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ROGUN BYPASS PROJECT

Biodiversity Update Report

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PROJECT NO. 70056162

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EXECUTIVE SUMMARY

WSP was commissioned to undertake a rapid biodiversity baseline assessment in relation to the proposed Rogun bypass road project, Tajikistan. This assessment supplements work already undertaken to inform a draft ESIA produced for the project.

Work to inform this assessment comprised a literature review, targeted stakeholder consultation, and site visit/walkovers.

The assessment identifies a number of potential biodiversity impacts that will require mitigation to be implemented in order that sufficient protection is afforded biodiversity throughout construction and operation of the road. In summary, the impacts comprise the following:

- Direct loss/potential mortality during construction
- Potential disturbance impacts during construction
- Potential introduction/spread of invasive species during construction
- Potential increased illegal hunting/collecting during operation
- Potential wildlife road traffic accidents during operation

Mitigation will be delivered through a Biodiversity Management Plan (BMP). This will be informed by a full route walkover in advance of any construction activities in order to identify specific features/areas for which targeted mitigation will apply. The project is not anticipated to result in any residual impacts to Critical Habitats/ and/or Priority Biodiversity features. Nevertheless, the project will explore opportunities for biodiversity enhancement measures, especially in relation to temporary construction areas.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

WSP was commissioned by European Bank for Reconstruction and Development (EBRD) to undertake a rapid baseline assessment of potential biodiversity effects resulting from the construction of a section of the Rogun Bypass Project (hereafter the 'Project'). The Project is part of an overall road construction/rehabilitation scheme (hereafter the 'Scheme') to provide a replacement road to the existing M41 road, which will be lost upon completion/operation of the Rogun Dam (i.e. the M41 road will be permanently flooded beneath the reservoir upstream of the dam).

The Project comprises Lot 2 of the Scheme, and extends for c. 49km between Tagi Kamar and the Vakhsh River. The Scheme is illustrated below (Project extents denoted by *).

Figure 1-1 - Scheme western extent

Figure 1-2 - Scheme eastern extent

Although the WSP commission pertains specifically to the Project extents only, the whole Scheme is considered throughout this report to reflect the holistic nature of biodiversity receptors and potential impacts.

1.2 GAP ANALYSIS

An Environmental and Social Impact Assessment (ESIA) has already been produced for the Scheme, including a dedicated section on biodiversity. WSP was commissioned to undertake a gap analysis of the draft ESIA in order to assess compliance of the work completed with EBRD's Performance Requirements (PR). The gap analysis identified potential compliance issues in relation

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to PR 6 – Biodiversity Conservation and Management of Living Natural Resources[1], which has prompted the need for the rapid baseline assessment.

1.3   REPORT STRUCTURE

This report is structured as follows:

- Brief review of the gap analysis undertaken;
- Methods employed to address the gaps identified;
- Results of the rapid baseline assessment;
- EBRD PR 6 compliance review;
- Mitigation and recommendations.

Information included within this report will be used to inform an updated ESIA for the Project.

[1] EBRD (2014). EBRD Performance Requirement 6 – Biodiversity Conservation and Sustainable Management of Living Resources.

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2 GAP ANALYSIS SUMMARY

2.1 INTRODUCTION

A review was completed of the draft ESIA for the Scheme[2] in March 2019. Additionally, a review of the updated ESIA[3] was also undertaken in May 2019 to capture any updates pertinent to biodiversity.

2.2 GAPS IDENTIFIED

The following main/broad gaps were identified as part of this study:

- Lack of clarity over proportionality/seasonality of baseline data collection;
- Lack of detail of potential biodiversity risks (i.e. focussing at a regional/national level in many places);
- Lack of consideration of potential impacts to migratory fauna;
- Lack of consideration of invasive species; and
- Limited impact assessment.

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[2] ADB (2018). Central Asia Regional Economic Cooperation Corridors 2, 3, and 5 (Obigarm-Nurobod) Road Project. Volume 1 – Environmental Impact Assessment. Interim draft EIA.

[3] ADB (2019). Central Asia Regional Economic Cooperation Corridors 2, 3, and 5 (Obigarm-Nurobod) Road Project. Volume 1 – Environmental Impact Assessment. Draft EIA.

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3 ASSESSMENT METHODOLOGY

3.1 LITERATURE REVIEW

A literature review was undertaken in order to provide context for the rapid baseline assessment, and also to supplement findings from the consultation and walkover exercises (beyond information presented within the draft ESIA(s)). This review comprised interrogation of various resources, which are referenced throughout.

3.2 CONSULTATION

A face-to-face consultation exercise was undertaken during week-commencing 13 May 2019, and subsequently via email. This exercise comprised consultation with the following individuals/organisations (dates included).

Table 3-1 – Consultation Log

Name	Organisation/Role	Date of consultation
Dr. Bashid	Local EIA expert (commissioned by ADB)	15/05/2019
Dr. Safarov Nematullo	Head of the Laboratory for Biodiversity – Committee for Environmental Protection	15/05/2019
Abduvohidzoda Eraj	Deputy Exec. Director, PIURR	13/05/2019
Tavarov Sulaymon	Chief Specialist for Resettlement, PIURR	13/05/2019

3.3 SITE WALKOVER

A targeted walkover (and drive-through) of the Scheme was undertaken on 14 May 2019, focussing mainly on areas of perceived highest biodiversity value, and/or greatest potential impact. The main spatial area of focus was the Project extent (i.e. the Project footprint and surrounding area to c. 100m, access permitting).

The walkover was completed by a biodiversity specialist, with over 14 years' experience of undertaking ecological survey and assessment, including in excess of 35 international commissions during the past five years. The walkover comprised a broad appraisal of the habitats present, together with an informed review of the potential for these habitats to support important biodiversity.

Specific elements/findings obtained from the walkover were checked against published literature, and during the above consultation exercise, where considered appropriate.

3.4 PR 6 COMPLIANCE REVIEW

PR 6 requires potential impacts to biodiversity to be identified, through an appropriately scoped baseline data collection exercise. Following this, an assessment of potential biodiversity risks is required, with the mitigation hierarchy and Good International Practice (GIP) adopted in order to reduce the residual impacts to an acceptable level.

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Concurrent with the above, PR 6 also recognises areas/features of increased biodiversity value, with two tiers of such value identified (and defined) as follows[4]:

- Critical Habitat (as triggered by the following criteria):

    - i) *Highly threatened or unique ecosystems*
    - ii) *Habitats of significant importance to endangered or critically endangered species*
    - iii) *Habitats of significant importance to endemic or geographically restricted species*
    - iv) *Habitats supporting globally significant migratory or congregatory species*
    - v) *Areas associated with key evolutionary processes*
    - vi) *Ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph*

- Priority Biodiversity Features (as triggered by the following criteria):

    - i) *Threatened habitats*
    - ii) *Vulnerable species*
    - iii) *Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas)*
    - iv) *Ecological structure and functions needed to maintain the viability of priority biodiversity features described in this paragraph*

3.5 LIMITATIONS

This aim of this study is to undertake a targeted, rapid baseline assessment of the biodiversity relevant to the Project (and to a lesser extent, the Scheme as a whole), in order that any areas/features which would require detailed consideration to ensure compliance with PR 6 are sufficiently identified. As such, there was no dedicated ecological field survey undertaken (i.e. that would utilise specific field survey techniques). It is not considered that this represents a significant limitation to the findings of this study, with an appropriate level of understanding as to the composition of the biodiversity baseline obtained from the literature review, consultation and site walkover elements.

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[4] Recognising that the project is not located in a legally protected and/or internationally recognised area of biodiversity value

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4 RESULTS

4.1 INTRODUCTION

This section provides a broad baseline description of the Project in terms of the habitat composition. Following this, a description is provided of notable flora and fauna present (or considered likely to be present) within the Scheme Zone of Influence[5] (ZoI).

The information presented within this section summarises the baseline information already documented within the existing draft ESIA. Additional detail is provided where the existing draft ESIA is considered to be lacking (i.e. addressing the outcomes of the gap analysis exercise). With this in mind, the existing draft ESIA should be referred to for additional baseline information.

Much of this section (and the subsequent PR 6 compliance text) relies upon a risk-based approach, based on habitat suitability.

4.2 PROTECTED AREAS

No protected areas are situated within the ZoI. The closest such example is the Romit State Nature Reserve, which lies c. 25km to the north-west of the Scheme. This area was previously recognised by the International Union for Conservation of Nature (IUCN) as a major biodiversity site, but has lost this status due to the value of the Reserve having been compromised by unregulated grazing, wood gathering, and illegal hunting[6].

The next closest area is the Sari Khosor National Park, which lies c. 30km to the south of the Scheme.

4.3 HABITATS

The Scheme is located within an area characterised by habitats that exhibit signs of anthropogenic influence, to varying levels. Much of this is due to long-term grazing pressure and tree-clearance; this has resulted in a short grass sward, interspersed with herbs. Tree removal has also resulted in soil destabilisation and subsequent erosion. **Figure 4-1** below illustrates a typical landscape snapshot along the Scheme (note livestock tracks, sparse tree cover and bare earth).

The wider area is known to support ancient fruit/nut tree species, thought to be the ancestors of modern, commercial tree species. Elsewhere, cultivated fruit/nut trees are present within village gardens and small holdings.

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[5] The Zone of Influence is defined as '…*the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities.'*. Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. Chartered Institute of Ecology and Environmental Management, Winchester.

[6] Ning, Wu; Rawat, GS; Joshi, S; Ismail, M; Sharma, E. (2013). High-altitude rangelands and their interfaces in the Hindu Kush Himalayas. Kathmandu: ICIMOD

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Figure 4-1 - Typical Scheme landscape illustrating degradation of previously wooded area

In areas where grazing pressure is reduced, more diverse habitat pockets exist, including meadow habitats, pockets of native woodland, and scrubby hillsides.

The Scheme also contains a number of riparian zones, of varying sizes (13 formal bridge crossings will be required as part of the Scheme, together with additional informal crossing points). The habitats here are relatively lacking in vegetation, reflecting the dynamic nature of the watercourses (i.e. subject to regular spate conditions).

4.4   FAUNA

Faunal diversity across the Scheme (and wider area) is diverse, with numerous animal groups represented. The presence of key faunal species (i.e. those of increased conservation concern) will vary throughout the year depending upon prevailing weather conditions, prey availability, as well as other influences such as local livestock movement.

Large carnivores are considered to be very infrequent visitors to the Scheme ZoI, with snow leopard *Panthera uncia*, wolf *Canis lupus,* and brown bear *Ursus arctos* only potentially present during periods of prolonged snow cover at higher altitudes (i.e. when they are forced to forage at lower altitudes) (Dr. Bashid/Dr. Nematullo pers. comm). A programme of supplementary feeding is managed by the state forest authority to help reduce potential conflict between large carnivores (in particular wolves), and livestock farmers (Dr. Bashid, pers. comm); this likely reduces the numbers of individual carnivores accessing the Scheme ZoI.

The bare rock/cliff faces are likely to offer suitable roosting opportunities for bats, with ample foraging resource across the Scheme ZoI (an abundant insect assemblage was noted during the walkover). Furthermore, these areas will also likely provide a sheltering resource for reptiles. In addition, abandoned tunnelling which commenced during the initial construction activities for the Scheme will also provide suitable features for roosting bats (see **Figure 4-2** below). In particular,

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bats may use these tunnels over the winter months when they are likely to offer constant temperatures and conditions suitable to support hibernation, with a reduced predation risk.

Figure 4-2 - Abaondoned tunnelling (eastern end of the Karagach tunnel)

A diverse bird assemblage is present across the Scheme ZoI, with passerines the most numerous – in many cases utilising the same foraging resource as bats above. Species of particular interest which are confirmed/likely to be present include Egyptian vulture *Neophron percnopterus* (foraging behaviour observed during the walkover), griffon vulture *Gyps fulvus*, black vulture *Coragyps atratus*, and golden eagle *Aquila chrysaetos*. As with bats, the rock/cliff faces (and scree) offer suitable nesting opportunities; passerines were observed exhibiting nesting behaviour (i.e. alarm calling, carrying food, etc.) around such features during the walkover.

During the walkover, a relatively abundant invertebrate assemblage was observed, reflecting the lush flora present within the Scheme ZoI during late-spring. Butterflies such as clouded yellow Colias sp. and blue species (Family Lycanidae) were observed.

There are no significant animal migrations that occur across the Scheme ZoI (Dr. Nematullo pers. comm). Local migration is common, and heavily dependent upon prevailing weather conditions (as suggested above re: carnivore movements – there is no indication that the ZoI supports any den/shelter sites for such animals).

4.5   FLORA

The most abundant flora across the Scheme ZoI are perennial grasses, generally of short sward, and indicative of ongoing grazing practice in the region. In areas where grazing pressure is less pronounced, a lusher grass sward prevails, with herbs and shrubs also present. Species such as rose *Rosa kokanica*, hawthorn (likely *Cretaegus pontica*) were noted.

In many places (especially where the existing Scheme alignment has been created through rock), the Scheme footprint and immediately surrounding areas are characterised by scattered ruderals and pioneer species (such as wormwood *Artemisia* sp.), amongst locally extensive areas of bare ground (rock falls/landslips were observed in places).

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Trees are scattered across the Scheme ZoI, and vary between planted stands/rows, and remnant trees/stands. The species composition is relatively uniform, with the lowland and riparian areas dominated by species such as poplar *Populus* sp., and walnut *Junglans regia*, and the higher altitudes supporting willow *Salix* sp., and maple *Acer* sp.

Fruit trees are present within the scattered settlements and managed property gardens/holdings across the Scheme ZoI, and there are likely scattered wild fruit trees also present (including the potential presence of ancient specimens).

No non-native, invasive species have been identified within the Scheme ZoI. There has been migration of some common grasses and herbs to higher altitudes as a result of annual cattle movement.

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5 ASSESSMENT

5.1 INTRODUCTION

The existing Scheme alignment (where visible) does not directly support any biodiversity species of conservation value of note, mainly due to the habitat loss/disturbance that will have occurred during original work carried out in the late-20th century, and the subsequent, ongoing (low-level) use of the Scheme by local people. There remains the potential for effects to occur outwith the existing Scheme alignment, as well as indirectly (e.g. through disturbance). This section presents a rapid assessment of potential impacts in line with PR 6. PR 6 requires the client to '…*manage its risks in accordance with the mitigation hierarchy and GIP* (good international practice) …'. Where areas/features of increased importance are identified, a greater level of assessment is required, with more strict controls in place to prevent degradation of such areas. The most important areas are termed 'Critical Habitats' (CH), with those of slightly less biodiversity value (but still of high importance) termed 'Priority Biodiversity Features' (PBF).

This section considers CH and PBF in the first instance, before detailing an assessment of general biodiversity impacts.

5.2 CRITICAL HABITAT/PRIORITY BIODIVERSITY FEATURES SCREENING

CRITICAL HABITATS

As per Section 3.4, CH are defined within the context of six discrete criteria. This section discusses the potential for triggers of these criteria to be present within the Scheme ZoI.
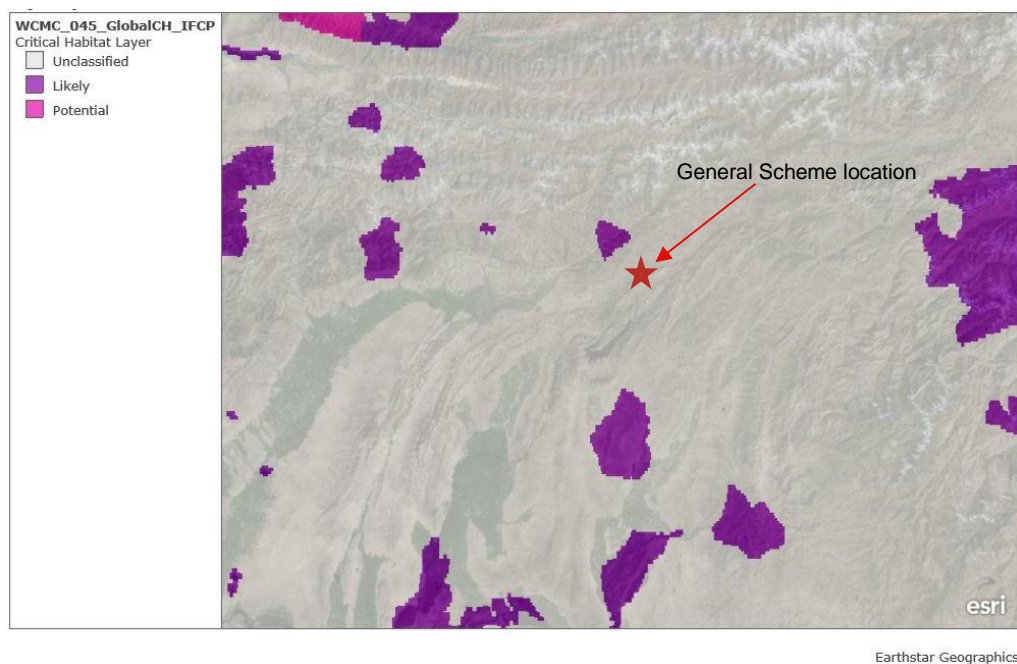
Table 5-1 - Critical Habitat Screening

CH Criterion	Potential CH Trigger	CH Summary
i) *Highly threatened or unique ecosystems*	No protected areas (or areas of sufficiently high nature conservation value) are contained within the Scheme ZoI.	None present. No further consideration required.
ii) *Habitats of significant importance to endangered or critically endangered species*	The Scheme ZoI contains habitats which may be occasionally used by IUCN endangered (EN) and critically endangered (CR) species, such as Egyptian vulture and ancient fruit tree species. There is no indication that the ZoI performs any significant role in supporting any such species.	None considered present. Discussed further below.
iii) *Habitats of significant importance to endemic or geographically restricted species*	The Scheme extends across habitats that are typical of the region, and are/have been subject to baseline of relative, historical disturbance. No endemic/restricted range species are considered to be present within the Scheme ZoI.	None present. No further consideration required.

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CH Criterion	Potential CH Trigger	CH Summary
iv) *Habitats supporting globally significant migratory or congregatory species*	There are no significant congregations of migratory species occur across the Scheme ZoI.	None present. No further consideration required.
v) *Areas associated with key evolutionary processes*	The Scheme ZoI does not contain features specifically associated with key evolutionary processes; the potential presence of genetically significant ancient fruit trees is captured within criterion ii) above.	N/A, but considered further below in the context of ancient fruit/nut trees.
vi) *Ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph*	No particular ecological functions have been identified across the Scheme ZoI that would represent a significant consideration under this criterion (i.e. no significant hydrological pathways, green corridors, etc.).	None present. No further consideration required.

A review of the UNEP WCMC Critical Habitat Screening Tool[7] revealed an area considered 'likely' to be CH, c.500m north of the Scheme. This area corresponds with the Romit State Nature Reserve (see above). See **Figure 5-1** below for illustrative purposes.

Figure 5-1 - CH Screening Tool Output

Earthstar Geographics

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[7] Brauneder, K. M, Montes, C., Blyth, S., Bennun, L., Butchart, S. H. M., Hoffmann, M., et al. (2018). Global screening for Critical Habitat in the terrestrial realm. PLoS ONE 13(3): e0193102. https://doi.org/10.1371/journal.pone.0193102

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The sections below present further information in support of the conclusions detailed above, where considered appropriate.

ii) Habitats of significant importance to endangered or critically endangered species

There are 22 species listed as EN or CR under the IUCN Red List[8] in Tajikistan. Of these, three species (all birds) may make use of the Scheme ZoI for foraging purposes: Egyptian vulture (observed near the Project), steppe eagle *Aquila nipalensis*, and saker falcon *Falco cherrug*. It is possible (based on broad range information detailed within Eastwood *et al.* (2009)[9]) that remnant individuals of two ancient fruit tree species (a pear tree *Pyrus korshinskyi* and a cherry tree *Prunus tadzhikistanica*) may also be present, although this is considered very unlikely - no records were documented within the original ESIA, and consultation on Red Data Book plant species did not reveal their potential presence. Furthermore, the most significant extents of these species are located within reserves identified in Tajikistan's National Biodiversity Strategy and Action Plan[10], situated away from the Scheme ZoI. There is also the slight possibility that a honeysuckle *Lonicera paradoxa* may also be present at very low numbers. No other IUCN EN or CR species will make use of the Scheme ZoI, based upon published literature regarding their extent, and/or general lack of suitable habitat.

Potential impacts relevant to the above comprise direct losses during construction, disturbance during construction, increased access to areas for hunting/collecting, and increased mortality from collisions during operation of the new road. Whilst impacts are not anticipated, precautionary mitigation measures are described within Section 6, with generic (good practice) measures also included.

Regardless of the above, there is no evidence that the Scheme ZoI plays a significant role in supporting any species that would trigger CH under this criterion.

v) Areas associated with key evolutionary processes

Whilst not the explicit intent of criterion v) to address ancient food crop species, there is an evolutionary element to their relative value, and so it is considered appropriate to provide a brief review under this criterion (alongside that presented above).

Tajikistan supports globally important fruit and nut forests, containing species of significant importance by virtue of them being the genetic basis of commercial/domesticated fruit and nut varieties. The more extensive areas of these trees are protected within national parks; however, it is possible that small, extant fragments (i.e. individual trees) of a wider coverage still exist within the Scheme ZoI. These trees are threatened across their range from over-grazing, collection, habitat loss, etc., and similar pressures are relevant to the Scheme.

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[8] Accessed at www.iucnredlist.org
[9] Eastwood, A., Lazkov, G, & Newton, A. 2009. The Red List of Trees of Central Asia.
[10] Flora & Fauna International (2019). Conserving threatened fruit-and-nut forests in Tajikistan. Accessed at: https://www.fauna-flora.org/projects/conserving-threatened-fruit-nut-forests-tajikistan

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Potential impacts relevant to the above comprise direct losses of individual trees during construction, and increased access to areas for collecting. Precautionary mitigation measures are described within Section 6, with generic (good practice) measures also included.

Regardless of the above, ***there is not (/no longer) a sufficiently large, contiguous, extent of these species for the Scheme ZoI to perform an important role in their long-term survival (any individual trees still present would not constitute a viable population due to the inherent fragmentation and low numbers). There is therefore no CH trigger under this criterion.***

PRIORITY BIODIVERSITY FEATURES

As per Section 3.4, PBF are defined within the context of four discrete criteria. This section discusses the potential for triggers of any these criteria to be present within the Scheme ZoI. Note that where a feature/category has been considered under the CH review above, it is not further considered as PBF.

Table 5-2 - Priority Biodiversity Feature Screening

PBF Criterion	Potential PBF Trigger	PBF Summary
i) *Threatened habitats*	The habitat assemblage across the Scheme ZoI is typical for the region. The Scheme is not considered to be of significant importance to any threatened habitats.	None present. No further consideration required.
ii) *Vulnerable species*	There is the potential for the Scheme ZoI to support IUCN vulnerable (VU) species, in particular foraging raptors, and Russian tortoise *Testudo horsfieldii*.	Potentially present. Considered further below.
iii) *Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas)*	No protected/formally identified areas of increased conservation value within the Scheme ZoI.	None present. No further consideration required.
iv) *Ecological structure and functions needed to maintain the viability of priority biodiversity features described in this paragraph*	No particular ecological functions have been identified across the Scheme ZoI that would represent a significant consideration under this criterion (i.e. no significant hydrological pathways, green corridors, etc.).	None present. No further consideration required.

The sections below present further information in support of the conclusions detailed above, where considered appropriate.

ii) Vulnerable species

There are 30 IUCN VU species known to occur in Tajikistan. In addition, the recently updated Red Book of Tajikistan contains around 500 species. The Scheme ZoI has the potential to support representatives from both lists, including snow leopard, raptors such as eastern imperial eagle *Aquila heliaca*, and insects such as predatory bush cricket *Saga pedo*. Anecdotal evidence (backed

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up through consultation undertaken with the Committee for Environmental Protection) would suggest that the prevailing/historical baseline of relative disturbance across the Scheme ZoI will have prevented any significant assemblages of vulnerable species from becoming established here. No evidence of important areas of the Scheme ZoI for vulnerable species was recorded during the walkover or through in-country consultation and literature review.

Potential impacts relevant to the above comprise direct losses during construction, disturbance during construction, increased access to areas for hunting/collecting, and increased mortality from collisions during operation of the new road. Whilst impacts are not predicted, precautionary mitigation measures are described within Section 6, with generic (good practice) measures also included.

Regardless of the above, ***there is no evidence that the Scheme ZoI plays a significant role in supporting any species that would trigger PBF under this criterion***.

Given the likelihood that vulnerable species do occasionally make use of the Scheme ZoI, a series of generic and targeted mitigation measures have been recommended, and are detailed within Section 6.

5.3 GENERAL BIODIVERSITY

Beyond the review completed above, there is also the requirement under PR 6 for potential risks to biodiversity to be managed in an appropriate manner. The main areas of concern in this regard relate to construction impacts to sensitive species such as those make use of features/habitats within the Scheme ZoI for sheltering purposes (e.g. hibernating bats, nesting birds, and roosting bats).

Areas of relatively natural/semi-natural habitat within the ZoI will be susceptible to degradation from construction activities. This may occur as a result of ancillary construction activities such as establishing temporary compounds, access routes, etc. Of greatest interest in this regard are pockets/stands of native woodland which still exist across the Scheme ZoI. Tajikistan's forests have been reduced by 85%, leaving just 3% of the country covered by forest[11].

The Scheme ZoI supports numerous features which will be used by sheltering animals; most notably mature trees, rock/cliff faces, and built structures. Direct and indirect disturbance to these features, i.e. from construction activities in/on such features, or those within disturbance distance, could result in abandonment by sheltering animals, and/or direct mortality. Activities such as blasting and tunnelling have the potential to result in high levels of local disturbance. Animals which make use of such features for sheltering are often highly sensitive to disturbance, and could feasibly be lost from large areas of the Scheme ZoI as a result. Furthermore, construction lighting could adversely impact nocturnal animals.

Current livestock movement patterns will likely be of local importance to scavenging animals, in particular birds such as black vulture and griffon vulture. The Scheme will potentially result in

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[11] Flora & Fauna International (2019). Country profile – Tajikistan. Accessed at: https://www.fauna-flora.org/countries/tajikistan

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changes to livestock movements, thus impacting species which rely on the associated carrion or faeces as part of their foraging regime.

The Scheme will provide increased local access across its extent, which poses potential risks in terms of increased poaching of wild animals, and picking/collecting of fruit/seeds. Furthermore, increased/new road use in the area will potentially impact local animal movement through vehicle collisions, in particular during the period within which animals are habituating to the operational Scheme.

The above impacts/concerns will be managed through implementation of standard, good practice mitigation (described within Section 6). Furthermore, there is an opportunity for effective, local education and awareness-raising to improve local biodiversity.

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6 MITIGATION AND RECOMMENDATIONS

6.1 INTRODUCTION

This section describes the mitigation required to help ensure compliance with PR 6, and also describes additional/general recommendations to further the interests of biodiversity within the Project.

6.2 SPECIFIC MITIGATION

A series of specific mitigation measures are described within **Table 6-1** below.

Table 6-1 – Specific Mitigation Measures

Mitigation measure	Details	ESAP reference
Pre-construction walkover	A pre-construction walkover of the whole route should be undertaken to specifically identify key biodiversity features. This should be undertaken by a suitably experienced biodiversity specialist, with sufficient knowledge of local flora and fauna. Particular attention should be paid to the following: - Ancient fruit trees; - Red Book species (especially nest sites/shelters of Red Book fauna); - Key foraging areas for Red Book species (especially in relation to scavenging raptors).	6.1
Biodiversity Management Plan	A Biodiversity Management Plan (BMP) should be produced to protect and enhance the biodiversity resource across the Scheme ZoI. The BMP should be informed by findings from the walkover above, as well as existing information/literature. The BMP should detail a series of Aims; Objectives requiring to be met in order to deliver the Aims; and specific Actions to be undertaken in to meet the Objectives. The BMP will document the commitments required to protect biodiversity during construction, including (but not limited to) the following. - Buffer distances around key biodiversity features (i.e. as identified from the above) to be adhered to during construction. - Where possible, micrositing of construction activities to avoid key biodiversity features. - Sympathetic timing of works to prevent disturbance to key fauna during sensitive life stages (i.e. nesting birds; roosting bats, etc.). - Informed restoration of temporary works area to increase local biodiversity – mainly applicable to the verge reinstatement. - Monitoring of wild animal road traffic accidents.	6.2

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Mitigation measure	Details	ESAP reference
	- Provision of replacement nesting/roosting features where appropriate (e.g. where tunnelling may result in the loss of bat roosts, etc.). This provision should be at least like-for-like in terms of number of features. - Sensitive lighting plan to reduce impacts to foraging bats and other nocturnal fauna.	
Local stakeholder liaison/education	As part of the overall education programme planned for the project, targeted engagement with local landowners/livestock farmers should be undertaken to help reduce, and prevent increases in, illicit hunting, poaching and seed/fruit collection. In addition to the above, consultation with the state forest authorities should be undertaken to understand the programme of supplementary feeding in the region. Should road traffic accident monitoring reveal an impact to large carnivores, supplementary feeding should be adapted to reduce the ongoing risk of this occurring.	6.3

6.3 GENERAL RECOMMENDATIONS

Alongside those measures described above, a series of generic mitigation measures are also relevant, and are described within **Table 6-2** below.

Table 6-2 – General Mitigation Measures

Mitigation Measure	Details	ESAP Ref.
Timing of works	Where suitable features have been identified to support sheltering/breeding fauna, construction activities should be planned to avoid these features during the most sensitive periods (most notably nesting birds, roosting bats, hibernating reptiles, etc.). The key periods in this regard broadly comprise the following months: - April – July (nesting birds and summer roosting bats) - October – March (roosting bats) - October – March (hibernating reptiles) In order to prevent an overly restrictive timing of works, the above periods should only come in to consideration where suitable features have been identified. These measures will be captured within the BMP.	6.2
Pre-construction checks	Where it has not been possible to avoid the sensitive periods as detailed above, a walkover of construction sites should be undertaken immediately pre-construction to identify any resident fauna which should be protected during construction. Should relevant fauna be confirmed as present then these features should be buffered to avoid disturbance until the feature is no longer in use (e.g. when bird nesting has been completed).	6.2

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Mitigation Measure	Details	ESAP Ref.
	These measures will be captured within the BMP.	
Biosecurity/Invasive species	Biosecurity measures should be employed throughout construction to prevent the introduction of non-native species in to the Scheme ZoI. The extent of such measures should be documented within the BMP, and will be informed by factors such as source of construction machinery and materials. The measures should include (but are not limited to) the following. - Traceable construction materials, and certification with regards their provenance and sterility. - Wheel washing for vehicles coming to/from the Scheme ZoI from different regions. - Use of appropriate, native flora (of local/regional provenance) for restoration activities.	6.2
Environmental/animal welfare protection	Construction sites should be secured when not in use to prevent environmental damage and access/harm to wild animals. This should include (but is not limited to) the following. - Covering excavations, or providing a means of escape (e.g. accessible ramp structure). - Securing dangerous/toxic materials. - Maintaining a safe working distance from watercourses and applying pollution prevention measures throughout. - Preventing/managing littering through provision of adequate refuse collection and education of workforce. - Restricting access outwith the construction site footprint. These measures will be detailed within the BMP.	6.2

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7 CONCLUSIONS

7.1 SUMMARY

This report summarises the updated biodiversity information collected in relation to the Scheme, and presents an assessment against the requirements of PR 6. Information from this report has been included within the ESIA for the Scheme.

No significant biodiversity concerns have been identified, although a number of measures have been recommended to ensure that the potential for rare and endangered species to be present across the Scheme ZoI is appropriately managed.

7.2 PR 6 COMPLIANCE

There are not considered to be any Critical Habitat or Priority Biodiversity Feature triggers present within the Scheme ZoI. This is mainly due to the existing/historical baseline of disturbance along the Scheme alignment, together with prevailing land-use across the wider area (i.e. influenced in most areas by settlements and livestock farming).

In order to ensure ongoing protection of biodiversity, additional information regarding specific location of features/species of increased value will be collected and this will inform a bespoke Biodiversity Management Plan, to be adopted and deployed throughout construction and operation of the Scheme.

Opportunities for enhancement through education/awareness-raising have been identified, together with a restoration proposal that will increase biodiversity upon completion of works.

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