

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

Critical Habitats and Priority Biodiversity Features  
Assessment

April 2022



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# Acronyms and abbreviations

Acronym / Abbreviation	Description
AoI	Area of Influence
BMP	Biodiversity Management Plan
CAIC	Central Asia International Consulting
CH	Critical Habitat
CHA	Critical Habitat Assessment
CR	Critically Endangered
EBRD	European Bank for Reconstruction and Development
EN	Endangered
ESIA	Environmental and Social Impact Assessment
ESP	Environmental and Social Policy
GN	Guidance Note
IBA	Important Bird Area (updated to Important Bird and Biodiversity Area)
ICC	International Coordinating Council
IFC	International Finance Corporation
IUCN	International Union for Conservation and Nature
KR	Kyrgyz Republic
MAB	Man and Biosphere
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organisation
PBF	Priority Biodiversity Feature
PR	Performance requirement
PS	Performance Standard
UNDP	United Nations Development Programme
UNESCO	The United Nations Educational, Scientific and Cultural Organization
WDPA	World Database on Protected Areas

# 1. Introduction

## 1.1. Purpose of this Report

This report is the Critical Habitat screening and assessment for the Tyup-Karakol Road Project Environmental and Social Impact Assessment (ESIA) in the Kyrgyz Republic. The Project is seeking funding from the European Bank for Reconstruction and Development (EBRD) and will need to align with EBRD Performance Requirement 6 (PR6) for Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The aim of this report is to:

- 1) Screen for Critical Habitat-qualifying biodiversity, and Priority Biodiversity Features associated with the Project;
- 2) Outline the implications of the outcome of the Critical Habitat Assessment (CHA) for the Project; and
- 3) Identify the recommended next steps for the Project.

It has been prepared as part of the Environmental and Social Impact Assessment (ESIA) for the Project, being undertaken by WS Atkins International (Atkins), with their sub-consultants, CAI Consulting (CAIC).

# 2. Project Background

## 2.1. Project 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 kilometre (km) Tyup-Karakol Road section of the Balykchy-Karakol Road (the Project), shown in Figure 2-1. The Balykchy-Karakol Road is part of the 440 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.

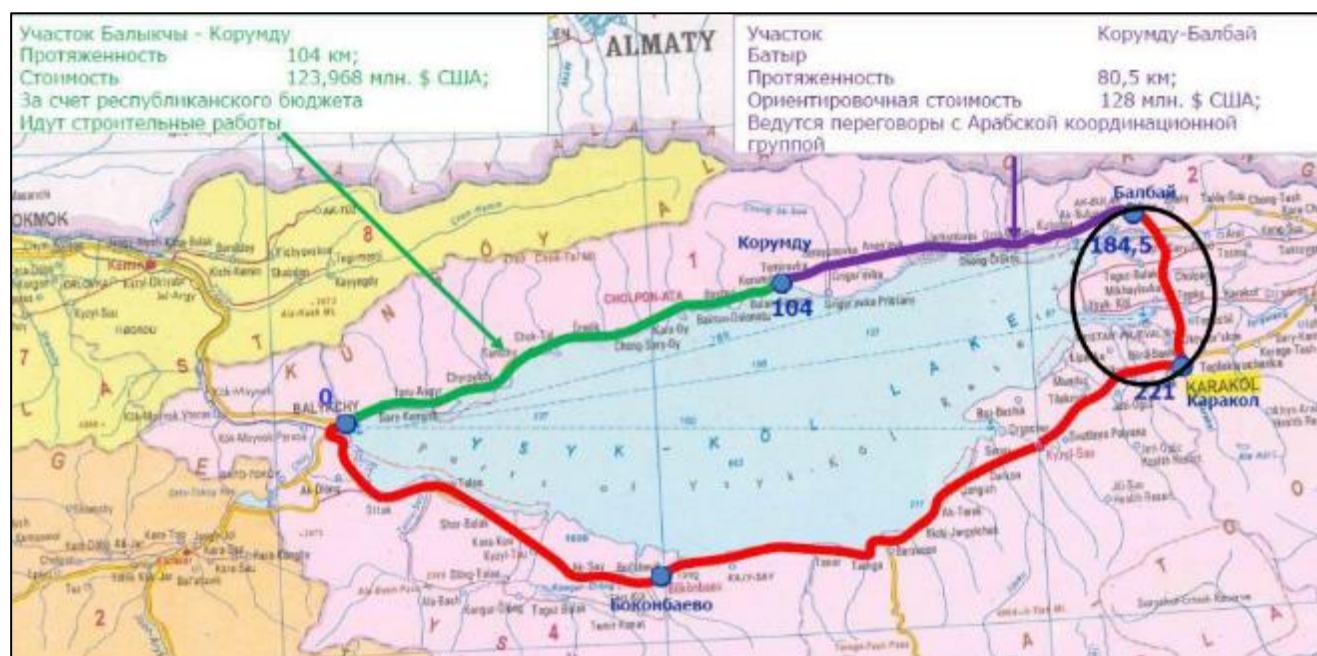


Figure 2-1. Location of the road section to be financed by EBRD (black circle)

The objective of the rehabilitation/upgrading of the Project road is to improve road safety and facilitate trade and tourist relationship of Kyrgyzstan, Kazakhstan and China, giving opportunities for both national and regional development and further improvement of transport services.

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.

The Project consists of widening a two lanes road into a four lanes road on an existing alignment over a 32 km section that could result in potentially significant adverse future environmental and/or social impacts.

In addition, a town option through Tyup, and several bypass options, skirting Tyup to the west and east (of just two lanes, not four) were being considered as shown below (Figure 2-2) and whose areas needed to be screened for Critical Habitat and Priority Biodiversity Features.

The town option through Tyup has since emerged as the preferred route. The CHA and supporting surveys, therefore give some consideration to the western and eastern bypass options (i) so that potential indirect impacts on the habitats along the alignments can be evaluated and (ii) the information is available for future reference. This report focuses on the selected route and should not be regarded as definitive for a western or eastern by-pass, if one or other is proposed at a date in the future but will provide a valuable starting point.

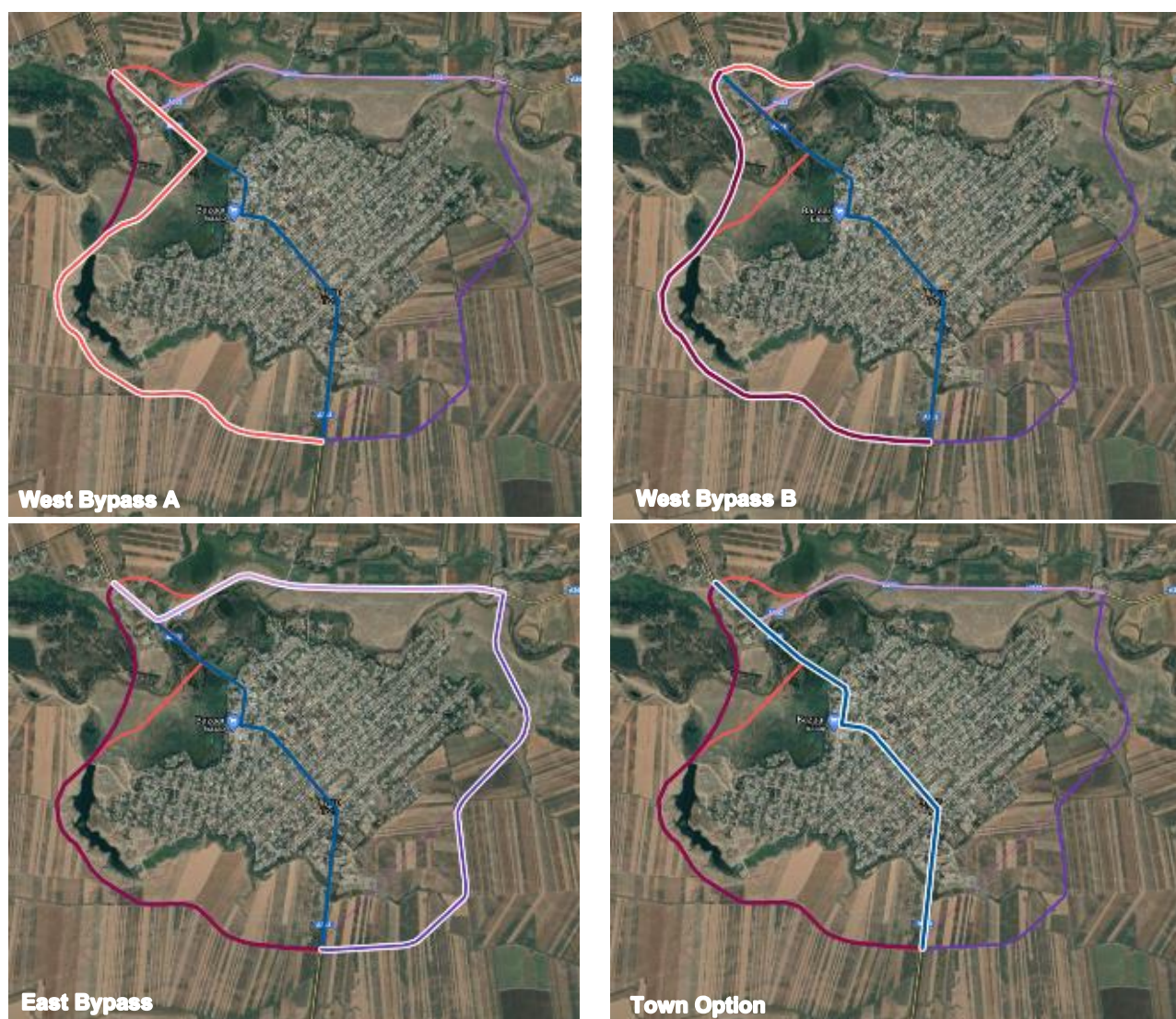


Figure 2-2. Tyup bypass options that were considered

## 2.2. Lender Standards

The objectives of the Guidance Note “EBRD Performance Requirement 6. Biodiversity Conservation and Sustainable Management of Living Natural Resources” (PR6) and the EBRD Environmental and Social Policy (ESP) (201) which it supports, are to protect and conserve biodiversity using a precautionary approach, adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity, and promote good international practice in the sustainable management and use of living natural resources (Appendix A).

PR6 identifies two classes of important biodiversity based on the principles of threat (vulnerability) and geographic rarity (irreplaceability):

- Critical Habitat
- Priority Biodiversity Features

PR6 in its guidance note (in support of EBRD E&S Policy 2014, 4.4, last paragraph) defers to the International Finance Corporation (IFC) Performance Standard 6 (PS6) Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC 2012b, updated June 27, 2019), regarding Critical Habitat numerical thresholds (Table B-2, Appendix B), and which have been applied in this report.<sup>1</sup>

Priority Biodiversity Features replace the previous definition of natural habitat used by the EBRD (in the 2008 ESP) and adopts the criterion-based approach already used for definition of critical habitat (EBRD PR6 Guidance note, 2014). Areas with Priority Biodiversity Features generally equate to the more important areas of “natural habitat” (as opposed to “modified habitat” within the IFC PS6 classification). PR6 more explicitly considers ecological functions that support Priority Biodiversity Features or Critical Habitat-qualifying biodiversity.

## 3. Approach to Assessment

Identification of features which potentially meet criteria for Critical Habitat was carried out through the following steps (EBRD 2014):

1. Identification of an appropriate scale for assessment:
  - To undertake the analysis for biodiversity;
2. Collection and verification of available information on biodiversity:
  - From reconnaissance ecological surveys, literature review, specialist analysis; and
3. Assessment against EBRD criteria and thresholds for species and ecosystems:
  - To identify which biodiversity features may qualify the area as Critical Habitat.

### 3.1. Scale of Assessment

CHA is usually carried out at the landscape scale, using ecologically and/or administratively coherent units (thresholds) for determining the presence or absence of Critical Habitat-qualifying features under PR6 Criteria ii – iv (Appendix B, Table B-2).

PR6 requires that the study area is clearly defined and mapped and includes the area of influence (AoI) and a consideration of broader landscape. The study area may include a relatively broad landscape and will depend on the biodiversity features of interest and the ecological functions required to maintain them. A CHA must encompass all direct and indirect impacts and not solely focus on the project site. More than one study area may be defined if ecologically sensible (EBRD 2014).

Study areas should be informed by the biodiversity features of concern and their ecological requirements. The current Project is likely to have terrestrial impacts mainly associated with its working boundary (i.e. expansion from two lanes to 4 lanes, and potential construction of a new Tyup bypass road – now ruled out). However, it will have potential impacts westwards towards the Issyk-Kul lake and the biodiversity and ecological requirements associated with the lake’s various protection designations, namely Issyk-Kul Biosphere Reserve core area; Eastern Issyk-Kul Important Bird Area (IBA); State Nature Reserve and Ramsar Site boundary.

<sup>1</sup> It is noted that whilst there is an update to the Guidance Note (PR6) on Biodiversity Conservation dated 2020, this Project and therefore this CHA is to be assessed against the 2014 EBRD ESP and PRs.



Two different approaches were thus taken to defining the scale of the study area, as described below.

### 3.1.1. Main Study Area

This assessment first considers a main study area of a 1 km area on either side of the existing Tyup-Karakol road (Figure 3-1) and along the Tyup village bypasses under consideration, since the majority of the Project impacts are likely to be within this zone.

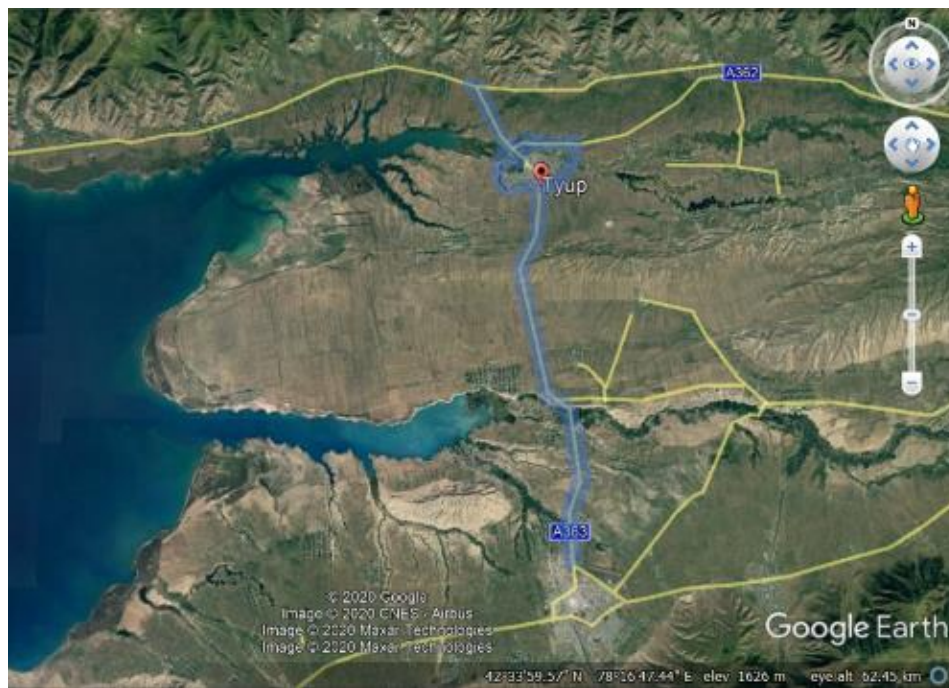


Figure 3-1. Main study area for CHA – 1km zone (shaded blue) either side of the Tyup-Karakol road and Tyup bypass options

This incorporates the various water courses (drainage channels, irrigation canals, ponds) and main rivers (Rivers Shaty, Tyup, Jergalan, Tegizchil, Zhany Aryk) crossed by the road, and fringing habitats that include planted roadside trees, steppe, floodplain vegetation, swamps and cultivated ground. Examples of these habitats are shown in the photos below.



Figure 3-2. Cultivated habitat within the Aol of the Project



**Figure 3-3. Photograph of the mouth of the Tyup River and Issyk Kul Lake**



**Figure 3-4. Photograph of the River Tyup downstream of the existing road alignment.**





**Figure 3-5. Photograph of the floodplain west of Tyup**



**Figure 3-6. Photograph of the River Jergalan downstream of the existing road alignment**





**Figure 3-7. Photograph of the tree-lined road**



**Figure 3-8. Photograph of one of the many quarries in the Aol of the Project**





**Figure 3-9. Flowers in Spring 2021 in the Aol of the Project**



**Figure 3-10. Tree plantations in the Aol of the Project**



### 3.1.2. Second Study Area of the Eastern Issyk-Kul Lake extending up to the Road Alignment

A second study area covers the eastern side of the Issyk-Kul lake extending to the road project (Figure 3-11). The habitat features of interest and associated biodiversity are the lake itself and shoreline habitat, floodplains and the rivers draining into the lake (that are crossed by the road in five places) along with their ecological functions that might be impacted by the Project.

This study area is characterised by various international and national protected area designations which are considered in detail in Chapter 6. Figure 3-11 for example shows the Ramsar and State Nature Reserve boundaries.

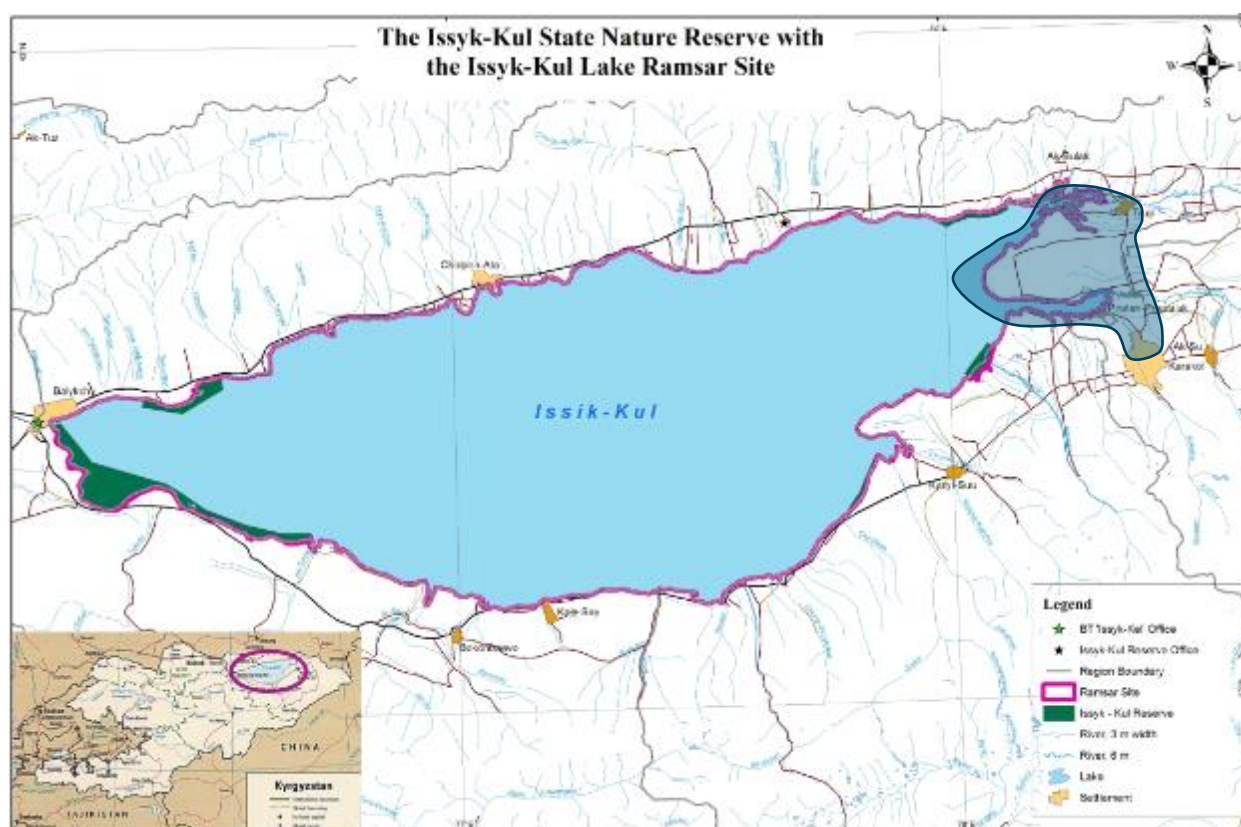


Figure 3-11. Second study area includes the Eastern Issyk-Kul lake and habitat (shaded area) extending up to the Tyup-Karakol road and Tyup bypass options

## 3.2. Available Information

This assessment is based on existing documentation and interpretation of global and regional datasets. All species classified as Critically Endangered and Endangered (for assessment of Critical Habitat) and Vulnerable (for assessment of Priority Biodiversity Features) in the International Union for Conservation and Nature (IUCN) Red List and Red Book of the Kyrgyz Republic were screened, as well as all species mapped by IUCN which could be considered restricted-range.

Data on protected areas and internationally recognised areas were analysed from existing literature including:

- United Nations Development Programme (UNDP) Project Document: Conservation of globally important biodiversity and associated land and forest resources of Western Tian Shan mountain ecosystems to support sustainable livelihoods;
- Potential for strengthening the coverage of the core zone of Biosphere Reserve Issyk-Kul (Michael Succow Foundation for the Protection of Nature, 2014);
- Lake Basin Management Initiative Experience and Lessons Learned Brief – Lake Issyk Kul (paper presented by Rasul Baetov at the Lake Basin Management Initiative Regional Workshop for Europe, Central Asia and the Americas June 2003).

- Update of the information on the status of wetlands in Kazakhstan, Kyrgyzstan, and Turkmenistan by collection and dissemination of good practices for conservation and sustainable use of wetlands by local communities. E.A. Rustamov (editor). Almaty, 2018.
- Information Sheet on Ramsar Wetlands (RIS) for The Issyk-Kul State Nature Reserve with the Issyk-Kul Lake, compiled 20 January 2013.

Information consulted and additional data were obtained from:

- ESIA reconnaissance field visit and detailed surveys and reports covering ecology, hydrology, aquatic environments, ichthyology and vegetation conducted by CAIC to inform development of the ESIA;
- Letters dated 01/02/2021 No. 01-23 / 23 and 03.02.2022 / Out. 01-19/43 to CAIC from the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic General Directorate of the Issyk-Kul Biosphere Territory confirming that the Tyup-Karakol road section is located in a transition zone (and not the core zone) where various types of productive activities are allowed.
- Publicly available development studies in the Issyk-Kul area, including:
  - Initial Environmental Examination KGZ: Issyk-Kul Wastewater Management Project (Sep. 2018)
  - Issyk-Kul Sustainable Development Project, Kyrgyz Republic, Vol. 5 Strategic Environmental Management Plan (Nippon Koei & RAM, Dec. 2009)
  - Important Bird and Biodiversity Areas;
- Birdlife International Data Zone fact sheets and map for the Eastern Issyk-Kul IBA; <http://datazone.birdlife.org/site/factsheet/eastern-issyk-kul-lake-iba-kyrgyzstan>
- Alliance for Zero Extinction sites;
- Important Plant Areas; and
- Edge of Existence Programme.

Information about Key Biodiversity Areas is from the BirdLife International Data Zone and Protected Area information is from the World Database on Protected Areas (WDPA).

### 3.3. Robustness of this Assessment

This assessment was first conducted using the best available information and reconnaissance surveys conducted by CAIC. Additional field survey findings (autumn, winter and spring bird survey; autumn and spring vegetation survey including terrestrial vertebrates) were then undertaken and further assessment to confirm the presence of species triggering Critical Habitat or Priority Biodiversity Features. Habitat maps derived from an analysis of terrain as shown on Google Earth were prepared for the whole route including the western bypass options, and the most ecologically sensitive of these areas were checked (ground truthed) by CAIC botanists (Appendix F).

The close proximity of Issyk-Kul Lake and the IBA to the western bypass is alone sufficient to demonstrate Critical Habitat values in the vicinity, and thus the need for well-considered mitigation plans and measures.

## 4. Critical Habitat

### 4.1. Method of assessment against PR6 criteria for Critical Habitat

#### 4.1.1. Criterion i (PR6) - Highly threatened and/or unique ecosystems

Highly threatened and/or unique ecosystems are defined in EBRD Guidance note (EBRD 2014; Table C-1 in Appendix C) as:

- Those at risk of significantly decreasing in area or quality;
- Those with a small spatial extent; and/or
- Those containing concentrations of biome-restricted species.

Areas determined to be of high priority/significance based on systematic conservation planning carried out at the landscape and/or regional scale by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally-recognized Non-Governmental Organisations (NGOs)) or that are recognized as such in existing regional or national plans, such as the National Biodiversity Strategy and Action Plan (NBSAP), also qualify as Critical Habitat as per Criterion i (EBRD 2014; Table C-1 in Appendix C).

EBRD does not provide quantitative thresholds for assessment under this criterion.

All ecosystems<sup>2</sup> known from both study areas were screened against the EBRD definition of highly threatened and unique ecosystems, and the Red List of Threatened Ecosystems criteria, considering the entire extent of an ecosystem.

#### 4.1.2. Criterion ii (PR6) – Habitats of significant importance to Endangered or Critically Endangered species

The EBRD Guidance Note (EBRD 2014, paragraph 4.4) refers to IFC PS6 Guidance Note (GN6) for definitions of and quantitative thresholds for critical habitat biodiversity. This assessment has been guided by those criteria/thresholds for the two categories which can be considered 'highly threatened': Critically Endangered (CR) and Endangered (EN). More detail on these categories is given in Table B-2, Appendix B of the EBRD Guidance Note.

Quantitative data for the list of candidate species in the study areas was screened against PS6 thresholds (IFC 2012b) (the same thresholds being applied in PR6; EBRD 2014). The screening is based on the proportion of a species' population in a given area. Assessment also considered any subspecies and populations that have been individually assessed on the IUCN Red List.

Although identification of Critical Habitat is largely based on global conservation priorities (based on the IUCN Red List of Threatened Species), Criterion ii also considers the presence of nationally important populations of Critically Endangered and Endangered species, as defined in the Red Book of the Kyrgyz Republic; and areas that support species at high risk of extinction (Critically Endangered and Endangered) on the IUCN Red List.

#### 4.1.3. Criterion iii (PR6) – Habitats of significant importance to endemic or geographically restricted species

Terrestrial geographically restricted-species (termed "restricted-range species" in IFC 6) are those with a range (extent of occurrence) of less than 50,000 km<sup>2</sup>. Aquatic species are CH based on the following definition (EBRD 2014 PR6 defers to IFC Guidance Note 6 GN74, update 2019):

- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart)

The study areas were screened for overlap with restricted-range species based on data from the IUCN Red List. Any which potentially occur were compared with the recommended thresholds for Criterion iii. These range thresholds are given in Table B-2, Appendix B.. As for Endangered/Critically Endangered species, the screening is based on the proportion of a species' population in a given area.

#### 4.1.4. Criterion iv (PR6) – Habitats supporting globally significant concentrations of migratory or congregatory species

Both study areas need to be assessed for their importance as migratory stop-over sites given the Project's location within the Central Asian flyway and proximity to the Eastern Issyk-Kul IBA. Information gained from the spring bird survey is needed to properly assess the importance of both study areas and particularly the floodplain area being considered for the western bypass around Tyup.

<sup>2</sup> The Red List of Threatened Ecosystems guidance notes that other terms (in addition to 'ecosystem') applied in conservation assessments— such as ecological communities, habitats, biotopes, and (largely in the terrestrial context) vegetation types – are regarded as operational synonyms of ecosystem type, providing they are adequately defined in accordance with the procedures described in the assessment process (Rodríguez-Clark et al. 2015)

#### 4.1.5. Criterion v (PR6) – Areas associated with key evolutionary processes

Although key evolutionary processes may operate at various spatial scales, in the sense of PR6 these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g., isolated lakes or mountain tops).

No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement.

#### 4.1.6. Criterion vi (PR6) – Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical habitat features)

PR6 Guidance Note (EBRD 2014 – Table B-1, Appendix B) notes that 'ecological functions without which critical biodiversity features could not persist' can be defined as areas that are essential for Critical Habitat-qualifying feature survival, such as riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species.

As for Criterion v, no quantitative thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement.

## 4.2. Findings - Critical Habitat Assessment

### 4.2.1. Criterion i (PR6) - Highly threatened and/or unique ecosystems

The habitats (agricultural land, steppes, forest plantations, meadows, swamps, riverine and floodplain vegetation) within the first study area (1 km zone around the road alignment) are not considered to be highly threatened or unique.

However, for the second study area, from the eastern Issyk-Kul lake up to the road alignment the situation is different. The Issyk-Kul Lake is internationally and nationally regarded as a unique high-altitude lake ecosystem, deep, slightly saline and consequently never freezes in winter, and recognised by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere, Ramsar, State Nature Reserve and IBA designations. It hosts endemic fish species and is an important wintering area for waterfowl and shore birds. There are 267 bird species, out of which 18 species are included in the Kyrgyz Republic Red Data Book and three are in the IUCN Red List (Ramsar RIS, 2013), which are ibisbill (*Ibidorhyncha struthersii*), bar-headed goose (*Anser indicus*), white-headed duck (*Oxyura leucocephala*).

A direct physical pathway exists between the road project and the lake via the five rivers that drain westwards into the lake. The greatest volume of flow comes through rivers on the basin's eastern side where precipitation is heavier. The rivers could potentially act as a conduit for polluting fuel spills during bridge building/widening and road construction, as well as being subject to impacts such as noise and dust. Therefore, the lake could be impacted during construction and operation.

**Therefore, Critical Habitat is considered likely under this Criterion (for the second study area).**

**Table 4-1. High level qualitative assessment of habitats in the first study area (1 km zone around road alignment) against Criterion i**

Habitat type		Assessment
Vegetation type	Summary description	
Mixed: steppes meadows swamps floodplain vegetation woodland plantations roadside tree strips riverine plants	Natural vegetation restricted to water channels (irrigation canals, rivers) that the road crosses and small water bodies/ponds close to the road in places.  Natural river floodplain exists west and east of Tyup although affected by grazing regimes	<p><b>PR6 definition:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk of significantly decreasing in area or quality</b> No – development in the region might decrease the extent and the quality of some vegetation types, but, given their wide distribution, it is not currently considered to be at significant risk</li> <li>• <b>Small spatial extent</b> No – common and widespread</li> <li>• <b>Containing concentrations of biome-restricted species</b> No evidence.</li> </ul> <p><b>Red List of Threatened Ecosystems:</b></p> <ul style="list-style-type: none"> <li>• <b>Reduction in geographic distribution</b></li> </ul>



Habitat type		Assessment
		<p>No – there is no current evidence to suggest a significant reduction in distribution</p> <ul style="list-style-type: none"> <li>• <b>Restricted geographic distribution</b> No – widespread habitat types</li> <li>• <b>Environmental degradation</b> No – no broad-scale degradation of the ecosystem</li> <li>• <b>Disruption of biotic processes or interactions</b> No – there is no evidence of this</li> <li>• <b>Quantitative analysis that estimates the probability of ecosystem collapse</b> Not possible using currently available data</li> </ul> <p><b>Conclusion</b> Unlikely to meet Criterion i</p>

Table 4-2. High level qualitative assessment of habitats in the second study area (Issyk-Kul lake eastwards to the road alignment)) against Criterion i

Habitat type		Assessment
Lake habitat type	Summary description	
<p><b>Terrestrial:</b> Shoreline wetlands, mudflats, especially in the vicinity of incoming rivers. sea buckthorn thickets</p> <p><b>Aquatic:</b> Lake water body</p>	<p>Water body is oligotrophic, produces phytoplankton at a rate of less than 488mg/m<sup>3</sup>, zooplankton at a rate of 910mg/m<sup>3</sup>, and zoobenthos at a rate of 10g/m<sup>3</sup>. Water has low salinity (5.968 g/l). Mineral content is chloride/sulphate/sodium/magnesium based. Waters are clear and transparent due to the paucity of organic life and to the overall salinity, which has in turn contributed to the coagulation of tinted minerals and organisms.</p> <p>5 habitat types: - sandy beaches, which include the surf zone and facing the lake is free of vegetation - sandy and sandy beach ridges, covered with thickets of sea buckthorn; - reed marshes; - granulated reed-sedge and grass-sedge meadows; - ancient sand ridges</p>	<p><b>PR6 definition:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk of significantly decreasing in area or quality</b> Yes – the lake is at risk from decreasing water levels through water abstraction and water quality (from irrigation, residential, tourism, industry).</li> <li>• <b>Small spatial extent</b> Yes – while it is a large lake (626,438.5 ha.) it has unique basin, physical and geographical, climatic and hydrological characteristics, not repeated elsewhere. Its shoreline is relatively straight, with small coves and mild indentations and therefore shoreline wetlands and mudflats are not extensive, making them especially valuable to birds.</li> <li>• <b>Containing concentrations of biome-restricted species</b> Yes – seven endemic fish species; Asiatic frog as a restricted range species.</li> </ul> <p><b>Criteria for Endangered or Critically Endangered IUCN Red Listed Ecosystems</b></p> <ul style="list-style-type: none"> <li>• <b>Reduction in geographic distribution</b> Not applicable.</li> <li>• <b>Restricted geographic distribution</b> Yes – a unique basin, with physical and geographical, climatic and hydrological characteristics, not repeated elsewhere.</li> <li>• <b>Environmental degradation</b> Yes – especially through land degradation and poor wastewater treatment. Impact on the lake is significant and has been well documented.</li> <li>• <b>Disruption of biotic processes or interactions</b> Yes – glacier retreat and climate change affecting water quantity entering the lake, reducing the lake level and increasing salinity. Pollution and unwise fish introductions have further disrupted biotic processes.</li> </ul>



Habitat type		Assessment
		<ul style="list-style-type: none"> <li>• <b>Quantitative analysis that estimates the probability of ecosystem collapse</b></li> </ul> <p>Not possible using currently available data but lake ecosystem is under threat.</p> <p><b>Conclusion</b></p> <p>Likely to meet Criterion i.</p>

#### 4.2.2. Criterion ii (PR6) – Habitats of significant importance to Endangered or Critically Endangered species

The preliminary terrestrial ecology survey conducted by CAIC (16-21 October 2020) along the road alignment and Tyup bypass options did not identify the presence of Endangered or Critically Endangered species.

The CAIC ichthyofauna survey (14-21 October 2020) identified the presence of a number of endemic fish in the rivers crossed by the Tyup-Karakol road. It is more appropriate to consider these under Criterion iii for endemics.

Information gained from additional autumn and spring field surveys did not confirm the presence of species and associated habitats triggering Critical Habitat.

A number of insect species are classified as endangered and are included in the Red Data Book of Kyrgyzstan. These include five butterflies (Swallowtail *Papilio machaon*, clouded Apollo *Parnassius mnemosyne*, banded Apollo *P. delphi*, snow Apollo *P. actius*), two bumblebees (*Bombus muscorum*, *B. serratissima*), a beetle (*Calosoma sycophanta*), a wasp (*Megascolia maculata*) and the alfalfa leafcutter bee (*Megachile rotunda*). They might not have been detected during the spring survey which was perhaps too early, especially given that there was a spell of unusually cold weather at the time of the survey.

There is a reference to a plant, the Sweet-flag sedge *Acorus calamus* (Endangered in the Red Data Book of the Kyrgyz Republic), “found in the water meadows on the River Tyup” mentioned in a study entitled “Issyk-Kul Sustainable Development Project, Kyrgyz Republic”, Vol. 5 Strategic Environmental Management Plan, Dec. 2009, on p. 49. However, this plant was not located by the CAIC botanist during the autumn and spring surveys in the Tyup floodplains nor in other areas affected by the Project. This is consistent with updates to its status. *Acorus calamus* was included in the Red Data Book of 1985 but was later removed and was not included in the Red Data Book of the Kyrgyz Republic in 2007 due to its absence in the territory of the Kyrgyz Republic.

**Critical Habitat status against this criterion has not been triggered.**

#### 4.2.3. Criterion iii (PR6) – Habitats of significant importance to endemic or geographically restricted species

##### Endemic species

Twenty-eight fish species have been confirmed in Issyk-Kul lake, with seven of them being endemics to the lake (Ramsar Information Sheet/RIS, 2013). It lists *Schizothorax issykkuli*, and *Diptychus dybowskii lanskii* as being included in the Kyrgyz Republic Red Data Book. These endemics are considered as threatened and vulnerable on account of historic and damaging fish introductions, unsustainable land and fisheries management and environmentally harmful development practices.

Kustareva and Naseka (2015) expand on the Ramsar list of endemics for Issyk-Kul basin, listing “5 species and 6 subspecies (which may represent distinct species): *Gobio latus* Anikin, 1905; *Leuciscus bergi* Kashkarov, 1925; *L. schmidtii* (Herzenstein, 1896); *Rhynchocypris issykkulensis* (Berg, 1912); *Rh. issykkulensis relictus*; *Schizothorax issykkuli* Berg, 1907; *Diptychus gymnogaster microcephalus* Turdakov, 1963 (from Chon-Ak-Su and other rivers flowing into the eastern Issyk-Kul, usually misidentified as *D. maculatus*), *Gymnodiptychus dybowskii* var. *primitiva* Turdakov, 1963 (only known by the original description from Karakol and Karkara rivers of Issyk-Kul basin, and no other data exist; it is commonly identified as *D. dybowskii*); *Gymnodiptychus dybowskii lanskii* (Gunther, 1889); *Triplophysa strauchii ulacholica* (Anikin, 1905), *T. strauchii dorsaloides* (Turdakov, 1947)”.

Kustareva and Naseka (2015) further note that *Gymnodiptychus dybowskii lanskii*, Naked Osman, has two ecological morphs - spawning in the lake, so-called winter Osman, and entering rivers for spawning, a so-called summer Osman. Therefore, the five rivers in the study area draining into the lake can be considered host to the spawning endemic Osman.

The preliminary ichthyofauna survey (14-21 October 2020) conducted by CAIC indeed confirmed the presence of Osman in each of the five rivers crossed by the Tyup-Karakol road, with other endemics also identified or suspected as being present by local residents (Table 4-2).

**Therefore the five main rivers in the study area crossed by the road, based on expert judgement and on a precautionary basis, can be considered as Critical Habitat according to Criterion iii.**

**Table 4-3. Endemic fish species confirmed and suspected in the study area from CAIC ichthyofauna survey (14-21 October 2020)**

River	Habitat in study area	Species	IUCN status	National status
River Shaty	Sample sites: (1) N 42°45.331', E 078° 19.831' (2) N 42°45.514', E 078° 19.945'	Thick-lipped mullet/gubach <i>T. ulacholica</i> Anikin		Endemic
	Channel width 1.5-3m, depth 0.25-0.5m; muddy bottom, steep banks, overgrown with reeds, swampy fringing areas	<i>Suspected by local residents:</i> Chebak <i>Leuciscus schmidtii</i>		Endemic
		Osman <i>Diptichus dybovskii lansdelli</i> Gunther		Endemic
River Tyup	Sample sites: (1) N 42°43.973', E 078° 20.460' (2) N 42°44.447', E 078° 23.235'	Thick-lipped mullet/gubach <i>T. ulacholica</i> Anikin		Endemic
	Channel width 35-40m, depth 0.5-1.5m, silty bottom, banks gently sloping, accessible, without dense vegetation, isolated thickets of bushes and trees, many wetlands.	Issyk-Kul gobies <i>G. gobio latus</i> Anikin		Endemic
		Osman <i>Diptichus dybovskii lansdelli</i> Gunther		Endemic included in Kyrgyz Red Book
		<i>Suspected by local residents:</i> Chebak/ich <i>Leuciscus schmidtii</i>		Endemic
River Jyrgalan	Sample site: N 42°35.606', E 078° 23.187'	Osman <i>D. (G.) d. dybovskii</i> Kessler		Endemic included in Kyrgyz Red Book
	Width 15-25m, depth 1.5-2m, flow relatively moderate, with ripples, bottom is silted, stony banks are steep, relatively accessible, thickets of bushes & trees, many wetlands	<i>Suspected by local residents:</i> Chebak/ich <i>Leuciscus schmidtii</i>		Endemic
		Marinka <i>Schizothorax issykkuli</i> Berg		Endemic
		Osman <i>Diptichus dybovskii lansdelli</i> Gunther		Endemic
River Tegizchil	Sample site: (1) N 42 ° 33.755 ', E 078 ° 23.492' (2) N 42 ° 33.708 ', E 078 ° 22.540	Osman <i>D. (G.) d. dybovskii</i> Kessler		Endemic included in Kyrgyz Red Book
	Width 1.5-3.5m, depth 0.3-1.3, flow is calm, bottom is silted, with sandy areas, banks gently sloping, relatively accessible, thickets of shrubs & trees, many wetlands	<i>Suspected by local residents:</i> Osman <i>Diptichus dybovskii lansdelli</i> Gunther		Endemic
		Marinka <i>Schizothorax issykkuli</i> Berg		Endemic

River	Habitat in study area	Species	IUCN status	National status
River Zhany Aryk	Sample site: N 42 ° 32.093 ' , E 078 ° 22.847'  Width 1.5-2.5m, depth 0.3 - 0.6m, flow is calm, bottom is sandy, with pebbles, banks gently sloping, relatively accessible, with thickets of shrubs and trees, many wetlands.	Osman <i>D. (G.) d. dybowski</i> Kessler		Endemic included in Kyrgyz Red Book
		<i>Suspected by local residents:</i> Osman <i>Diptichus dybovskii lansdelli</i> Gunther		Endemic
		Marinka <i>Schizothorax issykkuli</i> Berg		Endemic



Figure 4-1. Main rivers crossed by the Tyup-Karakol road

The plant *Astragalus projecturus*, listed as Endemic in the Kyrgyz Republic Red Data Book, was identified in the spring 2021 survey as being present in two areas west of the Tyup-Karakol road, south west of the River Jergalan (Fig.4-2). The first location closest to road is within the first CH study area (1 km zone either side of the road alignment) and the second location is within the second CH study area (between the Issyk-Kul Lake's eastern shore and the road). The survey indicated that the species is found in Steppe habitat but its abundance in the Project area remains unclear. Its presence suggests it could be occurring elsewhere in or close to the Project area. According to literature (Dr.Usupbaev *pers. comm.*) it is found in the Lake Issyk-Kul basin and Central Tien Shan, but current information on its overall abundance, distribution and status is lacking.





Figure 4-2. The endemic plant *Astragalus projecturus*

In the absence of reliable information on its status, the presence of the endemic plant species *Astragalus projecturus* in the project area indicates Critical Habitat according to Criterion iii. Expert judgement that has been used in the assessment, has been applied on a precautionary basis; further desk and field-based studies covering a wider area may reveal further information on the distribution and abundance of this plant species and allow a re-assessment with a different conclusion.

#### Geographically restricted species

The ecological survey conducted in autumn 2020 by CAIC indicated the possible presence of the Asiatic Frog *Rana asiatica*. This is listed in the Kyrgyz Republic Red Book as Vulnerable, whilst the IUCN Red List classifies it as Least Concern. However, this species has a restricted geographical range as shown in Figure 4-3.

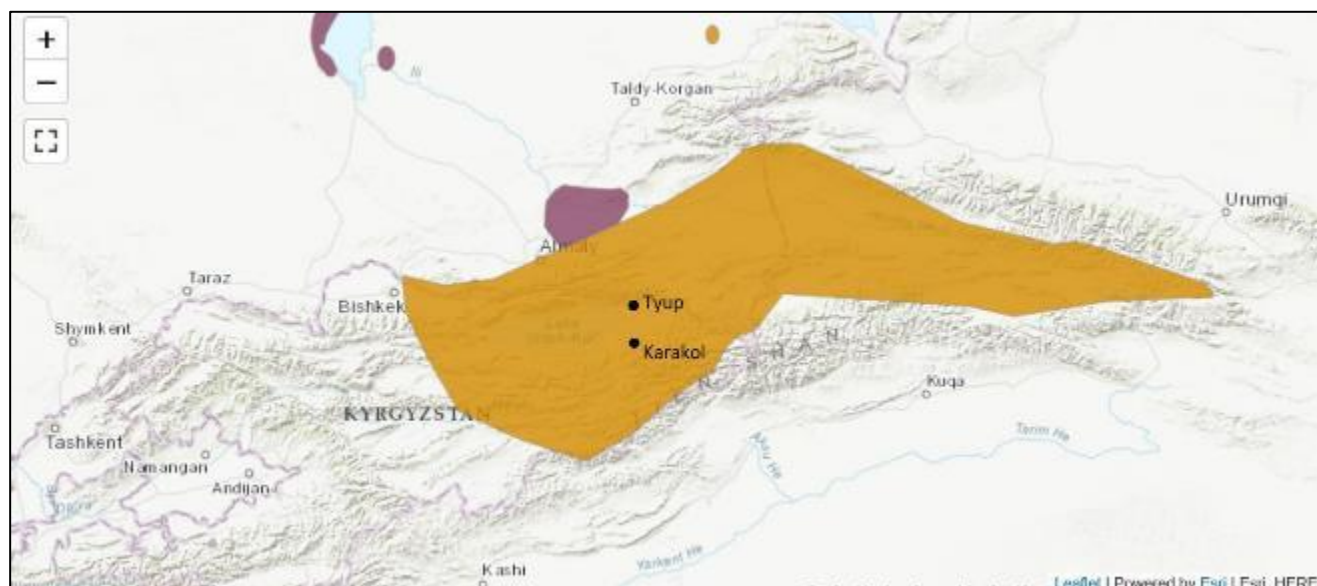


Figure 4-3. Distribution of Asiatic Frog - Orange = Known Extant; Purple = Possible Extant.

(source: IUCN Red List)

The species is found only in Kyrgyz Republic, Kazakhstan, and western China and is considered to be declining in population numbers. Within its range the Asiatic Frog is likely to be limited to suitable wetland habitats; the IUCN Red List description for this species notes that “suitable wetland habitats are often scarce within the distribution range of the species.”

Based on the presence of Asiatic Frog on the national Red Data Book, globally declining populations and limited suitable habitat, it is considered that this species should be classed as geographically restricted for the purposes of this CHA.

The ESIA ecology survey, conducted during the autumn did not reveal the presence of the Asiatic frog, due probably to it being in hibernation. However, its likely presence and suitable habitat was confirmed at various wetland sites along the road (Figure 4-4 - survey site 3, 5, 12, 13, 14).



Figure 4-4. Ecology survey sites investigated in autumn 2020 and spring 2021 as part of the ESIA

The spring survey in April 2021 did not detect its presence, but a spell of cold weather at the time (e.g., in the morning of 23 April the temperature was - 4°C) might have prolonged hibernation and/or constrained activity.

Based on a precautionary approach to the assessment and expert judgement, it is assumed that the species is present within the CHA area and therefore the study area is considered as Critical Habitat under Criterion iii.

#### 4.2.4. Criterion iv (PR6) – Habitats supporting globally significant concentrations of migratory or congregatory species

The terrestrial ecology survey conducted by CAIC (16-21 October 2020) and its species list did not identify the presence of habitat supporting globally significant concentrations of migratory or congregatory species in the immediate vicinity of the road alignment and Tyup bypass options.

However, the Eastern Issy-Kul Lake IBA is considered Critical Habitat. A distance of approximately 1,000 m separates the IBA boundary from the Tyup western bypass option B, and a 600 m separation in the area where the road crosses the River Jyrgalan (Figure 4-5), making birds and associated wetland habitat potentially vulnerable to impacts from the road construction and operation (e.g., noise, dust). Both these areas comprise riverine and lowland floodplain habitat and as such potentially provide suitable 'spill-over' habitat from the IBA for breeding, feeding and resting birds, particularly during periodic river floods and floodplain inundation.

Findings from the bird surveys support the notion that the area considered under the Tyup western bypass options does provide "spill-over" habitat, despite some anthropogenic disturbance (grazing) and therefore is important in this regard. However, based on species and numbers identified, both areas marked on Figure 4-5 cannot be considered Critical Habitat given that they do not support globally significant concentrations of migratory or congregatory species.



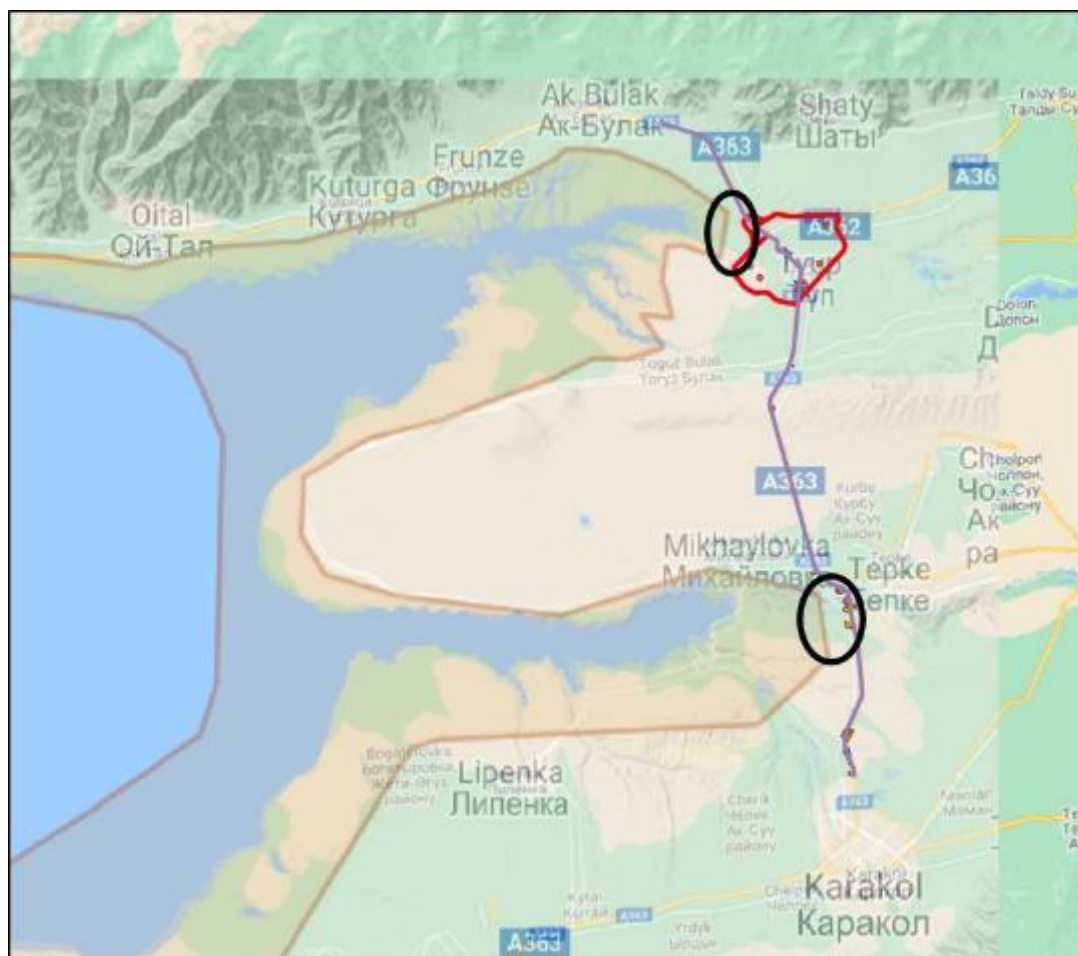


Figure 4-5. Eastern Issyk-Kul Lake IBA proximity to the road potentially triggering Critical Habitat (area encircled)

#### 4.2.5. Criterion v (PR6) – Areas associated with key evolutionary processes

This criterion relates to 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.

Although key evolutionary processes may operate at various spatial scales, in the sense of PR6 these are usually considered at a relatively fine scale rather than broad biogeographic regions, for example isolated lakes or individual mountains that host the evolution of a suite of endemic species. No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement.

Given that Issyk-Kul Lake, surrounded by mountains with no surface outlet, is home to seven endemic fish species, with several species confirmed as occurring in the rivers crossed by the Tyup-Karakol road, key evolutionary processes could occur in the Project area.

**Therefore, the Project area is considered to qualify as Critical Habitat under Criterion v.**

#### 4.2.6. Criterion vi (PR6) – Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical habitat features)

PR6 requires that ecological functions that are vital to maintaining the viability of Critical Habitat-qualifying features are also qualifying as Critical Habitat. It might include specific habitat features such as riparian zones and river dispersal or migration corridors, hydrological regimes, seasonal regimes or food sources, keystone or habitat-forming species (Table C-1, Appendix C), that are essential for the long-term survival of the species.

In the context of this Project, the rivers crossed by the Tyup-Karakol road support endemic fish. In addition, associated riverine and floodplain habitat in the western and eastern Tyup bypass area potentially support the Asiatic frog as a restricted range species.

**Therefore the main study area is considered as Critical Habitat under Criterion vi.**

## 5. Priority Biodiversity Features

Priority Biodiversity Features (PBFs) comprise those features that are of high irreplaceability (the limited number of places in which the feature is found) and/or vulnerability (the risk of the feature being lost over time), but not sufficient to qualify an area as Critical Habitat. These particularly include species and features which are important components of the natural environment, including any flyway.

Priority biodiversity features have a high, but not the highest, degree of irreplaceability and/or vulnerability. Although a level below critical habitat in sensitivity, they still require careful consideration during project assessment and impact mitigation.

PR6 defines four criteria for the identification of PBFs (Table 5-1). As PR6 does not define quantitative thresholds for identifying PBFs, this assessment has been qualitative using expert opinion.

**Table 5-1. PR6 criteria for Priority Biodiversity Features**

Features	PR6
Threatened habitats	Criterion i
Vulnerable species	Criterion ii
Significant biodiversity features identified by a broad set of stakeholders or governments	Criterion iii
Ecological structure and functions needed to maintain the viability of priority biodiversity features described in PR6 paragraph 14	Criterion iv

### 5.1. PBF Criterion i: Threatened habitat

Earlier assessment identified the Issyk-Kul Lake as a unique lake ecosystem present in the vicinity of the Project that is threatened (Section 4.2.1). The floodplain area on the Tyup river western and eastern bypass options and along the Jyrgalan River supports birds from the neighbouring IBA as a “spill-over” area. Winter and spring bird surveys determined that these two areas did not meet Critical Habitat thresholds under Criterion iv (Globally significant migratory or congregatory species). Nonetheless, the “spill-over” function provided by the floodplain area on the Tyup river western and eastern bypass options and along the Jyrgalan River, acting also as a buffer to the IBA mean that these two areas would likely qualify as Priority Biodiversity Features.

### 5.2. PBF Criterion ii: Vulnerable species

This Criterion includes Globally or nationally Vulnerable species that have a significant presence in the Project area and thus identified as a Priority Biodiversity Feature (PBF).

PBFs includes species listed in Annex I of the Birds Directive or Annex II of the Habitats Directive. Annex I birds comprise 39 species listed in the Kyrgyz Red Data Book, of which many could potentially be present within the Aol of the Project.

A total of 15 Annex 1 species, listed in the Kyrgyz Red Data Book, were recorded during the ESIA study surveys (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). Only ruddy shelduck was recorded in significant numbers (peak count of 176, October 2020). Four of these species (Eurasian eagle-owl, osprey, white-tailed eagle and whooper swan) are listed in the Kyrgyz Red Data book as least concern or near-threatened. One IUCN vulnerable species (common pochard) was recorded (peak count 208 in December 2020).

With regard to reptiles and amphibians, possible Kyrgyz Red Data Book species are the Asiatic Tortoise, the Asiatic Brown Frog and Green Toad but none of these were identified as being present in the autumn and spring surveys. CAIC ecologists have confirmed that the Asiatic Tortoise has never been identified in the Issyk-Kul area.

Field vegetation surveys were carried out in the autumn period from 14-22 October 2020 which is the end of the growing season in the Issyk-Kul region. A spring survey (April 2021) was carried out to identify ephemerals and ephemerooids in the study area and to check for any listed in the Red Book of the Kyrgyz Republic.

Only one was identified, being the tulip *Tulipa tetraphylla* (listed as Vulnerable in the Kyrgyz Red Data Book), located in the southern portion of the Tyup-Karakol road (Figures 5-1 and 5-2).

КАРТА СХЕМА РАСТИТЕЛЬНОСТИ НА ТЕРРИТОРИИ ПРЕДПОЛАГАЕМОГО  
СТРОИТЕЛЬСТВА АВТОДОРОГИ «ТЮП – КАРА-КОЛ»

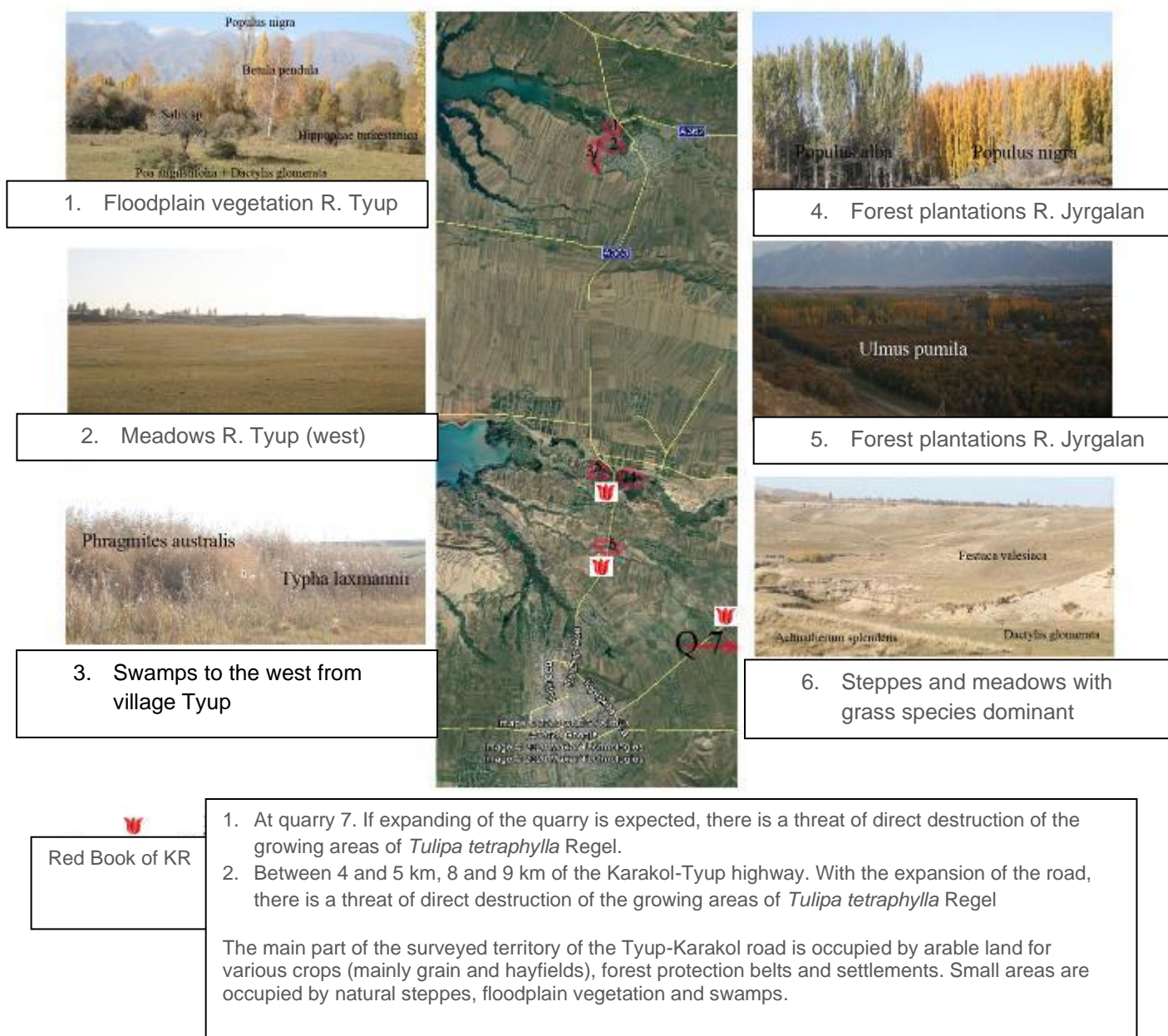


Figure 5-1. Vegetation types along the Tyup-Karakol road, showing locations of the Red Book listed *Tulipa tetraphylla* (from spring survey 2021)





Figure 5-2. Tulip *Tulipa tetraphylla* Regel

To conclude, based on a precautionary approach, up to 39 Annex I (Birds Directive) bird species listed in the Kyrgyz Red Data Book considered as potentially occurring in the Aol of the road project could be classified as PBF's, although only two (Ruddy Shelduck, Common Pochard) were confirmed in significant numbers during the autumn and winter surveys. The Asiatic Brown Frog and Green Toad are possible PBFs but were not confirmed during the ecological surveys. One plant PBF, *Tulipa tetraphylla*, was confirmed in the project area.

### 5.3. PBF Criterion iii: Significant biodiversity features identified by stakeholders or governments

Bird species that are interest features of Issyk-Kul Lake Ramsar site (under criteria 4, 5 and 6) and trigger species of Eastern Issyk-Kul Lake IBA under criteria 4i and 4iii (as identified by stakeholders) that potentially use suitable habitats within the Project area (e.g., floodplains, riverine areas) for foraging and roosting in important numbers can be considered as significant biodiversity features under PBF criterion iii.

A total of 13 Ramsar site interest 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 IBA trigger species (black-necked grebe, common pochard, Eurasian wigeon, goldeneye, red-crested pochard and ruddy shelduck) were recorded in the Aol during the three surveys (15 species in total).

As a precaution all species listed above are considered to regularly use the area for foraging or resting to some extent and therefore qualify as PBFs.

### 5.4. PBF Criterion iv: Ecological structures

As for Critical Habitat, PR6 requires that ecological functions that are vital to maintaining the viability of PBFs also qualify as PBFs.

Riverine and floodplain areas and agricultural areas with stubble or uncultivated ground may provide additional habitat for significant numbers of foraging and roosting birds that are interest features of Issyk-Kul Lake Ramsar site (notified under criteria 4, 5 and 6) and trigger species of Eastern Issyk-Kul Lake IBA under criteria 4i and 4iii. These areas could therefore constitute 'ecological structures' under PBF criterion iv.

**The bird surveys showed that the riverine and floodplain areas and agricultural areas with stubble or uncultivated ground 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.**

## 6. Protected areas and internationally recognised areas

Where the Project occurs within or has the potential to adversely affect an area that is protected through legal or other effective means<sup>3</sup>, and/or is internationally recognised<sup>4</sup>, or proposed for such status by national governments, the client must identify and assess potential project-related impacts.

Set out below are the various international and national designations pertaining to Issyk-Kul lake and relevant to the Project area.

### 6.1. International designations

At the international level, the Project area has the following designations:

- Issyk Kul Lake UNESCO Biosphere Reserve
- Issyk Kul Lake Ramsar Wetland of International Importance
- Three IBAs: Western Issyk Kul Lake, Eastern Issyk Kul Lake and Karkyra Valley IBA

#### 6.1.1. Issyk Kul 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> There are currently 714 biosphere reserves in 129 countries, that belong to the World Network of Biosphere Reserves.

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 Kyrgyz Republic has two UNESCO Biosphere Reserves, one of which is the Issyk-Kul Biosphere Reserve containing Issyk-Kul lake (Figure 6-1) and designated under the UNESCO programme MAB in 2001.

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<sup>3</sup> This PR is guided by the IUCN definition of "Protected Area"

<sup>4</sup> Sites identified under international conventions or agreements, including, but not limited to, UNESCO Natural World Heritage Sites, UNESCO Man-and-Biosphere Reserves and the Ramsar List of Wetlands of International Importance

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

<sup>6</sup> Ibid.



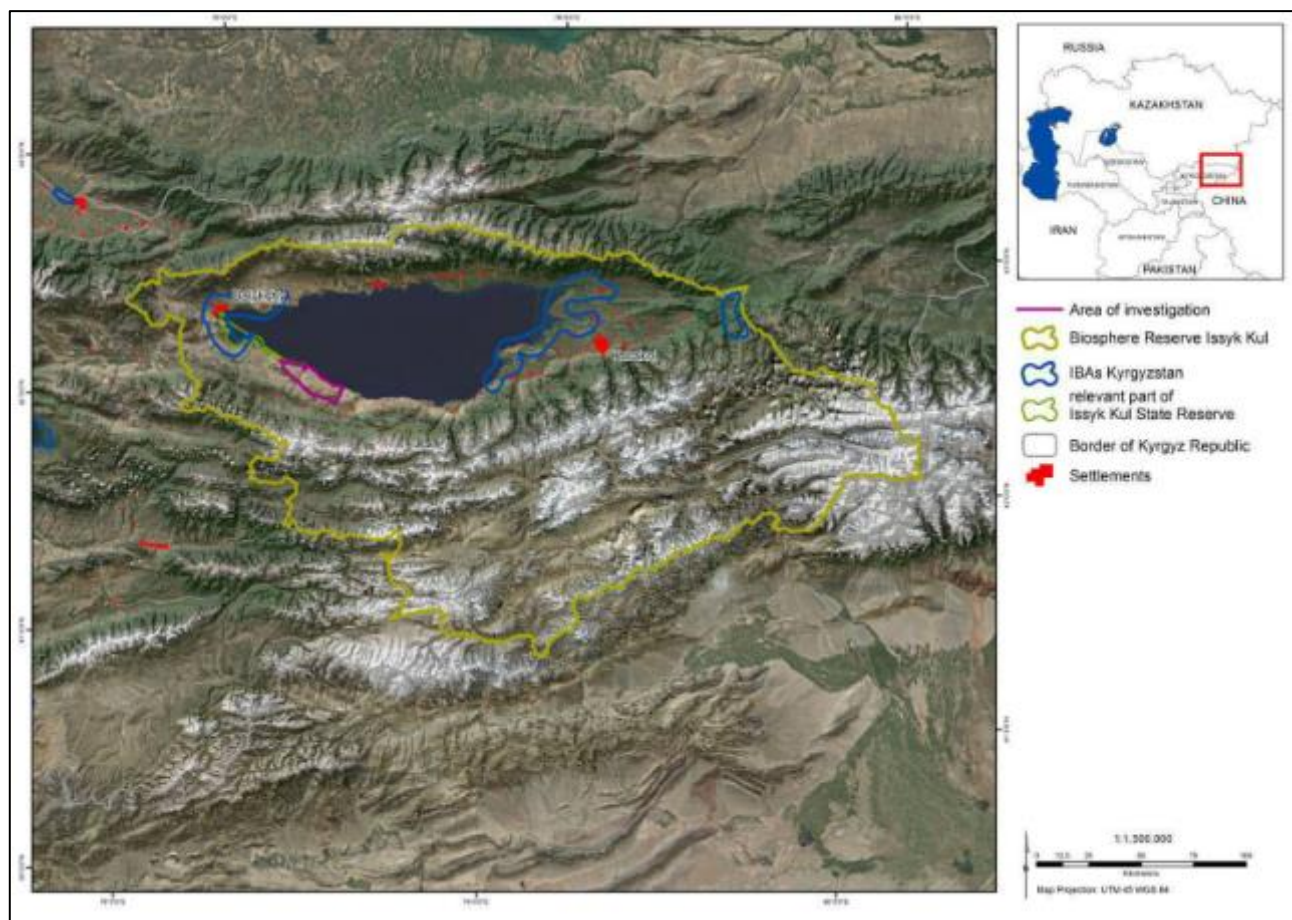


Figure 6-1. Biosphere Reserve Issyk-Kul (source: Wunderlich 2014)

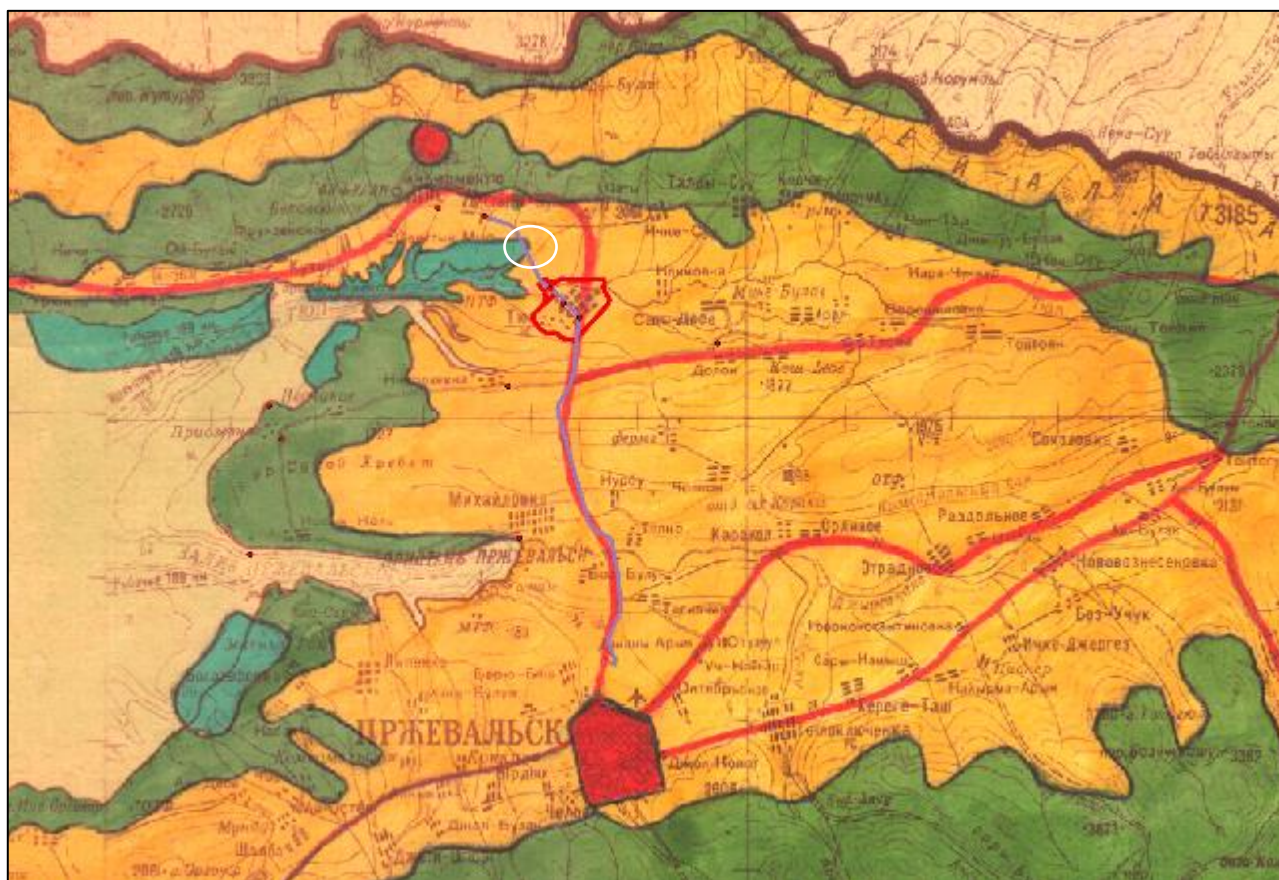
Issyk-Kul Biosphere Reserve is organised into four zones:

- **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 each zone (consultant findings and Wunderlich, 2013).

Various maps are available for the UNESCO Biosphere Reserve and its zones. Figure 6-2 indicates that the Road project is entirely in the Biosphere Transition Zone, except for a small area north west of Tyup where the road appears to cross the Core Zone (white circle in Figure 6-2). This area appears, from Google Earth imagery, to equate with the River Shaty along with three short adjoining tributaries and agricultural land. The inclusion of agricultural land suggests some imprecision in the delineation of the Core Zone in this area. There is no Buffer Zone adjoining the Core Area which can be regarded as surprising, and it has not been ascertained why there is no buffer zone here.

The selection of the route through Tyup town reduces the risk of direct or indirect impacts on the Reserve, nevertheless, the road project will need robust mitigation measures in place to avoid adversely affecting the nearby Biosphere Core Area, “an area that is protected through legal or other effective means”.



**Figure 6-2. UNESCO Biosphere Reserve of Issyk-Kul in the Project area**  
*Key: Blue – Core Zone; green – Buffer zone; Yellow - Transition zone*

There are some scale-related inconsistencies in the mapping of the Core Zone (and absence of a Buffer Zone in the Tyup area). This means that any overlap between the existing road alignment and the Core Zone is not clear. Correspondence with the Deputy Director of Issyk-Kul Biosphere Territory (Mr. Kanat Suiyndukov) in Balykchy indicated that the map in Figure 6-3 has since been forwarded to Parliament for approval.





Figure 6-3. UNESCO Biosphere Reserve of Issyk-Kul Map forwarded to Parliament

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 the mapping in Figure 6-3 does not show the geographic location of the existing road correctly (see Figure 6-2 where the blue line indicates the geographic position of the road). 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. These letters are provided in Appendix G.

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.

### 6.1.2. Issyk-Kul Ramsar Site

The first international recognition of the ecology and biodiversity of Issyk-Kul Lake came in 1976, when the lake was included by the Ramsar Convention on its initial list of Wetlands of International Importance, especially as Waterfowl Habitat. This designation lapsed with the break-up of the Soviet Union but was reinstated in 2003 when the KR became a signatory of the Ramsar Convention. Signatories commit to promoting the wise use of designated wetlands.

The Ramsar site area is 626,439 ha, including the Issyk-Kul Nature Reserve (Figure 6-4) and the entire surface area of Issyk-Kul Lake, and was recognized as a unique Central Asian wetland supporting vulnerable, rare and endangered species of birds and fish, including endemics. There is no officially approved management plan. There is an annual work plan and general land inventory plan which is updated every 10 years (Ramsar Information Sheet, 2013).

Article 3.2 of the Convention on Wetlands commits Contracting Parties to monitor their Ramsar sites and inform the Secretariat whenever the ecological character of a site has changed, is changing, or is likely to change as a result of human interference.

Change in ecological character is defined in paragraph 19 of Resolution IX.1 Annex A<sup>7</sup> as “[f]or the purposes of implementation of Article 3.2, change in ecological character is the human induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service”.

The Management Plan of the Issyk-Kul State Nature Reserve No. 01-9/132 for the years 2016-2021 (developed and approved on 07.06.2017) might be of assistance in determining ecological character but efforts made by the ESIA team to track down this plan and any accompanying English translation have not been successful.

As identified under Section 4.1.1 the five rivers entering the lake on the eastern side, crossed by the road project, could potentially act as a conduit for polluting fuel spills during bridge building/widening and road construction, as well as being subject to impacts such as noise and dust. Therefore the lake ecological character, particularly on its eastern side could be negatively affected during construction and operation.

The ESIA will need to identify robust mitigation actions under the Mitigation hierarchy (avoidance, minimisation, compensation) to guard against change in ecological integrity.

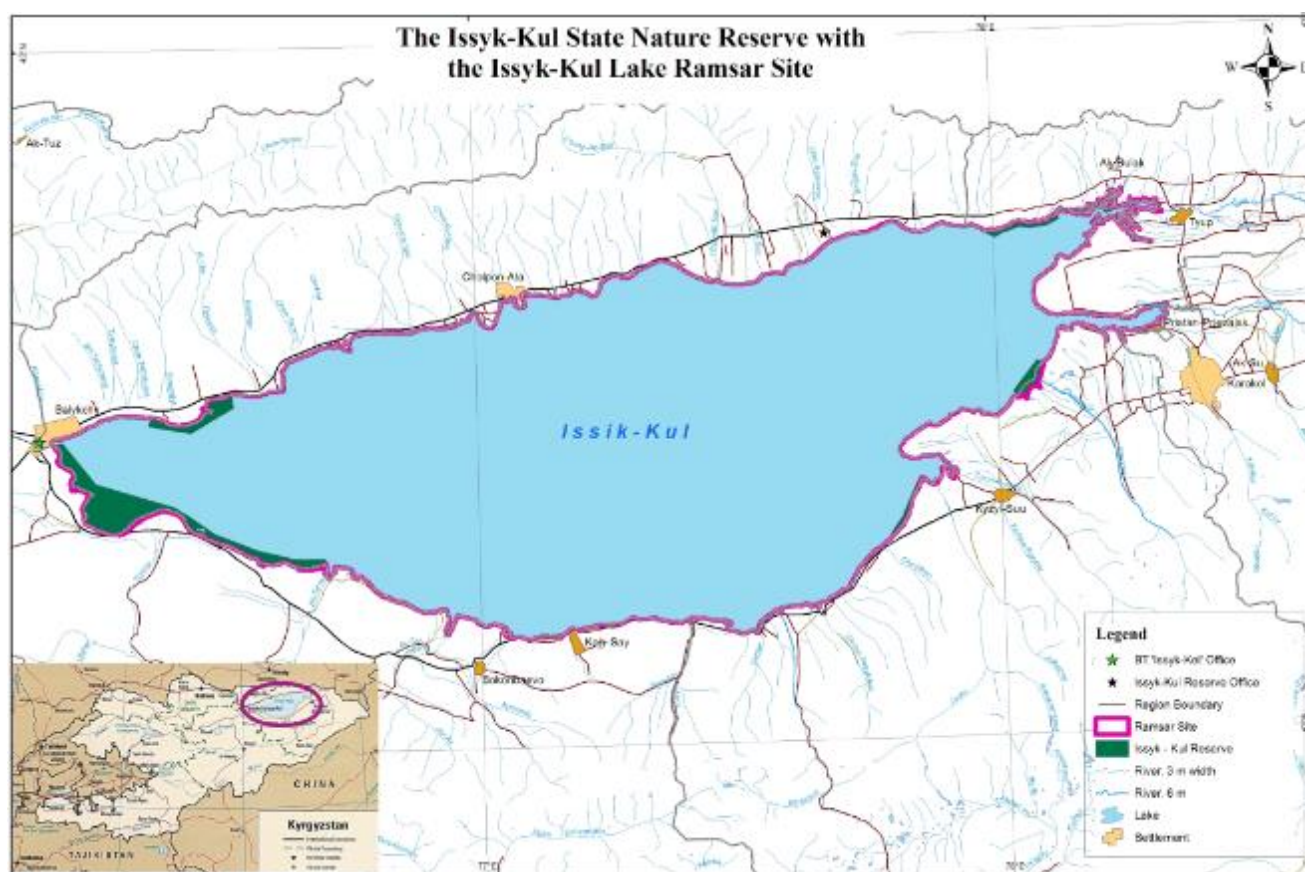


Figure 6-4. The Issyk-Kul State Nature Reserve with the Issyk-Kul Lake Ramsar Site  
(source: Ramsar Sites Information Service <https://rsis Ramsar.org/ris/1231>)

### 6.1.3. Important Bird Areas

There are 11 important Bird and Biodiversity Area (IBAs) in Kyrgyzstan, with three in the wider Project Area. An IBA is an area identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations<sup>8</sup>. These comprise:

<sup>7</sup> [https://www.ramsar.org/sites/default/files/documents/pdf/res/key\\_res\\_ix\\_01\\_annexa\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_ix_01_annexa_e.pdf)

<sup>8</sup> Available at: <http://datazone.birdlife.org/site/ibacritglob>. Accessed December 2020.



- A1. Globally threatened species. Criterion: The site is known or thought regularly to hold significant numbers of a globally threatened species;
- A2. Restricted-range species. Criterion: “The site is known or thought to hold a significant population of at least two range-restricted species”.
- A3. Biome-restricted species. Criterion: The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome; and
- A4. Congregations. Criterion: The site is known or thought to hold congregations of  $\geq 1\%$  of the global population of one or more species on a regular or predictable basis.

The IBA concept was developed by BirdLife International and sites are identified in collaboration with national stakeholders and experts. Sites are small enough to be entirely conserved and differ in their character, habitat or ornithological importance from the surrounding habitat. All existing IBAs qualify as Key Biodiversity Areas, i.e. 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater and marine ecosystems<sup>9</sup>. They are currently identified using the “Global Standard for the Identification of Key Biodiversity Areas” set out by the International Union for the Conservation of nature (IUCN) in 2016<sup>10</sup>.

The location of the three IBAs - Western Issyk Kul Lake, Eastern Issyk Kul Lake and Karkyra Valley IBA – are shown in Figure 6-5. Only the Eastern Issyk Kul Lake is considered to be within the Aol of the Project.

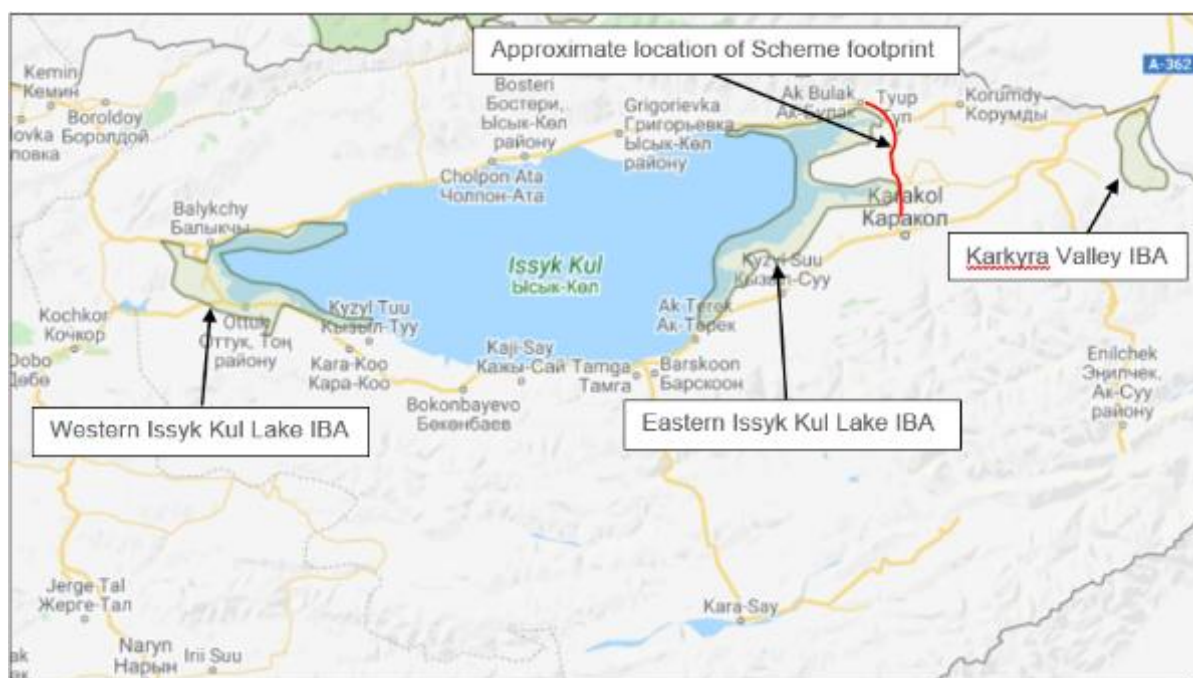


Figure 6-5. Important Bird and Biodiversity Areas in the Project Area

### Eastern Issyk-Kul Lake IBA

The criteria for the designation of the Eastern Issyk Kul Lake IBA is A4i (sites are known or thought to hold, on a regular basis, 1% or more of a biogeographic population of a congregatory waterbird species) and A4iii (sites are known or thought to hold, on a regular basis, at least 20,000 waterbirds, or at least 10,000 pairs of seabirds, of one or more species).

Criterion A4i is met as the site supports large wintering and/or passage populations of a number of waterbirds such as Ruddy Shelduck (*Tadorna ferrugina*), Common Goldeneye (*Bucephala clangula*), Red-crested Pochard, Northern Pintail (*Anas acuta*), Black-necked Grebe (*Podiceps nigricollis*) and Demoiselle Crane (*Anthropoides virgo*).

<sup>9</sup> Available at: <http://www.keybiodiversityareas.org/what-are-kbas>. Accessed December 2020.

<sup>10</sup> Available at: <http://datazone.birdlife.org/sowb/casestudy/what-are-key-biodiversity-areas>. Accessed December 2020.

Criterion A4iii is met as the site supports large numbers of wintering and passage waterbirds, i.e. between 15,00 and 40,000 wintering individuals and between 9,000 and 22,000 individuals on passage<sup>11</sup>. Key threats are from agricultural intensification, fishing and harvesting aquatic resources, human disturbance and selective logging.

The IBA boundary is close to the road alignment in two places (Figure 6-6), firstly near to the western bypass options around Tyup (Figure 6-7) and further south, nearer to Karakol the IBA extends along the River Jyrgalan, less than 100 m from the road in one place (Figure 6-8).

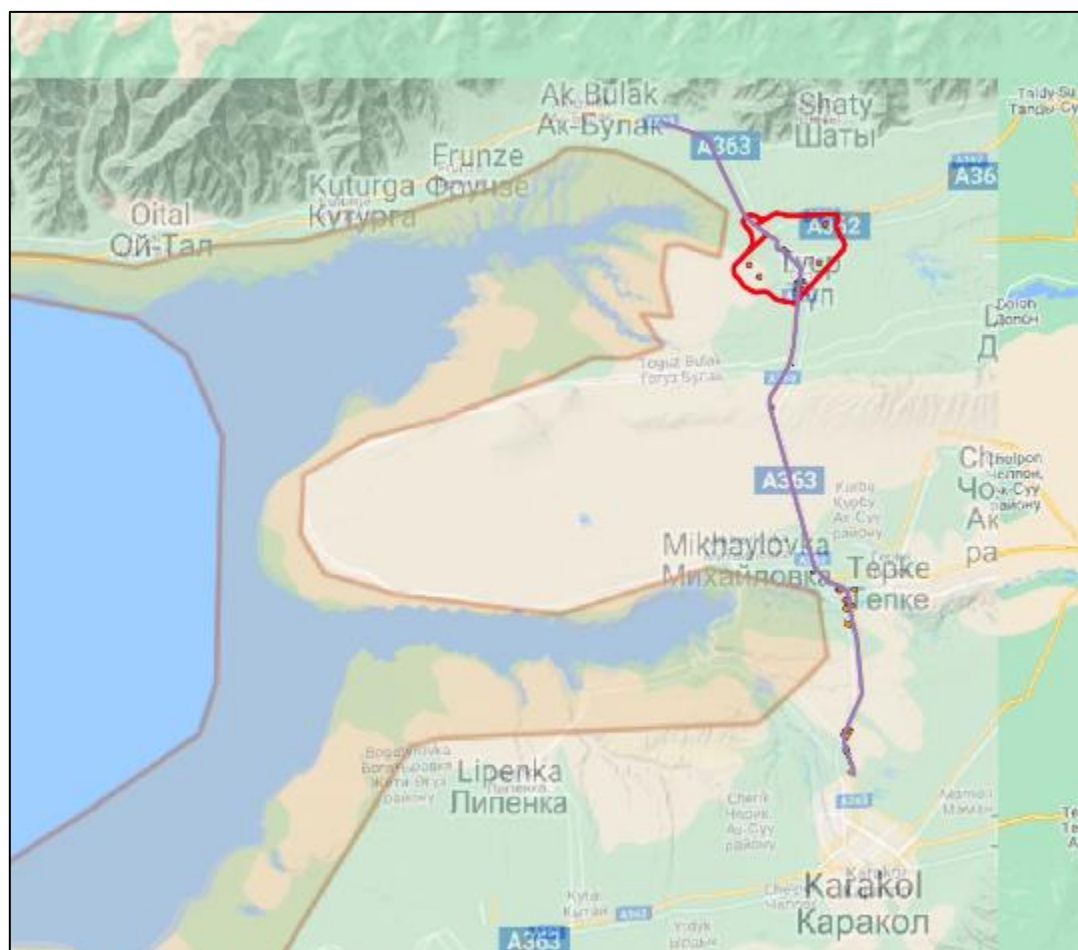


Figure 6-6. Eastern Issyk-Kul Lake IBA and location of the Road Project

<sup>11</sup> Available at: <http://datazone.birdlife.org/site/factsheet/eastern-issyk-kul-lake-iba-kyrgyzstan/details>. Accessed December 2020.

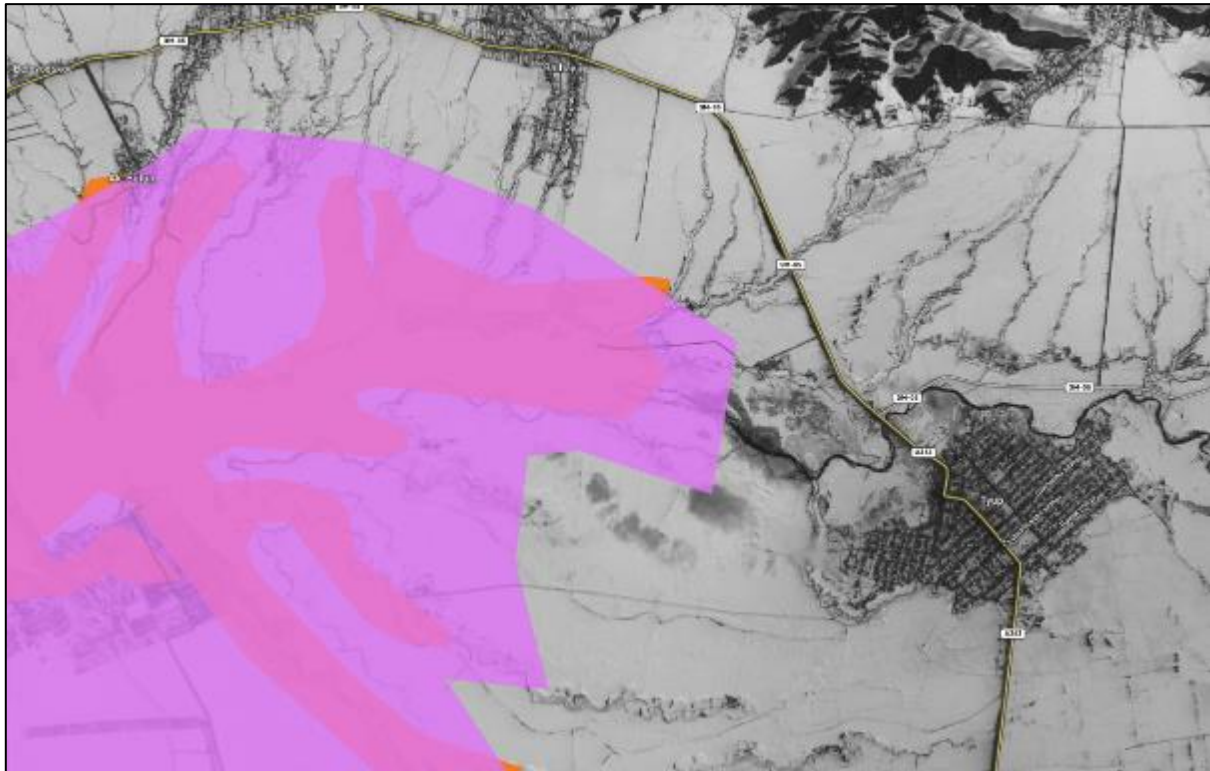


Figure 6-7. Eastern Issyk-Kul Lake IBA in the vicinity of Tyup

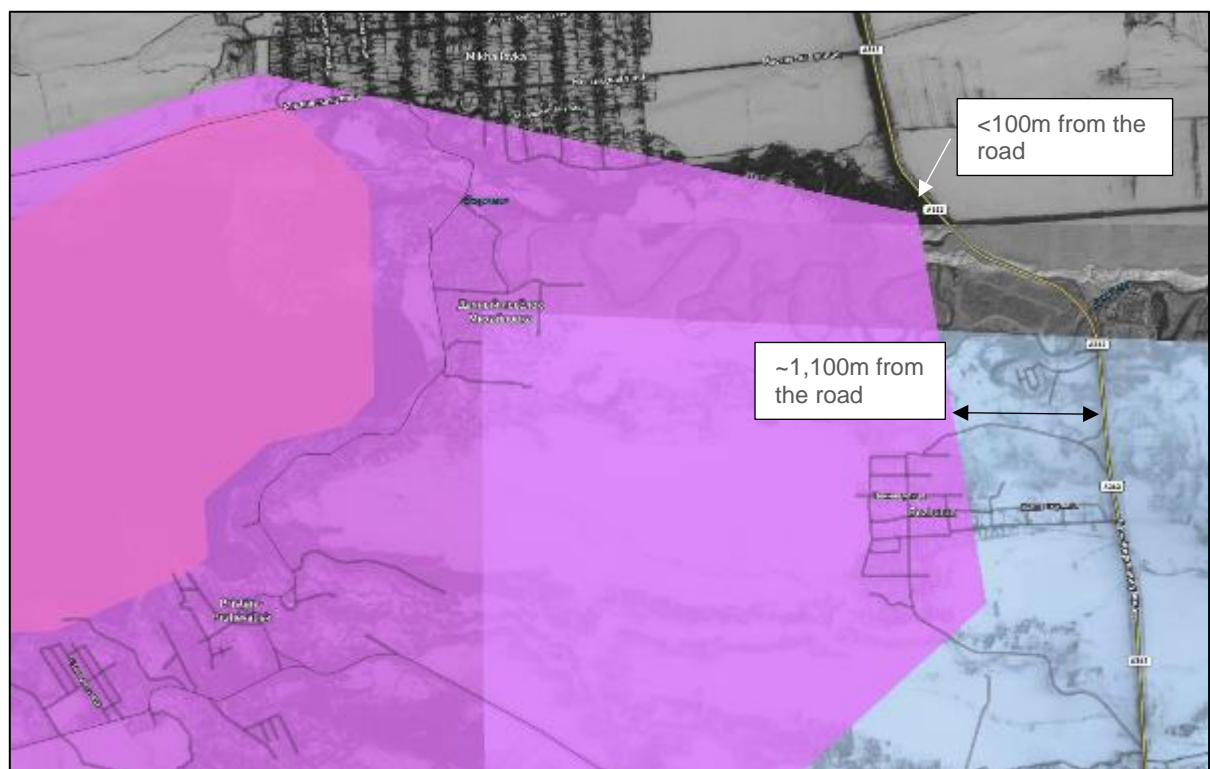


Figure 6-8. Eastern Issyk-Kul Lake IBA traversed by the River Jyrgalan

The Project has the potential to adversely affect the nearby IBA, an area that is internationally recognised, and as such will need to incorporate strong mitigation measures to guard against this.



## 6.2. National designations

### 6.2.1. Issyk-Kul Strict Nature Reserve

Issyk-Kul Nature Reserve (Figure 6-9) is one of two State Nature Reserves in the Kyrgyz Republic, created in 1948 and was the first such reserve in the country. The main conservation area incorporates the lake itself, and there is a 2 km buffer zone inland of the coast. The rationale for designating the reserve was to protect water-birds and the coastal flora and fauna; and to control fishing. The protected area covers almost 20,000 ha and includes 10 separate land plots (in which both hunting and fishing are prohibited), comprising the main areas occupied by birds and other fauna and flora.

The Project has the potential to adversely affect the nearby State Nature Reserve, an area that is protected through legal means, and must identify, assess and mitigate potential project-related impacts

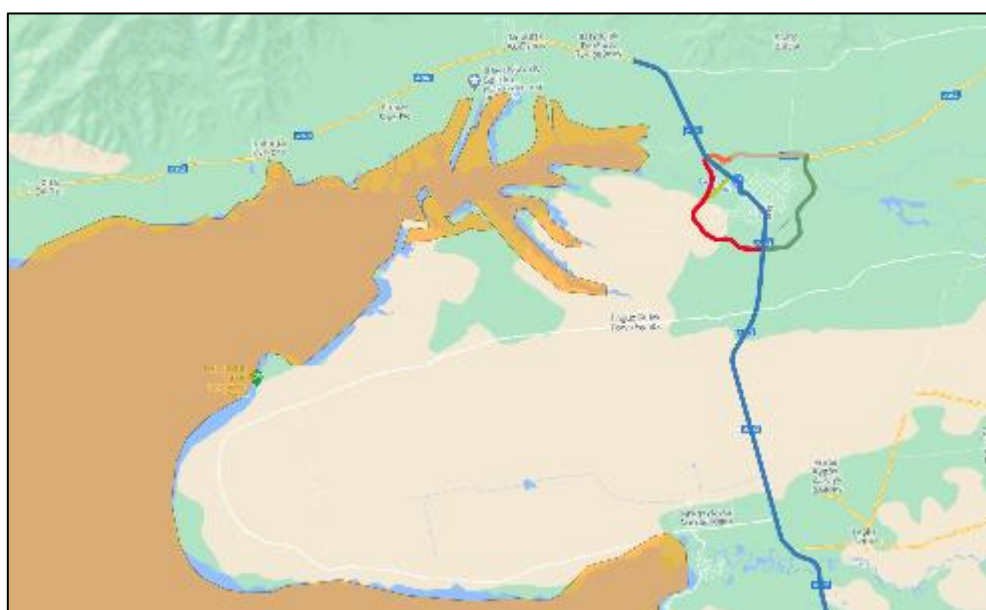


Figure 6-9. Issyk-Kul State Nature Reserve

## 7. Implications and next steps

Whilst the upgrade and widening of the road will follow the alignment of an existing road, the Project does occur in Critical Habitat and in areas with PBFs as defined in EBRD guidance and summarised in Table 7-1. This recognition of biodiversity importance is based on the biodiversity values and not the potential impacts associated with the Project. The Project will need to pay special attention to management of biodiversity impacts, particularly to avoid contributing to change in ecological character on the Issyk-Kul Lake.

One of the BMP / compensation measures that would help the Issyk-Kul Biosphere Reserve would be some further, carefully mapped ecological survey of the reserve area adjoining the road project north west of Tyup and the preparation of a management plan with clarified boundaries. An objective of the surveys and plan would be to consider the addition of a Buffer Zone, that at present is missing in this area. Surveys should be conducted not too late in autumn and not too early in spring to maximise species presence.

Where significant adverse impacts are predicted to occur, lender standards require projects to carefully follow the mitigation hierarchy. No net loss is required, and preferably a net gain, for priority biodiversity.

The cumulative effects and residual impact assessments will provide necessary information for the Biodiversity Management Plan (BMP). The BMP demonstrates how the Project will apply the mitigation hierarchy to address significant direct and indirect impacts and evaluate how the Project will achieve at least no net loss for CH and PBFs.

**Table 7-1. Critical Habitat and PBF assessment summary**

<b>Critical Habitat criteria</b>		<b>Applicability - Tyup-Karakol Road Project</b>
(i)	Highly threatened or unique ecosystems	✓ Yes, on account of the close vicinity of Issyk-Kul lake and its adjoining rivers crossed by the Project road.
(ii)	Habitats of significant importance to Critically Endangered and Endangered species	X. No. Additional field surveys in autumn, winter and spring did not confirm this.
(iii)	Habitats of significant importance to Endemic or geographically restricted species	✓ Yes, on account of endemic fish known to occur in the 5 rivers crossed by the Project road, and the plant <i>Astragalus projecturus</i> , Also on a precautionary basis, for the Asiatic frog as a geographically restricted species.
(iv)	Habitats supporting globally significant migratory or congregatory species	X. No, in the immediate vicinity of the road (i.e. western Tyup bypass flood plain area, Jergalan river floodplain. ✓ Yes, on account of the neighbouring Ramsar site and IBA, considered within the Aol of the Project.
(v)	Areas associated with key evolutionary processes	✓ Yes, on account of the Issyk-Kul Lake's endemic fish
(vi)	Ecological functions that are vital to maintaining the viability of biodiversity features	✓ Yes, on account the rivers crossed by the Tyup-Karakol road that support endemic fish. Riverine and floodplain habitat in the western and eastern Tyup bypass area, and along the rivers potentially support the Asiatic frog as a restricted range species.
<b>Priority Biodiversity Features criteria</b>		
(i)	Threatened habitats	✓ 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.
(ii)	Vulnerable species	✓ With confirmation of the presence of Whooper Swan, Osprey and the tulip <i>Tulipa tetraphylla</i>
(iii)	Significant biodiversity features identified by a broad set of stakeholders or governments	✓ 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 are therefore qualify as PBFs.
(iv)	Ecological structure and functions needed to maintain the viability of priority biodiversity features described in PR6 paragraph 14	X 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.

Following the step-by-step approach illustrated in Figure 7-1 below will enable the Project to follow industry good-practice standards for biodiversity (EBRD). Demonstrating good practice through such biodiversity management will offer an opportunity for the Tyup-Karakol Road Project to provide a responsible lead to the overall project rehabilitation of the 111.5 km long Balykchy-Karakol Road.

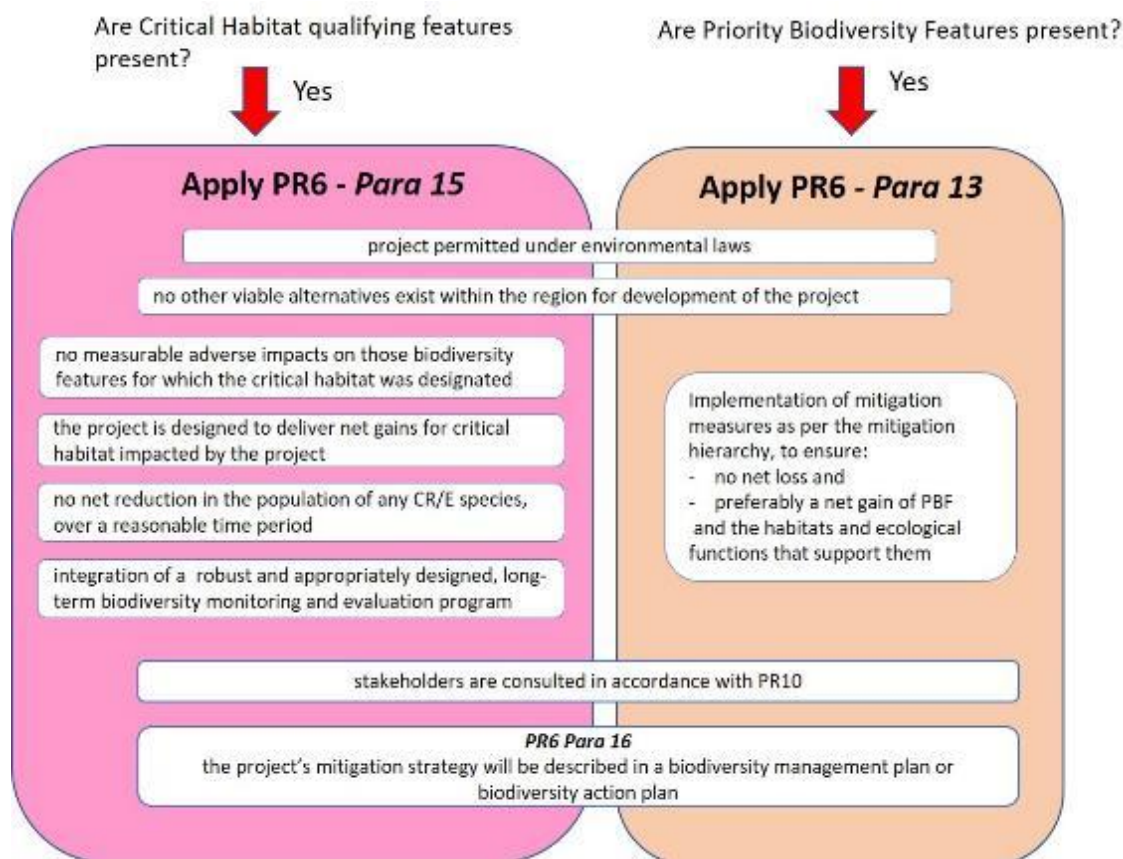


Figure 7-1. PR6 requirements for operating in Critical Habitats or having Priority Biodiversity Features



## 8. References

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# Appendices



## Appendix A. EBRD identification of biodiversity risks – the CH process

EBRD standards to define the value of biodiversity features focus on the ecological functions of the ecosystems with Priority Biodiversity Features and Critical Habitats classified as the most important features.

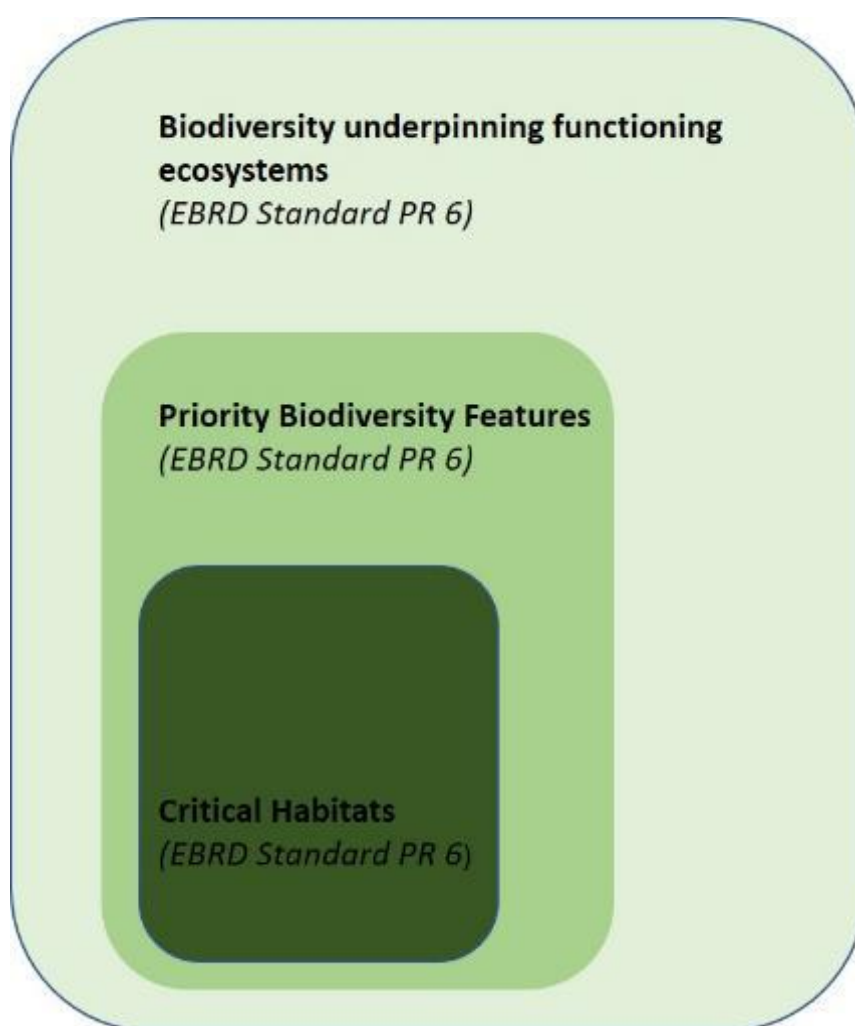


Figure A-1. Classification of biodiversity features following PR6 standards



## Appendix B. Criteria for biodiversity features

Criteria for the identification of potential Critical Habitat in PR6 are defined in Paragraph 14 of PR6. They are listed in Table B-1 and in Figure D-1.

**Table B-1. PR6 Criteria for Critical Habitat**

Features	PR6
Highly threatened or unique ecosystems	Criterion i
Habitats of significant importance to Critically Endangered and Endangered species	Criterion ii
Habitats of significant importance to Endemic or geographically restricted species	Criterion iii
Habitats supporting globally significant migratory or congregatory species	Criterion iv
Areas associated with key evolutionary processes	Criterion v
Ecological functions that are vital to maintaining the viability of biodiversity features described in PR6 paragraph 14	Criterion vi

PR6 also makes provision for Legally Protected and Internationally Recognised Areas as Critical Habitat (PR6 paragraph 19-20), including:

- UNESCO Natural World Heritage Sites
- UNESCO Man and the Biosphere Reserves
- Key Biodiversity Areas
- Important Bird and Biodiversity Areas
- Important Plant Areas
- Alliance for Zero Extinction Sites and
- wetlands designated under the Convention on Wetlands of International Importance ('the Ramsar Convention').

**Table B-2. Critical Habitat thresholds used in this assessment as defined by IFC PS6 and IFC GN 6 (January 1, 2012, updated June 27, 2019)**

Criteria	Threshold
Criterion 1 (Criterion ii of PR6): Critically Endangered (CR)/ Endangered (EN) Species	<ul style="list-style-type: none"> <li>(a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (<math>\geq 0.5\%</math> of the global population AND <math>\geq 5</math> Reproductive units<sup>12</sup> of a CR or EN species).</li> <li>(b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).</li> <li>(c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species</li> </ul>
Criterion 2 (Criterion iii of PR6): Endemic/ Restricted Range Species	Areas that regularly hold $\geq 10\%$ of the global population size AND $\geq 10$ reproductive units of a species.
Criterion 3 (Criterion iv of PR6): Migratory/ Congregatory Species	<ul style="list-style-type: none"> <li>(a) Areas known to sustain, on a cyclical or otherwise regular basis, <math>\geq 1</math> percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.</li> <li>(b) Areas that predictably support <math>\geq 10</math> percent of the global population of a species during periods of environmental stress.</li> </ul>
Criterion 4 (Criterion i of PR6): Highly Threatened and/or Unique Ecosystems	<ul style="list-style-type: none"> <li>(a) Areas representing <math>\geq 5\%</math> of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.</li> <li>(b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.</li> </ul>
Criterion 5 (Criterion v of PR6): Key evolutionary processes	No threshold

<sup>12</sup> PS6 GN.16 The IUCN Biodiversity Areas standard uses the following definition for reproductive unit: "the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species." Eisenberg, 1977. The Evolution of the Reproductive Unit in the Class Mammalia.

# Appendix C. Examples of features that may meet criteria for Critical Habitat

The Guidance note on EBRD PR6 provides examples of features that may meet criteria for Critical Habitat listed in Table C-1.

**Table C-1. PR6 examples of features meeting criteria for Critical Habitat**

Features		Definition/examples
(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. For example: <ul style="list-style-type: none"> <li>▪ Ecosystems listed as, or meeting criteria for, Endangered or Critically Endangered by the IUCN Red List of Ecosystems</li> <li>▪ Areas recognised as priorities in official regional or national plans, such as National Biodiversity Strategy and Action Plans</li> <li>▪ Areas determined to be of high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally-recognised NGOs).</li> </ul>
(ii)	Critically Endangered and 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). For example: <ul style="list-style-type: none"> <li>▪ Alliance for Zero Extinction sites</li> <li>▪ Animal and plant species of community interest in need of strict protection as listed in EU Habitats Directive (Annex IV)</li> </ul>
(iii)	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. For example: <ul style="list-style-type: none"> <li>▪ Alliance for Zero Extinction sites</li> <li>▪ Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for restricted-range species.</li> </ul>
(iv)	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. For example: <ul style="list-style-type: none"> <li>▪ Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for congregatory species</li> <li>▪ Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar Convention.</li> </ul>
(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. For example: <ul style="list-style-type: none"> <li>▪ Isolated lakes or mountaintops</li> <li>▪ Populations of species listed as priorities by the Edge of Existence programme.</li> </ul>
(vi)	Ecological functions that are vital to maintaining the viability of biodiversity features described in PR6 para 14	Ecological functions without which critical biodiversity features could not persist. For example: <ul style="list-style-type: none"> <li>▪ Where essential for critical biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species</li> </ul>



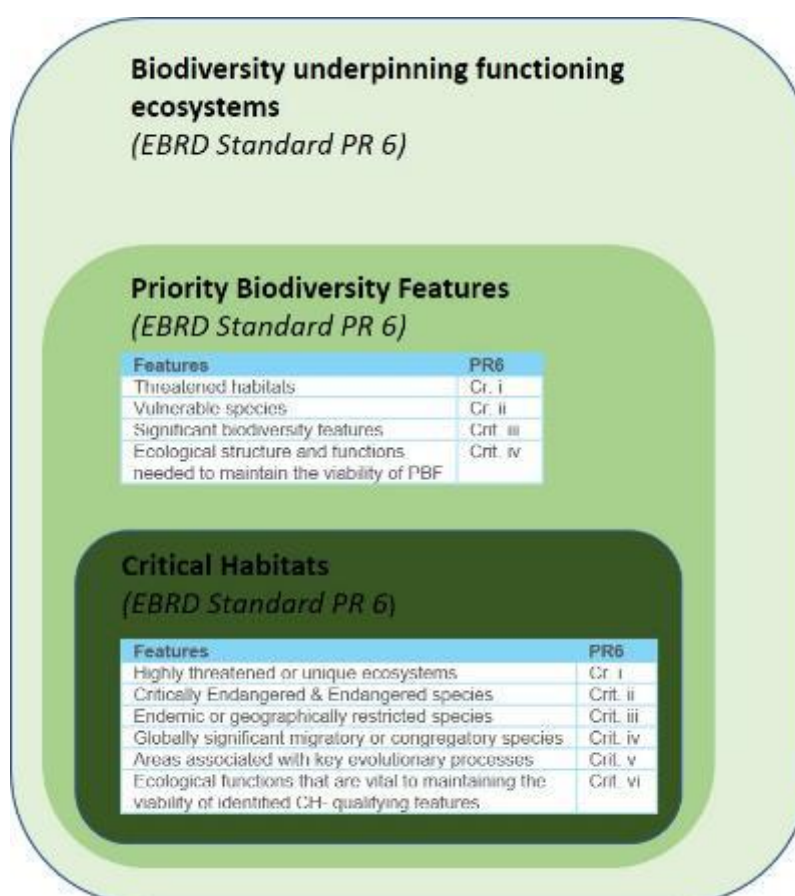
# Appendix D. Identifying Priority Biodiversity Features

PR6 requires that a Project identifies Priority Biodiversity Features present in the Project area (PR6 paragraph 12). Criteria are listed in Table D-1 and in Figure D-1.

In current practice, such features are often identified as species or issues that do not merit Critical Habitat status but remain of concern from a conservation perspective. Assessment is done based on expert opinion.

**Table D-2. PR6 Criteria for Priority Biodiversity Features**

Features	PR6
Threatened habitats	Criterion i
Vulnerable species	Criterion ii
Significant biodiversity features identified by a broad set of stakeholders or governments	Criterion iii
Ecological structure and functions needed to maintain the viability of priority biodiversity features described in PR6 paragraph 14	Criterion iv



**Figure D-1. Classification of biodiversity features following PR6 standards**

# Appendix E. Critical Habitat and relationship with Priority Biodiversity Features

Examples of features that may meet criteria for critical habitat and relationship with criteria for priority biodiversity features are listed in the table below (from EBRD 2014).

Critical Habitat as per PR 6 (2014), para 14	Definition/examples	Priority biodiversity features as per EBRD PR6 (2014), para 12
(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. For example: <ul style="list-style-type: none"> <li>▪ Ecosystems listed as, or meeting criteria for, Endangered or Critically Endangered by the IUCN Red List of Ecosystems</li> <li>▪ Areas recognised as priorities in official regional or national plans, such as National Biodiversity Strategy and Action Plans</li> <li>▪ Areas determined to be of high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally-recognised NGOs).</li> </ul>	(i) Threatened habitats
(ii) Critically Endangered and 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). For example: <ul style="list-style-type: none"> <li>▪ Alliance for Zero Extinction sites</li> <li>▪ Animal and plant species of community interest in need of strict protection as listed in EU Habitats Directive (Annex IV)</li> </ul>	(ii) Vulnerable species
(iii) 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. For example: <ul style="list-style-type: none"> <li>▪ Alliance for Zero Extinction sites</li> <li>▪ Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for restricted-range species.</li> </ul>	(iii) Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas)
(iv) 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. For example: <ul style="list-style-type: none"> <li>▪ Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for congregatory species</li> <li>▪ Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar Convention.</li> </ul>	
(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. For example: <ul style="list-style-type: none"> <li>▪ Isolated lakes or mountaintops</li> <li>▪ Populations of species listed as priorities by the Edge of Existence programme.</li> </ul>	(iv) Ecological structure and functions needed to maintain the viability of priority biodiversity features
(vi) Ecological functions that are vital to maintaining the viability of	Ecological functions without which critical biodiversity features could not persist. For example: <ul style="list-style-type: none"> <li>▪ Where essential for critical biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes,</li> </ul>	

Critical Habitat as per PR 6 (2014), para 14	Definition/examples	Priority biodiversity features as per EBRD PR6 (2014), para 12
biodiversity features described in PR6 para 14	seasonal refuges or food sources, keystone or habitat-forming species	



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

Several habitat maps of the Tyup-Karakol road were developed, based on delineating distinct habitat types evident on Google Earth, and are shown below along with a table listing the habitat types and their codes. The most ecologically sensitive of these were then checked by CAIC with ground surveys to provide more information on vegetation types, species and condition.

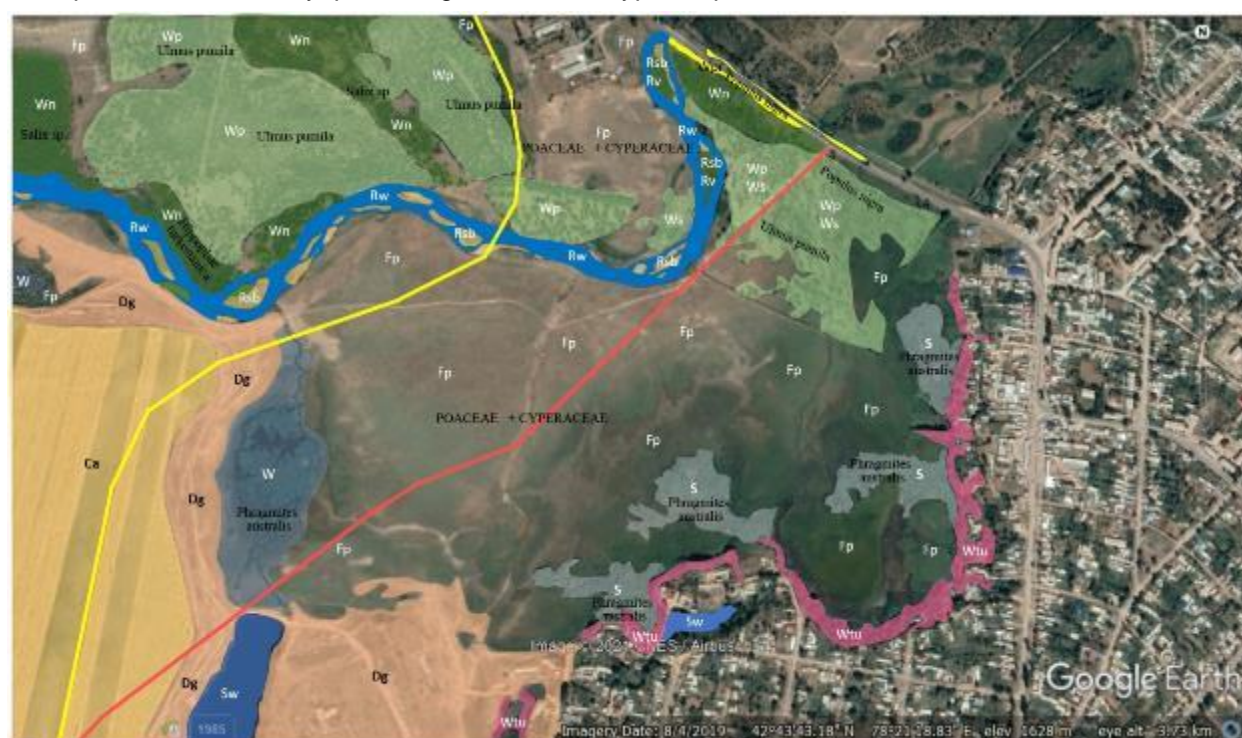
North West of Tyup (blue line is a very approximate boundary of the Biosphere Reserve Core Area shown in the inset image). The accuracy of this boundary is questionable as it includes agricultural land of low biodiversity value. The State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic General Directorate of the Issyk-Kul Biosphere Territory has since confirmed (letter dated 11/01/2022 No. 01-23 / 04 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.



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

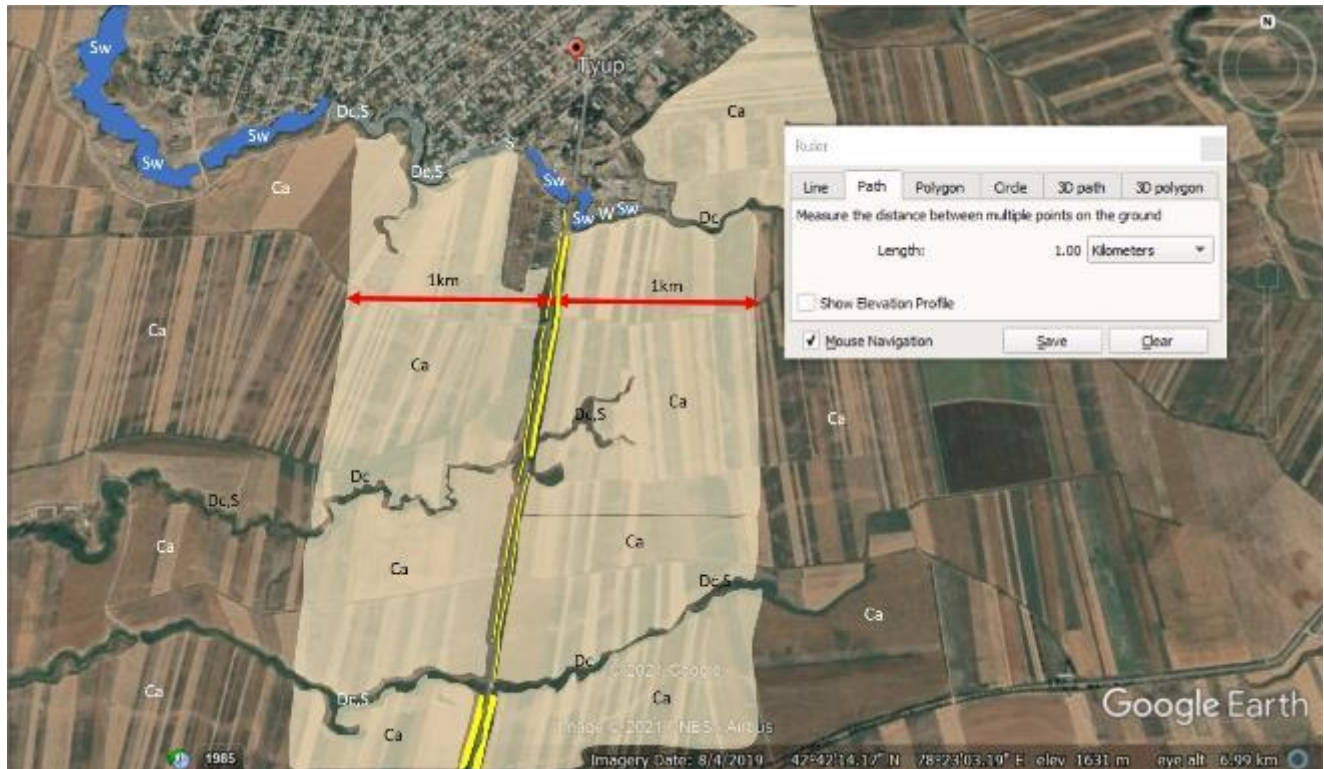


Floodplain area west of Tyup showing the western bypass options

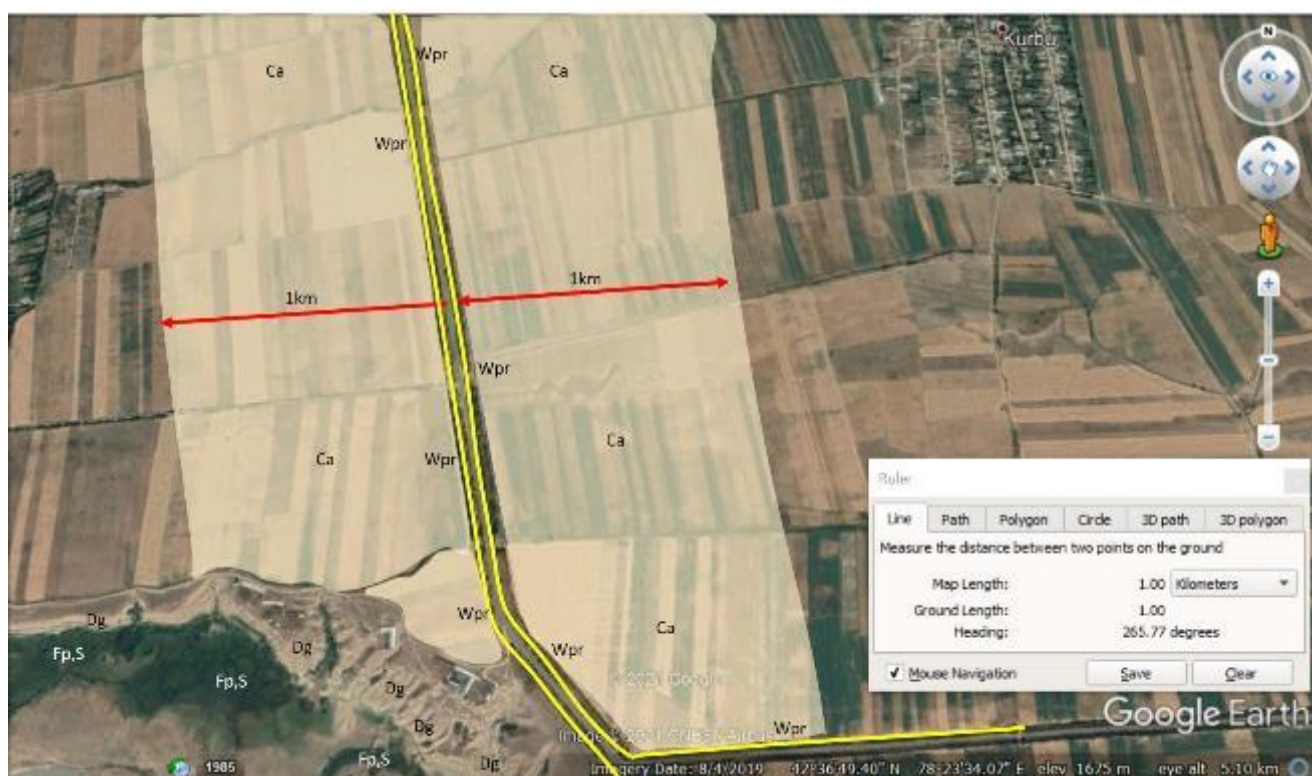


Maps below show sections progressively southwards from Tyup to Karakol, with the Critical Habitat 1km assessment zone either side of the road, often dominated by cultivated areas (map code 'Ca' - sandy colour). Note that scales vary between habitat maps).

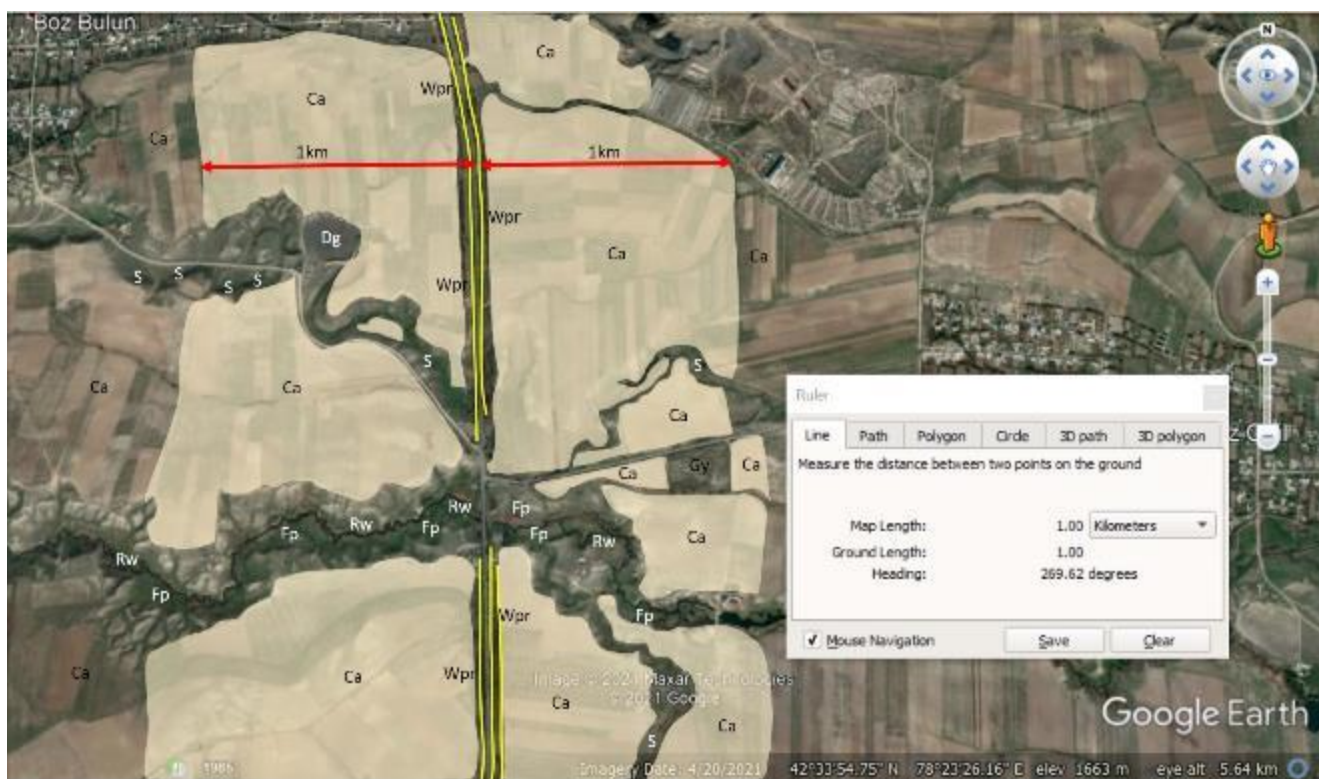




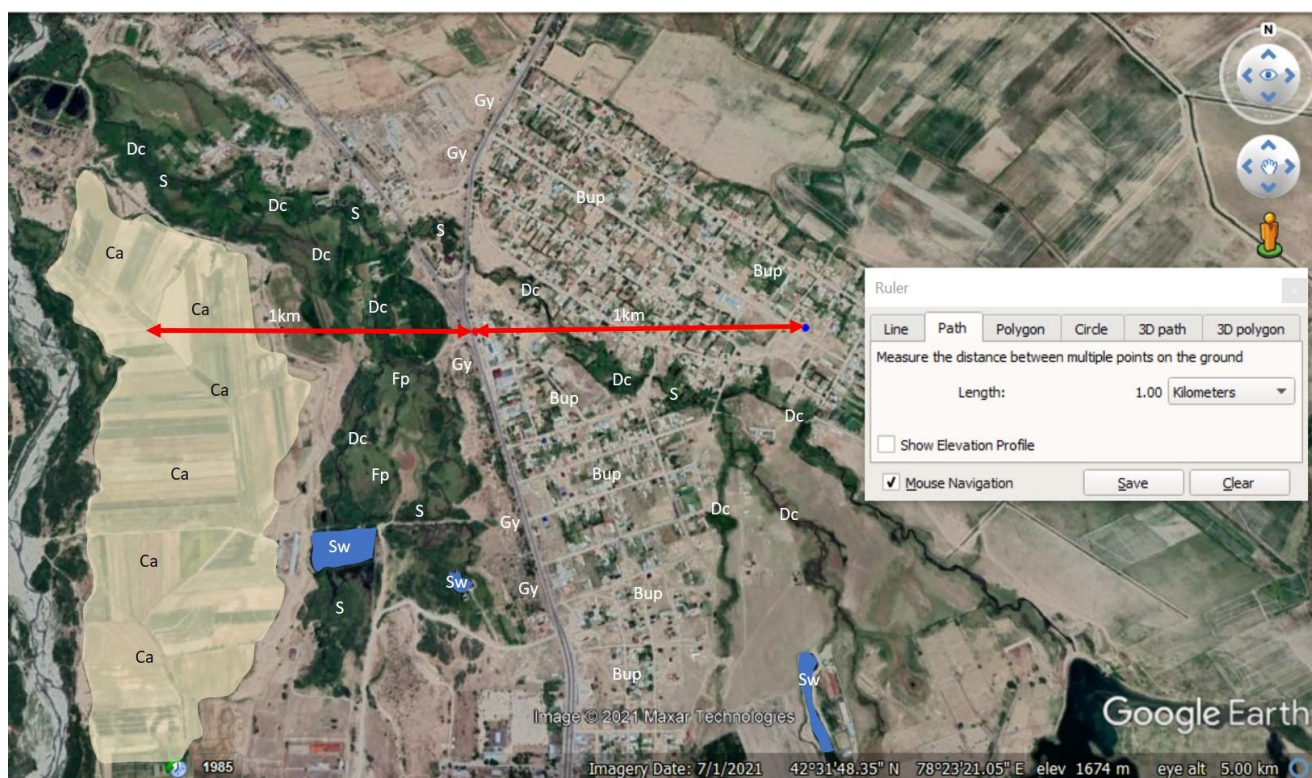














## Habitat maps - classification and coding – Tyup-Karakol

Code	Habitat type	Sub-type	Notes
Wn	Woodland (trees > 5m when mature)	Natural	
Wp		Plantation	
Wpr		Planted roadside	
Ws		Scattered trees	
Wtu		Trees urban fringe	
Fp (colour=Google Earth)	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
W	Wetland	Wetland	
Wr (colour=Google Earth)		Reeds	
Dc	Drainage channel		Can be an irrigation channel
S	Scrub (seral or climax vegetation dominated by locally native shrubs, < 5 m tall, occasionally with a few scattered trees)	Native shrubs	
Rv	Riverine	Vegetated	
Rsb		Sand bar	
Rw	Running water	River	
Sw	Standing water		
IK	Issyk-Kul Lake		
Ca	Cultivated ground	Arable	
Co		Orchard –for “horti-agricultural” trees	Can only be confirmed in field
Dg	Disturbed ground		
Bup (colour=Google Earth)	Built-up areas		
St	Steppe		
M	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
Q	Quarry		
Gy	Grave yard		

### Notes:

- Habitat changes may have occurred as the habitat mapping is based on the Google Earth image dates which vary.
- 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.

## Appendix G. Correspondence with State Agency for Environmental Protection and Forestry

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