution of the Council of People's Representatives of the Parliament of the Kyrgyz Republic dated November 30, 1995, No. 225-1</p>



Convention	Year	Summary	Relevant Kyrgyzstan law
The UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo)	2001	The Espoo (EIA) Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.	Law of the Kyrgyz Republic on accession of 12.01.2001. № 6
United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (December 18, 1997)	1999	Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.	The accession of the Kyrgyz Republic to the UN Convention to Combat Desertification was registered at the UN on December 19, 1997. In Kyrgyzstan, the Convention was ratified on July 21, 1999.
Ramsar Convention on the Protection of Water and Wetlands	2002	<p>The Convention uses a broad definition of wetlands. It includes all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fishponds, rice paddies, reservoirs and salt pans.</p> <p>Under the “three pillars” of the Convention, the Contracting Parties commit to:</p> <ul style="list-style-type: none"> <li>– Work towards the wise use of all their wetlands</li> <li>– Designate suitable wetlands for the list of Wetlands of International Importance (the “Ramsar List”) and ensure their effective management</li> </ul> <p>Cooperate internationally on transboundary wetlands, shared wetland systems and shared species.</p>	Law of the Kyrgyz Republic on ratification of April 10, 2002, No. 54
The United Nations Convention (Rio) on Biological Diversity	2002	Protecting human health and the environment from the harmful effects of hazardous wastes by regulating international trade in hazardous and other wastes, minimizing their formation and transboundary movement and ensuring their environmentally sound disposal.	Law of the Kyrgyz Republic on ratification of April 10, 2002, No. 54
UN Bonn Convention on the Conservation of Migratory Species of Wild Animals	1996	Provides a global platform for the conservation and sustainable use of migratory animals and their habitats.	Law on accession of the Kyrgyz Republic dated July 26, 1996, No. 40
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	2013	The Convention sets out the obligations of the Parties with respect to the assessment of the environmental impact of specific activities in the early stages of planning. It also contains the general obligations of the Parties to notify and consult each other when considering projects that can have significant harmful effects on the environment outside the borders of one state. The Convention is a tool with great potential, facilitating the cooperation of the Parties, joint discussion of issues, establishing contacts and finding common ways to resolve the issues that have arisen.	Law of the Kyrgyz Republic. on accession No. 205 of November 22, 2013
United Nations Framework Convention on Climate Change	1995	Intended to protect the human environment against air pollution and to gradually reduce and prevent air pollution, including long-range transboundary air pollution	Resolution of the Legislative Assembly of the Kyrgyz Republic Parliament on accession of to the Convention dated June 8, 1995 Z-No. 130-1; Resolution of the Assembly of the People's Representatives of the Kyrgyz Republic Parliament on accession of June 10, 1995, P-No. 97-1

## 3.5. National Framework, Legislation and Standards

### 3.5.1. National Requirements

At the highest level of the country's governance, the Jokorku Kenesh (Parliament) is responsible for the following relevant issues:

- definition of the general structure of the policy on environmental protection; and
- development and approval of environmental laws and regulations.

Several types of responsibility related to environmental issues are delegated to the Office of the President. The President is empowered on issues such as:

- establishing specific rules, and making decisions on the use of natural resources;
- define and declare borders and state of ecological emergencies and zones of ecological disasters; and
- approval of procedures for the collection and use of funds to protect the environment.

Since the governance in Kyrgyzstan has changed from presidential to parliamentary, the powers of the President have been reduced. According to Clause 64 of the new Constitution of the Kyrgyz Republic (2010), the President is responsible for signing all laws passed by the Jokorku Kenesh, holding international negotiations, and signing international agreements, with the approval of the Prime Minister. At the same time, the President has the right to transfer these powers to the Prime Minister and members of the Government, while retaining the authority to sign documents of ratification and accession.

The Ministry of Natural Resources, Ecology, and Technical Supervision is the authorized state institution responsible for the development, approval and management of environmental policy in the Kyrgyz Republic. Its main tasks and objectives include: conducting state control over the implementation of environmental protection, developing and implementing a common policy in the field of environmental protection and carrying out environmental protection measures.

Other major stakeholders in environmental assessment are:

- Department of road management under the MoT
- Ministry of Health
- Ministry of Culture, Information, Sport and Youth Policy
- Department of Tourism under the Ministry of Culture, Information, Sport and Youth Policy
- Ministry of Emergency Situations (natural hazards), and its subsidiary agency Kyrgyz Hydrometeorology Service (Kyrgyzhydromet)
- Ministry of Agriculture
- Ministry of Energy
- Forestry service under the Ministry of Agriculture
- Water Resources Service under the Ministry of Agriculture
- Ministry of Natural Resources, Environment and Technical Supervision
- Land resources service under the Ministry of Agriculture
- Local administrations (social issues, land use, etc)

### 3.5.2. Kyrgyzstan National Policies

The following national policies are relevant to this BMP:

#### National Environmental Action Plan

The National Environmental Action Plan (NEAP) was adopted in 1994, as a blueprint for environmental protection. The plan focused on solving a small number of critical problems, collecting reliable information to aid in that process, and integrating environmental measures with economic and social development strategy.

#### National Development Strategy of the Kyrgyz Republic for 2018-2040, set by the Decision of the President of the Kyrgyz Republic, November 2018

This Strategy for 2018-2040 defines strategic guidelines for the development of Kyrgyzstan for the long-term period. It sets out the image of the country's future, and the main principles and ways to achieve development

goals in all spheres of society including social and economic. Priority medium-term steps for launching the strategic vision have also been identified.

Chapter 3.2. contains strategic perspectives for the environment, climate adaptation and decreasing the risk of emergencies. Particularly, it is planned to review the policy on the development of the transport sector, the introduction of cost-effective solutions that in turn reduce the level of emissions of pollutants and greenhouse gases. It is also planned to expand the network of protected natural areas up to 10% of the total area of the country.

With regard to Issyk Kul province, i.e., the Project Area, priority steps of regional development include increasing the attractiveness for tourists, and developing transport infrastructure, primarily the ring road, as well as other service infrastructures taking into account the uniqueness of Issyk Kul as a biosphere territory, i.e. special work should be carried out to ensure environmental safety and its preservation.

Other actions to be taken include but are not limited to:

- upgrading of road infrastructure to ensure safe road operation in towns of Kara Kol, Cholpon Ata, Balakchy, and on the route Bishkek-Karakol;
- construction of the landfill following new technologies in towns of Karakol and Chopon Ata; and
- construction and rehabilitation of the water supply systems and sewage networks in towns of Balakchy, Cholpon Ata, and Karakol.

### Concept of sustainable development of the Issyk Kul ecological and economic system for the period up to 2020

Set out by the Order of the President of the Kyrgyz Republic N 98 of 10 February 2009.

The concept of sustainable development of the Issyk Kul ecological and economic system considers the development of the Issyk Kul region as an ecosystem, which ensures high quality of the environment, economic growth and growth of the population's well-being.

It is mentioned that the length of public roads is 2,855 km, including 869 km of international significance, 766 km of state significance, and 1,220 km of local significance. Most of the roads are in poor condition.

Chapter 3 deals with the protection of the environment. It is stated that the greatest contribution to air pollution is made by motor transport, the number of which increases sharply in the spring, summer, and autumn periods. Due to the increase in the intensity of automobile traffic, according to research by the Japan international cooperation Agency (JICA), CO<sub>2</sub> emissions are expected to almost triple from 16,541 tons to 49,561 tons by 2020.

In recent years, there has been an increase in spontaneous construction of car washes on the coast, the number of gas stations and mass entry of vehicles into the forbidden water protection zone of the Lake has increased, and the practice of clearing the coastal forest belt for the development of beaches has expanded. The ongoing transformation of agricultural land threatens the food security of the region.

### Priorities for the conservation of wetlands of the Kyrgyz Republic until 2023 and the Action Plan for the implementation of Priorities for the conservation of wetlands of the Kyrgyz Republic for 2013-2017

Set out by the Decision of the Government of the Kyrgyz Republic N 569 of 18 October 2013. These Priorities have been established in accordance with the law of the Kyrgyz Republic 'On the accession of the Kyrgyz Republic to the UN Convention on wetlands of international importance especially as waterfowl habitat, dated February 2, 1971'. The Priorities determine the strategy, principles, and main directions of the Kyrgyz Republic in the field of conservation of wetlands of international importance and increasing the number of waterfowl. Based on these priorities, action Plans are being implemented, i.e., a set of step-by-step measures for the conservation of wetlands in the Kyrgyz Republic. Since 1976, lake Issyk Kul has been included in the List of wetlands of international importance, mainly as a habitat for waterfowl (hereinafter referred to as the Ramsar list). In this regard, 12 sections of water and land of the Issyk Kul lake are specially protected natural territories of the Kyrgyz Republic and are administered by the Issyk Kul state natural reserve.

The buffer zone of Issyk Kul Biosphere Reserve covers an area of 3,501,516 ha, i.e., 81.3% of the total territory. The following activities are prohibited within the buffer zone: construction of new settlements, the placement and operation of industrial facilities, the construction and operation of production facilities, geological exploration and development of minerals, logging for primary use, the introduction (acclimatization) of new species of plants and animals, actions that change the hydrological regime of the core, and other activities that can affect the ecosystem.

### Priority Directions for Adaptation to Climate Change in the Kyrgyz Republic till 2017

Priority Directions for Adaptation to Climate Change were approved by Resolution No. 549 of the Government of the Kyrgyz Republic dated October 2, 2013. The main mission of the Priority Directions is establishing a national resource mobilization policy to minimize negative risks and use the potential of climate change for the sustainable development of the Kyrgyz Republic, through the implementation of adaptation measures sectors most vulnerable to climate change, i.e.:

- Water resources
- Agriculture
- Energy
- Emergency situations
- Health
- Forests and biodiversity

By 2020-2025, surface runoff is expected to increase to 55.5 cubic km due to increased melting of glaciers, then it is projected to decrease by 2100, to approximately 42-20 cubic km, which is between 44 and 88% of the flow volume in 2000. The consequences of this process can lead to insufficient water resources, reduced energy potential and land productivity not only in Kyrgyzstan, but also in the Central Asian region. Under the scenario of an increase in air temperature to +1.5°C and a decrease in precipitation to -0.9 mm, calculations showed an expected decrease in the flow of the Issyk-Kul, Chui, Syrdarya and Amudarya basins by 4-31% compared to the long-term average by 2050. A more significant decrease in runoff, in the range of 49-19% of the long-term average, is predicted by 2100. Moreover, the most significant decrease in runoff is expected in the Issyk-Kul lake basin - up to 31% by 2050 and 41% by 2100, and the Chu river - 21% and 42%, respectively.

Calculations show that an increase in temperature by 1°C will lead to an increase in the average annual number of climate emergencies by 214 cases.

### Tourism Development Program for 2019-2023

Set by the Decision of the Government of the Kyrgyz Republic N36 of 31 January 2019. Tourism is one of the priorities and export-oriented sectors of the economy of the Kyrgyz Republic. The government of the Kyrgyz Republic's tourism development program for 2019-2023 reflects current global trends in tourism and the current situation in the tourism industry of the Republic. The Program systematically defines goals, tasks, activities with specific deadlines, responsible performers, and financial resources to achieve effective results in the tourism sector.

Year 2019 was declared the year of regional development and digitalization by the President of the Kyrgyz Republic, according to which the program focuses on digitalization of the tourism sector and further promotion of the country's tourism opportunities, as well as the main directions of the national development strategy of the Kyrgyz Republic for 2018-2040 (see above).

The tourism sector in the Kyrgyz Republic should be environmentally oriented and be developed in accordance with current environmental requirements. However, there are the following challenges:

- environmental pollution, in particular, by household waste;
- lack of rules and regulations for the use of land where recreational activities are allowed in specially protected natural areas for the development of infrastructure in the field of tourism; and
- non-compliance with the rules for visiting and protecting the environment at objects of specially protected natural territories.

For the successful implementation of the program, first, it is necessary to solve a number of conceptual tasks, which include but not limited to:

- implement a system of cluster approaches in tourism;
- develop a list and methodology for collecting and calculating additional indicators in the field of tourism in accordance with the methods used by international organizations;
- rehabilitate highways of national significance leading to tourist clusters: Bishkek-Osh, Bishkek-Naryn-Torugart, Bishkek-Balykchy-Tamchy, North-South, Osh-Batken-Isfana, Talas-Taraz;
- develop effective regional and district action plans for the development of roadside infrastructure: service facilities (public catering, maintenance, medical centres), signs and signs in Kyrgyz, Russian and English; and

- take measures to preserve and promote historical and cultural heritage sites located in the regions.

### Concept of Environmental Safety of the Kyrgyz Republic

The Decree of the President of the Kyrgyz Republic dated November 23, 2007, No. 506, approved the Concept of Environmental Safety of the Kyrgyz Republic, which for the near future (until 2020) defines the main directions of the state policy in environmental protection and rational environmental management in the context of sustainable development. To accomplish the tasks defined by the Concept, Resolution of the Government of the Kyrgyz Republic of September 23, 2011 No. 599 was approved, which sets out measures to ensure the environmental safety of the Kyrgyz Republic for the period up to 2015.

### National Security Concept of the Kyrgyz Republic

Issues of environmental safety are included in the National Security Concept of the Kyrgyz Republic, approved by Decree of the President of the Kyrgyz Republic dated June 9, 2012 No. 120.

### Sixth National Biodiversity Conservation Report

With the support of the Global Environment Facility (GEF)/United Nations Development Programme (UNDP), the Sixth National Biodiversity Conservation Report of the Kyrgyz Republic has been prepared, in accordance with the country's obligations to the UN Convention on Biodiversity.

Linked to this, priorities of the Kyrgyz Republic for the Conservation of Wetlands until 2023, and an Action Plan for their implementation for 2013-2017, have been developed and approved by the Resolution of the Government of the Kyrgyz Republic.

### Priorities for conservation of biodiversity of the Kyrgyz Republic for the period up to 2024

Set by the Decision of the Government of the Kyrgyz Republic N 131 of 17 March 2014.

These priorities for the conservation of biodiversity of the Kyrgyz Republic for the period up to 2024 (hereinafter referred to as Priorities) define the strategy, program, principles, and main directions of the Kyrgyz Republic in the field of biodiversity conservation. On this basis, Action Plans are being implemented, i.e., sets of step-by-step measures to preserve the biodiversity of the Kyrgyz Republic. Priorities were developed based on the results of discussions at working meetings and round tables, consideration, and examination of prepared materials with the participation of representatives of relevant ministries, administrative departments, higher educational institutions, and public and independent experts. Data from the 4th national report on biodiversity conservation of the Kyrgyz Republic were used to develop these Priorities.

The ecosystem of Issyk Kul lake is mentioned as a unique wetland ecosystem. One of the planned actions for 2015-2020 is to undertake a survey of the conditions of Issyk Kul lake for the development of the Plan for Strategic Development of Issyk Kul Oblast. The key actions are to determine the number of key ecosystems and their conditions.

### Climate Change

A Coordination Board on Climate Change Issues has been established and assigned with the functions of the national climate change authority, according to the requirements of the UN Framework Convention on Climate Change. The Provisions and composition of the Board were approved by Resolution of the Government of the Kyrgyz Republic, dated November 21, 2012 No. 783 "On the establishment of the Coordination Board on Climate Change Issues". Noting new challenges and issues associated with global climate change, the Resolution of the Government of the Kyrgyz Republic, dated October 2 No. 569, developed and approved the Priority Directions for Adaptation to Climate Change in the Kyrgyz Republic until 2017, which include adaptation measures in the main sectors: water resources, agriculture, public health, climate emergencies, forest resources and biodiversity.

Pursuant to the obligations of the Kyrgyz Republic under the Framework Convention on Climate Change and the Kyoto Protocol, the Second National Communication of the Kyrgyz Republic under the UN Framework Convention on Climate Change (Resolution of the Government of the Kyrgyz Republic, dated May 6, 2009, No. 274) was prepared and submitted to the Convention's Secretariat, in which the issues of vulnerability and adaptation to a changing climate in the sectors of water, agriculture, public health, and extreme climatic conditions were considered. The GEF/UNDP project has prepared the Third National Communication of the Kyrgyz Republic on the UN Framework Convention on Climate Change (UNFCCC) in 2016.

In order to attract foreign investment and provide technical support for the processes taking place under the Climate Convention, the SAEPP, in accordance with the decisions of the conferences of the Parties to the Convention, developed a coordinated position of the Kyrgyz Republic on voluntary commitments to reduce greenhouse gas emissions by 2020 by 20% with appropriate international support. The Ministry of Foreign



Affairs of the Kyrgyz Republic has transmitted this position to the UNFCCC Secretariat. Accepting this position gives the country access to climate funds. The Paris agreement to the United Nations Framework Convention on Climate Change was ratified by the Kyrgyz Republic in 2019.

### 3.5.3. National Environmental Legislation

A list of legislation relevant to this BMP is provided in Table 3-3.

**Table 3-3. BMP-relevant national legislation**

Legislation	Summary
<b>Environmental framework legislation, state environmental review and EIA</b>	
The Constitution of Kyrgyz Republic, 2010	Land, its mineral resources, airspace, waters, forests, flora and fauna and other natural resources can be used, but at the same time are under protection. Everyone is obliged to take care of the environment, flora and fauna of the country.
Law on Environmental Protection, N 53 1999 (last update 2019)	<p>Establishes the basic principles of environmental protection and provides legal authority to establish environmental quality, designated special Protected/ designated areas , promulgates rules and procedures for the use of natural resources, establishes environmental monitoring and control systems and reinforces procedures for overcoming emergency situations. Standards and norms of environmental quality authorized under this law and related to the project include but not limited to:</p> <ul style="list-style-type: none"> <li>– Standards of Maximum Permissible Concentrations of Hazardous Substances in Air, Water, Soils and Subsurface</li> <li>– Standards of Maximum Permissible Emissions and Discharges of Hazardous Substances</li> <li>– Standards of Maximum Safe Noise, Vibration, and Electromagnetic Levels and Other Hazardous Physical Impacts.</li> </ul> <p>This law establishes the requirements for environmental examination (environmental assessment) intended by economic or other activities to prevent potential adverse environmental impacts. In addition, it prohibits financing or implementation of projects related to the use of natural resources without obtaining approval from the State Environmental Expertise.</p>
The Environmental Safety Concept of Kyrgyz Republic, N 506 2007	Establishes the basic principles of environmental policy and determines global, national and local environmental issues; priorities in the field of environmental protection at the national level as well as tools to ensure environmental safety.
Law on Environmental Review/Expertise N 54 1999 (last update 2015)	The main law that regulates environmental assessment. The aim of this law is to prevent negative impacts on human health and the environment occurring as a result of economic or other activities, and to ensure compliance of these activities with State environmental requirements.
Regulation on Procedure for Conducting EIA in the Kyrgyz Republic, N 60 2015	Establishes the procedure for assessing the environmental impact of the proposed activity (hereinafter EIA). The purpose of the EIA is to prevent and/or mitigate the environmental impacts of the proposed activity and other related social, economic and other consequences.
Law 'General Technical Regulation concerning Environmental Safety in the Kyrgyz Republic', N 151 2009 (last update 2019)	Determines the main provisions for technical regulation of environmental safety and establishes general requirements for ensuring environmental safety during design and operations of businesses and other facilities of all legal and physical entities.
Instructions on the procedure for conducting State Environmental Review of pre-design, design and other materials and documents in the Kyrgyz Republic. Set by the Decree of the Kyrgyz Republic N 407 dated 15 October, 1997	<p>Instructions set out requirements for composition, content and presentation of documentation submitted for State Environmental Review, and the procedure for organisation of activities of state environmental review authority of the Ministry of Environmental Protection of the Kyrgyz Republic.</p> <p>Instructions to be used by expert authorities of the Ministry of Environmental Protection and can be followed by organisations responsible for development of pre-design and design materials, and proponents of economic and other activities.</p>
Regulation on the procedure for conducting state environmental review in the Kyrgyz Republic, approved by the Decree of the Kyrgyz Republic N 248 dated May 7, 2014 (last update June 2017)	This Regulation is intended for use by experts of the expert commission of State Environmental Review of the authorized state body for environmental protection.
<b>Protected areas, Biodiversity, Flora and Fauna</b>	
Law on Special Protected Areas, N 18 2011 (2018)	<p>Establishes legal requirements for the protection and use of all-natural objects within certain areas.</p> <p>Regulates relations in arrangement, management, protection and use, as well as control over special protected natural areas in order to preserve the standard natural zones and unique natural complexes and sites, noteworthy natural formations, the genetic pool of the animal and plant world, study the natural processes in the biosphere over changes in its condition.</p>

Legislation	Summary
Law on the sustainable development of the environmental and economic system (EES) of Issyk Kul, N 115 2004 (last update 2017)	<p>This framework law sets general requirements on the protection of the environmental and economic system (EES) of Issyk Kul as a lake of natural and cultural significance. This law consists of four sections:</p> <ul style="list-style-type: none"> <li>– General provisions</li> <li>– Legal regime of protection of environmental assets of the EES of Issyk Kul</li> <li>– Legal regime of protection of the EES of Issyk Kul as a cultural and historical heritage</li> <li>– Legal regulation of economic activities conducted in the EES of Issyk Kul</li> <li>– State regulation of the EES of Issyk Kul</li> <li>– Final provisions.</li> </ul> <p>As set out in Article 32, construction of new roads is now allowed except for their reconstruction, improvement, and creation of tourist parkways, other than construction of pass ways in order to reduce traffic in areas of high density.</p> <p>Article 14 contains a list of measures for the protection of biodiversity of natural environment of the EES of Issyk Kul lake.</p>
Decree of the Government of the Kyrgyz Republic on the biosphere reserve of Issyk Kul, N 623 of 25th of September 1998	The Decision establishes biosphere reserve of Issyk Kul and proposes the inclusion of the biosphere reserves of Issyk Kul in the list of biosphere reserves of UNISCO.
Statement on biosphere reserve of Issyk-Kul, N 40 of 24th January of 2000	<p>This Statement sets out the list of functions of the biosphere reserve of Issyk-Kul, its zoning, water management regime, scientific studies and monitoring, planning and management of environmentally-focused land use, service of protection and control over compliance with nature use regimes, and management of the biosphere reserve Issyk Kul.</p> <p>The project road is located within the transition zone.</p>
<p>Procedure for the formation, change of category, approval of boundaries and liquidation of specially protected natural areas in the Kyrgyz Republic.</p> <p>Set out by the Decree of the Government of the Kyrgyz Republic N 541 dated July 30, 2015.</p>	<p>This procedure regulates formation (Chapter 2), changes of category, approval of boundaries and liquidation of specially protected natural areas in the Kyrgyz Republic (Chapter 3).</p> <p>There are following types of specially protected areas in the Kyrgyz Republic:</p> <ul style="list-style-type: none"> <li>– State nature reserves</li> <li>– State nature parks</li> <li>– State nature sanctuaries</li> <li>– State natural monuments</li> <li>– State botanical gardens, dendrological and zoological parks</li> <li>– Biosphere territories and/or reserves</li> </ul> <p>Transboundary specially protected areas.</p>
Decree of the Government of the Kyrgyz Republic on measures to regulate land use, construction, improvement and maintenance of environmental protection in the Issyk-Kul resort and tourist area, N 246 dated April 25, 2003	<p>This regulation covers a variety of measures to protect Issyk-Kul resort and tourist area. These measures include but not limited to the following topics:</p> <p>strict compliance with legislation</p> <ul style="list-style-type: none"> <li>– rehabilitation of wastewater treatment facilities</li> <li>– prevention of unauthorised construction</li> <li>– tourist service organisation</li> <li>– maintenance and reconstruction of resort roads</li> <li>– landscaping</li> </ul> <p>environmental protection measures in Issyk Kul tourist area.</p>
<b>Biodiversity, Flora and Fauna</b>	
Law on Wildlife, N 59 1999 (last update 2016 N 23)	Establishes the legal relations in the context of protection, use and reproduction of wildlife.
Law on Protection and Use of Flora, N 53 2001 (last update 2016)	Establishes the legal framework for ensuring effective protection, rational use and reproduction of flora resources.
Forest Code, N 66 1999 (last update 2019)	Establishes the legal basis for the rational use, conservation, protection, and reproduction of forests, increasing their ecological and resource capacity.
Law on Fisheries, N 39 1997	Regulates the legal, economic and organizational basis for the fishery sector of the Kyrgyz Republic to boost, to preserve and increase fish stocks, increase the fish productivity of water bodies and ponds, and to fully meet the needs of the population in fishery products.
Decree On fishery development and use of natural and artificial reservoirs in the Kyrgyz Republic	<p>The Decree sets out:</p> <ul style="list-style-type: none"> <li>- Regulation on the procedure for providing natural and artificial reservoirs for use in the Kyrgyz Republic for the purposes of fish farming and fishing;</li> </ul>

Legislation	Summary
dated September 7, 2009 No. 561	- A list of natural and artificial reservoirs in the Kyrgyz Republic provided for fishery development and use for fish farming and fishing.
Decree of the Government of the Kyrgyz Republic on the approval of the Lists of rare and endangered species of animals and plants for inclusion into the Red Book of the Kyrgyz Republic, N 170 dated April 28, 2005	This decree sets out the lists of: <ul style="list-style-type: none"> <li>– Species of Embryophytes and fungi (99 species);</li> <li>– Mammal species (26 species)</li> <li>– Birds species (59 species)</li> <li>– Insects species (18 species)</li> <li>– Amphibians and reptile species (10 species)</li> </ul> Fish species (7 species).
Strategy for Biodiversity Conservation of the Kyrgyz Republic, approved by the Decree of the Government of the Kyrgyz Republic N 524 dated August 3, 2002	This framework law establishes the strategy for biodiversity conservation in the Kyrgyz Republic that includes but not limited to: <ul style="list-style-type: none"> <li>– Key aim of biodiversity conservation in the republic</li> <li>– Key objectives to achieve the aim of biodiversity conservation</li> </ul> Several strategic components or approaches, that demonstrate how these objectives will be implemented.
<b>Air quality, greenhouse gases and climate change</b>	
Law on the Protection of Atmospheric Air, N 51 1999 (last update 2016)	Governs the use and protection of the atmospheric air, setting of ambient air standards, and air quality management.
Law on State Regulation and Policy in the Emission and Absorption of Greenhouse Gases, N 71 2007	Adopted to implement the United Nations Framework Convention on Climate Change (2000), this law forms the basis for state regulation, procedures, rights, duties and responsibilities of public authorities, local governments, individuals and legal persons in emission and absorption of greenhouse gases in the Kyrgyz Republic.
Methodology for the design and content of the Report for maximum permissible and temporarily agreed emissions into the atmosphere. Set out by the Decree of the Government of the Kyrgyz Republic N 479 dated September 2, 2016	This Methodology regulates the design and content of the Report for maximum permissible emissions and temporarily agreed emissions. This methodology is intended for use by business entities, regardless of their organizational and legal form, when developing a draft Maximum Permissible Emissions MPE standards for operated, projected, and reconstructed facilities.
Hygienic Norms 'Maximum permissible concentrations of substances in ambient air of urban areas'. Set by the Decision of the Government of the Kyrgyz Republic No 201 of 11 April 2016.	These norms establish maximum permissible concentrations (hereinafter-MPC) of polluting substances in atmospheric air of residential areas. These norms are applicable for urban and rural areas. The standards are set in the form of maximum one-time and average daily maximum permissible concentrations, indicating the hazard class and the limiting hazard index, which is the basis for setting the standard for a specific substance.
Noise in the workplace, in the premises of residential and public buildings and at the territory of residential development. Set by Decision of the Government of the Kyrgyz Republic No 201 of 11 April, 2016	These norms establish sanitary-epidemiological requirements, standard parameters, and permitted levels of noise in the workplace, classification of noise, permissible noise levels in designed, constructed, reconstructed and operated premises of residential and public buildings, and in residential areas.
Law on the ratification of the Paris agreement to United Nations Framework Convention on Climate Change signed on 12 December 2015 in Paris' N 329 of 28 June 2019.	This law ratifies the Paris agreement to the United Nations Framework Convention on Climate Change.
<b>Water protection and quality</b>	
Law on Water, N 1422-XII 1994 (last update 2019)	Regulates relations in the use and protection of water resources, prevent the environmentally harmful effects of economic and other activities on water bodies and water facilities and improve their condition, strengthening the rule of law with regard to water resources.  It defines the concepts of "water relations", "water use" and "water users", and the competence of public authorities to manage water resources. Also, this Law introduces the elements of a mechanism for the economic regulation of water use.
Water Code, N 8 2005 (last update 2019)	Creates a legal basis for the national water policy in the context of the key principles of integrated water resources management. Water relations in the Kyrgyz Republic are regulated, first, by the



Legislation	Summary
	Constitution of the Kyrgyz Republic. The Water Code also provides for the protection of human health along with the development, rational use, protection of water resources and the environment.
Regulation on Water Zones and Strips of Water Bodies, N 271 1995	Defines the procedure for establishing water zones and strips of water bodies protection in the Kyrgyz.
Law of the Kyrgyz Republic on water disposal and treatment facilities of the biosphere reserve Issyk-Kul N133 dated August 13, 2020	<p>This Law is aimed at realizing the rights of citizens to favourable ecological environment for life and health while preserving the unique ecological system of the Issyk-Kul biosphere territory, taking into account the inclusion of the Issyk-Kul biosphere reserve to the Planetary Network of Biosphere Reserves of the UNESCO.</p> <p>This law is aimed at reducing the adverse impact of wastewater on the environment, preventing pollution of the ecosystem of lake Issyk-Kul because of:</p> <ul style="list-style-type: none"> <li>– Undertaking commercial, trade, tourist, and other activities that area associated with the discharge of domestic and other wastewaters into Lake Issyk Kul</li> </ul> <p>Pollution with and infiltration of considerable amount of not treated domestic wastewater into surface water, groundwater, and lake Issyk-Kul.</p>
Decree of the Government of the Kyrgyz Republic on the approval of the Rules for the protection of surface waters of the Kyrgyz Republic, No. 128 dated March 14, 2016.	These Rules regulate the protection of surface waters from pollution, contamination, and depletion, when water users undertake various types of economic activities that have or may have an adverse effect on the state of surface waters, regardless of their organizational and legal forms, and also regulate the procedure for the implementation of measures for the protection of surface waters.
Law on Drinking Water, N 33 1999 (2014)	Regulates public relations in the field of drinking water supply to the population and ensuring the quality of drinking water.
Law "Technical Regulations" on Drinking Water Safety, N 34 2011 (last update 2017)	Establishes mandatory requirements for the application and performance of technical regulation in order to protect health and life of people from the harmful effects of contaminants contained in the water used. It contains norms that stipulate the rights of water users.
Hygienic Norm GN 2.1.5.1315-03 Maximum Permissible Concentrations) of Chemical Substances in the Water of Water Bodies used for Drinking and Domestic-Recreation Purposes, amended in GN 2.1.5.2280-07 SanPiN2.1.5.980-00	These Standards apply to water from underground and surface water sources used for centralized and non-centralized water supply to the population, for recreational and domestic water use, as well as drinking water and water heating systems.

## 4. Baseline Conditions

This section describes the baseline conditions present within an area in which ecological receptors may be affected as a result of the Project i.e., the Area of Influence (AoI). It includes all land within and adjacent to the footprint of the Project where direct or indirect impacts could occur as a result of the road upgrade. This covers any temporary and permanent land take during pre-construction, construction and operation, and watercourses due to potential pollution incidents. It also includes an area of up to 500 m either side of any pre-construction and construction activities and construction compounds recognising that disturbance due to changes in visual, noise and vibration stimuli can impact on certain species of animals.

Potentially sensitive ecological receptors assessed in the ESIA as being present within the AoI of the Project are as follows:

- Protected and designated area;
- Critical habitats and Priority Biodiversity Features;
- Terrestrial and aquatic habitats;
- Ecosystem services; and
- Species (including mammals, birds, reptiles, amphibians, fish, invertebrates and plants).

### 4.1. Protected and Designated Areas

#### Protected areas

There are eight specially protected areas in Issyk Kul Province<sup>4</sup>, comprising one national park, two national preserves and five game reserves (Table 4-1). Only the Issyk-Kul National Preserve is considered to be within the AoI of the Project.

Table 4-1. Protected sites within Issyk Kul Province

Site name/ designation	Area (ha)	Year founded	Purpose	Important species
Issyk-Kul National Preserve	18,998	1948	Protection of winter habitat, nesting grounds, stopover for waterfowl and shore birds	whooper swan, mute swan, flamingo, white heron, grey heron, white-tailed eagle, white-headed duck, Eurasian spoonbill
Sarychat-Ertash National Preserve	135,4	1995	Protection of ecosystems, of rare and endangered species	arkhar, Marco Polo sheep, snow leopard, Pallas's cat, golden eagle, mountain turkey, saker falcon, lammergeier
Karakol National Park	38,256	1997	Preservation of ecosystems unique to Karakol Gorge	pine, fir, larch, birch, roe deer, ibex snow leopard, brown bear, Siberian deer, lynx, golden eagle, kumai, saker, falcon, lammergeier
Tyup Game Reserve	19,085	1978	Protection of roe deer, Siberian deer, wild boar	roe deer, Siberian deer, wild boar, ibex, Marco Polo sheep, Pallas's cat, marten, bear, lynx, black grouse, mountain turkey, lammergeier
Zheti-Oguz Game Reserve (Wildlife Refuge Dzhety-Oguz)	31,300	1958	Preservation of alpine ecosystems, wild game, rare species	snow leopard, brown bear, lynx, Siberian deer, roe deer, ibex, wild boar, marten, ermine
Chonzhargylchak Game Reserve	13,092	1980	Preservation of ecosystems, wild game, rare species	brown bear, ibex, wild boar, roe deer, Marco Polo sheep
Kensuu Game Reserve	6,878	1989	Preservation and increase of Siberian and roe deer population, wild boar population, lynx population	wild boar, roe deer, Siberian deer, ibex, golden eagle, black vulture, grouse

<sup>4</sup> Baetov, R. (no date) Lake Issyk- Kul Experience and Lessons Learned Brief.

Site name/ designation	Area (ha)	Year founded	Purpose	Important species
Aksuu Game Reserve	32,014	1958	Preservation of game ecosystems animals and of alpine forest	Brown bear, marten, lynx, Siberian deer, wild boar, roe deer, black vulture, black grouse, sparrowhawk

## Designated Areas

There is one Biosphere Reserve, one Ramsar site and two IBAs within Issyk Kul Province, all of which are located in the vicinity of the Project.

### Issyk Kul Lake Biosphere Reserve

UNESCO Biosphere Reserves are designated to promote solutions reconciling the conservation of biodiversity with its sustainable use. They are learning areas for sustainable development under diverse ecological, social and economic contexts.<sup>5</sup>

Biosphere reserves are nominated by national governments and remain under the sovereign jurisdiction of the states where they are located. Biosphere Reserves are designated under the intergovernmental Man and Biosphere (MAB) Programme by the Director-General of UNESCO following the decisions of the MAB International Coordinating Council (MAB ICC). Their status is internationally recognized.<sup>6</sup> Biosphere reserves are commonly organized into three zones: a core area normally with strict legal protection, a buffer zone and a transition zone.

The Issyk-Kul Biosphere Reserve containing Issyk-Kul lake is designated under the UNESCO programme MAB in 2001. The central Tien-Shan mountain region around the Issyk-Kul lake is one of the last harmonic cultural landscapes in the middle Asia preserving habitats close to nature in combination with traditional culture.

The Issyk-Kul Lake with its 180 km length and 60 km width is the second biggest high mountain lake in the world. Because of its depth of 700 meters, its low salinity and because of warm water sources it even in the winter never freezes. Starting from the lake shore all significant landscapes from the sub-tropical to tundra can be found in an azonal order.

The fauna of the reserve is characterized by a high species diversity and unequal distribution on different landscapes. There are 335 species of animals including three species of amphibians, 11 species of reptiles, 267 species of birds and 54 species of mammals. Thirty nine species are included in the Kyrgyz Red Data Book (KRDB).

The main objective of the government's development of ecologically sound land use practice and economic activities in this area.

Issyk-Kul Biosphere Reserve is organised into four zones (Figure 4-1):

- **Core Zone:** Containing the most important habitats, species and other natural features. This area is subject to the highest level of protection (all economic activity is prohibited) and occupies 141,022 ha (~3% of the total).
- **Buffer Zone:** To protect the core zone from adverse anthropogenic activity. Some activities are permitted (e.g. forestry, ecologically sensitive fishing, recreation, agricultural use of summer pastures and alpine meadows); but more damaging activities are prohibited (e.g. establishment of new settlements, industries, manufacturing or tree felling programmes; and introduction of new species of plants and animals). This zone occupies 3,501,516 ha (81% of the total).
- **Transition Zone:** In this area priority is given to the development of sustainable economic activity (e.g. agriculture, industrial projects, transport, communication, defence and new settlements), which must comply with all relevant environmental and ecological standards. Occupies 688,540 ha (~16%).
- **Rehabilitation Zone:** This is a small area in which past human activity has damaged and degraded habitats, communities and ecological/environmental functioning, so there is a need for regeneration and re-vegetation.

Unfortunately, to date there is no legal description of the Issyk-Kul Biosphere Reserve in terms of actual boundaries and the delineation of the core, buffer, transition and rehabilitation zones and a clear definition of

<sup>5</sup> Available at: [Biosphere Reserves \(unesco.org\)](https://www.unesco.org/biosphere). Accessed December 2020.

<sup>6</sup> Ibid.

each zone. However, the Deputy Director of Issyk-Kul Biosphere Territory (Mr.Kanat Suiyndukov) in Balykchy has provided a map of the zones that has been put forward to Parliament for approval, as shown in Figure 4-1.



**Figure 4-1. UNESCO Biosphere Reserve of Issyk-Kul in the Project area**

Key: Blue – Core Zone; green – Buffer zone; Yellow - Transition zone

The State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic General Directorate of the Issyk-Kul Biosphere Territory has confirmed (letter dated 01/02/2021 No. 01-23 / 23 to CAIC) that the Tyup-Karakol road section is located in the transition zone throughout the alignment (and not the core zone) where various types of productive activities are allowed. Further correspondence was held with the State Agency for Environmental Protection and Forestry to confirm this, given that previous mapping has shown the road to possibly be within the core zone. In a letter dated 03.02.2022 / Out. 01-19/43 the State Agency for Environmental Protection and Forestry re-confirmed that the highways is included in the rehabilitation zone. Regeneration, recultivation, anti-erosion, pasture-restoration and afforestation activities are carried out in the zone of rehabilitation. It was also re-confirmed that reconstruction of the road is allowed in compliance with environmental requirements.

It is therefore taken that, whilst the mapping of the location of the road is visually not correct, the road is wholly within the transition zone. Accordingly, reconstruction of the road in this area is allowed in compliance with environmental requirements.

#### Issyk Kul Lake Ramsar site

Issyk-Kul Nature Reserve is also designated as wetland of international importance under the criteria of the Ramsar Convention on Wetlands 1971 (Ramsar site) (see Figure 4-2).

Issyk-Kul Lake is high altitude, deep, light salted, unfrozen lake. The Issyk-Kul Lake is the habitat of native fishes and important wintering area for waterfowl and semi-aquatic birds. There are 60-70 thousand wintering waterfowls in the Ramsar Site. This was one of the main reasons for the inclusion of the Issyk-Kul Lake and Issyk-Kul Reserve in the List of Wetlands of International Importance.



There are 267 bird species, out of 18 species are included in the Red Data Book of the Kyrgyz Republic and three are in the IUCN Red List: Ibisbill (*Ibidorhyncha struthersii*), bar-headed Goose (*Anser indicus*), white-headed duck (*Oxyura leucocephala*). The Issyk-Kul lake is the place for wintering birds like dalmatian pelican (*Pelecanus crispus*), great flamingo (*Phoenicopterus ruber*), whooper swan (*Cygnus cygnus*) and white-tailed eagle (*Haliaeetus albicilla*).

The site meets eight Ramsar criteria of which five are relevant to terrestrial ecology (see **Error! Reference source not found.** for details).

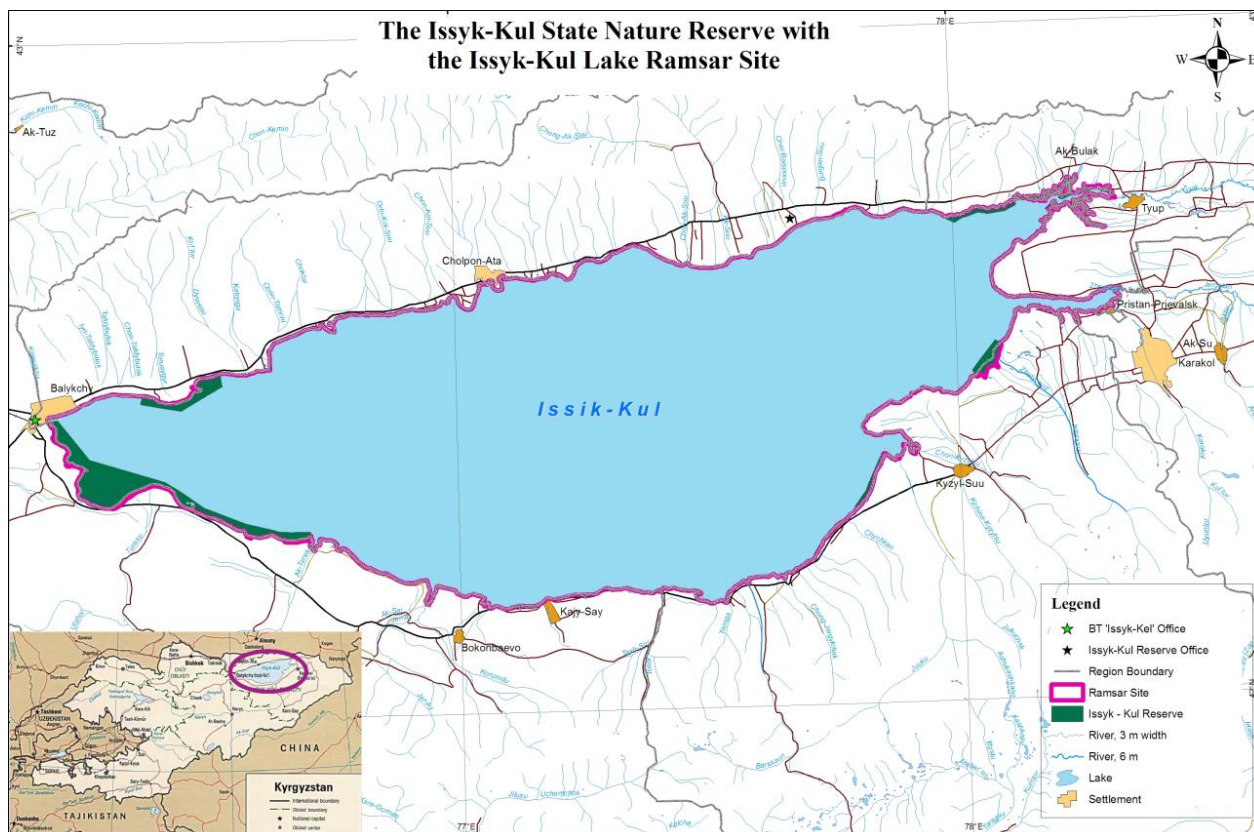


Figure 4-2. Location of Issyk Kul State Nature Reserve and Issyk Kul Lake Ramsar Site<sup>7</sup>

### Important Bird and Biodiversity Areas

Three IBAs, as designated by BirdLife International, are located in Issyk Kul province: Eastern Issyk Kul Lake IBA, Western Issyk Kul Lake IBA and Karkyra Valley IBA. The Project is located approximately 150 m from Eastern Issyk Kul Lake IBA at its closest point, and 54 km from Karkyra Valley IBA. These sites are shown in 3.

<sup>7</sup> Taken from BirdLife International (2020) Important Bird Areas factsheet: Eastern Issyk Kul Lake Map.  
<http://datazone.birdlife.org/site/factsheet/eastern-issyk-kul-lake-iba-kyrgyzstan/map> Accessed 29 October 2020





Figure 4-3. Location of Western Issyk Kul Lake, Western Issyk Kul Lake and Karkyra Valley IBAs<sup>8</sup>

## 4.2. Critical Habitats and Priority Biodiversity Features Assessment

An initial screening of existing biodiversity features that may be affected by the Project was undertaken to identify the potential presence of these features that could be defined as Critical Habitat or Priority Biodiversity Features under the criteria of EBRD PR 6. In order to assess the presence or absence of Critical Habitat-qualifying features a review against each criterion (i-vi) was conducted.

The Critical Habitat and Priority Biodiversity Features assessment was undertaken using professional judgement based on interpretation of the results of surveys and desk study, including a literature search. Where there is uncertainty, a precautionary principle has been applied. The assessment concluded that the Project occurs in Critical Habitat, and Priority Biodiversity Features are present as summarised in Table 4-2.

Table 4-2. Critical Habitat and Priority Biodiversity Features assessment summary

Critical Habitat criteria	Applicability
Highly threatened or unique ecosystems	<b>YES</b> , on account of the close vicinity of Issyk-Kul lake and its adjoining rivers crossed by the Project road.
Habitats of significant importance to Critically Endangered and Endangered species	<b>NO</b> . Additional field surveys in autumn, winter and spring did not confirm this.
Habitats of significant importance to Endemic or geographically restricted species	<b>YES</b> , on account of endemic fish known to occur in the five rivers (River Shaty, River Tyup, River Jergalan, River Tegizchil and River Zhany Aryk) crossed by the Project road, and the presence of the endemic <i>Astragalus projecturus</i> in two areas west of the Tyup-Karakol road, south west of the River Jergalan. Also on a precautionary basis, for the Asiatic frog as a geographically restricted species.
Habitats supporting globally significant migratory or congregatory species	<b>YES</b> , on account of the neighbouring Ramsar site and IBA, considered within the Aol of the Project.
Areas associated with key evolutionary processes	<b>YES</b> , on account of the Issyk-Kul Lake's endemic fish
Ecological functions that are vital to maintaining the viability of biodiversity features	<b>YES</b> , on account of the rivers crossed by the Tyup-Karakol road that support endemic fish. Riverine and floodplain habitat, in the vicinity of the western and eastern Tyup bypass options, and along the rivers where crossed by the proposed road, potentially support the Asiatic frog as a restricted range species.
Priority Biodiversity Features Criteria	Applicability
Threatened habitats	<b>YES</b> . The floodplain area on the Tyup river western and eastern bypass options and along the Jergalan River is considered likely to support birds from the neighbouring IBA, providing a 'spill-over' and 'buffer' function.

<sup>8</sup> Taken from BirdLife International (2020) Important Bird Areas factsheet: Eastern Issyk Kul Lake Map.  
<http://datazone.birdlife.org/site/factsheet/eastern-issyk-kul-lake-iba-kyrgyzstan/map> Accessed 29 October 2020

Critical Habitat criteria	Applicability
Vulnerable species	<b>YES.</b> With confirmation of the presence of Whooper Swan, Osprey and the tulip <i>Tulipa tetraphylla</i>
Significant biodiversity features identified by a broad set of stakeholders or governments	<b>YES.</b> A total of 13 Ramsar site interest features and six IBA trigger species were recorded in the Aol during the three surveys (15 species in total). As a precaution all species are considered to regularly use the area for foraging or resting to some extent and therefore qualify as PBFs.
Ecological structure and functions needed to maintain the viability of priority biodiversity features described in PR6 paragraph 14	<b>NO.</b> The bird surveys showed that the riverine and floodplain areas and agricultural areas with stubble or uncultivated ground adjacent to the road alignment do provide additional habitat, but numbers of foraging and roosting birds could not be described as 'significant' and therefore this PBF Criterion is unlikely to be triggered.

### 4.3. Habitats

The Project is situated in the province of Issyk-Kul covering the Ak-Suu District and Tup (Tyup) District. Terrestrial habitats in the Issyk-Kul basin vary depending on climate, soil type, land-use and particularly altitude, and include deserts, semi-deserts, steppes, meadow-steppes, tundra and forests. The range of altitudes and climatic conditions and the geographical isolation of the basin are key features influencing the region's ecology.

The Project Area falls in the Tien Shan mountain regime. The Kyungey Ala-Too mountains are located to the north of the Project road and the Terskey Alatau to the south (the 'sunny' and 'shady' Alatau, respectively). The altitude of the area crossed by the road is around 1,700 m above sea level, and is predominantly sub-horizontal, gently undulating, apart from an orographic escarpment to the south of the Jergalan River.

The land use along the route is predominantly agricultural, cultivated arable fields sparsely populated by farms connected by minor roads (See Figure 4-4). The exceptions are the north and south ends of the road penetrating more densely populated areas (Tyup and Karakol), and the natural and semi-natural areas around the floodplains of the rivers crossed by the road, presenting riparian vegetation and wetlands (see Figure 4-5); often grazed by livestock.

The Project road crosses two main watercourses, and other smaller watercourses and irrigation channels. The two main watercourses are the Tyup River (see Figure 4-6) and Jergalan River (see Figure 4-7), which are the two largest rivers in the Issyk-Kul basin. Other watercourses crossed by the Project include the Shaty River to the north of Tyup River, between Tyup and Balby Batyr, a number of unnamed channels/drainage channels between Tyup and the Tegizchil River, the Tegizchil River and Zhany Aryk River. All watercourses ultimately discharge to Issyk-Kul lake.

The proposed quarry locations are mainly comprised of steppe, bare ground and scrub habitats (see Figure 4-8 and Figure 4-9).

The Project is located to the east of Issyk Kul Lake, which is the second largest saline lake in the world, covering a surface area of approximately 22,080 square kilometres<sup>9</sup>.

<sup>9</sup> Baetov, R. (no date) Lake Issyk- Kul Experience and Lessons Learned Brief.



**Figure 4-4. Photograph of cultivated habitat within the Aol of the Project**



**Figure 4-5. Photograph of riparian vegetation and wetland within the Aol of the Project**





Figure 4-6. Photograph of Tyup River upstream of existing road alignment



Figure 4-7. Photograph of Jergalan River (downstream of existing road alignment)





Figure 4-8. Photograph of the proposed quarry site south of Shaty (Ichkesuu gravel field)



Figure 4-9. Photograph of the proposed quarry site east of Boz Bolon (Sary-Topurak)

#### 4.4. Ecosystem services

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services can be organised into four types:

- Provisioning services: The extent and frequency that the land unit provides consumable goods (e.g. food, freshwater; timber, fibre, medicinal plants);



- Regulating services: The extent to which the land unit provides regulating services such as flood attenuation, water purification, storage, climate regulation, carbon sequestration;
- Cultural services: The extent to which the land unit provides cultural services (e.g. tourism attraction, spiritual attraction, aesthetic value), and;
- Supporting services: The extent to which the land unit provides supporting ecological services, either positive (e.g. migration corridor, refuge area, primary production, pollination, pest control, nutrient cycling, soil formation), or negative (e.g. disease sources, pest outbreaks)<sup>10</sup>.

Ecosystems include highlands, fertile plains located in lowlands, and large freshwater systems. Key ecosystem services relevant to ecology that may be affected by the Project are provisioning and regulating services of the rivers, e.g., consumables such as timber, fish and certain game birds, cultural services such as ecotourism and supporting services, e.g., migration corridors.

## 4.5. Species

This section provides a summary of the results of the desk study and walkover surveys. The field surveys were undertaken during autumn, winter and spring. The autumn visit (14<sup>th</sup> to 21<sup>st</sup> October 2020) comprised an initial reconnaissance walkover, and habitat, vegetation, mammal, bird and herpetofauna surveys (the October start date for the project necessitated the combining of the initial reconnaissance (Phase 1) survey with the more detailed (Phase 2) surveys). The winter visit (16<sup>th</sup> to 21<sup>st</sup> December 2020) involved mammal and bird surveys, and the spring visit (22<sup>nd</sup> to 27<sup>th</sup> April 2021) involved vegetation, mammal, bird, herpetofauna and invertebrate surveys. Details of each of these surveys are provided below.

### 4.5.1. Vegetation

#### Desk Study

Approximately 7,723 species of plants, including 3,780 species of higher plants, have been recorded in the Kyrgyz Republic<sup>11</sup>. The IUCN Red List includes a total of 230 named species of plants that have been recorded in the Kyrgyz Republic. This comprises six critically endangered species, five endangered species, two vulnerable species, two near threatened species, 192 least concern species and 23 data deficient species (i.e., insufficient information to assign a conservation status). Appendix A lists the IUCN globally threatened species (critically endangered, endangered and vulnerable) recorded in the Kyrgyz Republic.

#### Field survey

A total of 95 species were recorded during the two field visits. This comprises 11 species of trees, six species of shrubs, dwarf shrubs and vines, and 78 species of herbs. including 48 species recorded in October 2020, 59 species recorded in December 2020 and 67 species recorded in April 2021. One KRDB species, quadrifolious tulip, was recorded. This species was located at two sites in the vicinity of the Project: between 4 and 5 km, and 8 and 9 km of the Karakol-Tyup highway, and at the proposed Sary-Topurak quarry site to the east of Boz Bulun. One endemic species, *Astragalus projecturus*, was recorded at two locations, the closest of which was approximately 100 m from the existing road (see Appendix C). Its abundance or favoured habitats in the Aol remains unclear but its presence suggests it could be occurring elsewhere in the Aol.

Three invasive species, wild chamomile *Matricaria chamomilla*, field mustard *Sinapis arvensis* and common cocklebur *Xanthium strumarium* were also recorded within the Aol.

Along the road there are perennial trees, often planted in several rows. In general, the trees in the first two rows are undergrown *Ulmus pumila*, *Armeniaca vulgaris* and in the third and where relevant fourth row, the trees species are *Pinus pallasiana*, *Salix babylonica*, *Populus nigra*, *Populus afghanica*, *Acer negundo*, *Betula pendula*. These are all cultivated species. The average age of these trees is 50 - 60 years. It was observed in the survey that a number of these trees need replacing as they are dead and even in some cases pose a threat of falling onto the carriageway. The poor condition was attributed to lack of maintenance (watering).

The full species list of plants recorded, along with lifeform, habitat, and conservation status, is given in **Error! Reference source not found.**

<sup>10</sup> Available at: <https://www.ebrd.com/documents/environment/esp-policy.pdf>. Accessed February 2020.

<sup>11</sup> Dzunuzova, M. (2008) Country Report on The State of Plant Genetic Resources for Food and Agriculture in Kyrgyzstan. Food and Agriculture Organization of the United Nations

## 4.5.2. Mammals

### Desk study

The IUCN Red List includes a total of 88 mammal species that have been recorded in the Kyrgyz Republic (of which three are now extinct in the Kyrgyz Republic). This comprises two endangered species, four vulnerable species, six near threatened species, 71 least concern species and five data deficient species (i.e., insufficient information to assign a conservation status). Appendix A lists the IUCN globally threatened species (critically endangered, endangered and vulnerable) recorded in the Kyrgyz Republic.

The online sources, reports and literature reviewed indicate that the species known to be present within Issyk Kul province and considered to potentially be within the AoI include snow leopard<sup>12</sup> (IUCN Red List vulnerable and KRDB critically endangered); Eurasian otter (KRDB critically endangered, Habitats Directive Annex II and IV); and Eurasian lynx and grey wolf (Habitats Directive Annex II and IV), and wild cat and steppe polecat (Habitats Directive Annex IV<sup>13</sup>).

Additional species present within Issyk Kul province include manul (Pallas's) cat, Siberian jerboa and Eurasian water shrew (KRDB near-threatened); and golden jackal, red fox, least weasel, Asian badger, muskrat, grey dwarf hamster, Tamarisk gerbil, long-eared hedgehog, tolai hare, Siberian roe deer, and wild boar.

### Field survey

Evidence or sightings of 15 mammal species was recorded within the AoI of the Project during the October, December and April visits. This comprises grey wolf (Habitats Directive Annex II and IV), house mouse, wood mouse, common vole, field vole, brown rat, muskrat, Tien Shan ground squirrel (relict gopher), northern mole vole, rabbit, tolai hare, Asian badger, least weasel, red fox and jackal.

Anecdotal evidence of an additional four species or groups of species was also recorded (Eurasian water shrew, long-eared hedgehog, forest dormouse and bats).

## 4.5.3. Birds

### Desk study

The IUCN Red List includes a total of 352 species that have been recorded in the Kyrgyz Republic. This comprises one critically endangered species, five endangered species, 15 vulnerable species, 17 near threatened species, 313 least concern species and one data deficient species (i.e. insufficient information to assign a conservation status). **Error! Reference source not found.** lists the IUCN globally threatened species (critically endangered, endangered and vulnerable) recorded in the Kyrgyz Republic.

The online sources, reports and literature reviewed indicate that IUCN globally threatened species known to be present within Issyk Kul province and considered to potentially be within the AoI include steppe eagle, saker falcon, Pallas's fish eagle, Egyptian vulture and white-headed duck (IUCN Red List endangered); and common pochard, horned grebe, spotted eagle, eastern imperial eagle, houbara bustard and pale-backed pigeon (IUCN Red List vulnerable).

Species listed in the KRDB which may be present within the AoI include barbary falcon, black-throated diver and houbara bustard (critically endangered); white-headed duck and saker falcon (endangered) and lesser kestrel, short-toed eagle, eastern imperial eagle, Pallas's fish eagle, Egyptian vulture, Dalmatian pelican, Eurasian stone curlew, ibisbill, Pallas's sandgrouse and pale-backed pigeon (vulnerable).

Additional species recorded within vicinity of the Project and therefore potentially present within the AoI of the Project include lesser sandplover, common quail, northern long-eared owl, pallid scops-owl, European bee-eater, European roller, common kingfisher, common hoopoe, sand martin, northern nutcracker, eastern rock nuthatch, citrine wagtail, masked wagtail, Mongolian finch, desert finch, white-winged grosbeak, Eurasian skylark, tawny pipit, isabelline wheatear, northern wheatear, common stonechat, tree sparrow, red-headed bunting and corn bunting.

Information provided by from Dr. S Kulagin (Kyrgyzstan national coordinator of the Wetlands International conservation program) states that demoiselle crane have been recorded in numbers from 400 to 500 individuals during the spring migration period in Tyup and the adjacent territory of Tyup Bay. However, the main mass accumulations of demoiselle crane on migration are located approximately 7 to 10 km to the west of

<sup>12</sup> The IUCN distribution map of snow leopard shows that its range includes the very northern tip of the Project

<sup>13</sup> Annex IV species are those for which a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites. [https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index\\_en.htm](https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm)

Tyup, outside of the Aol<sup>14</sup>.

Species listed under Annex 1 of the Birds Directive that may be present within the Aol of the Project are provided in **Error! Reference source not found.**

#### Field survey

A total of 104 species were recorded during the three field visits, including 48 species recorded in October 2020, 59 species recorded in December 2020 and 67 species recorded in April 2021. A total of 28 important species were recorded, comprising four species listed in the KRDB (Eurasian eagle-owl, osprey, white-tailed eagle and whooper swan), one species listed as IUCN globally threatened species (common pochard – vulnerable) and 15 species on Annex 1 of the Birds Directive (black kite, bluethroat, common crane, common kingfisher, common tern, Eurasian eagle-owl, long-legged buzzard, Montagu's harrier, night heron, osprey, ruddy shelduck, smew, western marsh harrier, white-tailed eagle and whooper swan). Thirteen species recorded are Issyk Kul Lake Ramsar site key designation features (black-necked grebe, common coot, common pochard, gadwall, goldeneye, great crested grebe, great egret, grey heron, mute swan, ruddy shelduck, tufted duck, white-tailed eagle and whooper swan) and six species are Eastern Issyk Kul Lake IBA trigger species (black-necked grebe, common pochard, Eurasian wigeon, goldeneye, red-crested pochard and ruddy shelduck).

Three species were considered to be present or potentially present in important numbers within the Aol of the Project. These were:

- black-necked grebe (peak count of 250 representing 62.5 to 125% of the Eastern Issyk Kul Lake IBA population (estimated in 1976-1986), recorded December 2020 at four locations at the east of Issyk Kul Lake),
- goldeneye (peak count of 68, representing 6.8 to 17% of the IBA population (estimated in 1976-1986), recorded in December 2021 at the north east of Issyk Kul Lake (site 16)) and
- ruddy shelduck (peak count of 176, representing 2.9 to 29.3% of the IBA population (estimated in 1976-1986), recorded in October 2020 on Issyk Kul Lake/mouth of the River Tyup (site 17)).

No demoiselle cranes were observed during the three survey visits.

A large number of rook nests (2265) were recorded in the roadside plantation woodland in April 2021.

The full species list of birds recorded, along with the peak count, visits recorded, seasons generally present in the region and conservation status, is given in **Error! Reference source not found.**

### 4.5.4. Reptiles and amphibians

#### Desk study

The IUCN Red List includes a total of 26 reptiles and four amphibian species that have been recorded in the Kyrgyz Republic. This comprises four vulnerable, 19 least concern and three data deficient (i.e. insufficient information to assign a conservation status) species of reptile; and three least concern and one data deficient species of amphibian. **Error! Reference source not found.** lists the IUCN globally threatened species (critically endangered, endangered and vulnerable) recorded in the Kyrgyz Republic.

The online sources, reports and literature reviewed indicate that the species known to be present within Issyk Kul province and considered to potentially be within the Aol include marsh frog, European green toad and steppe-runner lizard (IUCN Red List least concern).

Information provided by from Dr. S Kulagin that Central Asian tortoise is not present in Issyk-Kul and has not been recorded in the region in the past.<sup>15</sup>

#### Field Survey

No reptiles were recorded during the surveys and no amphibian species were identified during the October or December surveys. One species of amphibian, Xinjiang Toad was recorded during the April 2021 survey.

Anecdotal evidence of marsh frog was recorded and suitable habitat for additional species including Central Asian frog is present within the Aol, i.e. waterbodies and wetlands.

Suitable habitat for lizards of the genus *Eremias* such as steppe-runner is present within the Aol, i.e. within

<sup>14</sup> Kulagin, S. (2021) personal communication

<sup>15</sup> Kulagin, S. (2021) personal communication

areas of natural steppe habitat and quarries.

### 4.5.5. Fish

#### Desk study

In summary, Kyrgyzstan is inhabited by 1% of all known fish species of the world today.<sup>16</sup> There are more than 75 species of fish belonging to 15 families present in the Kyrgyz Republic, mainly associated with lakes and reservoirs.<sup>17</sup> Of these, 49 species are indigenous, and 24 species have been introduced, either deliberately or accidentally.<sup>18</sup> Two endemic species of the Issyk-Kul lake – the Issyk-Kul marinka (*Schizothorax issykkuli*) and Issyk-Kul naked osman (*Diptychus dybowskii*) are included in the Red Book of the Kyrgyz Republic.

Issyk-Kul lake contains 26 fish species, of which 12 are endemic to the lake and its drainage basin, four are Central Asian endemics, and 10 have been introduced (figures and naming conventions vary slightly according to which source is consulted)<sup>19</sup>.

#### Field Survey

Fish surveys yielded 12 species across the five watercourses surveyed with a further four species suspected as being present following interviews with local residents. The River Tyup surveys yielded the highest number of species (8 at survey) with the lowest recorded from the Shaty River (1 species at survey). When considering the combined survey and suspected species records for the watercourses there are several species common across the survey sites. These include the endemic species, osman (recorded/suspected in all watercourses) and marinka (both Red Book), as well as the chebak. In addition to the endemics are a number of records of introduced species, of which Sevan trout are notable being recorded/suspected in all of the watercourses surveyed.

In summary, the watercourses surveyed support a wide range of fish species, many of which are also recorded in the downstream receiving water body, Issyk-Kul lake. This indicates that the Project's watercourses are likely to provide an important resource (feeding/spawning habitat) for maintaining the wider freshwater fish population in the region. The species data returns identify the watercourses as Critical Habitat of significant importance to both endemic and geographically restricted fish species.

### 4.5.6. Invertebrates

#### Desk study

The IUCN Red List includes that a total of 63 invertebrates that been recorded in the Kyrgyz Republic, comprising 54 species of Arthropoda<sup>20</sup> and nine species of Mollusca<sup>21</sup>. This comprises four vulnerable species (all insects), three near threatened species, 44 least concern species and three data deficient species (i.e. insufficient information to assign a conservation status) of Arthropoda; and six least concern species and three data deficient species of Mollusca. **Error! Reference source not found.** lists the IUCN globally threatened species (critically endangered, endangered and vulnerable) recorded in the Kyrgyz Republic.

The online sources, reports and literature reviewed indicate that the species known to be present within Issyk Kul province and considered to potentially be within the AoI include apollo butterfly (IUCN Red List vulnerable); swallowtail butterfly (IUCN Red List least concern); alfalfa leafcutter bee, Cullum's bumblebee, forest caterpillar hunter beetle and mammoth wasp (IUCN Red List data deficient or not classified).

No desk study data is available for aquatic invertebrates present in the Project's watercourses.

#### Field Survey

A total of eight terrestrial invertebrate species were recorded during the April 2021 site visits. This comprised two species of blister beetle, two species of darkling beetle, two species of butterfly, one species of firebug and one species of dung beetle.

<sup>16</sup> UNDP/Economic Commission for Europe.

<sup>17</sup> Ibid.

<sup>18</sup> [Fish species introductions in the Kyrgyz Republic \(fao.org\)](#) (accessed 22 June 2021)

<sup>19</sup> ADB (September 2018), Issyk-Kul Wastewater Management Project Initial Environmental Examination (IEE) Report.

<sup>20</sup> Arthropoda includes insects, arachnids (spiders, mites and scorpions), myriapod (millipedes and centipedes) and crustaceans (crabs, lobsters, shrimps, woodlice).

<sup>21</sup> Mollusca includes bivalvia (shellfish); cephalopoda (squid, octopus) and gastropoda (limpets, snails, slugs).

Aquatic invertebrate surveys conducted in October 2020 and April 2021 yielded a total of 34 aquatic invertebrate taxa across the sampled watercourses. Full taxa lists are presented in Appendix A, with presence/absence summary data provided in Table 6-8. One species recorded (blatetail dragonfly *Lindenia tetraphylla*) is listed on EU Habitats Directive Annex IV. No KRDB species were recorded.

Representatives from the mayfly, stonefly and caddisfly orders typically indicate good biological water quality within the watercourses sampled. The watercourses have been shown to support broadly similar aquatic invertebrate assemblages with a high proportion groups and individual taxa recorded across the watercourses and survey sites. Whilst the generally low taxon richness (range 5 to 17 per survey) is attributed to the survey methodology applied, comparative analysis indicates that the assemblage of the Tegizchil River is the most taxon rich with a total of 17 taxa recorded.



## 5. Potential Impacts

A summary of the potential ecological impacts associated with the Project is provided below.

### 5.1. Pre-construction/Construction Phase

**Table 5-1. Summary of ecological impacts during the pre-construction and construction phases**

Pre-construction/Construction Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
<b>Terrestrial Ecology</b>			
<p>Temporary and permanent land-take</p> <p>Increased traffic around construction areas</p> <p>Increased human activities for example, construction workers and temporary construction camps</p> <p>Presence of the construction site</p> <p>Use of equipment resulting in air and noise emissions</p> <p>Construction activities near /in waterbodies and uncontrolled discharges</p>	<p>Critical habitat / priority biodiversity features</p> <p>Eastern Issyk Kul Lake IBA, Issyk Kul Lake Ramsar site, Issyk Kul Biosphere reserve</p> <p>Issyk-Kul National Preserve</p> <p>Riverine/ wetland habitat/smaller waterbodies; plantation woodland/tree belts, scrub, steppe</p> <p>Open water (Issyk Kul Lake)</p> <p>Provisioning and supporting services</p> <p>Species of conservation concern (IUCN globally threatened species, Kyrgyzstan Red Data Book species, endemic species, Ramsar site key designation features, IBA trigger species, Habitats Directive Annex II and IV species and Birds Directive Annex I species)</p>	<p>Habitat loss and degradation</p> <p>Direct mortality and disturbance of species</p> <p>Severance</p> <p>Changes in hydrology and water quality</p>	<ul style="list-style-type: none"> <li>Design of Project to reduce impacts on sensitive areas particularly with watercourse crossings. Any new access roads required will be designed to minimise habitat fragmentation, barrier effects and induced access to previously undisturbed areas.</li> <li>Road widening should avoid areas where sensitive features, particularly quadrifolious tulip and <i>Astragalus projecturus</i>, are present where practicable; if possible the additional highways should be constructed on the opposites side of the road of sensitive features.</li> <li>The MoT will engage with regulatory authorities including UNESCO representatives and obtain approval for the works once the final alignment of the road has been determined.</li> <li>Collaborate with local governments, environmental departments and specialists on regional biodiversity conservation to provide mitigation advice as and when needed in relation to the final design.</li> <li>A detailed survey of quadrifolious tulip and <i>Astragalus projecturus</i> within the footprint of the Project plus a buffer of 200 m (to allow for effects of habitat degradation) should be undertaken by a trained ecology specialist post-detailed design and where necessary, further mitigation measures identified to avoid direct loss wherever possible. Transplantation method statement drawn up by a botany specialist. Transplantation of quadrifolious, and <i>Astragalus projecturus</i> plants if present, from habitat due to be lost or subject to habitat degradation in the spring-summer period to areas of suitable retained habitat.</li> <li>Ensure the footprint of the Project is not increased through poor working practices on site in order to minimise habitat loss; this is particularly important in areas of natural habitat and adjacent to the IBAs/Ramsar site. Demarcation of working areas and fencing of sensitive sites.</li> <li>A suitably robust Pollution Prevention Plan and emergency response plan to be produced and adopted.</li> <li>Management of aqueous discharges and waste.</li> <li>Management of dust and air emissions.</li> <li>Management of noise.</li> <li>Measures should be taken to prevent fire.</li> </ul>

Pre-construction/Construction Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
			<ul style="list-style-type: none"> <li>• Ensure measures are taken to prevent spread of invasive plant species. This includes pre-construction checks to determine the location of invasive species within the works areas, avoiding site clearance in, and movement of soils from areas containing invasive species and appropriate treatment of individuals plants where applicable. Demarcation of working areas and fencing of sensitive sites.</li> <li>• Minimise noise and illumination (especially at night). Night working in areas adjacent to the river to be avoided where possible.</li> <li>• Percussive piling immediately adjacent to the watercourse avoided where practicable.</li> <li>• Preparation and implementation of Traffic Management Plan.</li> <li>• Soft start-up of plant and machinery (i.e. initial start-up undertaken away from watercourse).</li> <li>• During ecological clearance works, the Construction Contractor will employ an Ecological Clerk of Works (ECW) to undertake daily/weekly inspection to ensure compliance with method statements.</li> <li>• Toolbox talks provided by an Ecological Clerk of Works or equivalent (from the Construction Contractor team) to ensure workforce are aware of required mitigation and legislation relevant to hunting and poaching.</li> <li>• Monitoring of Construction Contractor's compliance with method statements during construction works should be undertaken by an ECW by carrying out daily/weekly inspection as appropriate.</li> <li>• Vegetation cleared outside of the breeding bird season (generally April to August) where practicable. If this is not possible, a pre-clearance walkover will be completed by a suitably qualified ecologist to check for the presence of active bird nests, including the rookery present in the roadside plantation woodland. Should any active nests be identified, it is recommended that these are excluded from works until such time that the chicks have fledged the nest.</li> <li>• Any clearance of low vegetation in sensitive areas within the footprint should be undertaken in two stages (a high cut, a short period to allow reptiles, amphibians and small mammals to disperse followed by a lower cut) where possible.</li> <li>• Excavations covered at night or ramps/sloping sides provided.</li> <li>• Any carcasses on/near roads in the vicinity of the Project should be removed to prevent scavengers (including vultures) coming close to roads and colliding with site infrastructure and plant. The carcasses could also be placed at a location away from the construction footprint in order to provide additional resources for scavengers and help to prevent these species coming into contact with infrastructure and plant.</li> <li>• Use of poison at waste sites to be prohibited.</li> <li>• Waste storage areas should be covered.</li> <li>• Restore natural areas of vegetation. Replant trees along the new road, at a safe distance in accordance with GIP. Proposed species include <i>Armeniaca vulgaris</i> for the first rows and taller species <i>Betula pendula</i>, <i>Salix babylonica</i> for the third and fourth rows, where relevant.</li> </ul>
<b>Aquatic Ecology</b>			

Pre-construction/Construction Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
<p>Temporary and permanent landtake</p> <p>Construction activities near /in waterbodies and uncontrolled discharges</p> <p>Increased movement and light around construction area</p> <p>Dust arising from construction activities</p>	<p>Critical habitat / priority biodiversity features</p> <p>Eastern Issyk Kul Lake IBA, Issyk Kul Lake Ramsar site, Issyk Kul Biosphere reserve</p> <p>Issyk-Kul National Preserve</p> <p>Riverine/ wetland habitat/smaller waterbodies; Open water (Issyk Kul Lake)</p> <p>Provisioning and supporting services</p> <p>Species of conservation concern (endemic fish species, bladetail dragonfly)</p>	<p>Degradation of habitats</p> <p>Disturbance to and mortality of species</p> <p>Changes to local hydrology and water quality</p>	<ul style="list-style-type: none"> <li>Design of new/replacement bridge crossings on the Tyup River and Jergalan River as clear span structures with set back any bridge abutments from the watercourse banks – negating the need for in-channel working.</li> <li>Adopt environmentally sensitive design of culvert replacements.</li> <li>Create habitat corridors on water course crossings at regular intervals and in sensitive areas.</li> <li>Consider replacement of existing culverts on the Shaty River, Tegizchil River and Zhany Aryk River with a clear span structure with set-back abutments to improve watercourse and reinstate riparian habitat connectivity. Note that this may require reinforcement of watercourse banks at the crossing location. For the Shaty River, if a direct culvert replacement is progressed as the preferred engineering option, then design the culvert to remove the existing head difference through the structure.</li> <li>Detailed design of culvert replacements at existing crossings shall incorporate wherever practical environmentally sensitive design: <ul style="list-style-type: none"> <li>Replace existing culverts in preference to extension of existing structures to provide opportunities for improvements in design of crossings. Widen on the side of the road at which the watercourse and riparian zone exhibit the lowest habitat complexity.</li> <li>Use of open portal-frame culverts in favour of box culverts which serve to: <ol style="list-style-type: none"> <li>restore natural bed substrates; and</li> <li>improve water depth and flow provision at crossing locations, supporting unimpeded passage for fish.</li> </ol> </li> <li>Ensure appropriate conveyance of water and sediment for a range of flows (including at low flow conditions).</li> <li>Maintain existing channel gradient to avoid erosion at the upstream or downstream end of a culvert and head differences which could impede fish passage.</li> <li>Avoid reduction in watercourse length through shortening of watercourse planform.</li> <li>Minimise culvert length through use of headwalls and adoption of a perpendicular crossing alignment to the road.</li> <li>If box culverts are required embed hard inverts where practical, to allow for formation of a natural watercourse bed (culvert invert to a depth of at least 0.3 m below existing bed level) and to reduce the potential for significant habitat severance and effects on fish passage.</li> </ul> </li> <li>A suitably robust Pollution Prevention Plan should be produced and adopted during construction: <ul style="list-style-type: none"> <li>For construction works, in, over or adjacent to watercourses adhere to appropriate industry standards such as the UK's Guidance for Pollution Prevention (GPP)<sup>22</sup> and CIRIA guidance on the control of water pollution from construction sites<sup>23</sup>.</li> </ul> </li> </ul>

<sup>22</sup> [Guidance for Pollution Prevention \(GPPs\) - Full list | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland](#) (accessed 24 June 2021)

<sup>23</sup> [Event Display \(ciria.org\)](#) (accessed 24 June 2021)

Pre-construction/Construction Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
			<ul style="list-style-type: none"> <li>Development of an emergency response plan and adequate on site provision of spill kits and wash down areas.</li> <li>Avoid full channel width coffer damming and over-pumping associated with any in-channel dewatering works. If dewatering is required, then only dewater half channel widths at a time to maintain flow through working area or flume flow through the working area as not to affect hydrological character of the watercourses.</li> <li>Avoid in-channel works/dewatering during key sensitive stages for fish e.g., spawning/migration periods. Information on seasonal constraints in relation to fish spawning in the watercourse is limited, but endemic species such as the osam are known to spawn between April and September.</li> <li>Prior to any watercourse dewatering, measures shall be implemented that act to displace fish from the reach which will be affected. Measures may include the removal of features that provide cover such as large stones, boulders and large wood to reduce the overall attractiveness of the reach for fish species. All large substrates or wood should be placed outside of the working area e.g. in the channel downstream of the works, and replaced following the reinstatement of flow in the affected reach.</li> <li>To ensure no entrainment or harm to the fish populations of the Project's watercourses, fish removal/management may be required in relation to any de-watering activities required to facilitate culvert/bridge works. Where watercourse conditions allow, consider fish removal (non-destructive sampling methods) prior to any channel dewatering. A record of all species caught, their abundance and length (major species only) shall be made to yield further information on the fish population structure. Where practical, appropriate fish exclusion measures e.g. use of stop-nets, shall be implemented to prevent fish moving back into the working area. Any pumps or sumps used for dewatering or over pumping/fluming should be appropriately screened to prevent fish entrainment or impingement.</li> <li>Adopt measures that reduce noise, vibration and visual disturbance associated with bridges/culverts by working back from the watercourse bank where possible or working within a dry area to avoid implications on aquatic species, such as behavioural changes e.g., avoidance of areas or physical damage to hearing. If night-time working is required, avoid directional lighting of the watercourses.</li> <li>Set site compounds and access routes back from watercourse. access routes and materials/waste storage areas back from watercourse. If used, Workers' accommodation camp site(s) and location of latrines should be carefully selected under the local environmental authority's guidance and will be at least 500 m from rivers. The same distance applies to any laydown areas and equipment camps or haul roads.</li> <li>Avoid percussive (hammer) piling in favour of softer alternatives (e.g. silent sheet piling, vibratory sheet piling). Where not possible, soft start piling procedures should be utilised. The soft-start duration should be a period of not less than 20 minutes and should piling cease for a period greater than 20 minutes, the soft start procedure must be repeated.</li> <li>Adopt soft-start procedures. Plant and machinery should be started up at least 10m from the river bank and are gradually brought towards the watercourse.</li> </ul>

Pre-construction/Construction Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
			<ul style="list-style-type: none"> <li>Avoidance of excessive noise and illumination (especially at night). Night working in areas adjacent to the river to be avoided where possible.</li> </ul>

## 5.2. Operation Phase

**Table 5-2. Summary of ecological impacts during the operation phase**

Operation/Maintenance Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
<b>Terrestrial Ecology</b>			
Operation and maintenance of Project  Increased traffic and speeds	Critical habitat / priority biodiversity features  Eastern Issyk Kul Lake IBA, Issyk Kul Lake Ramsar site, Issyk Kul Biosphere reserve  Issyk-Kul National Preserve  Riverine/ wetland habitat/smaller waterbodies; plantation woodland/tree belts, scrub, steppe  Open water (Issyk Kul Lake)  Provisioning and supporting services  Species of conservation concern (IUCN globally threatened species, Kyrgyzstan Red Data Book species, endemic species, Ramsar site key designation features, IBA trigger species, Habitats Directive Annex II and IV species and Birds Directive Annex I species).	Habitat degradation  Changes in water quality  Direct mortality and disturbance	<ul style="list-style-type: none"> <li>Incorporation in design of speed limits and warning signs showing the presence of animals near to watercourses and wetlands to prevent collisions and accidents and reduce emissions.</li> <li>Update as necessary and implement the Biodiversity Management Plan. Post-construction monitoring of sites will be undertaken as necessary and set out in the Biodiversity Management Plan, following the pre-construction surveys and updates to the Plan. This may include monitoring of translocation sites, as relevant. Monitoring of the overall net gain in biodiversity of the Project, as relevant to final design impacts</li> <li>Ensure appropriate maintenance regime for the trees planted along the road.</li> <li>Provision of underpasses or safe places for mammals, reptiles, and amphibians to cross the road e.g., underneath bridges or within culverts adjacent to at known and/or likely crossing points, where local topography allows. These passes should be provided where any linear habitat crosses the road, particularly the larger watercourses but also any small streams where commuting animals may be forced up onto the road.</li> <li>Work with UNESCO to contribute to net ecological gain. This should comprise a carefully mapped ecological survey of the UNESCO reserve area adjoining the Project road around and just north of Tyup and the preparation of a management plan with clarified boundaries. An objective of these surveys would be to consider the addition of a Buffer Zone, that at present is missing in this area.</li> <li></li> </ul>
<b>Aquatic Ecology</b>			
Temporary and permanent landtake	Critical habitat / priority biodiversity features	Habitat degradation  Changes in water quality  Changes to hydrology  Disturbance	<ul style="list-style-type: none"> <li>Speed limits to be implemented at watercourse crossing locations. Provision of safety barriers at watercourse crossing locations to reduce risk of accidental spills.</li> <li>No direct discharge from the road to the watercourse.</li> </ul>



Operation/Maintenance Activity/Sources of Impact	Potentially Sensitive Receptors	Potential Impacts	Summary of mitigation measures
<p>Construction activities near /in waterbodies and uncontrolled discharges</p> <p>Increased movement and light around construction area</p> <p>Dust arising from construction activities</p>	<p>Eastern Issyk Kul Lake IBA, Issyk Kul Lake Ramsar site, Issyk Kul Biosphere reserve</p> <p>Issyk-Kul National Preserve</p> <p>Riverine/ wetland habitat/smaller waterbodies; plantation woodland, scrub, steppe</p> <p>Open water (Issyk Kul Lake)</p> <p>Provisioning and supporting services</p> <p>Species of conservation concern (endemic fish species, bladetail dragonfly)</p>		<ul style="list-style-type: none"> <li>Design of road drainage to include measures to improve water quality. The detailed design will include sedimentation/ attenuation ponds which will ensure that runoff from the road water does not reach the major watercourses or Issyk-Kul lake.</li> </ul>

## 6. Biodiversity Management

### 6.1. Introduction

The BMP will form part of the wider Project ESMS. The Project ESMS, once established, will provide a set of policies, procedures, tools and management plans (including the ESMP and this BMP) to identify and manage environmental and social risks. An overview of the ecological impacts is set out below, together with the mitigation and management measures required to be implemented, as reported in ESIA. The Monitoring Plan is set out in Section 8.

### 6.2. Environmental and Social Management Measures

The proposed mitigation measures required during the pre-construction, construction and operation phases are set out below in Table 6-2 to Table 6-4. These measures are listed in order of the mitigation hierarchy, (as detailed in section 1.2). The column headings are defined in Table 6-1 below.

**Table 6-1. Definitions of column headings in mitigation measures tables**

Column Heading	Description
<b>ID no.</b>	A reference number unique to that measure.
<b>Mitigation measure</b>	A summary description of the measure (i.e. commitment or action) required as given in the ESIA.
<b>Details</b>	Additional information about the measure.
<b>Potential impact</b>	The potential impact of the Project that the measure aims to mitigation.
<b>Receptor</b>	The natural feature or process that may be impacted by the Project.
<b>Location</b>	The location that the measure needs to be carried out in relation to the Project
<b>Other Phases</b>	The additional phase(s) in which this measure is/may be required.
<b>Source reference</b>	The document(s) in which the mitigation measure was proposed.
<b>Frequency/timing</b>	The number of occasions and, where relevant, the timing for which the measure needs to be carried out.
<b>Responsible party</b>	The organisation that has primary responsibility for the measure.
<b>Achievement criteria</b>	An indication of how successful implementation of the commitment might be demonstrated.

**Table 6-2. Proposed mitigation measures during the design and pre-construction phase**

**Key: D = Design, PC = Preconstruction, Con = Construction, Op = Operation**

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
<b>Avoidance</b>										
<b>BMP-01</b>	Design of Project to reduce impacts on sensitive areas	<p>The design of the Project, including any access/haul roads and associated infrastructure to reduce impacts on sensitive areas, , particularly quadrifolious tulip and <i>Astragalus projecturus</i>, are present where practicable; if possible, the additional highways should be constructed on the opposites side of the road of sensitive features.</p> <p>. Any new access/haul roads required will be designed to minimise habitat fragmentation, barrier effects and induced access to previously undisturbed areas.</p> <p>The design will include sedimentation/ attenuation ponds which will ensure that runoff from the road water does not reach the major watercourses or Issyk-Kul lake.</p>	<p>Habitat loss</p> <p>Changes in hydrology</p> <p>Changes in water quality</p> <p>Direct mortality</p>	<p>Protected/ designated areas</p> <p>Critical habitats</p> <p>Priority Biodiversity Features</p> <p>Ecosystem services</p> <p>Habitats</p> <p>Species</p>	<p>Critical habitats</p> <p>Footprint of Project and associated infrastructure</p>	n/a	ESIA, ESAP	Once	MoT / PIU Consultant	Design according to best practice guidance.
<b>BMP-02</b>	Clear span bridges used over main rivers	<p>Design of new/replacement bridge crossings on the Tyup River and Jergalan River as clear span structures with set back any bridge abutments from the watercourse banks. This avoids the need for in-channel piers that would act to cause habitat loss and alter hydromorphology.</p> <p>Set back any bridge abutments from the watercourse banks to maintain riparian connectivity beneath the bridge deck.</p>	<p>Habitat loss</p> <p>Changes in hydrology</p> <p>Changes in water quality</p> <p>Habitat degradation</p> <p>Direct mortality</p>	<p>Protected/ designated areas</p> <p>Critical habitats</p> <p>Priority Biodiversity Features</p> <p>Ecosystem services</p> <p>Habitats</p> <p>Species</p>	<p>Critical habitats</p> <p>Footprint of development and associated infrastructure</p>	n/a	ESIA, ESAP	Once	MoT	Design according to best practice guidance.
<b>BMP-03</b>	Detailed design of culvert replacements at existing crossings to incorporate environmentally sensitive design	<p>Replace existing culverts in preference to extension of existing structures to provide opportunities for improvements in design of crossings. Widen on the side of the road at which the watercourse and riparian zone exhibit the lowest habitat complexity.</p> <p>Use of open portal-frame culverts in favour of box culverts which serve to restore natural bed substrates; and improve water depth and flow provision at crossing locations, supporting unimpeded passage for fish.</p>	<p>Habitat loss</p> <p>Changes in hydrology</p> <p>Changes in water quality</p>	<p>Protected/ designated areas</p> <p>Critical habitats</p> <p>Priority Biodiversity Features</p> <p>Ecosystem services</p> <p>Habitats</p> <p>Species</p>	<p>Critical habitats</p> <p>Footprint of development and associated infrastructure</p>	n/a	ESIA, ESAP	Once	MoT	Design according to best practice guidance.

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
		<p>Ensure appropriate conveyance of water and sediment for a range of flows (including at low flow conditions).</p> <p>Maintain existing channel gradient to avoid erosion at the upstream or downstream end of a culvert and head differences which could impede fish passage.</p> <p>Avoid reduction in watercourse length through shortening of watercourse planform.</p> <p>Minimise culvert length through use of headwalls and adoption of a perpendicular crossing alignment to the road.</p> <p>If box culverts are required embed hard inverts where practical, to allow for formation of a natural watercourse bed (culvert invert to a depth of at least 0.3 m below existing bed level) and to reduce the potential for significant habitat severance and effects on fish passage.</p> <p>Creation of habitat corridors on water course crossings at regular intervals and in sensitive areas.</p>								
<b>BMP-04</b>	Replacement of existing culverts on Shaty River, Tegizchil River and Zhany Aryk River	<p>Consider replacement of existing culverts on the Shaty River, Tegizchil River and Zhany Aryk River with a clear span structure with set-back abutments to improve watercourse and reinstate riparian habitat connectivity. Note that this may require reinforcement of watercourse banks at the crossing location.</p> <p>For the Shaty River, if a direct culvert replacement is progressed as the preferred engineering option, design the culvert to remove the existing head difference through the structure.</p>	<p>Habitat loss</p> <p>Changes in hydrology</p> <p>Changes in water quality</p>	<p>Protected/ designated areas</p> <p>Critical habitats</p> <p>Priority Biodiversity Features</p> <p>Ecosystem services</p> <p>Habitats</p> <p>Species</p>	<p>Critical habitats</p> <p>Footprint of development and associated infrastructure - watercourses</p>	n/a	ESIA, ESAP	Once	MoT	Design according to best practice guidance.
<b>BMP-05</b>	Speed limits and (animal) warning signs to be implemented and maintained	<p>Speed limits and warning signs showing the presence of animals on the highway will be implemented at sensitive locations e.g. near to watercourses and wetlands to prevent collisions and accidents and reduce emissions (Appendix D).</p>	<p>Direct mortality</p> <p>Habitat degradation</p>	<p>Protected/ designated areas</p> <p>Critical habitats</p> <p>Priority Biodiversity Features</p> <p>Ecosystem services</p> <p>Habitats</p>	<p>Critical habitats</p> <p>Footprint of development and associated infrastructure - watercourses</p>	n/a	ESIA, ESAP	<p>Once (installation)</p> <p>Continuous (maintenance)</p>	MoT	Design according to best practice guidance.

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
				Species						
<b>BMP-06</b>	Ensure no increase in Project footprint	Ensure the footprint of the Project is not increased in order to minimise semi-natural habitat loss.	Habitat loss Changes in hydrology	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Habitats Species	Footprint of development and associated infrastructure	Con	ESIA	Once	MoT/ PIU Consultant / ECoW	No encroachment of footprint outside designated working areas, including off-road driving.  As-built footprint to be verified against design
<b>BMP-07</b>	Demarcation of working areas	Demarcation of working areas and fencing of sensitive sites to ensure potentially damaging works do not take place outside of designated works areas.	Habitat loss	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Habitats Species	Footprint of development and associated infrastructure	Con	ESIA	Once	MoT / PIU Consultant ECoW	No encroachment of footprint outside designated working areas, including off-road driving.
<b>BMP-08</b>	General pre-construction checks	Where significant design changes occur from the current design, an additional ecological survey will be undertaken to confirm that the biodiversity baseline as reported in the ESIA has not changed significantly, and that there are no additional features that should be avoided, specifically focusing on the new landtake and covering Endemic and KRDB plant species, particularly <i>quadrifolious tulip</i> and <i>Astragalus projecturus</i> , and the presence or otherwise of the Asiatic frog. This survey will be undertaken by a trained ecologist.	Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	Footprint of development and associated infrastructure	n/a	ESIA	Once	ECoW	Signed land clearance authorisation / environmental controlled access authorisation
<b>BMP-09</b>	Vegetation cleared outside of the breeding bird season (April to August)	Vegetation to be cleared outside of the breeding bird season (April to August) where practical to prevent damage and destruction of active birds' nests. Should any nests be identified, it is recommended that these are excluded from works until such time that the chicks have fledged the nest.	Direct mortality	Priority Biodiversity Features Species	Footprint of Project and associated infrastructure	Con	ESIA	At least once	Construction Contractor	No mortality of birds/eggs in working areas



ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
<b>BMP-10</b>	Post-design and Pre-construction survey of Endemic and KRDB plant species	A detailed survey of quadrifolious tulip and <i>Astragalus projecturus</i> within the footprint of the Project plus a buffer of 200 m (to allow for effects of habitat degradation) should be undertaken by a trained ecology specialist post-detailed design and where necessary, further mitigation measures identified to avoid direct loss wherever possible.  Following the survey, the trained ecologist should update the BMP and, as necessary, prepare a method statement for the Construction Contractor to follow.	Direct mortality	Critical habitats Species	Footprint of Project and associated infrastructure	Con	ESIA	Prior to any clearance works	ECoW / specialist	Identification of all plants within footprint
<b>BMP-11</b>	Toolbox talks	'Toolbox talks' provided by an Ecological Clerk of Works or equivalent (from the Construction Contractor team) to ensure workforce are aware of required mitigation and legislation relevant to hunting and poaching.	Direct mortality Disturbance of fauna	Priority Biodiversity Features Species	n/a	Con	ESIA	Prior to any works / workforce arriving	Construction Contractor E&S Manager, ECoW	Full implementation of all relevant actions within and around project site
<b>BMP - 12</b>	Avoid Issyk Kul Biosphere core zone	MoT to engage with regulatory authorities including UNESCO representatives to confirm the boundary of the Issyk Kul Biosphere Reserve core zone once final alignment is determined.  Collaborate with local governments, environmental departments and specialists on regional biodiversity conservation to provide mitigation advice as and when needed.	Habitat loss/ degradation	Protected/ designated areas Critical habitats	Footprint of development and associated infrastructure	n/a	ESIA, ESAP	Once	MoT	Written clarification from authorities that the road improvements will not pass through the core zone of the Issyk Kul Biosphere Reserve
<b>Minimization</b>										
<b>BMP-13</b>	Design of Project to include safe crossing points for species	Provision of underpasses or safe places for mammals, reptiles and amphibians to cross the road, e.g. underneath bridges or within culverts adjacent to known and/or likely crossing points such as between areas of wetlands and along watercourses. These passes should be provided where any linear habitat crosses the road, particularly the larger watercourses but also any small streams where commuting animals may be forced up onto the road.	Direct mortality Severance	Terrestrial species Priority Biodiversity Features	Footprint of infrastructure (at/near watercourses and wetlands)	n/a	ESIA, ESAP	Once	MoT	Design according to best practice guidance.
<b>BMP-14</b>	Preparation and implementation of Traffic	This should aim to minimise potential effects associated with construction activities which may arise through an increase in Heavy Goods Vehicles (HGVs) to/from the site and around	Habitat degradation Direct mortality Severance	Protected/ designated areas Critical habitats	Existing road and any new access/haul roads	Con	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
	Management Plan	sites, which could result in traffic delays, noise, dust and air quality impacts and potential health and safety hazards. This includes the identification of routes to site; placing warning signs at each intersection/ exit/ entrance junctions; providing temporary signs along any deviation roads; appropriate management of interaction of construction traffic with public road users, such as use of traffic marshals/flagmen.		Priority Biodiversity Features Habitats Ecosystem services Species						within and around project site
<b>BMP-15</b>	Preparation and implementation of Pollution Prevention/ Spill Prevention and Emergency Response Plan	Develop and implement a detailed Spill Prevention Plan for the management of all chemicals, fuels and oils used during the Project, including septic tanks and diesel generator, and to reduce the risk of pollution from oil and other accidental contaminant spills and leaks, that reach watercourses and increase in turbidity due to soil erosion into watercourses.	Changes in water quality Habitat degradation Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure	Con	ESIA, ESMMP	Once	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-16</b>	Preparation and implementation of Water, Wastewater and Drainage Management Plan.	A Water, Wastewater and Drainage management plan will be produced to set out how aqueous discharges and wastewater will be managed.	Changes in water quality Habitat degradation Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure	Con	ESIA, ESMMP	Once	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-17</b>	Preparation and implementation of Waste Management Plan.	Waste disposal facilities to be operated so that exposed refuse is regularly covered with material such as soil or gravel. Food and domestic waste storage areas/bins should be kept covered. This will reduce risk of exposure of birds such as vultures that regularly forage in waste dumps to potentially damaging waste products.  Use of poison at waste sites should not be allowed.	Direct mortality Disturbance of fauna	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	All works area	Con	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
<b>BMP-18</b>	Management of noise and vibration	All staff will adhere to Noise and Vibration Management throughout the pre-construction and construction phases. This includes the use of silencers and sound barriers as appropriate and regular plant / machinery maintenance to minimise noise and vibration.  Project construction will not be undertaken at dusk, dawn and night to avoid disturbance to nocturnal and crepuscular fauna (e.g. bats, otter) from increased noise and vibration	Disturbance of fauna	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Species	All works areas	Con	ESIA, ESMMP	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-19</b>	Management of dust and air emissions	Implement the Air Quality Management Plan. Ensure concrete batching plants, if used, are not located within proximity to ecologically sensitive areas	Habitat degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	All works area	Con	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site.  No visual indication of excessive dust on vegetation
<b>BMP-20</b>	Measures taken to prevent fire	Open burning of waste and fire as a means to clear vegetation will be prohibited.	Habitat loss Disturbance of fauna Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure	Con, Op	ESIA, ESMMP	Continuous	All	Full implementation of all relevant actions within and around project site.  No uncontrolled fires on site.
<b>BMP-21</b>	Measures taken to prevent spread of invasive plant species	Pre-construction checks to determine the location of invasive species within the works areas. Avoid site clearance in, and movement of soils from areas containing invasive species.  Appropriate treatment of individuals plants where applicable.	Habitat loss/ degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure	Con	ESIA, ESMMP	Continuous	All	Full implementation of all relevant actions within and around project site.  No spread of invasive plant species on site.

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
<b>BMP-22</b>	Nesting bird checks	If vegetation clearance undertaken in breeding bird season, a pre-clearance walkover will be completed by a suitably qualified ecologist to check for the presence of active bird nests. Should any nests be identified, it is recommended that these are excluded from works until such time that the chicks have fledged the nest.	Direct mortality	Priority Biodiversity Features Species	Footprint of development and associated infrastructure	Con	ESIA	Prior to any new clearance works	ECoW / Ornithologist	No significant mortality of birds/eggs in working areas
<b>BMP-23</b>	Vegetation clearance in sensitive areas to be undertaken in two stages	Vegetation clearance in sensitive areas, i.e. those with likely presence of small mammals, reptiles and amphibians should be undertaken in two stages (a high cut, a short period to allow reptiles, amphibians and mammals to disperse followed by a lower cut).	Direct mortality	Priority Biodiversity Features Species	Footprint of development and associated infrastructure	Con	ESIA	Once	Construction Contractor / ECoW	ECoW to ensure works are undertaken in accordance with agreed method statements. No animal mortality in working areas
<b>BMP-24</b>	Translocation of endemic/ KRDB plant species	Transplantation of quadrifolious tulip bulbs, and <i>Astragalus projecturus</i> plants if present, from habitat due to be lost or subject to habitat degradation in the spring-summer period to areas of suitable retained Specific biodiversity action plan or transplantation method statement drawn up by a botany specialist.	Habitat degradation, direct mortality	Priority Biodiversity Features Habitats Species	Footprint of development and associated infrastructure	n/a	ESIA	Once	Construction Contractor/ Specialist	Survival of at least 75% of translocated plants
<b>BMP-25</b>	Improve water quality	Design of road drainage to include measures to improve quality. The detailed design will include sedimentation/ attenuation ponds which will ensure that runoff from the road water does not reach the major watercourses or Issyk-Kul lake.	Habitat loss Disturbance of fauna Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Watercourses	n/a	ESIA, ESAP	Once	MoT	No significant reduction in fish populations
<b>Compensation/net gain</b>										
<b>BMP-26</b>	Compensation measures for endemic/	If the loss of habitat containing <i>Astragalus projecturus</i> or quadrifolious tulip cannot be mitigated, compensation may be required to	Direct mortality Habitat loss	Critical habitats Habitats	Footprint of development	Con, Op	ESIA	Once (purchase of land for	MoT / Specialist	Compensation site/ areas created, and no

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency / timing	Responsible party	Achievement criteria
	KRDB plant species	<p>achieve net gain in accordance with EBRD PR6. This could include the propagation of additional plants which would then be transplanted to suitable habitat.</p> <p>The direct purchase, enhancement and management of land may be required in order to ensure suitable habitat is available for the propagated specimens to be transplanted. This area of land would be at a ratio of at least 1:1 of the area of habitat lost or degraded. These measures should seek to support the conservation of the Biosphere Reserve, especially near the core zone where it abuts the road to the north of Tyup. Alternatively, or in addition, supporting the conservation of Lake Issyk Kul would be appropriate.</p>		Species	and associated infrastructure			compensation site) Continuous		signification decrease in population of <i>Astragalus projecturus</i> or quadrifolious tulip
<b>BMP-27</b>	Monitoring of net gain provisions / actions	Compensation sites for <i>Astragalus projecturus</i> or quadrifolious tulip and attenuation ponds will be monitored where practicable to assess the changes in number, distribution and abundance of species present. Baseline surveys will be undertaken during the pre-construction phase.	Direct mortality Habitat loss Severance	Critical habitats Habitats Species	Compensation sites and attenuation ponds	Con, Op	ESIA	Continuous	MoT/ specialist	Increase in the diversity and abundance of species present

**Table 6-3. Proposed mitigation measures during the construction phase**

Key: D= Design, PC = Preconstruction, Con = Construction, Op = Operation

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
<b>Avoidance</b>										
<b>BMP-05</b>	Speed limits and (animal) warning signs to be implemented and maintained	Speed limits and warning signs showing the presence of animals on the highway will be implemented at sensitive locations e.g. near to watercourses and wetlands to prevent collisions and accidents and reduce emissions. (Appendix D)	Direct mortality Habitat degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Habitats Species	Critical habitats Footprint of development and associated infrastructure - watercourses	n/a	ESIA, ESAP	Once (installation)  Continuous (maintenance)	MoT/ PIU Consultant	Design according to best practice guidance.



ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
<b>BMP-06</b>	Ensure no increase in Project footprint	<p>Ensure the footprint of the Project is not increased through poor working practices on site in order to minimise habitat loss; this is particularly important in areas of natural habitat and adjacent to the IBAs/Ramsar site. Demarcation of working areas and fencing of sensitive sites.</p> <p>Set site compounds and access routes back from watercourse. Arrange site tracking routes to avoid watercourse margins and site on existing hardstanding where practically possible. If used, Workers' accommodation camp site(s) and location of latrines should be carefully selected under the local environmental authority's guidance and will be at least 500 m from rivers. The same distance applies to any laydown areas and equipment camps or haul roads.</p> <p>During ecological clearance works, the Construction Contractor will employ an Ecological Clerk of Works (ECW) to undertake daily/weekly inspection to ensure compliance with method statements.</p>	Habitat loss Changes in hydrology	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Habitats Species	Footprint of development and associated infrastructure	D, PC	ESIA	Once	MoT/ PIU Consultant/ ECoW	<p>No encroachment of footprint outside designated working areas, including off-road driving.</p> <p>As-built footprint to be verified against design</p>
<b>BMP-07</b>	Demarcation of working areas	Demarcation of working areas and fencing of sensitive sites to ensure potentially damaging works do not take place outside of designated works areas.	Habitat loss	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services	Footprint of development and associated infrastructure	PC	ESIA	Once	MoT/ PIU Consultant/ ECoW	No encroachment of footprint outside designated working areas, including off-road driving.

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
				Habitats Species						
<b>BMP-09</b>	Vegetation cleared outside of the breeding bird season (April to August)	Vegetation to be cleared outside of the breeding bird season (April to August) where practical to prevent damage and destruction of active birds' nests. Should any nests be identified, it is recommended that these are excluded from works until such time that the chicks have fledged the nest.	Direct mortality	Priority Biodiversity Features Species	Footprint of development and associated infrastructure	PC	ESIA	Once	Construction Contractor	No mortality of birds/eggs in working areas
<b>BMP-11</b>	Toolbox talks	'Toolbox talks' provided by an Ecological Clerk of Works or equivalent (from the Construction Contractor team) to ensure workforce are aware of required mitigation and legislation relevant to hunting and poaching.	Direct mortality Disturbance of fauna	Priority Biodiversity Features Species	n/a	PC	ESIA	Prior to any works / workforce arriving	Construction Contractor /E&S Manager / ECoW	Full implementation of all relevant actions within and around project site
<b>Minimization</b>										
<b>BMP-14</b>	Preparation and implementation of Traffic Management Plan	This should aim to minimise potential effects associated with construction activities which may arise through an increase in Heavy Goods Vehicles (HGVs) to/from the site and around sites, which could result in traffic delays, noise, dust and air quality impacts and potential health and safety hazards. This includes the identification of routes to site; placing warning signs at each intersection/ exit/ entrance junctions; providing temporary signs along any deviation roads; appropriate management of interaction of construction traffic with public road users, such as use of traffic marshals/flagmen.	Habitat degradation Direct mortality Severance	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Existing and proposed roads	PC	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
<b>BMP-15</b>	Preparation and implementation of Pollution Prevention/ Spill Prevention and Emergency Response Plan	Develop and implement a detailed Spill Prevention Plan for the management of all chemicals, fuels and oils used during the Project, including septic tanks and diesel generator, and to reduce the risk of pollution from oil and other accidental contaminant spills and leaks, that reach watercourses and increase in turbidity due to soil erosion into watercourses.	Changes in water quality Habitat degradation Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of Project and associated infrastructure; watercourses	PC	ESIA	Once	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-16</b>	Preparation and implementation of Water, Wastewater and Drainage Management Plan.	A Water, Wastewater and Drainage Management Plan will be produced to set out how aqueous discharges and wastewater will be managed.	Changes in water quality Habitat degradation Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of Project and associated infrastructure	PC	ESIA, ESMMP	Once	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-17</b>	Preparation and implementation of Waste Management Plan.	Waste disposal facilities to be operated so that exposed refuse is regularly covered with material such as soil or gravel. Food and domestic waste storage areas/bins should be kept covered. This will reduce risk of exposure of birds such as vultures that regularly forage in waste dumps to potentially damaging waste products. Use of poison at waste sites should not be allowed.	Direct mortality Disturbance of fauna	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	All works area	PC	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-18</b>	Management of noise and vibration	All staff and contractors will adhere to Noise and Vibration Management throughout the pre-construction and construction phases. This	Disturbance of fauna	Protected/ designated areas Critical habitats	All works areas	PC	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
		includes the use of silencers and sound barriers as appropriate and regular plant / machinery maintenance to minimise noise and vibration. Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (e.g. bats, otter, owls) from increased noise and vibration. Avoid percussive (hammer) piling in favour of softer alternatives (e.g. silent sheet piling, vibratory sheet piling) and Adopt soft-start procedures. Plant and machinery should be started up at least 10m from the river bank and are gradually brought towards the watercourse.		Priority Biodiversity Features Ecosystem services Species						
<b>BMP-19</b>	Management of dust and air emissions	Implement the Air Quality Management Plan. Ensure concrete batching plants, if used, are not located within proximity to ecologically sensitive areas.	Habitat degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	All works area	PC	ESIA	Continuous	Construction Contractor	Full implementation of all relevant actions within and around project site.  No visual indication of excessive dust on vegetation
<b>BMP-20</b>	Measures taken to prevent fire	Open burning of waste and fire as a means to clear vegetation will be prohibited.	Habitat loss Disturbance of fauna Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services	Footprint of Project and associated infrastructure	PC, Op	ESIA	Continuous	All	Full implementation of all relevant actions within and around project site. No uncontrolled fires on site.

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
				Species						
<b>BMP-21</b>	Measures taken to prevent spread of invasive plant species	Avoid site clearance in, and movement of soils from areas containing invasive species. Appropriate treatment of individuals plants where applicable.	Habitat loss/ degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of Project and associated infrastructure	PC	ESIA, ESMMP	Continuous	All	Full implementation of all relevant actions within and around project site.  No spread of invasive plant species on site.
<b>BMP-22</b>	Nesting bird checks	If vegetation clearance undertaken in breeding bird season, a pre-clearance walkover will be completed by a suitably qualified ecologist to check for the presence of active bird nests. Should any nests be identified, it is recommended that these are excluded from works until such time that the chicks have fledged the nest.	Direct mortality	Priority Biodiversity Features Species )	Footprint of Project and associated infrastructure	PC	ESIA	Prior to any new clearance works	Construction Contractor / ECoW / Ornithologist	No mortality of birds/eggs in working areas
<b>BMP-23</b>	Vegetation clearance in sensitive areas to be undertaken in two stages	Vegetation clearance in sensitive areas, i.e. those with likely presence of small mammals, reptiles and amphibians should be undertaken in two stages (a high cut, a short period to allow reptiles, amphibians and mammals to disperse followed by a lower cut).	Direct mortality	Priority Biodiversity Features Species	Footprint of Project and associated infrastructure	PC	ESIA	Once	Construction Contractor	ECoW to ensure works are undertaken in accordance with agreed method statements. No animal mortality in working areas
<b>BMP-28</b>	Excavations covered at night or ramps /sloping sides provided	Ensure all deep excavations are covered at night or ramps/sloping sides provided where practicable to allow animals to escape.	Direct mortality	Priority Biodiversity Features Species	All works area	n/a	ESIA	Continuous	Construction Contractor	No animal mortality in working areas
<b>BMP-29</b>	Minimise light disturbance	Night working in areas adjacent to the river to be avoided where possible to avoid disturbance to sensitive species.	Disturbance of fauna	Priority Biodiversity Features Species	Adjacent tot watercourses	n/a	ESIA	Continuous	Construction Contractor	



ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
		<p>Retain natural barriers to minimise artificial light spill, particularly near watercourse (e.g. tall vegetation.).</p> <p>Reduce visual disturbance associated with bridge/culvert works by working back from the watercourse bank where possible or working within a dry area to avoid implications on aquatic species, such as behavioural changes e.g., avoidance of areas or physical damage to hearing. If night-time working is required, avoid directional lighting of the watercourses.</p>								
<b>BMP-30</b>	Remove carcasses	Carcasses near or on roads and works areas should be removed to prevent scavengers (including vultures) coming close to roads and colliding with site infrastructure and plant. The carcasses could also be placed at a location away from the construction footprint in order to provide additional resources for scavengers and help to prevent these species coming into contact with infrastructure and plant.	Direct mortality	Priority Biodiversity Features Species	Existing and proposed roads, works areas	Op	ESIA	Continuous	Construction Contractor	No animal mortality in working areas
<b>BMP-32</b>	Avoid full channel width coffer damming and over-pumping associated with any in-channel dewatering works	Avoid full channel width coffer damming and over-pumping associated with any in-channel dewatering works. If dewatering is required, then only dewater half channel widths at a time to maintain flow through working area or flume flow through the working area as not to affect hydrological character of the watercourses.	Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	Watercourses	n/a	ESIA, ESAP	Once	MoT/ PIU Consultant	No significant reduction in fish populations

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
<b>BMP-32</b>	Avoid in-channel works/dewatering during key sensitive stages for fish.	Avoid in-channel works and dewatering during key sensitive stages for fish e.g. spawning/migration periods. Information on seasonal constraints in relation to fish spawning in the watercourse is limited, but endemic species such as the osam are known to spawn between April and September.	Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	Watercourses	n/a	ESIA, ESAP	Once	MoT/ PIU Consultant	No significant reduction in fish populations
<b>BMP-33</b>	Fish removal/management	<p>To ensure no entrainment or harm to the fish populations of the Project's watercourses, fish removal/management may be required in relation to any dewatering activities.</p> <p>Prior to any watercourse dewatering, implement measures to displace fish from the reach which will be affected. including the removal of cover such as large stones, boulders and large wood. All large substrates or wood should be placed outside of the working area e.g. in the channel downstream of the works, and replaced following the reinstatement of flow in the affected reach.</p> <p>Where watercourse conditions allow, consider fish removal (non-destructive sampling methods) prior to any channel dewatering. A record of all species caught, their abundance and length (major species only) shall be made to yield further information on the fish population structure.</p> <p>Where practical, appropriate fish exclusion measures e.g. use of stop-nets, shall be implemented</p>	Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Species	Watercourses	n/a	ESIA, ESAP	Once	MoT/ PIU Consultant	No significant reduction in fish populations

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
		to prevent fish moving back into the working area.  Any pumps or sumps used for dewatering or over pumping/fluming should be appropriately screened								
<b>Rehabilitation/restoration</b>										
<b>BMP-34</b>	Restore natural areas of vegetation	Footprint of temporary areas of the site, e.g. access roads and site compounds, to be returned to pre-existing condition	Habitat loss Severance	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Species	Footprint of temporary construction areas	Op	ESIA	Once at end of construction / start of operation	Construction Contractor	All areas of temporary habitat loss re-vegetated within 5 years of the completion of the construction phase
<b>BMP-35</b>	Restore natural areas of vegetation	Replant trees along the new road, at a safe distance in accordance with GIP. Proposed species include <i>Armeniaca vulgaris</i> for the first rows and taller species <i>Betula pendula</i> , <i>Salix babylonica</i> for the third and fourth rows, where relevant.	Habitat loss Severance	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Species	Along the road corridor	Op	ESIA	Once at end of construction / start of operation	Construction Contractor	All areas of planting along the road re-vegetated within 5 years of the completion of the construction phase
<b>Compensation/net gain</b>										
<b>BMP-27</b>	Monitoring of net gain provisions / actions	Compensation sites for <i>Astragalus projecturus</i> or quadrifolious tulip and attenuation ponds will be monitored where practicable to assess the changes in number, distribution and abundance of species present. Baseline surveys will be undertaken during the pre-construction phase	Direct mortality Habitat loss Severance	Critical habitats Habitats Species	Compensation sites and attenuation ponds	PC, Op	ESIA	Continuous	MoT/ PIU Consultant / Specialist	Increase in the diversity and abundance of species present

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source reference	Frequency	Responsible party	Verification indicator
<b>BMP-36</b>	Compensation measures for endemic/KRDB plant species	<p>If the loss of habitat containing <i>Astragalus projecturus</i> or quadrifolious tulip cannot be mitigated, compensation may be required. This could include the propagation of additional plants which would then be transplanted to suitable habitat.</p> <p>The direct purchase, enhancement and management of land may be required in order to ensure suitable habitat is available for the propagated specimens to be transplanted. This area of land would be at a ratio of at least 1:1 of the area of habitat lost or degraded. These measures should seek to support the conservation of the Biosphere Reserve, especially near the core zone where it abuts the road to the north of Tyup. Alternatively, or in addition, supporting the conservation of Lake Issyk Kul would be appropriate.</p>	Direct mortality Habitat loss	Critical habitats Habitats Species	Footprint of Project and associated infrastructure	Op	ESIA	Once (purchase of land for compensation site) Continuous	MoT / PIU Consultant / Specialist	Compensation site/ areas created, and no signification decrease in population of <i>Astragalus projecturus</i> or quadrifolious tulip

**Table 6-4. Proposed mitigation measures during the operation phases**

**Key: D= Design, PC = Preconstruction, Con = Construction, Op = Operation**

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source document	Frequency	Responsible party	Verification indicator
<b>Minimization</b>										
<b>BMP-05</b>	Speed limits and (animal) warning signs to be implemented and maintained	Speed limits and warning signs showing the presence of animals on the highway will be implemented at sensitive locations e.g. near to watercourses and wetlands to prevent collisions and accidents and reduce emissions.	Direct mortality Habitat degradation	Protected/ designated areas Critical habitats Priority Biodiversity Features Ecosystem services Habitats Species	Critical habitats Footprint of development and associated infrastructure - watercourses	n/a	ESIA, ESAP	Once (installation) Continuous (maintenance)	MoT/ PIU Consultant	Design according to best practice guidance.
<b>BMP-15</b>	Preparation and implementation of Pollution Prevention/ Spill Prevention and Emergency Response Plan	Develop and implement a detailed Spill Prevention Plan for the management of all chemicals, fuels and oils used during the Project, including septic tanks and diesel generator, and to reduce the risk of pollution from oil and other accidental contaminant spills and leaks, that reach watercourses and increase in turbidity due to soil erosion into watercourses.	Changes in water quality Habitat degradation Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure; watercourses	PC	ESIA	Once	Construction Contractor	Full implementation of all relevant actions within and around project site
<b>BMP-20</b>	Measures taken to prevent fire	Open burning of waste and fire as a means to clear vegetation will be prohibited. Emergency response plan detailing the management of bushfires will be produced	Habitat loss Disturbance of fauna Direct mortality	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Ecosystem services Species	Footprint of development and associated infrastructure;	Con	ESIA	Continuous	All	Full implementation of all relevant actions within and around project site.  No uncontrolled fires on site



ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source document	Frequency	Responsible party	Verification indicator
<b>BMP-30</b>	Remove carcasses	Carcasses near or on roads and works areas should be removed to prevent scavengers (including vultures) coming close to roads and colliding with site infrastructure and plant. The carcasses could also be placed at a location away from the construction footprint in order to provide additional resources for scavengers and help to prevent these species coming into contact with infrastructure and plant.	Direct mortality	Priority Biodiversity Features Species	Existing and proposed roads, works areas	Con	ESIA	Continuous	Construction Contractor	No animal mortality in working areas
<b>BMP-37</b>	Maintenance of safe crossing points for species	Ensure safe crossing points e.g. underpasses are kept free from obstructions and suitable for use by receptors, e.g. mammals reptile and amphibians.	Direct mortality Severance	Species Priority Biodiversity Features Critical habitat	Footprint of development and associated infrastructure; watercourses	n/a	ESIA	Continuous	MoT/ PIU Consultant	Regular, continued use of crossings by wildlife recorded (e.g. footprints)
<b>Rehabilitation/restoration</b>										
<b>BMP-34</b>	Restore natural areas of vegetation	Footprint of temporary areas of the site, e.g. access roads and site compounds, to be returned to pre-existing condition	Habitat loss Severance	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Species	Footprint of temporary construction areas	Con	ESIA	Once at end of construction / start of operation	Construction Contractor	All areas of temporary habitat loss re-vegetated within 5 years of the completion of the construction phase
<b>BMP-35</b>	Restore natural areas of vegetation	Replant trees along the new road, at a safe distance in accordance with GIP. Proposed species include <i>Armeniaca vulgaris</i> for the first rows and taller species <i>Betula pendula</i> , <i>Salix babylonica</i> for the third and fourth rows, where relevant.	Habitat loss Severance	Protected/ designated areas Critical habitats Priority Biodiversity Features Habitats Species	Along the road corridor	Con	ESIA	Once at end of construction / start of operation	Construction Contractor	All areas of planting along the road re-vegetated within 5 years of the completion of the construction phase
<b>Compensation/net gain</b>										

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source document	Frequency	Responsible party	Verification indicator
<b>BMP-27</b>	Monitoring of net gain provisions / actions	Compensation sites for <i>Astragalus projecturus</i> or quadrifolious tulip and attenuation ponds will be monitored where practicable to assess the changes in number, distribution and abundance of species present. Baseline surveys will be undertaken during the pre-construction phase	Direct mortality Habitat loss Severance	Critical habitats Habitats Species	Compensation sites and attenuation ponds	PC, Con	ESIA	Continuous	MoT/ PIU Consultant / Specialist	Increase in the diversity and abundance of species present
<b>BMP-36</b>	Compensation measures for endemic/KRDB plant species	<p>If the loss of habitat containing <i>Astragalus projecturus</i> or quadrifolious tulip cannot be mitigated, compensation may be required. This could include the propagation of additional plants which would then be transplanted to suitable habitat.</p> <p>The direct purchase, enhancement and management of land may be required in order to ensure suitable habitat is available for the propagated specimens to be transplanted. This area of land would be at a ratio of at least 1:1 of the area of habitat lost or degraded. These measures should seek to support the conservation of the Biosphere Reserve, especially the core zone to the north of Tyup. Where feasible, MoT to work with UNESCO to identify a Buffer Zone, that at present is missing in this area. This should comprise a carefully mapped ecological survey of the UNESCO reserve area adjoining the Project road around and just north of Tyup and the preparation of a management plan with clarified boundaries.</p>	Direct mortality Habitat loss	Critical habitats Habitats Species	Footprint of development and associated infrastructure	Con	ESIA	Once (purchase of land for compensation site) Continuous	MoT/ PIU Consultant / Specialist	<p>Compensation site/ areas created, and no signification decrease in population of <i>Astragalus projecturus</i> or quadrifolious tulip</p> <p>Potential addition of a buffer zone to the UNESCO Reserve around Tyup</p>

ID no.	Mitigation measure	Details	Potential impact	Receptor	Location	Other Phases	Source document	Frequency	Responsible party	Verification indicator
		Alternatively, or in addition, supporting the conservation of Lake Issyk Kul would be appropriate.								

## 7. Biodiversity Offsetting / Compensation and Net Gain

The residual impacts due to habitat loss on Critical Habitats (habitat supporting the endemic *Astragalus projecturus*) and Priority Biodiversity Features (KRDB listed quadrifolious tulip) within the Project area may remain significant if the mitigation is not beneficial to these important receptors. If this impact cannot be mitigated, compensation may be required.

The residual effects due to habitat loss and degradation on potential Critical Habitats and Priority Biodiversity Features may remain significant if the recommended mitigation (i.e. avoidance through design of Project to avoid suitable habitat; management of dust and air emissions; production of a transplantation method statement drawn up by a botany specialist and transplantation of bulbs of quadrifolious tulip plants due to be lost) lost does not have the desired affect and negative impacts remain.

If the impacts cannot be mitigated, compensation may be required. This would involve the propagation of additional *Astragalus projecturus* and quadrifolious tulip plants which would then be transplanted to suitable habitat. The direct purchase, enhancement and management of land may be required in order to ensure suitable habitat is available for the propagated specimens to be transplanted. This area of land would be at a ratio of at least 1:1 of the area of habitat lost or degraded (i.e. areas of suitable habitat up to 200 m from the new road).

The acquisition and management of additional habitat to enhance habitat areas and plant numbers would mean the measures go beyond basic mitigation and would compensate for the loss of *Astragalus projecturus* and quadrifolious tulip due to the construction of the Project. This could also result in a net gain in the distribution of these plants and therefore Critical Habitat. A net gain in biodiversity in general would also result from the management of the compensation site due to an increase in value for pollinators and other species.

Net gain will also be achieved through the upgrading and construction of road infrastructure such as bridges and culverts, which will allow for safe passage of aquatic and terrestrial species within and adjacent to watercourses and between areas of sensitive habitat. The creation of sedimentation/attenuation ponds as part of the drainage design will provide additional open water and marginal vegetation habitat that will lead to an increase in biodiversity. It will also provide additional breeding opportunities for amphibians. This includes the Asiatic frog, and an increase in the distribution of this species would therefore also result in a net gain in Critical Habitat.

The compensation sites and attenuation ponds will be monitored where practicable to assess the changes in the distribution and abundance of species and number of individuals present. Baseline surveys will be undertaken during the pre-construction phase.

Where feasible, the MoT should work with UNESCO to identify a Buffer Zone around the core zone near Tyup and to the north of Tyup. , that at present is missing in this area. This should comprise a carefully mapped ecological survey of the UNESCO reserve area adjoining the Project road in this area, and the preparation of a management plan with clarified boundaries. This will also contribute towards Biodiversity Net Gain.

## 8. Biodiversity Monitoring and Reporting

### 8.1. Introduction

Through the BMP, the MoT and Construction Contractor will establish a Biodiversity Monitoring Programme. Monitoring of Project activities will be undertaken in order to:

- Ensure the Project is implemented in compliance with national requirements and EBRD PRs;
- Monitor changes to baseline conditions during construction;
- Assess the efficiency of mitigation, compensation and net gain provisions and actions;
- Provide information on environmental and social performance to Lenders and permitting authorities as required; and
- Implement corrective actions, if required, if proposed mitigation measures are unable to eliminate/reduce potential construction related impacts or established thresholds.

Where possible, thresholds will be established for each monitoring approach that will alert the Project that mitigation measures need to be adapted and revised biodiversity management measures are required. The draft monitoring measures are summarised in Table 8-1 and the monitoring approach is outlined below.

### 8.2. Construction Biodiversity Monitoring and Inspection Plan

A detailed monitoring and inspection plan for construction phase will be prepared by the Construction Contractors with specified targets for each indicator.

Monitoring is focused around site visual inspections, on a daily, weekly and monthly basis as appropriate. An outline proposal for Construction Contractors to build on is provided in Table 8-1.

**Table 8-1. Outline monitoring and inspection plan**

Topic	Phase	Responsibility	Monitoring / Inspection
<b>Protection of flora and fauna during any periods of vegetation clearance at any project sites</b>	Construction	Construction Contractor	Visual inspections on site
<b>Monitoring of net gain provisions/ actions (compensation sites and attenuation ponds)</b>	Preconstruction / construction / operation	PIU Consultant / Specialist	Visual inspections / surveys on site
<b>Air emissions</b>	Construction	Construction Contractor	Visual inspections on site - 15 minutes per day site walkover
<b>Noise and vibration</b>	Construction	Construction Contractor	Auditory inspections daily. If a noise complaint is raised and not resolved through management procedures, noise monitoring should be undertaken at the sensitive receptors (local community buildings closest to the works/where the noise complaint arose from)
<b>Surface water, effluent and soil quality</b>	Construction	Construction Contractor	Hazardous materials management <ul style="list-style-type: none"> <li>• Hazardous materials storage areas at all project sites - weekly visual inspection</li> <li>• Emissions to ground and water</li> <li>• Areas where workers have been working at all work sites – visual inspection checking for leaks</li> <li>• Soil management</li> <li>• Excavation areas - visual inspection of the excavation sites and soil management measures.</li> </ul>
<b>Transport and traffic</b>	Construction	Construction Contractor	<ul style="list-style-type: none"> <li>• Visual inspection (speed limits, vehicle loading, vehicle conditions)</li> <li>• Daily random checks of vehicles conveying dust-generating materials</li> </ul>



Topic	Phase	Responsibility	Monitoring / Inspection
<b>Waste management</b>	Construction	Construction Contractor	<ul style="list-style-type: none"> <li>Waste storage areas at all project sites - visual inspection to carry out a review of waste inventory and transfers</li> </ul>

The draft monitoring measures specific to biodiversity are summarised in Table 8-2.

**Table 8-2. Outline monitoring and inspection measures specific to biodiversity**

Topic	Details	Phase	Frequency	Responsible party	Monitoring / Inspection
<b>Habitat loss</b>	Walkover surveys of the sites should be regularly undertaken by a trained ecologist or ECoW to ensure and measures proposed are being incorporated correctly and that the footprint of the Project are not increasing.	Construction	Once per week	ECoW	Visual inspections on site / photography
<b>Translocated endemic and KRDB plant species</b>	The endemic species translocation to alternative sites (or compensation sites if required) will be monitored to check success rate	Construction / At least one year post-construction in Operation	Once per year at optimal time	PIU Consultant / Specialist	Visual inspections on site / surveys / photography
<b>Vehicle / animal collision reporting</b>	The numbers of animals killed due to collision with site machinery will be recorded in order to determine the presence of any collision hotspots	Construction	Continuous / daily to weekly random checks	Construction Contractor	Visual inspections on site / photography
<b>Use of underpasses/ channel crossings</b>	The use of underpasses by wildlife at sensitive areas will be monitored by checking sand traps or other substrate in which footprints can be left.	Construction / At least one year post-construction in Operation	Continuous / weekly random checks	PIU Consultant / Specialist	Visual inspections on site / photography / sand traps
<b>Monitoring of net gain provisions/ actions</b>	Compensation sites and attenuation ponds will be monitored where practicable to assess the changes in number, distribution and abundance of species present.	Preconstruction / construction / At least one year post-construction in Operation	Continuous / monthly checks at optimal times	PIU Consultant / Specialist	Visual inspections on site / surveys / photography

## 9. Roles and Responsibilities

The roles, responsibilities, and monitoring systems for the delivery of avoidance, mitigation and management measures are detailed in the Project's ESMP. A summary which relates to biodiversity management is presented below.

### 9.1. Lender

The EBRD will potentially finance this Project. Responsibility for Project delivery will be with the Project Owner; however, reports will be required to be submitted to EBRD on the status of the Project, including any requirements as set out in this BMP.

### 9.2. Project Owner

The MoT will be the Project Owner/Implementing Agency (the Client) for this Project. As the Project Owner, MoT will assume overall responsibility for implementing conditions of the ESMP, including this BMP, during construction and will be supported in this task by the PIU Consultant.

The Project Owner will also be responsible for developing and implementing the O&M ESMP and any actions in this BMP relevant to the operational phase of the Project.

### 9.3. Project Implementation Unit Consultant

The PIU Consultant will assist the MoT through the management, implementation, and delivery of Project contracts in line with all applicable legislative and regulatory requirements.

Within the PIU Consultant, a person responsible for ESMP will be appointed. This individual will be responsible for updating the ESMP, ensuring adequate training of the PIU Consultant staff and ensuring the Construction Contractor undertakes the works in compliance with the Project ESMP and this BMP. They will mainly focus on delivery of the ESMP during construction, i.e. monitoring the effectiveness of Construction Contractor implementation of the ESMP and this BMP.

The PIU Consultant will undertake regular inspections and audits of the Construction Contractor to ensure compliance with the Project mitigation measures, including this BMP.

### 9.4. Construction Contractor

The Construction Contractor will be selected and appointed for the Project. Each Construction Contractor will be responsible for complying with all relevant national and international legislation and adhere to all mitigation measures specified in this BMP. All sub-contractors must meet all requirements in relation to the Contractor's discharge of their responsibilities in terms of ongoing management of potential ecological impacts of all contract activities.

The Construction Contractor will be required to develop a detailed Construction ESMP which covers the full requirements of this BMP as they relate to the construction phase.

The Construction Contractor's organisation must have sufficient, adequate and competent resources available to fulfil the environmental and social requirements established in the Project ESMP and this BMP. The Construction Contractor will be responsible for setting up a suitably experienced and qualified individual or team to oversee implementation of the requirements of this BMP for the construction phase.

Minimum requirements for personnel include:

#### 9.4.1. Construction Contractor Project Manager

The Contractor Project Manager will:

- Have overall responsibility for the implementation of the Construction ESMP and this BMP relevant to the construction phase; and
- Appoint an Environmental and Social Manager to lead the implementation of the Construction ESMP and this BMP relevant to the construction phase; and an ECoW if applicable.

#### 9.4.2. Contractor HSE Manager

In addition to the overarching responsibilities identified in the ESMP, specific responsibilities of the Contractor

HSE Manager in relation to the BMP during construction include:

- Managing all on-site ecological and vegetation management activities in compliance with this BMP;
- Developing procedures to support this BMP;
- Working to minimise the ecological impact produced from construction activities;
- Working with the ECoW to carry out the ecological monitoring;
- Reporting on progress to the Construction Project Manager and PIU Consultant; and
- Monitoring any Sub-contractors to ensure the requirements and responsibilities set out in this BMP are met.

#### 9.4.3. Ecological Clerk of Works

Where necessary, an ECoW will be contracted by the Contractor during construction. The ECoW will be responsible for:

- Leading and implementing any surveys;
- Preparation of method statements;
- Watching briefs;
- Ecological monitoring programme; and
- Reporting progress and results to the Contractor Environment and Social Manager.

## 10. Audit, Review and Reporting

This Project BMP will be held by the MoT, as the Project owner. As identified earlier, the Construction Contractor will be expected to incorporate construction related requirements under their remit into their detailed construction ESMP.

At least three months prior to the operation phase, the O&M BMP shall be finalised by the MoT with support from the PIU Consultant. This will be implemented by the MoT and all O&M Contractors will be expected to follow the O&M BMP.

### 10.1. Audit and Review

The correct implementation of this BMP will be verified through internal inspections and audits to be carried out according to the requirements included in the Project ESMP.

During construction, site inspection/monitoring will be undertaken by the Construction Contractor to ensure that works are being undertaken in conformance with the requirements of their Construction ESMP (incorporating the requirements of this BMP). These inspections will be undertaken on a daily, weekly and monthly basis by the roles identified in the Construction ESMP, and will be recorded using Checklists, Forms and Registers. Any non-conformances will be recorded, and appropriate corrective measures undertaken by the Construction Contractor.

Internal audits will be conducted by the Construction Contractor Environment and Social Manager on the Construction ESMP to assess its effectiveness and relevance as follows:

- A full annual review:
- Following a reportable incident, or a significant non-compliance; and
- Following an addition, up-date or change order to the Construction ESMP.

During construction the Construction Contractor will report to the MoT / PIU Consultant. The PIU Consultant will undertake regular audits of Contractor performance.

Audits should cover the following in relation to the BMP:

- the correct implementation of the BMP;
- the correct development and implementation of Contractor's Construction ESMP;
- the correct and timely implementation of an auditing and review system by the Contractor; and
- The measures identified in Table 6-2,
- Table 6-3 and Table 6-4 of this BMP.

Change control will be managed in accordance with the requirements set out in the Project ESMP. During construction and operation, amendments may be required if any major changes occur to the Project design, performance, environmental and social conditions or resulting from incidents or accidents. This may include any unforeseen impacts on wildlife; or no longer requiring offsetting for quadrifolious tulip and *Astragalus projecturus* (i.e. compensation sites) following appropriately timed surveys, if undertaken.

### 10.2. Reporting

During construction, the format for reporting will be agreed between the MoT / PIU Consultant and Construction Contractor and will include reporting in relation to actions set out in this BMP. This may include:

- Monitoring data together with the results of the audit activities will be summarized in a Self-Monitoring Report to be provided by the Construction Contractor to the PIU Consultant. Performance report from the PIU Consultant to the EBRD.

During the design phase and operation phase, the format for reporting will be agreed between the MoT and the EBRD and will include reporting in relation to actions set out in this BMP. This may include:

- Update of this BMP and the measures proposed in relation to impacts identified related to the final detailed design.
- Reporting on the outcomes of transplanted endemic and KRDB plant species.
- Reporting on the monitoring of Vehicle / animal collisions and the use of underpasses and watercourse channel crossings.
- Reporting on the overall net gain provisions of the Project.



# Appendices



# Appendix A. Desk Study Information and Survey Results

## A.1. Protected and Designated Sites

**Table A-1 - Eastern Issyk Kul Lake IBA trigger species**

English Name	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Common goldeneye <i>Bucephala clangula</i>	winter	1976-1986	400-1,000 individuals	A4i
Ruddy shelduck <i>Tadorna ferruginea</i>	unknown	1976-1986	600-6,000 unknown	A4i
Red-crested pochard <i>Netta rufina</i>	winter	1976-1986	2,000-4,000 individuals	A4i
Northern pintail <i>Anas acuta</i>	passage	1976-1986	6,000-12,000 individuals	A4i
Black-necked grebe <i>Podiceps nigricollis</i>	winter	1976-1986	200-400 individuals	A4i
Demoiselle crane <i>Anthropoides virgo</i>	passage	1976-1986	2,000-6,000 individuals	A4i
A4iii Species group - waterbirds	passage	1976-1986	9,000-22,000 individuals	A4iii
A4iii Species group - waterbirds	winter	1976-1986	15,000-40,000 individuals	A4iii

**Table A-2 - Karkyra Valley IBA trigger species**

English Name	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Demoiselle Crane <i>Anthropoides virgo</i>	passage	1976-2005	1,000-9,000 individuals	A4i

**Table A-3 - Issyk Kul Lake Ramsar key species<sup>24</sup>**

English Name	Scientific Name
Criterion 2. This area supports the existence of vulnerable, rare and endangered species of birds	
White-headed duck	<i>Oxyura leucocephala</i>
Dalmatian pelican	<i>Pelecanus crispus</i>
Slender-billed curlew	<i>Numenius tenuirostris</i>
Criterion 4. Issyk-Kul Lake is an important wintering and stopover site for birds, and in a lesser degree for nesting waterfowl.	
The total number of birds in the winter are 35-70 thousand, including:	
Common coot	<i>Fulica atra</i>
Red-crested pochard	<i>Netta rufina</i>
Common pochard	<i>Aythya ferina</i>
Black-necked grebe	<i>Podiceps nigricollis</i>

<sup>24</sup> Kulagin, S. (2013) Information Sheet on Ramsar Wetlands: The Issyk-Kul State Nature Reserve with the Issyk-Kul Lake <https://rsis Ramsar.org/RISapp/files/RISrep/KG1231RIS.pdf> (accessed 20 October 2020)

English Name	Scientific Name
Whooper swan	<i>Cygnus cygnus</i>
Bewick's swan	<i>Cygnus bewickii</i>
White-headed duck	<i>Oxyura leucocephala</i>
Pygmy cormorant	<i>Phalacrocorax pygmeus</i>
Great Black-headed gull	<i>Larus ichthyaetus</i>
White-tailed sea eagle	<i>Haliaeetus albicilla</i>
About 50 species of waterfowl migrate through the Issyk-Kul Lake in the spring and fall. Including:	
Northern pintail	<i>Anas acuta</i>
Norther shoveler	<i>Anas clypeata</i>
Greylag goose	<i>Anser anser</i>
Demoiselle crane	<i>Anthropoides virgo</i>
Temminck's stint	<i>Calidris temminckii</i>
Dunlin	<i>Calidris alpina</i>
Ruff	<i>Philomachus pugnax</i>
Eurasian curlew	<i>Numenius arquata</i>
Whimbrel	<i>Numenius phaeopus</i>
Criterion 5. During wintering there are approximately 35 to 70 thousand waterfowl and shorebirds.	
Great crested grebe	<i>Podiceps cristatus</i>
Black-necked grebe	<i>Podiceps nigricollis</i>
Great egret	<i>Egretta alba</i>
Grey heron	<i>Ardea cinerea</i>
Bean goose	<i>Anser fabalis</i>
Mute swan	<i>Cygnus olor</i>
Whooper swan	<i>Cygnus cygnus</i>
Ruddy shelduck	<i>Tadorna ferrugenia</i>
Eurasian wigeon	<i>Anas penelope</i>
Northern pintail	<i>Anas acuta</i>
Red-crested pochard	<i>Netta rufina</i>
Common pochard	<i>Aythya ferina</i>
Tufted duck	<i>Aythya fuligula</i>
Common goldeneye	<i>Bucephala clangula</i>
Demoselle crane	<i>Anthropoides virgo</i>
Common coot	<i>Fulica atra</i>
Criterion 6. The wetland regularly supports 1% the following waterfowls and shorebirds	
Black-necked Grebe	<i>Podiceps nigricollis</i>
Whooper swan	<i>Cygnus cygnus</i>
Ruddy shelduck	<i>Tadorna ferruginea</i>

English Name	Scientific Name
Red-crested pochard	<i>Netta rufina</i>
Mute swan	<i>Cygnus olor</i>
Eurasian coot	<i>Fulica atra</i>
Black-necked grebe	<i>Podiceps nigricollis</i>

## A.2. Vegetation

**Table A-4 – Plant species listed as IUCN critically endangered, endangered, vulnerable and near threatened present in the Kyrgyz Republic.**

Species recorded or considered to potentially be present within the Aol of the Project are shown in bold

English Name	Scientific Name	English Name	Scientific Name
<b>Critically endangered</b>			
Bukharan pear	<i>Pyrus korshinskyi</i>	n/a	<i>Sibiraea tianschanica</i>
n/a	<i>Calligonum calcareum</i>	n/a	<i>Ammopiptanthus nanus</i>
n/a	<i>Polygonum toktogulicum</i>	n/a	<i>Crataegus knorringiana</i>
<b>Endangered</b>			
n/a	<i>Armeniaca vulgaris</i>	Shrubby buckwheat	<i>Atraphaxis muschketowi</i>
n/a	<i>Lonicera paradoxa</i>	Niedzwetzky's apple	<i>Malus niedzwetzkyana</i>
n/a	<i>Spiraeanthus schrenkianus</i>		
<b>Vulnerable</b>			
n/a	<i>Malus sieversii</i>	n/a	<i>Amygdalus bucharica</i>

**Table A-5 – Plant species recorded within the Project Aol during the October 2020 and April 2021 site visit.**

Scientific Name	Lifeform	Habitat	KRDB Status	Endemic
<i>Acer negundo</i>	tree	edifiers/subedifiers, forest parks, settlements/agricultural fields	n/a	n/a
<i>Achillea millefolium</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Achnatherum splendens</i>	herb	edifiers/subedifiers, steppe	n/a	n/a
<i>Acroptilon repens</i>	herb	steppe	n/a	n/a
<i>Agropyron pectinatum</i>	herb	edifiers/subedifiers, forest parks, settlements/agricultural fields	n/a	n/a
<i>Agrostis gigantea</i>	herb	edifiers/subedifiers, swamps, floodplains	n/a	n/a
<i>Ajania fastigiata</i>	herb	steppe	n/a	n/a
<i>Androsace maxima</i>	herb	steppe	n/a	n/a
<i>Anisantha tectorum</i>	herb	steppe	n/a	n/a
<i>Arctium tomentosum</i>	herb	floodplains	n/a	n/a
<i>Armeniaca vulgaris</i>	tree	edifiers/subedifiers, forest parks,	n/a	n/a

Scientific Name	Lifeform	Habitat	KRDB Status	Endemic
<i>Artemisia absinthium</i>	herb	steppe	n/a	n/a
<i>Artemisia dracunculus</i>	herb	steppe	n/a	n/a
<i>Artemisia tianschanica</i>	herb	edifiers/subedifiers, steppe	n/a	n/a
<i>Asparagus neglectus</i>	herb	swamps, floodplains	n/a	n/a
<i>Aster canescens</i>	herb	steppe	n/a	n/a
<i>Astragalus projecturus</i>	herb	steppe	n/a	yes
<i>Avena trichophylla</i>	herb	settlements/agricultural fields	n/a	n/a
<i>Berberis sphaerocarpa</i>	shrub/vine	edifiers/subedifiers, floodplains	n/a	n/a
<i>Berteroia incana</i>	herb	floodplains	n/a	n/a
<i>Betula pendula</i>	tree	forest parks	n/a	n/a
<i>Bolboschoenus maritimus</i>	herb	edifiers/subedifiers, swamps, floodplains	n/a	n/a
<i>Bothriochloa ischaemum</i>	herb	edifiers/subedifiers, steppe	n/a	n/a
<i>Brassica elongata</i>	herb	floodplains	n/a	n/a
<i>Bromus japonicus</i>	herb	steppe	n/a	n/a
<i>Caragana pleiophylla</i>	shrub/vine	edifiers/subedifiers, steppe	n/a	n/a
<i>Carex pseudocyperus</i>	herb	swamps, floodplains	n/a	n/a
<i>Carex turkestanica</i>	herb	edifiers/subedifiers, floodplains	n/a	n/a
<i>Cerasus tianschanica</i>	shrub/vine	steppe	n/a	n/a
<i>Ceratocarpus utriculosus</i>	herb	steppe	n/a	n/a
<i>Chorispora sibirica</i>	herb	floodplains, settlements/agricultural fields	n/a	n/a
<i>Cichorium intybus</i>	herb	steppe	n/a	n/a
<i>Cirsium esculentum</i>	herb	floodplains	n/a	n/a
<i>Cirsium vulgare</i>	herb	settlements/agricultural fields	n/a	n/a
<i>Clematis orientalis</i>	shrub/vine	edifiers/subedifiers, swamps	n/a	n/a
<i>Dactylis glomerata</i>	herb	edifiers/subedifiers, swamps	n/a	n/a
<i>Echium vulgare</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Elaeagnus angustifolia</i>	herb	edifiers/subedifiers, floodplains, forest parks	n/a	n/a
<i>Elytrigia repens</i>	herb	edifiers/subedifiers, steppe	n/a	n/a
<i>Epilobium sp.</i>	herb	floodplains	n/a	n/a
<i>Equisetum ramosissimum</i>	herb	swamps, floodplains	n/a	n/a
<i>Festuca valesiaca</i>	herb	edifiers/subedifiers, steppe	n/a	n/a
<i>Gagea emarginata</i>	herb	floodplains, forest parks	n/a	n/a
<i>Glaucium fimbriigerum</i>	herb	steppe, floodplains	n/a	n/a
<i>Hedysarum songoricum</i>	herb	steppe	n/a	n/a
<i>Hippophae turkestanica</i>	shrub/vine	edifiers/subedifiers, floodplains	n/a	n/a
<i>Inula britannica</i>	herb	swamps, floodplains	n/a	n/a



Scientific Name	Lifeform	Habitat	KRDB Status	Endemic
<i>Iris halophila</i>	herb	floodplains	n/a	n/a
<i>Kochia prostrata</i>	herb	steppe	n/a	n/a
<i>Krascheninnikovia ceratoides</i>	shrub/vine	edifiers/subedifiers, steppe	n/a	n/a
<i>Lactuca serriola</i>	herb	floodplains, settlements/agricultural fields	n/a	n/a
<i>Leonurus turkestanicus</i>	herb	floodplains	n/a	n/a
<i>Lunaria sp.</i>	herb	floodplains	n/a	n/a
<i>Malva neglecta</i>	herb	floodplains, settlements/agricultural fields	n/a	n/a
<i>Marrubium anisodon</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Matricaria recutita</i>	herb	floodplains, settlements/agricultural fields	n/a	n/a
<i>Melandrium album</i>	herb	floodplains	n/a	n/a
<i>Mentha arvensis</i>	herb	swamps, floodplains	n/a	n/a
<i>Nonea caspica</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Onopordum acanthium</i>	herb	settlements/agricultural fields	n/a	n/a
<i>Peganum harmala</i>	herb	edifiers/subedifiers, settlements/agricultural fields	n/a	n/a
<i>Phleum paniculatum</i>	herb	floodplains	n/a	n/a
<i>Phragmites australis</i>	herb	edifiers/subedifiers, floodplains, swamp	n/a	n/a
<i>Picea schrenkiana</i>	tree	forest parks	n/a	n/a
<i>Pinus pallasiana</i>	tree	forest parks	n/a	n/a
<i>Plantago major</i>	herb	swamps, floodplains	n/a	n/a
<i>Poa angustifolia</i>	herb	edifiers/subedifiers, floodplains	n/a	n/a
<i>Polygonum aviculare</i>	herb	settlements/agricultural fields	n/a	n/a
<i>Populus afghanica</i>	tree	edifiers/subedifiers, forest parks	n/a	n/a
<i>Populus nigra</i>	tree	edifiers/subedifiers, forest parks	n/a	n/a
<i>Potentilla anserina</i>	herb	floodplains	n/a	n/a
<i>Potentilla moorcroftii</i>	herb	steppe	n/a	n/a
<i>Psathyrostachys juncea</i>	herb	swamps, floodplains	n/a	n/a
<i>Ranunculus polyrhizos</i>	herb	floodplains	n/a	n/a
<i>Salix babylonica</i>	tree	edifiers/subedifiers, forest parks	n/a	n/a
<i>Salix sp.</i>	tree	forest parks	n/a	n/a
<i>Salvia deserta</i>	herb	steppe	n/a	n/a
<i>Scabiosa ochroleuca</i>	herb	floodplains	n/a	n/a
<i>Sinapis arvensis</i>	herb	settlements/agricultural fields	n/a	n/a
<i>Stipa capillata</i>	herb	steppe	n/a	n/a
<i>Taraxacum officinale</i>	herb	floodplains	n/a	n/a
<i>Thermopsis turkestanica</i>	herb	floodplains	n/a	n/a
<i>Torularia korolkowii</i>	herb	swamps, floodplains	n/a	n/a

Scientific Name	Lifeform	Habitat	KRDB Status	Endemic
<i>Trifolium fragiferum</i>	herb	floodplains	n/a	n/a
<i>Trifolium pratense</i>	herb	floodplains	n/a	n/a
<i>Trifolium repens</i>	herb	floodplains	n/a	n/a
<i>Typha angustifolia</i>	herb	edifiers/subedifiers, swamp	n/a	n/a
<i>Typha laxmannii</i>	herb	edifiers/subedifiers, swamp	n/a	n/a
<i>Tulipa tetraphylla</i>	herb	steppe	VU*	n/a
<i>Ulmus pumila</i>	tree	edifiers/subedifiers, forest parks, settlements/agricultural fields	n/a	n/a
<i>Urtica cannabina</i>	herb	floodplains	n/a	n/a
<i>Urtica dioica</i>	herb	floodplains	n/a	n/a
<i>Verbascum songaricum</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Xanthium strumarium</i>	herb	steppe, settlements/agricultural fields	n/a	n/a
<i>Viola tianschanica</i>	herb	forest parks	n/a	n/a

\*KRBD vulnerable

### A.3. Mammals

**Table A-6 – Mammal species listed as IUCN critically endangered, endangered, vulnerable and near threatened present in the Kyrgyz Republic.**

Species recorded or considered to potentially be present within the Aol of Project are shown in bold

English Name	Scientific Name	English Name	Scientific Name
<b>Endangered</b>			
Dhole*	<i>Cuon alpinus</i>	Tiger*	<i>Panthera tigris</i>
<b>Vulnerable</b>			
<b>Snow leopard</b>	<b><i>Panthera uncia</i></b>	European bison**	<i>Bison bonasus</i>
Goitered gazelle	<i>Gazella subgutturosa</i>	Menzbier's marmot	<i>Marmota menzbieri</i>

\*The IUCN lists dhole and tiger as being extinct in Kyrgyzstan.

\*\*The IUCN lists European bison as being Extant & Introduced in Kyrgyzstan.

### A.4. Birds

**Table A-7 – Bird species listed as IUCN critically endangered, endangered, vulnerable and near threatened present in the Kyrgyz Republic.**

Species recorded or considered to potentially be present within the Aol of the Project are shown in bold

English Name	Scientific Name	English Name	Scientific Name
<b>Critically endangered</b>			
Sociable lapwing	<i>Vanellus gregarius</i>		
<b>Endangered</b>			

English Name	Scientific Name	English Name	Scientific Name
<b>Egyptian vulture</b>	<b><i>Neophron percnopterus</i></b>	<b>Steppe eagle</b>	<b><i>Aquila nipalensis</i></b>
<b>Pallas's fish-eagle</b>	<b><i>Haliaeetus leucoryphus</i></b>	<b>White-headed duck</b>	<b><i>Oxyura leucocephala</i></b>
<b>Saker falcon</b>	<b><i>Falco cherrug</i></b>		
<b>Vulnerable</b>			
<b>Asian houbara</b>	<b><i>Chlamydotis macqueenii</i></b>	Long-tailed duck	<i>Clangula hyemalis</i>
Black-legged kittiwake	<i>Rissa tridactyla</i>	Marbled teal	<i>Marmaronetta angustirostris</i>
<b>Common pochard</b>	<b><i>Aythya ferina</i></b>	Red-breasted goose	<i>Branta ruficollis</i>
<b>Eastern imperial eagle</b>	<b><i>Aquila heliaca</i></b>	Relict gull	<i>Larus relictus</i>
<b>European turtle-dove</b>	<b><i>Streptopelia turtur</i></b>	Snowy owl	<i>Bubo scandiacus</i>
Great bustard	<i>Otis tarda</i>	Velvet scoter	<i>Melanitta fusca</i>
<b>Greater spotted eagle</b>	<b><i>Clanga clanga</i></b>	<b>Yellow-eyed pigeon</b>	<b><i>Columba eversmanni</i></b>
<b>Horned grebe</b>	<b><i>Podiceps auritus</i></b>		

**Table A-8 – Species recorded within the Project Aol during the October and December 2020 and April 2021 site visit.**

English Name	Scientific Name	Months recorded	Peak Count	Seasons	IBA/ Ramsar/ IUCN/ KRDB Status
Azure Tit	<i>Parus cyanus</i>	A	16	R	n/a
Barn Swallow	<i>Hirundo rustica</i>	A	12	B	n/a
Black Kite	<i>Milvus migrans</i>	A	14	B	Annex 1
Black-billed Magpie	<i>Pica pica</i>	O, D, A	68	R	n/a
Black-headed Wagtail	<i>Motacilla feldegg</i>	A	2	B	n/a
Black-necked Grebe	<i>Podiceps nigricollis</i>	O, D	250	R	IBA, Ram
Black-throated Thrush	<i>Turdus atrogularis</i>	O, A	51	W, M	n/a
Bluethroat	<i>Luscinia svecica</i>	O, A	1	B	Annex 1
Carrion Crow	<i>Corvus corone</i>	O, D, A	17	R	n/a
Caspian Gull	<i>Larus cachinnans</i>	D	60	R	n/a
Cetti's Warbler	<i>Cettia cetti</i>	A	3	B	n/a
Chaffinch	<i>Fringilla coelebs</i>	O, D	89	W	n/a
Chiffchaff	<i>Phylloscopus collybita</i>	A	22	M	n/a
Citrine Wagtail	<i>Motacilla citreola</i>	A	34	B	n/a
Common Black-headed Gull	<i>Larus ridibundus</i>	O, A	22	R	n/a
Common Buzzard	<i>Buteo buteo</i>	D	2	R	n/a
Common Coot	<i>Fulica atra</i>	O, D, A	750	R	Ram
Common Crane	<i>Grus grus</i>	O	5	M	Annex 1

English Name	Scientific Name	Months recorded	Peak Count	Seasons	IBA/ Ramsar/ IUCN/ KRDB Status
Common Greenshank	<i>Tringa nebularia</i>	D	2	B	n/a
Common Kingfisher	<i>Alcedo atthis</i>	O	1	B	Annex 1
Common Merganser	<i>Mergus merganser</i>	O	1	R	n/a
Common Pheasant	<i>Phasianus colchicus</i>	O, D, A	13	R	n/a
Common Pochard	<i>Aythya ferina</i>	O, D	208	R	IBA, Ram, IUCN VU
Common Redshank	<i>Tringa totanus</i>	D, A	14	B	n/a
Common Sandpiper	<i>Actitis hypoleucos</i>	O, D, A	1	B	n/a
Common Shelduck	<i>Tadorna tadorna</i>	D	1	R	n/a
Common Snipe	<i>Gallinago gallinago</i>	A	7	B	n/a
Common Teal	<i>Anas crecca</i>	D	23	R	n/a
Common Tern	<i>Sterna hirundo</i>	A	10	B	Annex 1
Corn Bunting	<i>Emberiza calandra</i>	O, D, A	49	R	n/a
Crested Lark	<i>Galerida cristata</i>	O, D	10	R	n/a
Cuckoo	<i>Cuculus canorus</i>	A	1	B	n/a
Eurasian Blackbird	<i>Turdus merula</i>	O, D, A	8	R	n/a
Eurasian Eagle-Owl	<i>Bubo bubo</i>	D	1	R	Annex 1, KRDB LC
Eurasian Kestrel	<i>Falco tinnunculus</i>	O, D, A	4	R	n/a
Eurasian Tree Sparrow	<i>Passer montanus</i>	O, D, A	161	R	n/a
Eurasian Wigeon	<i>Anas penelope</i>	A	3	M	IBA
European Greenfinch	<i>Carduelis chloris</i>	D	1	R	n/a
Eversmann's Redstart	<i>Phoenicurus erytronotus</i>	D, A	6	W	n/a
Feral Pigeon	<i>Columba livia</i>	O, D	557	R	n/a
Gadwall	<i>Anas strepera</i>	O, A	30	R	Ram
Garganey	<i>Anas querquedula</i>	A	95	B	n/a
Goldeneye	<i>Bucephala clangula</i>	D	68	W	IBA, Ram
Great Cormorant	<i>Phalacrocorax carbo</i>	O, A	6	R	n/a
Great Crested Grebe	<i>Podiceps cristatus</i>	O, D, A	7	R	Ram
Great Egret	<i>Egretta alba</i>	O, D	8	W	Ram
Great Grey Shrike	<i>Lanius excubitor</i>	D	2	R	n/a
Great Tit	<i>Parus major</i>	O, D, A	13	R	n/a
Green Sandpiper	<i>Tringa ochropus</i>	D, A	11	B	n/a
Greenfinch	<i>Carduelis chloris</i>	A	8	B	n/a
Grey Heron	<i>Ardea cinerea</i>	O, D, A	4	R	Ram
Grey Wagtail	<i>Motacilla cinerea</i>	A	3	B	n/a

English Name	Scientific Name	Months recorded	Peak Count	Seasons	IBA/ Ramsar/ IUCN/ KRDB Status
Grey-headed Goldfinch	<i>Carduelis caniceps</i>	O, D, A	97	R	n/a
Hooded Crow	<i>Corvus cornix</i>	O, D	27	R	n/a
Hoopoe	<i>Upupa epops</i>	A	8	B	n/a
Horned Lark	<i>Eremophila alpestris</i>	D	42	W	n/a
House Sparrow	<i>Passer domesticus</i>	O	20	R	n/a
Indian Myna	<i>Acridotheres tristis</i>	O, D, A	23	R	n/a
Isabelline Wheatear	<i>Oenanthe isabellina</i>	A	32	B	n/a
Jackdaw	<i>Corvus monedula</i>	O, D, A	102	R	n/a
Lesser Whitethroat	<i>Sylvia curruca</i>	A	22	B	n/a
Linnet	<i>Carduelis cannabina</i>	O, D, A	1	R	n/a
Little Grebe	<i>Tachybaptus ruficollis</i>	D	18	R	n/a
Long-eared Owl	<i>Asio otus</i>	O, D, A	4	R	n/a
Long-legged Buzzard	<i>Buteo rufinus</i>	O, D, A	3 (2 nests)	R	Annex 1
Mallard	<i>Anas platyrhynchos</i>	O, D, A	531	R	n/a
Masked Wagtail	<i>Motacilla personata</i>	A	7	B	n/a
Merlin	<i>Falco columbarius</i>	D	1	W	n/a
Mistle Thrush	<i>Turdus viscivorus</i>	O, D, A	5	R	n/a
Montagu's Harrier	<i>Circus pygargus</i>	A	1	M	Annex 1
Moorhen	<i>Gallinula chloropus</i>	A	4	B	n/a
Mute Swan	<i>Cygnus olor</i>	O, D	66	W	Ram
Night Heron	<i>Nycticorax nycticorax</i>	A	1	B	Annex 1
Northern Goshawk	<i>Accipiter gentilis</i>	O, D	1	W	n/a
Northern Harrier	<i>Circus cyaneus</i>	O, D	2	W	n/a
Northern Lapwing	<i>Vanellus vanellus</i>	A, D	22	R	IUCN NT
Northern Wheatear	<i>Oenanthe oenanthe</i>	A	9	B	n/a
Oriental Turtle Dove	<i>Streptopelia orientalis</i>	A	4	B	n/a
Osprey	<i>Pandion haliaetus</i>	A	1	M	Annex 1, KRDB LC
Raven	<i>Corvus corax</i>	D, A	2	R	n/a
Red-crested Pochard	<i>Netta rufina</i>	A	2	R	IBA
Reed Bunting	<i>Emberiza schoeniclus</i>	O	6	R	n/a
Rock Sparrow	<i>Passer petronia</i>	O, D	4	R	n/a
Rook	<i>Corvus frugilegus</i>	O, D, A	2265 nests	R	n/a
Ruddy Shelduck	<i>Tadorna ferruginea</i>	O, D, A	176	R	IBA, Ram, Annex 1
Rough-legged Buzzard	<i>Buteo lagopus</i>	D	1	W	n/a



English Name	Scientific Name	Months recorded	Peak Count	Seasons	IBA/ Ramsar/ IUCN/ KRDB Status
Sand martin	<i>Riparia diluta</i>	A	27	B	n/a
Shoveler	<i>Anas clypeata</i>	A	2	B	n/a
Siberian Stonechat	<i>Saxicola maurus</i>	A	119	B	n/a
Skylark	<i>Alauda arvensis</i>	A	10	B	n/a
Smew	<i>Mergus albellus</i>	D	15	W	Annex 1
Sparrowhawk	<i>Accipiter nisus</i>	D	1	R	n/a
Starling	<i>Sturnus vulgaris</i>	A	113	B	n/a
Tufted Duck	<i>Aythya fuligula</i>	O, D	25	W	Ram
Turkestan Shrike	<i>Lanius phoeniceus</i>	A	1	B	n/a
Warbler sp.	<i>Phylloscopus sp.</i>	O	6	n/a	n/a
Water Rail	<i>Rallus aquaticus</i>	O, A	3	B	n/a
Western Marsh Harrier	<i>Circus aeruginosus</i>	D	1	R	Annex 1
White-tailed Eagle	<i>Haliaeetus albicilla</i>	D	1	W	Ram, Annex 1, KRDB NT
White-throated Dipper	<i>Cinclus cinclus</i>	D, A	2	R	n/a
Whooper Swan	<i>Cygnus cygnus</i>	O, D	25	W	Ram, Annex 1, KRDB LC
Wood Pigeon	<i>Columba palumbus</i>	A	14	B	n/a
Yellow Hammer	<i>Emberiza citrinella</i>	O, D	14	W	n/a
Yellow-legged Gull	<i>Larus cachinnans</i>	A	1	R	n/a

Key:

IBA – East Issyk Kul Lake IBA trigger species  
 Ram – listed on Issyk-Kul Lake Ramsar Information Sheet  
 Annex 1 – listed on the EU Birds Directive Annex 1  
 IUCN VU - IUCN species listed as vulnerable  
 IUCN NT - IUCN species listed as near threatened  
 KRDB LC – listed in the Red Data Book of Kyrgyzstan as least concern  
 KRDB NT – listed in the Red Data Book of Kyrgyzstan as near threatened  
 R – resident in region  
 B – summer breeder in region  
 W – wintering visitor in region  
 M – migrant/passage visitor in region

## A.5. Reptiles and Amphibians

**Table A-9 – Reptile and amphibian species listed as IUCN critically endangered, endangered, vulnerable and near threatened present in the Kyrgyz Republic.**

Species recorded or considered to potentially be present within the Aol of the Project are shown in bold

English Name	Scientific Name	English Name	Scientific Name
<b>Vulnerable</b>			
Strauch's Even-fingered Gecko	<i>Alsophylax loricatus</i>	Persian toad-headed agama	<i>Phrynocephalus saidalievi</i>
Central Asian Tortoise	<i>Testudo horsfieldii</i>	Strauch's Toad Agama	<i>Phrynocephalus strauchi</i>

## A.6. Invertebrates

**Table A-10 – Invertebrate species listed as IUCN critically endangered, endangered, vulnerable and near threatened present in the Kyrgyz Republic.**

Species recorded or considered to potentially be present within the Aol of the Project are shown in bold

English Name	Scientific Name	English Name	Scientific Name
<b>Vulnerable</b>			
Common Predatory Bush-cricket	<i>Saga pedo</i>	Waved Pincertail	<i>Onychogomphus flexuosus</i>
<b>Apollo</b>	<b><i>Parnassius apollo</i></b>	n/a	<i>Chalepoxenus tarbinskii</i>

**Table A-11 – Terrestrial invertebrate species recorded within the Project Aol during the April 2021 site visit.**

Scientific Name	Type	Survey site					
		1	2	3	4	5	6
<i>Blaps halaphila</i>	darkling beetle			+			
<i>Dyrrhocoris apterus</i>	firebug				+		
<i>Lethyus apterus</i>	dung beetle						+
<i>Meloidus violaceus</i>	blister beetle			+			
<i>Mylabris schrenki</i>	blister beetle		+			+	
<i>Opatrum sabilosum</i>	darkling beetle			+			
<i>Polidonia calbum</i>	butterfly				+		
<i>Vanessa urticae</i>	butterfly				+		
	total	0	1	3	3	1	1

Survey sites:

Site 1 – Shaty river

Site 2 – Tyup river (near the village of Tyup, in the lower reaches)

Site 3 – Tyup river (upstream of the village)

Site 4 – Jergalan river (near the bridge)

Site 5 – Jergalan river (near the resort)

Site 6 – Tegizchil river

**Table A-12 – Aquatic invertebrate species recorded within the Project Aol during the October 2020 and April 2021 site visit.**

Watercourse		Shaty River		Tyup River				Jergalan River			Tegizchil River		Zhany Aryk River
Site reference		SRInv01		TRInv01		TRInv02		JRInv01		JR1nv02	TRInv01		ZRInv01
Grid reference		78°19'50.6"E, 42°45'19.6"N		78°20'49.3"E, 42°44'09.4"N		78°21'11.5"E, 42°44'30.7"N		78°23'09.3"E, 42°35'34.0"N		78°23'39.3"E, 42°35'41.2"N	78°23'18.1"E, 42°33'45.4"N		78°22'56.3"E, 42°3'2'00.9"N
Survey date		Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Apr-21	Oct-20	Apr-21	Oct-20
Groups	Taxa												
Springtails (semi-aquatic)	Collembola	+			+			+	+				
Freshwater shrimp	<i>Gammarus sp.</i>	+	+		+			+	+		+	+	
Non-biting midge	<i>Diamesa sp.</i>	+	+	+	+	+	+				+	+	
	<i>Syndiamesa sp.</i>					+	+						
	<i>Syndiamesa orientalis</i>										+	+	
	<i>Eukiefferiella sp.</i>					+	+				+	+	
	<i>Orthocladius sp.</i>			+	+	+	+						
	<i>Orthocladius thienemanni</i>							+	+				
	<i>Tanytarsus sp.</i>										+	+	
	<i>Tanytarsus longipes</i>									+			+
Water-snipefly	<i>Atherix ibis</i>	+	+					+	+	+	+	+	+
Blackfly	<i>Simulium sp.</i>	+	+							+	+	+	+

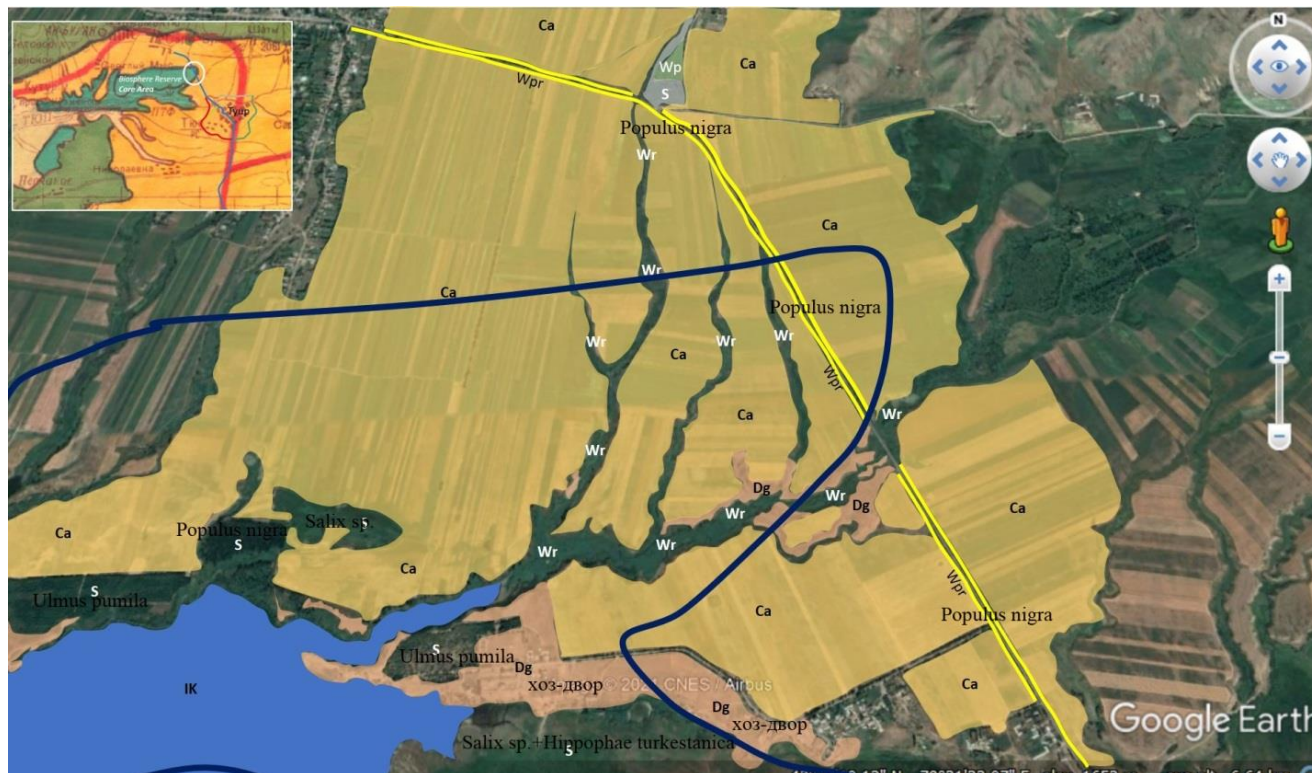
Watercourse		Shaty River		Tyup River				Jergalan River			Tegizchil River		Zhany Aryk River
Site reference		SRInv01		TRInv01		TRInv02		JRInv01		JR1nv02	TRInv01		ZRInv01
Grid reference		78°19'50.6"E, 42°45'19.6"N		78°20'49.3"E, 42°44'09.4"N		78°21'11.5"E, 42°44'30.7"N		78°23'09.3"E, 42°35'34.0"N		78°23'39.3"E, 42°35'41.2"N	78°23'18.1"E, 42°33'45.4"N		78°22'56.3"E, 42°3'2'00.9"N
Survey date		Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Apr-21	Oct-20	Apr-21	Oct-20
Groups	Taxa												
	<i>Prosimulium sp.</i>										+	+	
	<i>Prosimulium macropyga</i>						+						
Cranefly	<i>Tipula sp.</i>			+	+						+	+	
	<i>Hexatoma sp.</i>	+	+										
Mayfly	<i>Rhithrogena sp.</i>							+	+				
	<i>Ecdyonurus sp.</i>										+	+	
	<i>Baetis sp.</i>	+	+	+	+	+	+	+	+	+	+	+	+
Dragonfly	<i>Lindenia tetraphylla</i>			+	+				+				
	<i>Cordullina sp.</i>				+				+			+	
Stonefly	<i>Amphinemura sp.</i>										+	+	
	<i>A. mirabilis</i>							+	+				
	<i>Mesonemoura thianshanica</i>	+	+										
Backswimmer	<i>Notonecta sp.</i>			+	+								
Caseless caddisfly	<i>Hydropsyche sp.</i>									+	+	+	+

Watercourse		Shaty River		Tyup River				Jergalan River			Tegizchil River		Zhany Aryk River
Site reference		SRInv01		TRInv01		TRInv02		JRInv01		JR1nv02	TRInv01		ZRInv01
Grid reference		78°19'50.6"E, 42°45'19.6"N		78°20'49.3"E, 42°44'09.4"N		78°21'11.5"E, 42°44'30.7"N		78°23'09.3"E, 42°35'34.0"N		78°23'39.3"E, 42°35'41.2"N	78°23'18.1"E, 42°33'45.4"N		78°22'56.3"E, 42°3'2'00.9"N
Survey date		Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Oct-20	Apr-21	Apr-21	Oct-20	Apr-21	Oct-20
Groups	Taxa												
Cased caddisfly	<i>Brachycentrus subnubilus</i>										+	+	
Riffle beetle	<i>Elmis sp.</i>	+	+	+	+	+	+				+	+	
Crawling water beetle	<i>Halipus sp.</i>								+				
Leech	<i>Haemopsis sanquisuga</i>									+			
Aquatic snail	<i>Lemnaea ovate</i>									+			
	<i>Lemnaea obliquata</i>									+			
	<i>Lemnaea stagnalis</i>											+	
	<i>Lemnaea fontinalis</i>									+			
Number groups represented		9	9	6	8	3	4	7	9	7	10	12	5
Total number taxa*		9	8	7	10	6	7	7	10	9	15	17	5
		9		10		7		10		9	17		5

## Appendix B. Habitats and vegetation types along the Tyup-Karakol road

Several habitat maps were developed based on delineating distinct habitat types evident on Google Earth. The accuracy of these were then check by CAIC with ground surveys to provide more information on vegetation types, species and condition.

North West of Tyup

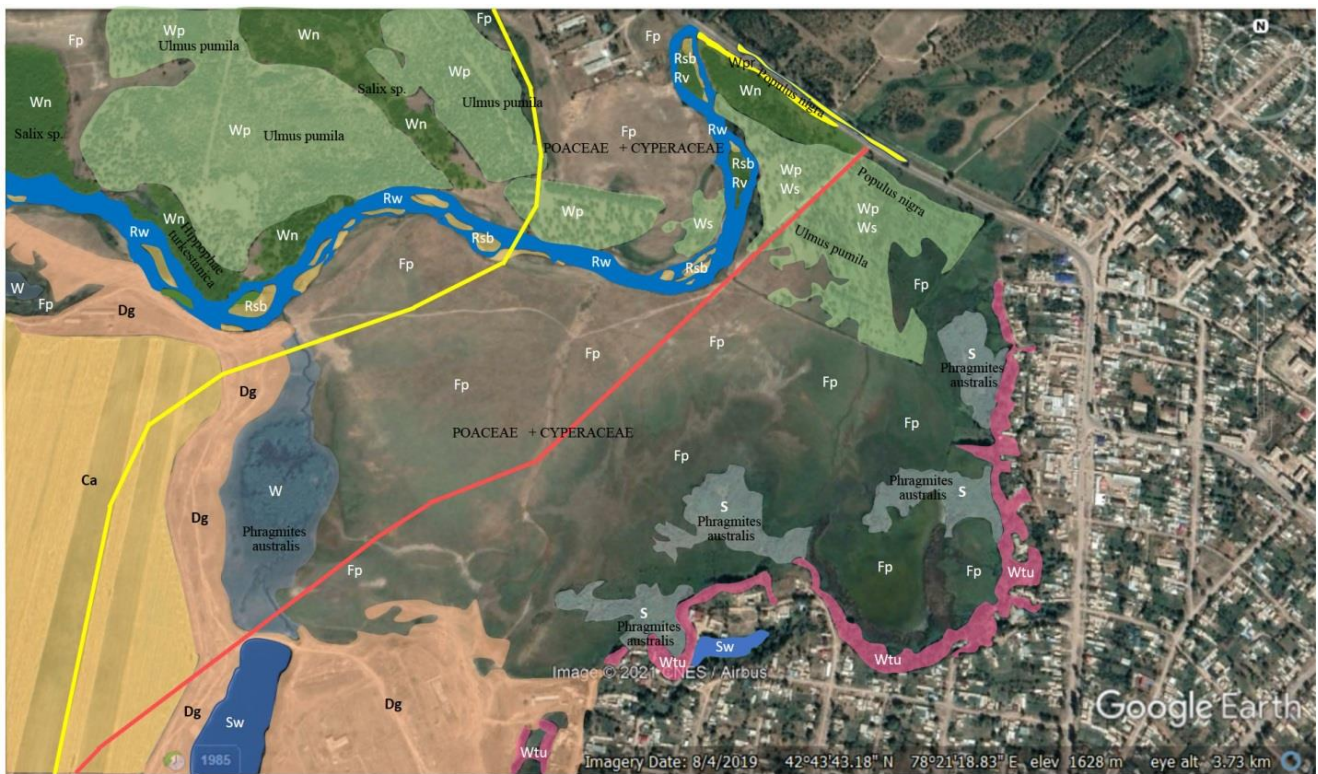


Flood plain area north of Tyup, immediately south of map above

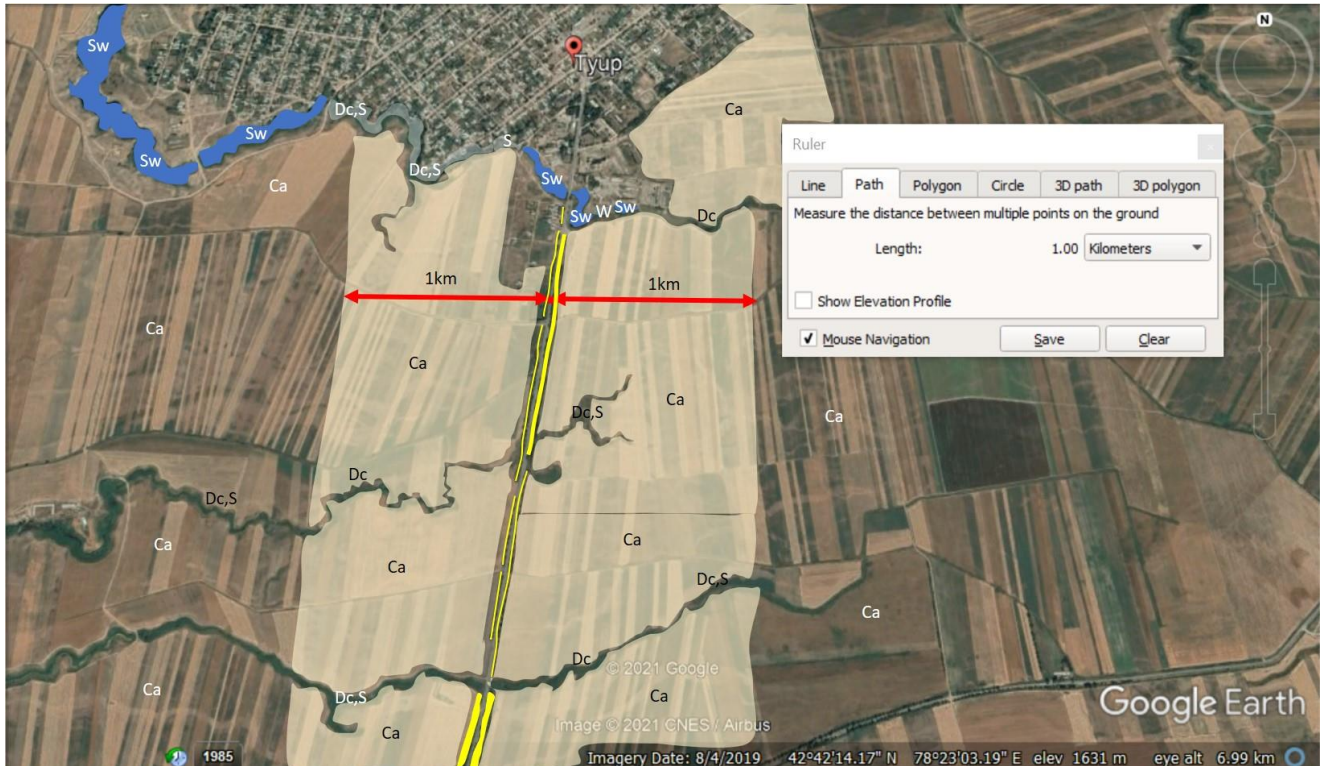




Floodplain area west of Tyup showing the western bypass options



Main road immediately south of Tyup





# Floodplain of the Jergalan River and adjacent habitats north east of Boz Bulun



## Habitat maps key - classification and coding

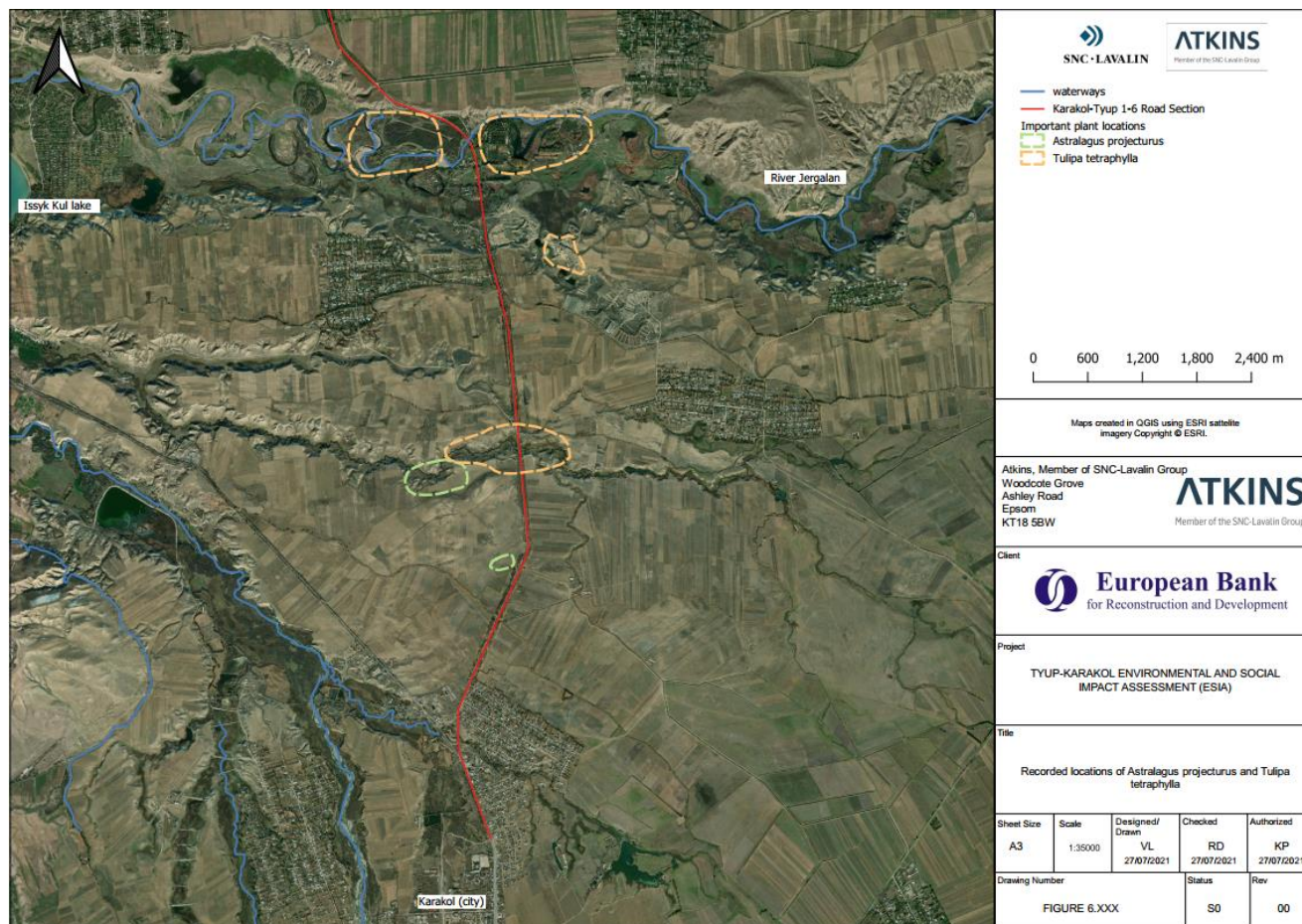
Code	Habitat type	Sub-type	Notes
<b>Wn</b>	Woodland (trees > 5m when mature)	Natural	
<b>Wp</b>		Plantation	
<b>Wpr</b>		Planted roadside	
<b>Ws</b>		Scattered trees	
<b>Wtu</b>		Trees urban fringe	
<b>Fp (colour = Google Earth)</b>	Flood plain	Meadows/ grassland with drainage channels	West of Tyup is a mix of higher/ drier areas and lower/ wetter areas which are almost wetlands
<b>W</b>	Wetland	Wetland	
<b>Wr (colour = Google Earth)</b>		Reeds	
<b>Dc</b>	Drainage channel		Can be an irrigation channel
<b>S</b>	Scrub (seral or climax vegetation dominated by locally native shrubs, < 5 m tall, occasional scattered trees)	Native shrubs	
<b>Rv</b>	Riverine	Vegetated	
<b>Rsb</b>		Sand bar	
<b>Rw</b>	Running water	River	
<b>Sw</b>	Standing water		
<b>IK</b>	Issyk-Kul Lake		
<b>Ca</b>	Cultivated ground	Arable	
<b>Co</b>		Orchard –for “horti-agricultural” trees	can only be confirmed in field
<b>Dg</b>	Disturbed ground		
<b>Bup (colour = Google Earth)</b>	Built-up areas		

Code	Habitat type	Sub-type	Notes
<b>St</b>	Steppe		
<b>M</b>	Mosaic habitat		areas that can't be identified as one type of habitat, e.g. where natural and plantation woodland are present (or can't be accurately distinguished), or wetland areas dominated by scrub
<b>Q</b>	Quarry		
<b>Gy</b>	Graveyard		

**Notes:**

- Habitat changes may have occurred as the habitat mapping is based on the Google Earth image date 8<sup>th</sup> April 2019.
- Only captures broad habitat types. Smaller habitats not captured.
- Mapped habitats are not of equal conservation value. All sites of any particular habitat type also not of equal value.
- Additional maps for the Tyup-Karakol road are under preparation.

# Appendix C. Recorded locations of Endemic and KRDB plant species





## Appendix D. Location of Underpasses / Signage for Ecology

