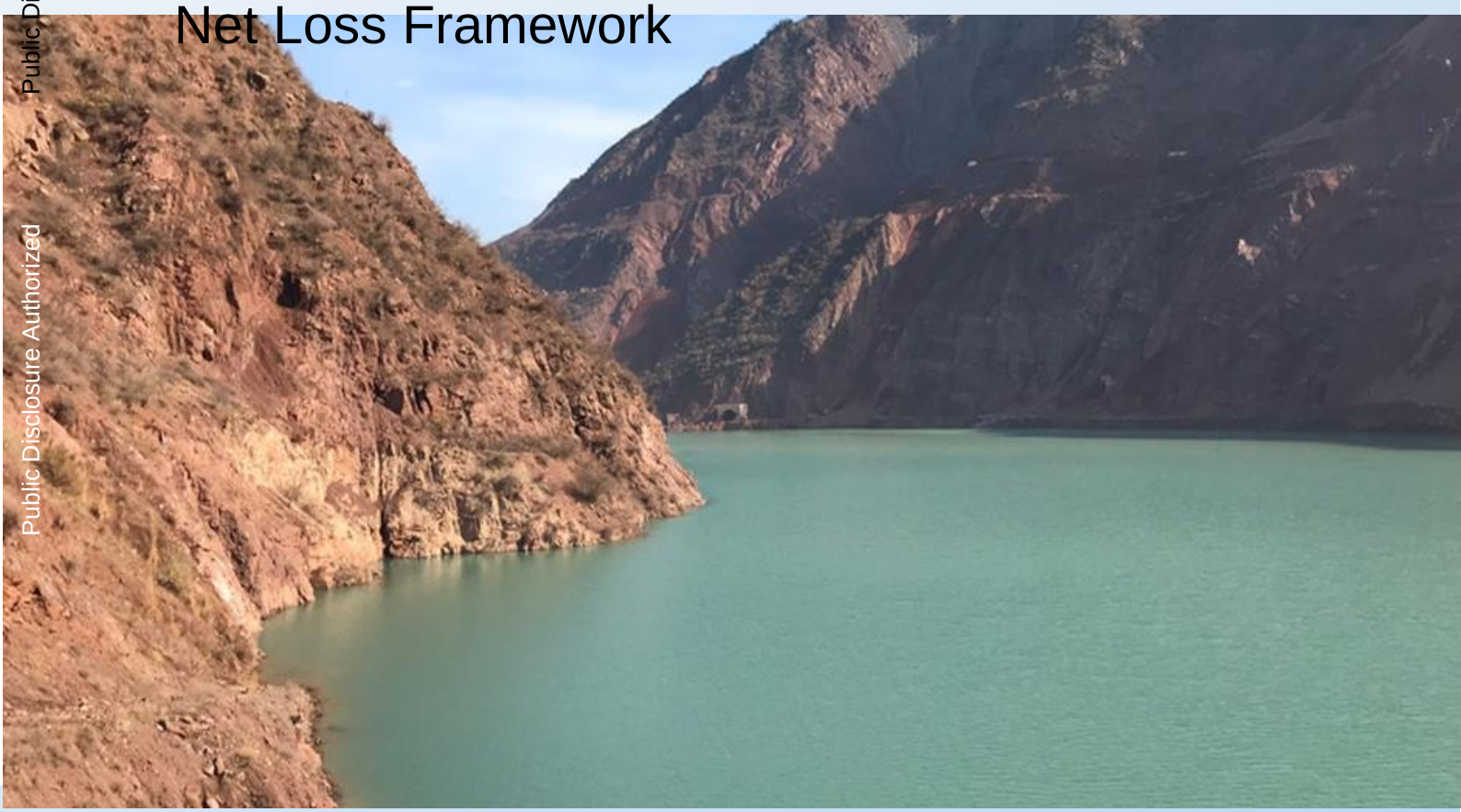
JSC “Rogun HPP”

State Enterprise “Directorate for Flooding Zone of Rogun HPP”

Project Management Group For Energy Facilities Construction Under The President Of The Republic Of Tajikistan

ROGUN HYDROPOWER PROJECT - UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Volume 3: Biodiversity Management Plan and No Net Loss Framework



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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION TO THE BIODIVERSITY MANAGEMENT PLAN

1.1.1 This Biodiversity Management Plan (BMP) has been prepared for the Rogun Open Joint Stock Company (JSC) (hereafter referred to as 'Rogun JSC') by WSP UK Limited (hereafter referred to as 'WSP') for the Rogun Hydropower Project (HPP) (hereafter referred to as 'the Project').

1.1.2 The Government of Tajikistan established Rogun JSC to own and operate the Project. Tajikistan also established the Project Management Group (PMG) for Energy Facilities Construction under the President of the Republic of Tajikistan, which is the implementing entity for construction of the Project.

1.1.3 A lender consortium, led by the World Bank, collectively called the 'Lenders', are considering financing the Project. Given the number of potential Lenders involved, a robust appreciation of the various policies, standards and frameworks is required to ensure that all requirements are met. The overarching E&S framework for the Project is the WB Environmental and Social Framework

1.1.4 This BMP has been developed in alignment with World Bank Environmental and Social Standards (ESS), ESS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources[1] (ESS6). Other applicable IFI standards that are relevant to the Project are:

- European Investment Bank (EIB) Environmental and Social Standards (2022)
- Asian Development Bank (ADB) Environmental and Social Framework (Approved by ADB Board – 22/11/2024))
- Asian Infrastructure Investment Bank (AIIB) Environmental and Social Framework (2022).

1.1.5 Surveys of the area to be affected by the impoundment are described in **Volume 2: Annex 7.1** of this ESIA, and discovered several small areas of Natural Habitat, as defined by ESS6. Mitigation has been described within **Volume 1: Chapter 15** of this ESIA to compensate for the loss of Natural Habitat, alongside measures required to minimise Project impacts to less sensitive biodiversity. A Biodiversity Management Plan (BMP) is therefore required under the Project Standards.

Volume 3, A5: No Net Loss Framework (NNLF) is a critical part of the BMP. The NNLF is prepared based on the findings of Volume 2: Chapter 15.1, Critical Habitat Assessment. Both the NNLF and BMP are integral components of the Environmental and Social Commitment Plan (ESCP). According to the ESCP, the No Net Loss Program is incorporated into the Biodiversity Management Plan, and the adoption of the BMP is a withdrawal condition under Section III.B.1(b) of Schedule 2 of the Financing Agreement for the Project. The ESCP further stipulates that the implementing agency will ensure the revegetation with native species and monitor the area until the vegetation is self-sustaining upon the completion of construction and before the contractor's departure from the Project area.

1.2 REPORT PURPOSE

1.2.1 This BMP provides the mitigation and monitoring commitments that are required to be delivered to ensure the Project remains compliant with ESS6 (and other relevant IFI standards) and international

[1] World Bank (2018). Guidance Note for Borrowers. ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

good practice on biodiversity. These commitments are derived from the outcomes of the updated Environmental and Social Impact Assessment (ESIA) and Critical Habitat Assessment (CHA).

1.2.2 The BMP summarises the findings of the biodiversity assessment work undertaken for the Rogun HPP ESIA update as well as information from the 2014 ESIA as appropriate.

1.2.3 The BMP is and will remain a live document throughout construction and operation, until agreed otherwise by the Lender consortium. It shall be updated to reflect increased understanding of Project programme and design and be informed by new information as it becomes available (e.g. as obtained from ongoing/pre-construction surveys or as received from relevant Project stakeholders).

1.2.4 This BMP should be read in conjunction with the following reports:

- Volume 1: Chapter 15 of this ESIA
- Volume 2: Annex 15.1 of this ESIA
- Volume 2: Chapter 15.1, Critical Habitat Assessment
- Volume 3, A5: No Net Loss Framework (NNLF)
- Various complementary Plans/documents, referenced throughout where relevant.
- Environmental and Social Commitment Plan

1.2.5 The BMP not only addresses mitigation measures required to reduce significant adverse effects, but also measures required to deliver compliance with Tajik law and particular IFI standards (such as EIB's standards and their alignment with EU nature conservation legislation). In particular, the BMP includes measures to protect Tajikistan Red Book (TRB) species.

1.3 ONGOING REVIEW

1.3.1 Where relevant (and specified accordingly), this BMP (and relevant supporting documents) will be finalised as part of delivery of ESS6 elements of the Environmental and Social Commitment Plan (ESCP). Where necessary, this will be completed in advance of rises in the elevation of the reservoir water level.

1.3.2 This BMP should be regarded as a "living document" and will be iterated, as necessary, throughout the progression of the Project, to the approval of the Lender consortium.

2 SUMMARY OF FINDINGS

2.1 INTRODUCTION

2.1.1 This section provides a summary of the findings from the biodiversity studies and assessment completed for the Project, as derived from the 2014 ESIA and updates completed in 2023. Based on the findings, a Biodiversity Management Plan (BMP) has been developed.

2.2 WORK UNDERTAKEN

2.2.1 The biodiversity baseline has been described using a combination of available desk-based information combined with information from the 2014 ESIA and a series of surveys undertaken for the updated ESIA. Aside from general walkover survey efforts (e.g., for habitats and flora), specific survey sampling sites/areas are provided in **Figure 2-1** of this BMP.

HABITAT SURVEYS

2.2.2 Habitats were mapped through a combination of desk-based remote sensing, supplemented with rapid, field-based ground truthing. Cross-referencing to existing information on the habitat assemblage across the Project and surrounding area was also undertaken. Mapping was conducted across the flooding zone and a buffer distance of 2km (hereafter the 'habitat study area'), which was later focussed into a defined Project Area of Interest. Habitats were mapped into broad habitat types. Habitat types were defined in line with descriptions provided within the 2014 ESIA to maintain continuity of information. However, these were updated where considered appropriate using targeted field surveys, and resources such as the IUCN habitat classification system (EEA, 2019 and IUCN, 2012) and Nowak & Nobis (2020).

FLORA SURVEYS

2.2.3 Targeted botanical surveys were undertaken in April and May 2023 at 15 representative sampling sites focusing on rare and vulnerable plant species across the Project Area of Interest. The aim of these surveys was to confirm and update previous results, as appropriate, given the time elapsed between surveys (ecological baseline data are generally considered valid for around two years). At each location, noteworthy species were recorded; in addition, suitable habitat was also identified for species considered likely to be present based upon desktop study results and surveyor expertise.

2.2.4 Surveys were completed by experienced botanists, including those who have previously been engaged on the Project (i.e., as part of the 2014 ESIA studies).

2.2.5 Additionally, a walkover survey was undertaken across the floodplain habitat identified near to the settlement of Darband (see **Figure 2-1**). This was undertaken on 8th October 2023 and comprised a detailed inventory of the plant species present within the floodplain habitat, together with complementary information on ground conditions, evidence of habitat modification and human influence, and potential faunal assemblage present within the habitat.

2.2.6 The botanical surveys recorded the frequency of individual plant species using the DAFOR scale, with plants categorised in terms of their abundance as follows:

- **D**ominant
- **A**bundant
- **F**requent

- **O**ccasional
- **R**are

2.2.7 Photographs were also taken to provide additional context to the data collected.

2.2.8 The aim of these surveys was to inform an updated appraisal of whether these habitats represented Modified or Natural Habitat (as per ESS6).

2.2.9 Concurrent with the above botanical surveys, other areas of potential floodplain habitat were revisited to confirm current classification as **Modified Habitat**.

FAUNA SURVEYS

2.2.10 A desk study assessment was conducted to identify "target species" of amphibians, reptiles, birds, and mammals. This included academic papers, the Tajikistan Red Book (TRB), and in-country experts accessing published literature by Tajikistan experts. The target species included rare and vulnerable species as well as species specific to ecosystems present within the study area. Targeted Fauna Surveys were conducted in April and May 2023, focusing on 15 representative sample sites.

2.2.11 Herpetofauna (amphibians and reptiles) surveys were completed along transects of varying width dependent upon habitat type during both day and night-time (when amphibians in particular are more active),

2.2.12 Bird surveys comprised walked transects of up to 1km in length and 50m wide. Birds were recorded as encountered, with the aid of binoculars and telescope. Bird calls were also surveyed. This was supplemented by net-trapping of birds to confirm species in suitable locations.

2.2.13 Additional surveys were undertaken in October and November 2023 to identify migratory bird movements within targeted areas of the Project inundation zone to assess the importance of these areas (e.g., as stopover locations, for foraging, etc.).

2.2.14 Migratory Bird Surveys comprised observing birds from three specific locations ('Vantage Points' [VP]), with the following information collected:

- Species
- Number of birds
- Behaviour (e.g., flying, foraging, resting, etc.)
- General contextual information – date, time, weather conditions, visibility, etc.

2.2.15 The focus for these surveys was on target species, which were species of relevance to the Project by virtue of their conservation status[2] or potential for increased risk of adverse impacts from the Project[3].

2.2.16 A total of 12 hours of survey effort was completed at each of the three VP locations during October and November 2023. VP locations are illustrated in **Figure 2-1**. Survey effort was designed to capture significant movement of birds (which, based upon surveyor expertise and knowledge of the area, was not expected) and was considered proportionate to the potential risk). Survey effort was split to give a spread which would be expected to capture any significant movement.

[2] e.g., the IUCN Red List www.iucnredlist.org and Red Book of Tajikistan
[3] Such as those which make use of the river/riparian habitats for foraging or resting (e.g., migratory birds).

2.2.17 Mammal surveys comprised various survey techniques. Visual observations, of both live animals and animal signs (such as tracks, droppings, and burrows) were made from walked transects. For some species/species groups, this also comprised night-time surveys with spotlights to observe those animals with more nocturnal behaviour such as porcupines. Some trapping was undertaken for small mammals/rodents.

2.2.18 It should be stressed that human-animal conflict is not considered an issue of concern, as the risk of such human-animal conflict at this 40-year-old construction site are minimal. This will be stated clearly in the BMP.

AQUATIC SURVEYS

2.2.19 Access to the Vakhsh River within the Project area is limited due to the steep terrain. The river features deep, turbid, and fast-flowing waters, and as such, the river is not accessible by boat or conducive for wading across and therefore is not suitable for traditional survey techniques such as electrofishing or netting.

2.2.20 In order to overcome this limitation, the approach to the aquatic scope was redefined, limiting the sampling to locations where water access was considered to be safe. As there were no safe access locations downstream of the Rogun dam due to the topography, water sampling included five locations which were all upstream of the Rogun HPP construction site, as the river has already been diverted due to construction. The areas sampled included Subordination, Yust, Sangdevo, Chorsada, and Ali-Galabo (see **Figure 2-1**). Sampling was completed using a range of equipment that could be safely operated from the shoreline, and included, cast nets, rod and line (hooks) and basket traps.

2.2.21 Following the agreed approach to further validate the 2014 ESIA data and to understand the insight into the aquatic biodiversity of the Project AoI, it was agreed that water samples should be collected for the purpose of Environmental DNA ('eDNA') analysis (at additional locations to the more conventional sampling). This analysis has been done and the results form part of the baseline condition assessment in Section 2.3.

2.2.22 The study design considered the following areas (see **Figure 2-1**):

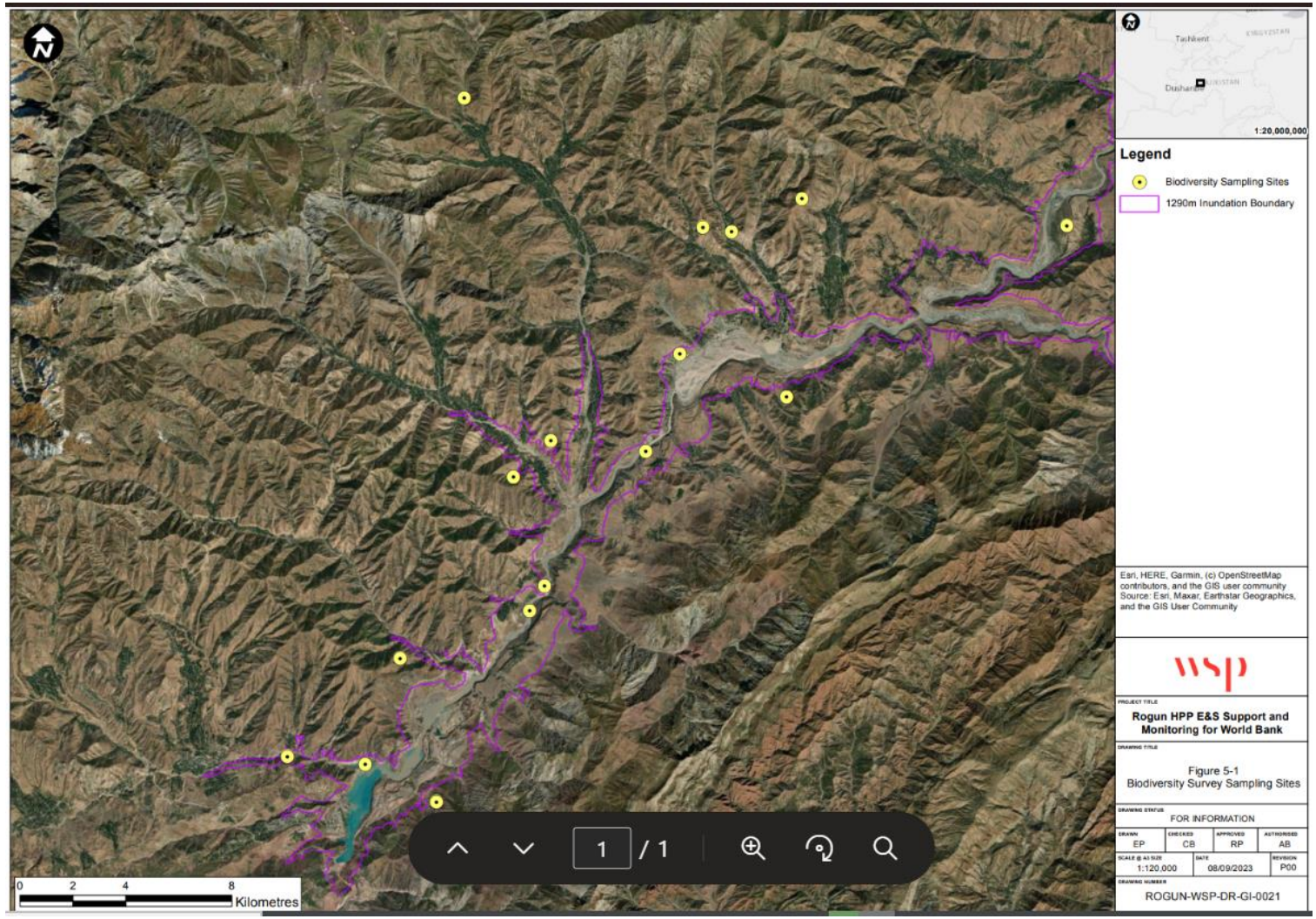
- The Vakhsh River below the Rogun HPP, upstream of the Nurek Reservoir
- Upstream of the flooding zone in the 3 main rivers coming into the proposed Rogun impoundment
- Within the Nurek Reservoir
  Within the Rogun flooding zone for comparative purposes and to track changes over time.

2.2.23 The sample collection process adhered to established protocols set by NatureMetrics to ensure the samples were free from contamination and properly preserved. Water samples were gathered from various locations near the sampling sites using the provided sampling bags. The water was then filtered using a syringe to pass as much water as possible through the provided filter. The volume of water filtered was recorded before air was pushed through the filter to remove any remaining water. A preservative solution was added to the filter, which was then sealed. The filter was placed inside the specimen bag, sealed, and labeled for transportation to the laboratory in the United Kingdom for sequencing and analysis. Necessary permits and letters were obtained for the transportation of the samples.

2.2.24 Local fishermen were informally consulted on site to identify the species they were targeting, catching, and historically knew to occur within the Project area.

Figure 2-1 - Survey sites

Source: Volume 2, Annex 7-1: Baseline Conditions Report



2.3 BASELINE CONDITIONS

2.3.1 The source of the secondary baseline conditions are summarised in Table 2-1 and detailed in **Volume 1: Chapter 7** of the updated ESIA.

PROTECTED AREAS

2.3.2 **No protected areas** are present within the Project AoI, with the nearest being located 10km away to the north-east of the Project. No potential connectivity has been identified between the Project and any protected area.

HABITATS

2.3.3 Most of the habitats present across the habitats study area (and including the new settlement areas) have been modified by humans as part of settlements and agriculture land use, with some areas also comprising built-up areas. Along with remnant natural/semi-natural habitats, this has resulted in a landscape that comprises the following habitat types (in order of relative extent across the AoI):

Table 2-1 - Summary of Habitat Types in the Rogun HPP Biodiversity AoI

Habitat type	Area (ha)	Relative coverage within AoI (%)
Pasture habitat which is all heavily degraded by grazing by livestock; includes eroded hillsides.	15650	55.6
Cultivated land including crops for humans and livestock and therefore lacks natural vegetation.	5850	20.8
Urban areas where the settlements are located, including buildings and roads as well as gardens including a high number of fruit trees. This also incorporates the existing dam footprint.	4220	15
River and floodplain habitats which is natural/semi-natural habitat, with little impact from humans.	2150	7.6
Mesophilic juniper woodlands on the valley sides, with signs of modification but retaining most of their natural species composition.	283	<1
TOTAL	**28153**	**100**

2.3.4 Two areas of floodplain habitat and the mesophilic juniper woodland have been classified as Natural Habitat (as per ESS6) due to the relative absence of modification (both in terms of species composition and structure).

Floodplain Habitat

2.3.5 The two Natural Habitat floodplains are located close to the confluence of the Vakhsh and Obikhingou rivers (within the Obikhingou River), one of which potentially aligns with floodplain pre-identified within the 2014 ESIA; and another 'new' floodplain area identified approximately 6km upstream of this confluence. At both locations, there are far fewer signs of habitat modification, with an established scrub community present, comprising dominant tamarisk *Tamarix ramosissima*, with

hawthorn *Crataegus azarolus,* buckthorns *Hippophae rhamnoides* and *Rhamnus dolichophylla* all abundant. Other large scrub species include Russian olive *Elaeagnus angustifolium* and barberry *Berberis vulgaris.* The floodplain is also interspersed with grasses (including common reed *Phragmites australis*) and herbs (including liquorice *Glycyrrhiza glabra*), together with pockets of seasonally inundated channels/hollows. The newly identified area appears to be present as a result of recent geomorphological changes, which could also explain why it has persisted in a relatively unmodified state when compared to other floodplains in the AoI. Furthermore, the relative inaccessibility of both areas may mean that they are unsuitable for livestock grazing.

Juniper Woodland

2.3.6 Remnant mesophilic juniper woodland habitat is present within the habitats study area at seven locations on the left bank of the Vakhsh River. This habitat partially aligns with the mesophilic broad-leaved forest described within the 2014 ESIA as occurring from 1500m to 2500m asl. Although, following surveys in 2023, additional extents of distinct woodland habitat at these five locations were also classified from upwards of approximately 1000m asl. This is a characteristic native woodland type for the region, occurring within this subalpine belt (known as 'archevniki') in which tree cover is relatively sparse. The woodland recorded from the AoI here can be further classified within this category as thermophilous woods, dominated mainly by *J. polycarpos* var. *seravschina*, which is an endemic tree to Middle Asia (Nowak & Nobis 2020).

2.3.7 The juniper woodland represents a habitat that would have formerly extended across much of the Vakhsh River valley but has been reduced in extent by ongoing human influence; mainly grazing pressure and collection of firewood/timber. Alongside *J. seravschina*, at slightly higher altitudes there is frequent Turkestan maple *Acer turkestanicum*, walnut *Juglans regia*, sycamore *Acer pseudoplatanus*, and smaller tree and scrub species such as juniper *J. commune*, wormwood *Artemisia* sp., *Clematis* sp. Afghan redbud *Cercis grifilhii,* apple species (including *Malus sierversi*), cherry *Prunus* sp. almond and hawthorn *Crataegus* sp.

2.3.8 The woodland has a combined extent of approximately 283ha recorded within the AoI, of which 188ha will be lost to the flooding and construction of the left bank road. In relative terms at a country level, the woodland cover within the AoI represents 0.2% of the remaining juniper woodland cover (estimated to be 150,000ha (Rubinov 2016[4]).

FLORA

2.3.9 The 2014 ESIA described 63 species as being present across the Project site and wider area, with most of these species being common and widespread, and many being indicative of ongoing human influence. There were 11 species included within the TRB and this was increased to 18 following surveys undertaken in 2023; however, only five of these were recorded within the Project AoI (*Fritillaria eduardii, Crocus korolkowii, Tulipa praestans, Juno Nicolai* and *Vitex agnus-castus*), with a further two (*Cousinia leptocampyla* and *C. corymbose*) included in the assessment on the basis of habitat suitability and therefore potential presence on a precautionary basis.

2.3.10 Invasive plant species were recorded during the 2023 surveys, most notably the highly invasive weed Bathurst burr.

[4] Rubinov, I. (2016). Forest resources in Tajikistan. In *The impact of migration and remittances on natural resources in Tajikistan* (pp. 12–16). Center for International Forestry Research. http://www.jstor.org/stable/resrep16268.8

TERRESTRIAL FAUNA

2.3.11 Common and widespread faunal assemblages were described within the 2014 ESIA and confirmed within the 2023 studies, although some limitations to these studies were identified, most notably with regards bats. TRB species described includes several bird (such as Egyptian vulture, which is also IUCN Endangered), mammal (such as Eurasian otter and several bat species) and reptile (such as blunt-nosed viper) species, although none are considered present in high numbers and the AoI is not considered to be of significant importance to any TRB species, as confirmed through the ESIA & CHA process.

AQUATIC ECOLOGY

2.3.12 The 2014 ESIA concluded that fish diversity and abundance within the Project AoI was low, and that fish were not economically important for the local population. Longitudinal connectivity has already been lost as a result of downstream dam construction (such as Nurek), which prevents fish migration. Additionally, the Vakhsh River has a very high sediment load, which may be limiting to fish. Two (2) species listed as Vulnerable in the Red Book of the Republic of Tajikistan, *Salmo trutta oxianus* and *Glyptosternon oschanini* (previously referred to as *G. reticulatum*) have been confirmed in the Project AoI.

2.3.13 It should be noted that the Nurek Reservoir water levels will be managed, and the current operational fluctuations will change it to a nearly steady state, with limited water level fluctuation. This change is likely to be beneficial as it will promote a more productive littoral zone which will add nutrients to the currently nutrient poor oligotrophic system.

2.3.14 *Salmo trutta oxianus* is an endemic subspecies (of *Salmo trutta*) that occurs in the upper reaches of the Amu Darya and in its tributaries, the Kafirnigan and Surkhandarya rivers (potamodromous). *Salmo trutta oxianus* was confirmed within the Vakhsh River and the Rogun Project Area (ESIA, 2014), with detection of Salmonid eDNA supporting these findings. Literature indicates that this species is widespread and currently found up and downstream of the Nurek Reservoir (TRB, 2017; FEOA, 2019; FAO, 2013). As detailed in the Critical Habitat Assessment Report, the known global range of *Salmo trutta oxianus* is greater than 500 km linear geographic span, and the Project AoI would not hold ≥10% of the global population size or ≥10 reproductive units and, as such, is not considered Critical Habitat.

2.3.15 Although *Glyptosternon oschanini* is not listed in the TRB, *Glyptosternon reticulatum* (spelt *Glyptosternum*) is. An assessment in 2020[5and6] concluded that records for *G. reticulatum* from Afghanistan, Tajikistan and Kyrgyzstan have been assigned to *G. oschanini* and thus for the purpose of this ESIA, the TRB status will be maintained as a precautionary approach. *Glyptosternon oschanini* is still widespread in high altitude streams in Central Asia and occurs in mountainous rivers and streams (>3000 km) of the Syr and Amu Darya rivers in many populations [6]. The Project AoI would not hold ≥10% of the global population size or ≥10 reproductive units. A *Glyptosternon* (Genus level) marker was detected in eDNA samples at 12 of the 13 sites upstream of the Rogun dam.

[5] Karimov, B. 2020. *Glyptosternon reticulatum*. The IUCN Red List of Threatened Species 2020: e.T128722612A128722626. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T128722612A128722626.en

[6] Karimov, B. 2020. *Glyptosternon oschanini*. The IUCN Red List of Threatened Species 2020: e.T169837826A169837859. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T169837826A169837859.en

2.3.16 It should be noted that introduced species that hold a conservation status, such as Carp (e.g. *Cyprinus carpio*) were screened out during the Critical Habitat Assessment Report. No other fish species or aquatic invertebrates of conservation concern have been identified within the Project AoI.

2.3.17 Neither the Small Amu-Darya shovelnose sturgeon *Pseudoscaphirhynchus hermanni* or Amu Darya shovelnose Sturgeon *Pseudoscaphirhynchus kaufmanni*, were sampled or detected during eDNA analysis.

2.4 ASSESSMENT

2.4.1 The updated assessment of effects upon the baseline conditions resulted in the following significant effects being identified, with mitigation described that has been carried through into this BMP.

In summary, the following significant impacts were identified:
Loss of Natural Habitats – floodplain; and juniper woodland
Loss of *Vitex agnus-castus* (TRB)
Encroachment/introduction of invasive species – loss of juniper woodland
Degradation of habitat as a result of construction activities – juniper woodland
Change in habitat composition for fish and aquatic ecology
Loss of tributaries and short-range migration for fish

2.4.2 An additional significant effect was identified from the impact of collision mortality to birds from the new overhead lines (OHL); however, this mitigation recommendations for this (e.g. informed routing and installation of bird divertors) will be delivered through the ESIAs/BMPs for those projects and is therefore not included here.

2.4.3 All other effects were assessed as being minor to beneficial, and therefore not significant and not formally requiring specific mitigation to be implemented. However, given the requirement for the Project to comply with nuanced Lender standards, and Tajik law regarding protection of TRB, additional mitigation is recommended that will help ensure that risks to important biodiversity are appropriately managed.

2.4.4 For the purposes of the assessment, the Project impacts were categorised depending broad activities as follows:

CONSTRUCTION

2.4.5 The activities that will be considered under the construction phase will be:

- Clearance activities across the flooding zone, left bank road and associated facilities (including new settlements), and ongoing, incremental inundation up to Full Supply Level (FSL)
- Construction activities at the HPP site and associated facilities
- Current HPP operation

OPERATION

2.4.6 The activities that will be considered under the operation phase:

- Operational reservoir regime including annual drawdown (c. 30m) and associated facilities
- Reservoir at FSL

2.4.7 The BMP is based on a consideration that the inundation may be somewhat episodic rather than a smooth linear transition to fully flooded state. This is as a result of water availability and topography. Mitigation measures are designed to account for this variability.

2.4.8 A full assessment summary is provided within **Table 2-2**; for full details, **Volume 1, Chapter 15** should be cross-referenced.

2.4.9 A precautionary approach has been taken to managing potential risks to the floral and faunal assemblages across the AOI, and this will be underpinned by repeated surveys undertaken pre-construction. This will serve to maintain a valid baseline in the context of Project impacts that are realised incrementally, over a number of years.

Table 2-2 – Impact Assessment Summary

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
Habitats	A landscape dominated by pasture, cultivated land and rural communities, with small areas of floodplain and woodland habitat. The latter two areas include Natural Habitat (as per ESS6).	Construction: Clearance activities across the flooding zone, left bank road and associated facilities, and ongoing inundation up to Full Supply Level (FSL)	Loss/degradation of habitats and species	Major (Significant) for Natural Habitats	Activities to compensate for losses to floodplain and juniper woodland habitats, ensuring No Net Loss for these habitats. The implementing agency will ensure the revegetation with native species and monitor the area until the vegetation is self-sustaining upon the completion of construction and before the contractor's departure from the Project area.	Neutral (Not Significant); potentially beneficial.
			Encroachment / Introduction of invasive species	Major (Significant) for Natural Habitats	Invasive Species Management Plan (ISMP) ECoW	Negligible (Not Significant)
		Construction: Construction activities at the HPP site and associated facilities	Habitat degradation and disturbance and injury/killing of fauna as	Miror /essentially nil on the HPP	Site access control to prevent any wildlife from entering the site.	Minor (Not Significant)

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
			a result of construction activities	construction site and very small on DFZ sites, including the vegetation clearance by the Forestry Agency.	Air quality measures to include robust pollution and dust controls will limit spreading of dust which may impact the fauna unless managed.	
		Operation: Reservoir at FSL	Impacts from Increased Human Pressures	Minor (Not Significant)	Activities to compensate for losses to floodplain and juniper woodland habitats, ensuring No Net Loss for these habitats.	Negligible (Not Significant)
Sensitive Flora	Common and widespread floral assemblage across the AoI, with only very localised occurrence of Tajikistan Red Book (TRB) species.	Construction: Clearance activities across the flooding zone, left bank road and associated facilities, and ongoing inundation up to Full Supply Level (FSL)	Loss/degradation of habitats and species	Minor (Not Significant) for sensitive flora Major (Significant) for *Vitex agnus-castus*	Pre-construction surveys to update baseline findings within areas that will be subject to impacts on an incremental basis (as per paragraph 2.4.10) and translocation of sensitive plant species as required. Additional propagation of species as an adaptive	Given the uncertainty over mitigation options here, the effect precautionarily remains Minor (Not Significant) for sensitive flora Major (Significant) for *Vitex agnus-castus*

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
					management strategy. ECoW.	
			Spread of Invasive Species	Minor (Not Significant)	An Invasive Species Management Plan will be required to mitigate significant effects elsewhere, and this will reduce the impact to rare plants also.	Negligible (Not Significant)
Sensitive Fauna	Several TRB species of reptile and mammals are likely present within the AoI, although not in high numbers. The bird assemblage is generally comprising common/widespread species, with some more sensitive species identified although with no indication of the AoI being of significant importance to these species.	Construction: Clearance activities across the flooding zone, left bank road and associated facilities, and ongoing inundation up to Full Supply Level (FSL)	Loss/degradation of habitat and species.	Negligible to Minor (Not Significant)	Pre-construction surveys to update baseline findings within areas that will be subject to impacts on an incremental basis (as per paragraph 2.4.10) and localised ad hoc translocation of sensitive fauna. ECoW.	Negligible (Not Significant)
			Direct mortality/drowning of sensitive fauna	Minor (Not Significant)	Pre-construction surveys to update baseline findings	Negligible (Not Significant)

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
					within areas that will be subject to impacts on an incremental basis (as per paragraph 2.4.10) and localised ad hoc translocation of sensitive fauna. ECoW.	
		Construction: Construction activities at the HPP site and associated facilities	Disturbance and injury/killing of fauna as a result of construction activities	Minor (Not Significant)	Air quality measures to include robust pollution and visual/acoustic disturbance controls	Minor (Not Significant)
		Operation: Operational reservoir regime including annual drawdown (c. 30m) and associated facilities	Mortality/displacement of sensitive fauna from new roads and overhead transmission lines	Moderate (Significant) for birds Negligible (Not Significant) for sensitive fauna	ESIAs for the new OHTLs will include measures to reduce collision and electrocution risk to birds from these new infrastructure	Minor (Not Significant)
		Operation: Reservoir at FSL	Impacts from Increased Human Pressures	Minor (Not Significant)	n/a	Minor (Not Significant)
		Operation: Reservoir at FSL	Change in habitat composition	Negligible (Not Significant)	n/a	Negligible (Not Significant)

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
Aquatic Biodiversity	The Vakhsh River has already been fragmented, any long-range fish migrations that would have occurred between the Amu Darya or the lower parts of Vakhsh River to its headwaters have already been interrupted. Upstream populations need to be maintained and the Project AoI will change to a lake system.	Clearance activities across the flooding zone and associated facilities, and ongoing inundation up to FSL	Encroachment / Introduction of invasive species – *Aquatic Biodiversity*	Minor (Not Significant)	Restrict the introduction of non-native fish species.	Negligible (Not Significant)
		Construction activities at the HPP site and associated facilities	Release of pollutants into the river	Moderate (Significant)	Environmental management plans, spill response as outlined in Volume 1, Chapter 13 (Water) and Volume 2, Annex 12.1 (Contaminated Land).	Minor (Not Significant)
		Current HPP Operation and Maintenance	Entrainment and Impingement of fish through the turbines	Minor (Not Significant)	None	Minor (Not Significant)
			Changes to downstream flow regimes	Minor (Not Significant)	None	Minor (Not Significant)
		Operational reservoir regime including annual drawdown (c. 30m) and associated facilities	Release of pollutants into the river	Negligible (Not Significant)	None - *similarly to the construction phase, management plans and mitigation measures to avoid and minimise incidents from*	Negligible (Not Significant)

Topic	Baseline Summary	Phase	Potential Impact(s)	Effect (without mitigation)	Mitigation Measures	Residual Effects (after mitigation)
					occurring during operation will be developed.	
			Entrainment and Impingement of fish through the turbines	Minor (Not Significant)	None	Minor (Not Significant)
			Changes to downstream flow regimes	Negligible (Not Significant)	None	Negligible (Not Significant)
		Reservoir at FSL	Change in habitat composition. *Change in habitat from a lotic (river) to a lentic (lake) system.*	Moderate (Significant)	None	Moderate (Significant)
			Loss of tributaries and short-range migration	Moderate (Significant)	None	Moderate (Significant)

The Invasive Species Management Plan is a strategic, adaptive, and documented process that moves from assessment and planning through implementation, monitoring, and adjustment, ensuring that management is effective, efficient, and accountable. It is a living document designed to guide the coordinated and effective management of invasive species within the AOI. The ISMP will include the following set of core elements.

1. Introduction and Background

- **Purpose and Scope:** Clearly states the plan's objectives (e.g., protect biodiversity, restore ecosystem function, protect economic assets) and defines the geographic area it covers.
- **Legal and Policy Context:** Identifies relevant laws, regulations, policies, and any mandated responsibilities that authorize and guide the management actions.
- **Stakeholders and Partners:** Lists all involved parties (e.g., government agencies, NGOs, private landowners, community groups) and outlines their roles and responsibilities.

2. Problem Definition and Assessment

- **Description of the Invaded Ecosystem:** Provides a baseline description of the natural community or area to be managed, including its ecological, economic, and cultural values.
- **Identification of Invasive Species:** Lists the target invasive species, prioritizing them based on the threat they pose.
- **Assessment of Impacts:** Documents the specific ecological, economic, and/or human health impacts caused by the invasive species.
- **Inventory and Mapping:** Details the current distribution and abundance of the invasive species within the management area, often using GIS (Geographic Information Systems) to create maps. This establishes a baseline to measure progress against.

3. Goals and Objectives

- **Overarching Goal:** A broad, long-term vision.
- **Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) Objectives:** Concrete targets that support the goal

4. Management Strategies and Actions

- **Prevention:** Actions to stop the introduction and spread of invasives (e.g., public education, cleaning stations for boats and boots, regulating pathways of introduction, early detection surveys).
- **Early Detection and Rapid Response (EDRR):** Protocols for finding new infestations early and responding quickly to eradicate them before they become established.
- **Control and Eradication:** Detailed methods for dealing with existing populations. This includes:
  - **Control Methods:** Mechanical (e.g., hand-pulling, mowing), Chemical (e.g., herbicide application), Biological (e.g., introducing natural enemies), and Cultural (e.g., prescribed fire, revegetation).

- **Treatment Protocols:** Specific instructions for each method and species, including timing, dosage, safety, and permitting.

- **Restoration:** Strategies for rehabilitating the site after invasive species are removed to prevent re-invasion (e.g., replanting with native species, managing soil health).

5. Prioritization

- **Criteria for Prioritization:** Establishes a system to rank management efforts. Common criteria include:

- **Protection Value:** Prioritizing areas with high ecological or economic value.

- **Feasibility of Success:** Focusing on areas where control is most likely to work.

- **Degree of Threat:** Tackling the most damaging species or the newest infestations first.

6. Implementation Plan

- **Work Schedule:** A detailed timeline outlining what actions will be taken, by whom, and when (e.g., annual work plans).

- **Equipment and Resources:** Lists the necessary tools, supplies, and budget required to implement the plan.

- **Personnel and Training:** Identifies who will do the work and any specific training they need (e.g., herbicide applicator certification).

7. Monitoring and Evaluation

A

- **Monitoring Protocols:** Defines how and when the effectiveness of management actions will be measured (e.g., annual photo points, population surveys, vegetation plots).

- **Success Indicators:** Specific metrics to assess progress towards objectives

- **Adaptive Management:** A formal process for reviewing monitoring data annually or biennially and using those results to adjust and improve the management strategies for the next cycle.

8. Communication, Education, and Outreach

- **Public Awareness:** Strategies to inform the community about the problem of invasive species and how they can help (e.g., websites, workshops, brochures).

- **Stakeholder Engagement:** Plans for keeping partners and stakeholders informed and involved throughout the process.

- **Reporting:** How results and progress will be communicated to funders, decision-makers, and the public.

2.4.10 9. References and Appendices

- **References:** Citations for scientific literature, methods, and guidelines used.

- **Appendices:** Detailed supporting information, such as:

- Maps of infestations and priority zones.

- Specific herbicide labels and permits.
- Data sheets for monitoring.
- Contact lists for partners and contractors.
- Full species-specific control protocols.

3 BIODIVERSITY MANAGEMENT

3.1 INTRODUCTION

3.1.1 This section provides details of the overarching aims of this BMP together with specific objectives required to be met in order to achieve these aims.

3.2 AIMS AND OBJECTIVES

3.2.1 Table 3-1 below lists the aims and objectives that form the basis of the BMP. These will be subject to change as required through ongoing management of the BMP.

Table 3-1 - BMP Aims and Objectives

Aim Ref.	Description	Associated Objective(s)
1	To deliver No Net Loss[7] of Natural Habitats	1a: achieve No Net Loss for floodplain habitat. 1b: achieve No Net Loss for juniper woodland.
2	To minimise impacts to biodiversity during construction.	2a: Minimise predicted impacts to TRB flora 2b: Minimise predicted impacts to TRB reptiles 2c: Minimise potential impact to bats 2d: Maintain good practice biodiversity measures. 2e: Manage risk of introduction or spread of invasive species (It should be noted that Tajikistan does not have a specific law on "invasive species" but the topic is primarily framed within its national biodiversity conservation strategy and its commitment to the Convention on Biological Diversity (CBD) and its Article 8(h) on invasive species. Tajikistan has established a National Biodiversity and Biosafety Center (NBBC) and is working to strengthen its policy and legislative framework to support the implementation of the CBD, which includes measures to prevent, control, and eradicate invasive and alien species). 2f: Protect the aquatic environment and aquatic biodiversity during construction. 2g: Manage biodiversity risks associated with new Project components and associated facilities.
3	To enhance biodiversity	3a: Inform planting plans required to mitigate Landscape & Visual impacts 3b: Inform planting plans required to mitigate Soils & Geology impacts (erosion) 3c: Inform planting plans required to mitigate Landslide risks.

[7] As per relevant Lender standards, such as ESS6

3.3 MANAGEMENT ACTIONS

INTRODUCTION

3.3.1 This section presents the biodiversity management actions and targets required to be delivered against the Aims and Objectives listed within Section 3 Table 3.1 and Table 3.3.

BIODIVERSITY CONSTRAINTS TRACKER

3.3.2 A Biodiversity Constraints Tracker (BCT) will be produced by the PMG Lead Ecological Clerk of Works (ECoW) (see Table 3-2) that will be a resource for tracking of biodiversity constraints across the project and the progress in managing these constraints as required by this BMP. This is especially relevant given the scale (spatially and temporally) of the Project, and the requirement to keep an active and auditable log of biodiversity management measures. A biodiversity constraint is something (a receptor, specific feature, habitat area, etc.) for which a specific action will be required in order to ensure ongoing compliance with the biodiversity management requirements on the Project, in line with the mitigation hierarchy. That action may simply be avoidance during a specified period, or it may require intervention such as pre-emptive vegetation clearance in advance of the bird nesting season.

3.3.3 The BCT will be a concise and simple tool designed to support and facilitate rather than inhibit progress of mitigation and Project activities.

The BCT will be produced upon implementation of this BMP and will catalogue all biodiversity constraints within the context of the various Project activities and timeline. As a starting point, the BCT will include (but is not limited to) all of the following Current baseline information from within the flooding zone for TRB flora – i.e., where TRB species have been identified

Emerging findings from update surveys for TRB flora and bats – what the current status is regarding the baseline information, and where any new populations have been identified (e.g., along the left bank road)

Areas where vegetation clearance cannot avoid the nesting bird season and will therefore need to be subject to pre-clearance nesting bird checks

Areas where pre-clearance checks are required and the timing of these (to coincide with SFA/DFZ clearance schedules across the flooding zone)

Standardised reporting/survey forms to ensure consistent collection of information.

3.3.4 The BCT should be an excel table, Google Earth map, or similar, available to be viewed by all relevant parties, but editable only by PMG (and other authorised individuals). An example/recommended BCT template is provided within **Appendix A**. The BCT will be an explicit component of the ESCP to ensure its implementation.

ROLES AND RESPONSIBILITIES

3.3.5 A key component of the successful delivery of this BMP is the full understanding of roles and responsibilities required under this plan. It is the responsibility of the PMG to ensure that all relevant staff and contractors adhere to the requirements of the BMP, together with all other relevant obligations.

3.3.6 PMG will be responsible for ensuring the BMP is updated, as required, to ensure its efficacy as the Project develops, and that updates are submitted for approval to the Lenders as specified in the

ESMP. Where necessary, additional technical specialists will also need to be contracted to discharge specific components of the BMP, for example in relation to botany, ornithology, etc.

3.3.7 A breakdown of roles and responsibilities is included in Table 3-2.

Table 3-2 - Roles and Responsibilities

Role	Responsibilities
Developer	
PMG	Overall responsibility for overseeing: ▪ the implementation of the BMP (and associated NNLF) and BCT; ▪ the submission of annual updates for the ongoing approval by Lenders; ▪ awareness and protection of biodiversity on the Project during construction; and ▪ the overall stakeholder liaison process for the Project. Responsible for ensuring roles and responsibilities are clearly identified and allocated within the PMG and within the Contractors' (and sub-contractors') organisations responsible for clearance activities and construction activities outside of the existing dam site (e.g. at new resettlement sites). Including ensuring alignment with contractor (and sub-contractor) own HSE roles to minimise duplication of effort. Appointing technical specialists to effectively plan and audit the implementation of environmental measures and processes, including an Environmental / Biodiversity Specialist on staff or available as a consultant. Provision of recommendations to address any non-compliance identified. Reporting to the Project Lenders in line with existing reporting requirements for the Project – biodiversity will form a sub-section of these reports. Responsible for overseeing Rogun JSC and DFZ.
Rogun JSC	Overall responsibility for the Project's construction and operation.
PMG's Lead Environmental Expert/Environmental Clerk of Works (ECoW)	Responsible for supervising/auditing the Contractor(s) associated with clearance activities and at new resettlement sites, and DFZ to ensure that recommendations and requirements, as set out in the BMP are applied. Responsible for preparation/management of the BCT and development of an operational NNL 'Plan' following the NNLF. Responsible for delivery of the NNL Plan. Responsible for continuous monitoring of the processes and activities undertaken by the Contractors, and specifying measures to be implemented by the Contractors, to address any areas of non-compliance. Work with the EHS Lead to ensure general biodiversity good practice on the Project. Forecast and manage an adaptive ECoW services team (local staff and/or contractors as necessary) and requirements for expert input (e.g., botanist). Undertaking regular inspections / review of works areas, especially with regards construction good practice (e.g. animal welfare, pollution control etc.) during clearance activities and construction at new resettlement sites.

Role	Responsibilities
	Provision of ad hoc advice regarding biodiversity sensitivities during construction, including advice on micro-siting of works and pre-clearance surveys. Oversee any removal of animals, if required. The ECoW, via the PMG, will have the granted authority to stop works at any point should they consider that the potential ecological impacts associated with a particular activity are unacceptably high. Input to monthly reporting (as required). Training of Forestry Agency staff (and others, as appropriate) to identify and remove sensitive fauna from works/clearance areas.
DFZ	Responsibility for the flooding zone and any/all activities taking place within the flooding zone, including clearance of vegetation and settlements/built structures. Reporting to PMG on progress of clearance activities and compliance with BMP in terms of pre-clearance checks/surveys. Reporting should be aligned with other reporting requirements between DFZ and PMG (i.e., does not constitute standalone reporting). Cascading environmental responsibilities to any contractors engaged on clearance activities across the flooding zone.
DFZ's Environmental Expert/Environmental Clerk of Works (ECoW)	In line with DFZ's overall responsibilities, the DFZ Environmental/Biodiversity Specialist will be responsible for the following: ▪ Programming pre-clearance checks/surveys to coincide with clearance programme ▪ Pre-clearance checks for sensitive biodiversity ▪ Reporting to DFZ on progress and findings from pre-clearance checks/surveys ▪ Monitoring environmental performance and BMP compliance with any contractors engaged by DFZ (with the ability to stop works in the event of unacceptably high ecological impacts) ▪ Liaising with additional specialists as required (e.g., third party botanists, in-region E&S consultancies, etc.).
State Forestry Agency (SFA)	Responsible for vegetation clearance across the flooding zone (DFZ to monitor, then SFA to enact, with SFA contracted to DFZ). Reporting on BMP implementation relating to clearance activities, to DFZ.
SFA Contractor(s) HSE Manager	Responsibility for: The implementation of relevant BMP elements during clearance activities; and Instilling and maintaining strong culture of environmental / biodiversity awareness and protection on the Project site during construction. Ensuring the provision of regular reporting to the SFA, to ensure they remain informed on performance during construction.
Lenders	

Role	Responsibilities
Lenders	Provide advice on environmental aspects of the Project, and approvals.

Table 3-3 - BMP Actions

Aim	Objective	Action	Target Date	Responsibility
1	1a (Achieve No Net Loss for floodplain Habitat)	1a(i): An off-site area will be managed to compensate for the loss of approximately 77ha of floodplain habitat. This compensation will be developed and delivered through a no net loss plan. At this stage, a No Net Loss Framework (**NNLF**) has been produced and is included in this ESIA. The **NNLF** will demonstrate how the requirements of ESS6 will be delivered with regards to losses of floodplain Natural Habitat and will also identify key stakeholders required to be engaged with/consulted as the NNL process develops. Measures to compensate for losses will comprise: ▪ Restoration and protection of native riparian woodland habitat ▪ A contingency restoration and protection action for native fruit and nut woodland Both options represent 'better than like for like'' measures based upon the higher conservation importance of both of these habitat types (compared with the floodplain habitat being lost). 1a(ii) Upon agreement of the option(s) available to achieve no net loss to floodplain habitat, a shortlist of NNL sites will be produced and submitted for Government/Lender approval. A NNL management, protection and monitoring plan will be produced that will provide detail necessary to deliver the required NNL. This will be an operational document that will be produced and implemented by end-2030 (i.e. dam completion date).	NNL management, protection and monitoring plan to be produced and implemented by 2030.	PMG

	1b (Achieve No Net Loss for juniper woodland)	1b(i): An off-site area will be managed to compensate for the loss of approximately 188ha of juniper woodland habitat. This compensation will be developed and delivered through an no net loss plan. At this stage, a **NNLF** has been produced and is included in this ESIA. The **NNLF** will demonstrate how the requirements of ESS6 will be delivered with regards losses of floodplain Natural Habitat and will also identify key stakeholders required to be engaged with/consulted as the NNL process develops. Measures to compensate for losses will comprise: ▪ Restoration and protection of juniper woodland habitat ▪ A contingency restoration and protection action for native fruit and nut woodland The fruit and nut woodland option represents a 'like for better' measure based upon the higher conservation importance of this habitat types. 1a(ii) Upon agreement of the option(s) available to achieve no net loss to floodplain habitat, a shortlist of NNL sites will be produced and submitted for Government/Lender approval. A NNL management, protection and monitoring plan will be produced that will provide detail necessary to deliver the required NNL. This will be an operational document that will be produced and implemented by end-2030 (i.e. dam completion date).	NNL management, protection and monitoring plan to be produced and implemented by 2030.	PMG
	1c (Achieve No Net Loss for juniper woodland)	1c(i): Measures as detailed within the mitigation sections of the **Volume 1, Chapter 8 (Air Quality)** and **Chapter 11 (Noise and Vibration)** of this ESIA will be adopted to reduce significant effects to juniper woodland from construction activities.	Measures to be adopted throughout construction activities associated with the left bank road and any activities required within 100m of the juniper woodland within the flooding zone.	PMG

2	2a (Minimise predicted impacts to TRB flora)	2a(i): A suitably qualified Project botanist will be identified by the Lead ECoW. The botanist should have >10 years of experience in Tajik/Central Asian botany and plant translocation. It may be appropriate for this role to be filled by those botanists previously involved on the Project Given the scale of the Project, it may be more appropriate for a team of botanists to be deployed, and this will be at the discretion of the Lead ECoW. A re-survey for TRB flora will be undertaken across those areas where these species were previously identified, together with areas of Natural Habitat woodland and the proposed route of the left bank road. A proportion of TRB flora, as determined by the supervising botanist will be identified and will be relocated to receptor areas outside of the flooding zone (. The supervising botanist will evaluate the likely zone of inundation (and clearance for the left bank road) early in the growing season [April] each year. The botanist will undertake a sequence of pre-determined transect surveys intended to locate more important/protected plant species suitable for translocation. The botanist will identify translocatable material along the transects and record positions by GPS and physically by marker canes (in the case of individual plants) or caned marker tape (in the case of patches/areas). This information will be added to the BCT. The botanist will record all translocatable species by scientific name, noting quantities/plant condition and any particular translocation requirements. The botanist will determine viable translocatable material and the amounts of material that should be translocated to have a good chance of success.	Project botanist to be identified by end-2025. April-August within TRB areas focussing on areas that will be flooded within the period following the survey (i.e. so that any plant relocation can take place prior to most imminent flooding).	DFZ

		The botanist will also search for appropriate receptor sites outside of the inundation zone in the same search phase focussing on areas as close as possible to the identified plants, so that topography, aspect, elevation and other environmental factors are similarly matched to maximise the prospects of lants becoming established in these receptor areas. The botanist will avoid receptor sites that already hold important plant assemblages/protected species. The botanist will also record invasive/problematic plant species encountered along the transect routes. The botanist's report and briefing will then be utilised by the Lead ECoW who will formulate a translocation plan for the year – prioritising translocation to match inundation progress. The translocation plan will aim, as far as is possible, to undertake translocations in a single operation (i.e. lift – transport – replant) but the plan will include precautions for temporary storage where this is not possible. Translocated material (as determined by the botanist) will be: ▪ Individual plants extracted with intact rootballs ▪ Macro-turfs containing plant mixes and supporting soil ▪ Viable reproductive material – seeds, fruits, rhizomous material, grafts etc.		
	2b (Minimise predicted impacts to TRB reptiles)	2b(i): A suitably qualified/experienced herpetologist will be identified by the Lead ECoW (if not the Lead ECoW themself) to undertake a programme of pre-construction surveys and ad hoc relocations of reptiles annually in advance of proposed clearance activities, with areas cleared on an incremental basis in line with the flooding programme (see target date column). These clearance areas will be identified by the Lead ECoW (with the assistance of the herpetologist) and added to the BCT.	Project herpetologist to be identified by end-2025. Within one month of clearance activities required across the sequential flooding zones. Reptile translocations will be phased over 2025 to 2028.	DFZ

		Any/all reptiles encountered will be collected and relocated to an area outside of the flooding zone. Given the broad habitat tolerances of the resident reptile species (including the TRB/IUCN Red List species identified), it is not necessary to identify specific receptor areas; instead, the reptile specialist will use their discretion as to where reptiles will be moved to. It is expected that translocations will be at a longer distance than might typically be undertaken, but this is to account for variability in the inundation rate and to prevent the risk of animal return to the cleared areas. It is recommended that reptile receptor sites are located >1000m from the inundation zone. The supervising herpetologist will capture reptiles within the expected annual inundation zone using techniques including: ▪ Burrow searches ▪ Search of shelters/features potentially used by sheltering and basking herptiles ▪ Transect searches Reptiles shall be captured at early morning and evenings. Unless there are specific conditions it is desirable that there is no “head-starting” (the process of taking captured animals into temporary captivity) as it is preferable that animals are captured, safe-handled, and released in a single operation. Numbers, life-stages and species of captured animals will be recorded. Release sites will be GPS marked, and details added to the BCT for future monitoring. Reptile releases will be undertaken in morning or evening when conditions are more benign. Where possible captured reptiles will be provided with drink water 20 minutes prior to release. In the case of tortoises, animals will be placed in unoccupied burrows that have been either located or purposefully created. Release sites will be monitored, where		

		possible, for at least 30 minutes by the ECoW service (particularly in the case of tortoises to check there are no obvious signs of animals being heat stressed). Other reptile releases will be into suitable, pre-determined or created, habitat features such as rock or brash piles.		
	2c (Minimise potential impact to bats)	2c(i): A suitably qualified bat/mammal specialist will be identified by the Lead ECoW (if not the Lead ECoW themselves) to undertake a survey of key areas/features to identify bat roost potential. This will be extended to include any new areas of suitable habitat potentially at risk from clearance activities or new Project components, as identified by, and at the discretion of, the ECoW, and added to the BCT accordingly. Suitable areas will then be subject to roost surveys and bat activity surveys to determine presence and species of bats present. The surveys will comprise a mix of daytime roost searches and night-time bat activity surveys, with the aid of appropriate bat survey equipment (such as high-powered torches and handheld and/or static bat detectors). Surveys will comprise the following: ▪ Daytime identification of potential roosting features (PRF), using a high-powered torch and endoscope. ▪ For features where it has not been possible to fully investigate the PRF and conclude its use/suitability for use by roosting bats, a night-time activity survey should be undertaken, using hand-held bat detectors (see note below). Should pre-construction surveys identify any bat roosts, the ECoW will advise on an appropriate course of action to be taken to minimise effects associated with loss of these roosts. Such actions will comprise the following:	Project bat/mammal specialist to be identified by end-2025.	DFZ

		▪ If not in use during clearance or construction activities, and if adequate alternative natural roost sites are available in the wider area, then no further action will be required. ▪ If not in use during clearance or construction activities, and if no other roost sites are available, then it will be necessary to provide artificial roost sites for use by bats when they return to the roost site. The artificial roost shall be suitable for they species/number of bats that use the roost that will be lost; expert input shall be provided to inform this. Artificial bat roosts are readily available online. ▪ If the roost is in use during construction works, and if these works cannot be delayed until the bats have vacated the roost, then a suitably experienced bat worker shall be consulted to attend site and remove the bats prior to work. In advance of this an alternative roost site shall be identified (whether natural or artificial). The bats shall be moved to a suitable new roost site. It is important than an experienced bat worker is engaged to undertake this work given the risk of rabies transmission when handling bats. [*Note: Assuming that broadband bat detectors cannot be sourced in Tajikistan – the import of suitable detectors into the country might prove problematic (this has been the case in other Central Asian countries). Arrangements should be explored early on to avoid surveys being compromised by import delays*].		
	2d (Maintain good practice biodiversity measures)	2d(i): Good practice biodiversity measures will be adopted throughout construction. These will include, where relevant to site works and the location thereof, (but are not limited to): ▪ Securing active construction sites to minimise risk of harm/trapping ▪ Vegetation clearance to take place outside of the nesting bird season (March to August inclusive) or under ECoW supervision	Good practice biodiversity measures will be adopted throughout construction. The action will be considered a full success if high biodiversity standards are maintained through constructions,	Forestry Agency DFZ Contractors

		▪ Prohibition of hunting/killing of animals by Project individuals. ▪ Prohibition of harvesting of plants by Project individuals. All of the above will be the responsibility of the ECoW to oversee and delivered through toolbox talks and will be delivered in areas where wildlife will potentially be present (i.e. excluding areas that are sterile in this context, such as the HPP construction site).	as confirmed through ECoW observations/monitoring.	
		2d(ii) Pre-clearance checks will be completed prior to vegetation/habitat clearance within the flooding zone on a regular (e.g., monthly) basis. These checks will be completed as follows: ▪ Bird surveys within areas of scrub/tree vegetation as it is likely that such areas will be subject to clearance activities within the nesting bird season (taken as March to August inclusive). ▪ Bat roost surveys within areas of mature trees and built structures. ▪ General biodiversity walkovers to inform the requirement for targeted mitigation measures (i.e., such as local translocation, or where feasible, construction micrositing for infrastructure outside of the flooding zone). Surveys should identify presence of sensitive biodiversity such as reptiles and amphibians, and any species listed on the Tajikistan Red Book. The frequency and extent of these surveys should be managed by the DFZ Environmental Specialist/ECoW to ensure that they remain proportionate to the relatively limited biodiversity risks. All findings from the above checks should be included in the BCT.	Good practice biodiversity measures will be adopted throughout construction. The action will be considered a full success if high biodiversity standards are maintained through constructions, as confirmed through ECoW observations/monitoring.	DFZ Environmental Specialist/ECoW

		2d(iii) Notwithstanding the above, and where possible, vegetation clearance will be managed in such a way that areas are cleared in advance of the bird nesting season (taken as broadly between March-August inclusive). The DFZ Environmental Specialist will advise of such areas and work with the Forestry Agency to facilitate this clearance, with areas brought forward for 'early' clearance where necessary (i.e., where clearance was originally planned for within the nesting season but is brought forward to negate any potential risk to nesting birds). 2d(iv) The PMG Environmental Specialist/ECoW will deliver a series of 'toolbox talks', including site inductions, to DFZ construction workers and supervisors to raise awareness of particular ecological issues. This will include, but is not limited to, the following: ▪ Ecological exclusion zones and working around features of increased ecological sensitivity (e.g., nesting birds, mammal burrows, reptile hibernacula, watercourses, etc.) ▪ Construction site good practice (e.g., keeping the construction site safe for wildlife when not in use, sensitive use of lighting, etc.) ▪ How to recognise particular animal or plant species or groups ▪ What to do if particular animal or plant species are encountered, including handling and removal of animals from current/future construction/clearance areas where they may be at risk of mortality ▪ Awareness-raising in relation to hunting/poaching of sensitive fauna, and prohibition in the construction workers Code of Conduct, as required in the ESMP. The ECoW will also undertake ad hoc monitoring of the implementation and efficacy of the above measures		

	2e (Manage risk of introduction or spread of invasive species)	2e(i): An **Invasive Species Management Plan (ISMP)** will be formulated and implemented by DFZ across the Project, with specific measures designed to prevent the spread of Bathurst burr *Xanthium spinosa* across the AoI. The ISMP will be informed by a thorough invasive species survey (see 2b(i)), undertaken during the appropriate growing season (especially for Bathurst burr - as informed by a botany specialist).	The **ISMP** will be prepared and amended to the BMP to operationalize it to allow precautionary/proactive measures to be implemented that will prevent impacts to sensitive habitats (mainly juniper woodland and floodplain habitats outside of the flooding zone). This action will be considered a success once construction has been completed and invasive species have been prevented from being introduced/spread during construction activities. The ISMP will be applicable to both the construction and operational phases of the Project unless it is deemed necessary (by DFZ) for separate documents to be produced in this regard.	DFZ
	2f (Protect the aquatic environment and aquatic biodiversity during construction [in-channel works])	2f(i): A water quality monitoring programme will be developed to manage and prevent contamination of the environment, that may result in the degradation of the aquatic environment and biodiversity. This is included within the **Water and Wastewater Management Plan (WWMP)** and comprises regular monitoring of water quality, together with a feedback mechanism to inform adaptive management in the event that water quality is deteriorating as a result of Project activities.	See **Water and Wastewater Management Plan**. Regular monitoring to take place during the current construction phase, with deterioration in water quality resolved through adaptive management. This action will be considered complete after the construction is complete.	PMG

	2g (Manage biodiversity risks associated with new Project infrastructure)	2g(i): The PMG Environmental Specialist/ECoW will maintain a record of all new Project infrastructure that will be outside of the flooding zone and add this to the BCT. 2g(ii): Any new construction activities outside of the flooding zone will avoid sensitive biodiversity in line with the mitigation hierarchy. This will be informed by the biodiversity walkovers described within 2b(i) and will be managed by the PMG Environmental Specialist/ECoW.	Protection of biodiversity within new infrastructure components through application of the mitigation hierarchy.	PMG
3	3a (Inform planting plans required for site rehabilitation)	3a(i): Planting plans for the purpose of both landscaping and soil stabilisation will be informed by biodiversity specialists to maximise biodiversity benefits derived from these plans. This BMP will be updated once detail around planting location/extents has been agreed. 3a(ii): Planting for the purposes of landscaping and soil stabilisation should be done in consultation with the ECoW (and botany specialist, as required) and should comprise native species of local provenance, sourced from (or in consultation with) Vakhdat Forest Nursery.	As described in the Site Rehabilitation Plan but include additional plans as appropriate).	PMG

4 MONITORING AND ADAPTIVE MANAGEMENT

4.1 INTRODUCTION

4.1.1 This section presents a summary of the current monitoring requirements required to be delivered under the BMP, together with the pathways to inform adaptive management on the Project. This section will be updated as required (e.g., upon initial findings from the additional survey effort) to ensure an effective monitoring strategy is adopted.

4.1.2 Monitoring is limited to survey work collected during 'construction' and 'operation' (as defined in 2.4.4). Survey work undertaken pre-construction (and used to inform the BMP) is not considered here.

4.1.3 A summary of monitoring requirements is presented in

4.2 MONITORING

NO NET LOSS MONITORING

4.2.1 The NNLF outlines an approach to monitoring that will be required to ensure ongoing delivery of biodiversity commitments, and this will be detailed in full within the subsequent, finalised NNLP (or similar), that will underpin the achievement of no net loss of biodiversity for the Project.

PLANTING MONITORING

4.2.2 Monitoring will also be required to ensure ongoing effectiveness of planting undertaken as part of the landscaping and soil stabilisation mitigation. This will be detailed in the **Site Rehabilitation Plan (SRP)** and won't be a biodiversity-specific monitoring exercise (albeit biodiversity benefits will be delivered by virtue of these plans). Planting will be a historically and ecologically suitable native species mix, informed by the ECOW.

BOTANICAL MONITORING

4.2.3 For instances where threatened plants (at numbers determined by the botanist) have been translocated outside of the flooding zone, a programme of monitoring will be implemented to gauge the efficacy of this action. This will be conducted in years 1, 2, 3 and 5 after translocation, and undertaken by an appropriate experienced botanist, comprising a botanical inventory of the receptor sites at an appropriate time within the growing season for each translocated species. If translocation is judged successful within the 5-year period monitoring shall cease accordingly. Should the monitoring show that the plants, having been translocated, have declined/have not successfully established within the receptor areas, then this will trigger the requirement for adaptive measures to be implemented, such as engagement with local nurseries to propagate and plant these species as replacements for failures (noting the documented relative ease with which the species in question can be propagated).

4.2.4 Alongside the above, regular monitoring of invasive species will be undertaken by an experienced botanical specialist. Where relevant, this should be coordinated with Project contractors' current EHS obligations regarding invasive species but will also extend across the flooding zone. Surveys will be completed annually during construction and operation (flooding) and should be incorporated into the biodiversity tracker and used to inform updates to the **ISMP** as necessary, including any

management prescriptions required (produced in consultation with invasive species management specialists).

4.2.5 No further biodiversity monitoring is required, beyond general good practice monitoring of environmental protection during construction (as already required under contractor EHS obligations).

FAUNA MONITORING

4.2.6 Faunal monitoring will be undertaken in the event that bat roosts are identified that require additional (artificial) roosts to be provided. In such cases, these artificial roost sites will be monitored in years 1, 2 and 3 to assess mitigation success. Should the monitoring demonstrate that the artificial roost sites have failed (and/or have become damaged/lost, etc.), then this will trigger the requirement for adaptive management measures to be implemented, such as provision of new/additional artificial roosts in the same or new (if more appropriate) location.

4.2.7 It is anticipated that artificial roost provision can generally be provided by the tree-mounting of general-purpose bat boxes (the FSC Enhanced Triple Cavity Box or a suitable equivalent). These units will provide suitable niche habitat for up to five genera of bats present in the Project area, They are relatively inexpensive and simple to install. Certain bat species will not use bat boxes and if roosts of such species are encountered the Lead ECoW will need to commission a bat expert to develop bespoke mitigations.

AQUATIC ECOLOGY MONITORING

4.2.8 An aquatic monitoring program should be designed that will need to consider two aspects of the fisheries, these being a) the management and change to natural fish stocks as a result of the Project, and b) the exploration of developing fish stocks and fish production within the reservoir. A third, and important aspect to consider, is data collection and contribution to the scientific community. The Committee for Environmental Protection stated that the upper Vakhsh River has not been well studied and that there is little reliable information available. Under the Fisheries Law of the Republic of Tajikistan, there is a requirement to carry out scientific research on the rational use and production of fish stocks under the Protection of Fish Stocks and their Habitats. Having a better understanding of the biodiversity within the system will allow for better decision making and refinement of the management objectives.

4.2.9 The first phase of the monitoring programme will be to comprehensively sample the Project AoI to further contribute to the understanding of the natural fish community, as well as to determine the extent of introduced species present above the dam wall. Such a monitoring programme would utilize a species accumulation curve and would require samples to be taken for taxonomic classification and updating of the eDNA reference library. Due to the project location (topography), the programme will need to take into account accessibility and sampling efficiency, as well as Health and Safety utilizing a range of techniques such as netting, electrofishing, trapping and angling where possible. It is anticipated that this would take place over two field surveys during the low flow period. Following this, the second phase of monitoring will occur, whereby it is recommended that eDNA samples be taken on a periodic basis (every 5 years) to identify changes in community composition. It is also recommended that once the reservoir reaches 1290m asl. (2-3 years after), a more comprehensive infield sampling programme be undertaken with more traditional survey techniques to the extent possible. This survey should extend to Nurek to identify any changes in community composition that may have resulted from its change to a nearly steady state, with limited water level fluctuations. The intent of these assessments will be to track the change in community composition

whilst the reservoir is filling. Once the reservoir is fill, it is recommended that as needed, population estimate studies be undertaken every five years to quantify if the anticipated shift in community composition, as was observed in Nurek, and inform any management objectives related to the fishery. After filling of the Nurek reservoir, the number of fish in the reservoir increased considerably. However, after a few years, once the additional nutrients gained from the submerged soils and vegetation were decomposed and flushed out, productivity decreased, and most of the introduced species disappeared again. These data will also form the basis of any management plans for species management (i.e. invasive species) or species introduction (i.e. aquaculture or conservation initiatives).

REPORTING

4.2.10 Monitoring reports will be included within existing reporting mechanisms submitted to PMG for comment/approval. Reports will include recommendations to update this BMP, as appropriate. All records will be stored safely and be readily accessible for auditing.

Types of records relevant to this BMP include:

- Monitoring, inspection and compliance reports/records;
- Registers of fauna disturbance, vegetation clearance and vegetation rehabilitation;
- Status aquatic life monitoring;
- Correspondence with public authorities;
- Induction and training records on BMP implementation;
- Status of NNLF based NNLP development and implementation;
- Reports on environmental incidents, other environmental incidents non- conformances;
- Records of complaints and follow-up action.

4.3 ADAPTIVE MANAGEMENT

4.3.1 Adaptive management will be informed by findings from the monitoring described above. Where it is identified that targets associated with the BMP actions are not being met, PMG will be responsible for rectifying this through appropriate adaptive management, to the approval of the Project Lenders. As a brief indication of what this may comprise, the following measures could feasibly be deployed:

- Identification of new areas for compensation planting, restoration, and/or protection;
- Increased planting, with nursery-propagated TRB flora, and/or refined planting locations; and
- Increased invasive species management.
- Increased provision of artificial bat roosts.

Table 4-1 - BMP Monitoring Plan

Monitoring Action	Frequency	Key Metrics	Adaptive Management Options
Monitoring the success of habitat creation to deliver NNL			See Volume 3: A5 NNLF for more details.
Monitoring of translocated flora	Years 1, 2, 3 & 5	Successful establishment of the translocated plants after 5 years	Planting of nursery-propagated seedlings.
Monitoring of identified invasive species presence and identification of new stands	Annually throughout ongoing construction and until reservoir at FSL. Surveys should be completed during growing season for Bathurst burr (i.e. September).	No further spread of invasive species, or new occurrence outside the current extent of these species	Targeted and specialist invasive species management such as removal and treatment of remaining stands.
Monitoring of translocated bats (to current or new artificial roost sites) – as required	Years 1, 2 & 3	Successful/continued use of the 'new; roost sites by translocated bats Artificial roosts in good state of repair	Provision of new roost sites if it is decided that the artificial roosts provided have become damaged, or otherwise unsuitable.
Aquatic ecology monitoring	Initially in years 1 and 2. Collection of eDNA	Community composition.	Once FSL has been reached, monitoring approach and techniques should be adapted for stock assessment.

	samples every 5 years until FSL. Comprehensive sampling in Rogun and Nurek 2 – 3 years after the reservoir reaches 1290m asl. As needed, stock assessments to inform any management objectives related to the fishery.		If eDNA data does not show any trends, frequency to be reduced.

5 INDICATIVE COST BREAKDOWN

5.1.1 As per the requirements of ESS6, an indicative cost breakdown for delivery of this BMP is provided within Table 5-1. These costs are necessarily indicative at this stage and subject to change.

Table 5-1 – BMP Indicative Cost Breakdown

BMP Action	Indicative Cost ($)	Notes
NNLF for Juniper woodland NNLF for floodplain habitat	See Volume 3: A5 NNLF of this ESIA	-
Provision of ECoW Services	Revenue: $50,000/yr Capital: $30,000/yr	Contingency budget assumes an average of the equivalent of 1FTE (of ECoW services -primarily Lead ECoW hours) for Years 1-6 and has a capital budget for the Lead ECoW to operate and draw in support services as necessary.
Pre-flooding TRB flora re-survey and relocation	$3,000/yr	Repeated on an annual basis
Annual monitoring of TRB flora relocation	$1,500/yr	Repeated on an annual basis in years 1, 2, 3 & 5 post-relocation. Additional monitoring at the discretion of the Project ECoW.
Pre-flooding reptile survey, receptor site identification and relocation	$3,000/yr	Repeated on an annual basis (or in alignment with material reservoir rises – to be advised by the ECoW)
Pre-flooding bat survey – roost check and activity surveys	$15,000	Repeated on an annual basis (or in alignment with material reservoir rises – to be advised by the ECoW)

Purchase and import of broadband bat detectors	Purchase: $6,000 Import: $6,000	Recommended unit is Elekon Batlogger M and purchase price is based on purchase of 3# units and their import. It is recommended that after Year 6 the units be transferred to SFA for ongoing management work.
Invasive Species Management Plan (ISMP)	$1,500	
Annual monitoring of invasive species presence/spread	$1,500/yr	
Aquatic monitoring programme	$75,000/ Monitoring to be undertaken every 3yrs $10,000/yr (eDNA)	Monitoring to be undertaken every three years. eDNA analysis annually for first three years.

Appendix A

EXAMPLE BIODIVERSITY CONSTRAINTS TRACKER TEMPLATE

Ref	GIS ref	Feature	Risk	Risk level	Management	Completion date	Status	Update
Bio1	Unique identifier linking to GIS platform	TRB Flora	Flooding	High	Relocation to area X.X	04/06/25	OPEN	06/11/2024: Discussion with Mr. X over botanist support; sub-contractor appointed.
Bio 2	As above	Bird nest	Vegetation clearance	Medium	Retention of the bush/tree until nesting has been completed	01/08/25	OPEN	06/06/2025: Nest check undertaken by Mr. Y confirmed nest still active.

State Enterprise “Directorate for Flooding Zone of Rogun HPP”

Project Management Group For Energy Facilities Construction Under The President Of The Republic Of Tajikistan

ROGUN HYDROPOWER PROJECT - UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Volume 3: No Net Loss Framework

2025

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PROJECT NUMBER

PROJECT REF

DATE: SEPTEMBER 2025

Contents

TABLES

FIGURES

ANNEXES

EXECUTIVE SUMMARY

Introduction

To comply with the Lender requirements, the Rogun Hydropower Project aims to deliver No Net Loss (NNL) for the residual loss of Natural Habitats (185 ha of juniper woodland and 77 ha of floodplain).

This NNL Framework report covers the first phase of NNL delivery. It focuses on feasibility and consists of:

- Stakeholder engagement to establish a list of potential NNL actions, with Government agencies, development banks, and NGOs;
- Screening these NNL actions against ecological, political, technical, and social criteria to identify Preferred Candidate NNL actions; and
- Identifying a longlist of areas for delivery of preferred NNL actions, in close collaboration with the State Forestry Agency under the Government of the Republic of Tajikistan (SFA).

The second phase will be development of the detailed NNL Plan for delivery (2025 – 2030) and will be followed by implementation of NNL (from 2031). It will consist of:

- Shortlisting candidate NNL sites, following further Government and community engagement, site visits and ecological assessments, and loss/gain accounting;
- Final engagement on the selected NNL sites, designation, delivery, and funding with the Government and Lenders; and
- Detailed design of an adaptive NNL management, protection, and monitoring plan.

Results

Three actions were classed as Preferred Candidate NNL actions, one as an Other Candidate NNL action that first requires further Government support and more detailed analysis, and twelve as Not Suitable.

The Preferred Candidate NNL actions are:

1. Restoration and protection of juniper woodland;
2. Restoration and protection of native riparian woodland; and
3. Restoration and protection of native fruit and nut woodland (this is a contingency action if juniper and/or native riparian woodland restoration is insufficient or unsuccessful, that would achieve NNL by trading up for like-for-better uplift)

To achieve NNL using the preferred actions, 786 ha is to be restored, representing a 3:1 multiplier for the 262 ha of natural habitat disturbed by the Rogun Hydropower Project (HPP).

NNL through restoration of juniper woodland and native riparian woodland is considered feasible because:

- The SFA have proposed a longlist of 7,599 ha for reforestation under Government's current policy. This is 29:1 compared to the area of loss, exceeding the 3:1 multiplier and providing confidence that Phase 2 can identify sufficient sites to achieve NNL for the Rogun HPP.
- The SFA have also agreed their support and capability to restore the required habitats and areas;

- There is an existing methodology for reforestation in-country which can be further adapted to maximize biodiversity gains and protection;
- There are existing methods and processes for long-term sustainability of restoration sites that can be applied to mitigate risks, including pasture management plans;
- Restoration and protection of these habitats aligns with Government reforestation, biodiversity, and conservation policy priorities, including the target of planting 2 billion trees in Tajikistan by 2040;
- Land is State-owned in Tajikistan, and the State Forestry Agency own large areas of State Forest Fund Land for restoration;
- There is written commitment from the Government of the Republic of Tajikistan to restore the required areas and habitats for NNL;
- As per the Environmental and Social Commitment Plan, the No Net Loss Program is a part of the Biodiversity Management Plan and adoption of the BMP is a withdrawal condition under Section III.B.1(b) of Schedule 2 of the Financing Agreement for the Project.
- The ESCP also mentions that the implementing agency will ensure revegetate with native species, monitoring until vegetation is self-sustaining upon Upon completion of construction and prior to departure of contractor from the Project area.

The areas of Natural Habitat to be lost are already partially degraded and relatively small compared to what could be delivered by the SFA. The SFA also confirmed their capacity to identify and propose further areas if required.

The estimated total capital cost for reforesting 786 ha to achieve NNL is **7,511,213** USD, with an annual revenue cost of **10,535** USD. Depending on the need for sustainable pasture management plans, there will be an additional estimated capital cost of **14,934** USD.

Conclusion

Preferred Candidate NNL actions have been identified and a longlist of NNL locations and areas proposed by the SFA. This concludes Phase 1 and will be followed by the subsequent steps in Phase 2.

1. Shortlisting of the candidate NNL sites. Further SFA engagement will be required to conduct detailed reviews to shortlist candidate NNL sites, including community engagement, site visits, and baseline biodiversity assessments.
2. Final engagement with the Government and Lenders to approve the selected NNL sites, their long-term protection, and funding arrangements.
3. A detailed, site-specific and adaptive NNL management, protection, and monitoring plan will be produced, for the implementation of actions to achieve NNL. An estimated timeframe for Phase 2 is provided in Section 5.3. Phase 2 is to be delivered 2025-2030, with implementation and establishment 2031-2038, and management, protection, and monitoring ongoing for the operational lifespan of the Project.

INTRODUCTION TO THE NO NET LOSS FRAMEWORK

- This No Net Loss Framework (NNLF) has been prepared for the Rogun Open Joint Stock Company (JSC) (hereafter referred to as 'Rogun JSC') by WSP UK Limited (hereafter referred to as 'WSP') for the Rogun Hydropower Project (hereafter referred to as 'the Project').
- The Government of the Republic of Tajikistan established Rogun Joint Stock Company to own and operate the Project. Tajikistan also established the Project Management Group (PMG) for Energy Facilities Construction under the President of the Republic of Tajikistan, which is the implementing entity for construction of the Project.
- A lender consortium, led by the World Bank (WB), collectively called the 'Lenders', are considering financing the Project. The overarching environmental and social framework for the Project is the WB Environmental and Social Framework. The NNLF has therefore been developed in alignment with World Bank Environmental and Social Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources (ESS6) (World Bank Group, 2018).
- Other applicable International Financial Institution (IFI) standards that have also informed the Project and its associated management plans are detailed within Volume 1: Chapter 2 – Legislation & Standards of this Environmental and Social Impact Assessment (ESIA).

- BUSINESS CASE

- The business case for the Project's NNL actions includes ensuring compliance with legislation, good international industry practice and standards, and Lenders requirements, including World Bank ESS6 to enable the release of funds to complete the construction of the Project. Adherence to ESS6 mandates that NNL must be achieved for Natural Habitat identified as being adversely affected by the Project. This aligns with the Project's other Lenders requirements.

- REPORT PURPOSE

- Some aspects of the hydropower dam at Rogun have already been developed; the current Project involves filling the reservoir up to the maximum inundation level (i.e. to 1290m), along with other Project components such as new roads and stockpiling areas.
- Volume 1: Chapter 15 - Biodiversity of this ESIA concluded that most of the biodiversity impacts from the Project affect modified habitat and the project does not adversely affect Critical Habitat. Natural Habitats (as defined by ESS6) were identified within the Area of Interest (AoI). The ESIA predicts that Natural Habitats will be impacted by the Project after the application of avoidance, minimisation and restoration actions of the mitigation hierarchy. The identification of Natural Habitat and details of specific mitigation actions are set out in the main body of Volume 3: Biodiversity Management Plan. This NNLF focuses on the final step of the mitigation hierarchy to deliver off-site compensation measures and No Net Loss (NNL) of the following residually impacted Natural Habitat:

185 ha of juniper woodland
77 ha of floodplain

- It is worth to mention that the project location is already a brown field. The Project aims to achieve NNL of Natural Habitat affected by the maximum impoundment and construction works associated with the Project. As residual impacts are anticipated to Natural Habitats, offsite NNL actions – on-the-ground interventions leading to NNL in biodiversity associated with Natural Habitats – will be required to compensate for the residual impacts, and so achieve NNL in accordance with ESS6.
- This document presents the framework of NNL design approach and evaluates the feasibility of several possible actions for delivering NNL and provides the Project's recommended approach for developing NNL actions, specifically it:

Presents a screening assessment of proposed NNL actions for the Project, driven by stakeholder engagement;
Presents the Preferred Candidate NNL actions for biodiverse habitat restoration;
Presents a longlist of locations and areas for NNL proposed by the State Forestry Agency under the Government of the Republic of Tajikistan for implementation; and
Outlines the next steps to be followed to implement Preferred Candidate NNL actions at selected sites.

- PROJECT NNL DESIGN APPROACH

- The Project NNL design process is illustrated in Figure 5-1. The process is split into two phases:

- Phase 1 - this NNL framework, including a feasibility assessment and the longlisting of NNL sites for further consideration (i.e., this report); and
- Phase 2, to be delivered at a later date, which will consist of the shortlisting of NNL sites, the agreement between Lenders and the Government of the Republic of Tajikistan as to which NNL sites to fund, and the design of an adaptive NNL management, protection, and monitoring plan to begin implementing NNL.
  - Shortlisting NNL sites in Phase 2 will identify the sites with the greatest value for long-term biodiversity uplift. It will consist of further government engagement, community engagement, site visits, assessments, and detailed loss/gain accounting of both the areas to be lost and restored to confirm the habitat areas and quality required for NNL.
  - The project aims for NNL actions to be established by the time of full reservoir inundation in 2038, with ongoing management, protection, and monitoring for the operational lifespan of the Project. See estimated timeframe in Sections 4.7 and 5.3.

- STAKEHOLDERS CONSULTATION SUMMARY

- Tajik institutions were engaged to help design and develop feasible NNL strategy/framework for the long-term. The approach taken seeks to overcome technical, political and social challenges to provide the engagement and finance necessary to ensure NNL action delivery.
- Stakeholders were selected to learn from and build upon their local knowledge and experience.

- The Government of the Republic of Tajikistan has been engaged through formal letters, meetings, and site visits during 2023 and 2024. Meetings were held with the following:

State Forestry Agency under the Government of the Republic of Tajikistan (hereafter 'SFA').
Committee for Environmental Protection under the Government of the Republic of Tajikistan (hereafter 'CEP').
Ministry of Agriculture under the Government of the Republic of Tajikistan.
Ministry of Water and Energy Resources under the Government of the Republic of Tajikistan.

- Development bank and NGO stakeholders were also engaged through meetings during 2023 and 2024:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
Kreditanstalt für Wiederaufbau (KfW).
Tajikistan representatives of Fauna and Flaura International (FFI).
Deutsche Welthungerhilfe e. V. (WHH).
Caritas Switzerland.
Helvetas.
Aga Khan Development Network.
3ZERO (established by Acted).

- These meetings clarified the Project and the objectives of the NNL, and explored the potential actions to achieve NNL within Tajikistan, including acquiring information on:

The type and area of habitats for NNL actions;
Methods for NNL actions;
Locations for NNL actions;
The ecological, political, technical, and social feasibility of NNL actions;
Past, ongoing, and future habitat biodiversity projects, including any which the Project may contribute funding to achieve additional biodiversity uplift;
NNL action, management, and monitoring costs;
Community engagement;
Key success, barrier, and risk factors for NNL actions; and
Suitable supporting literature/documents.

- Final meetings with the Government of the Republic of Tajikistan, including the SFA and CEP, agreed upon the location, scale, and method for delivery of NNL actions.

- The purpose of such engagement is to ascertain existing knowledge, experience and skills to enact Preferred Candidate NNL actions, and land management or ownership rights of Preferred Candidate NNL areas, to help determine NNL actions that may be appropriate and effectively delivered. This is of primary importance because NNL actions and biodiversity conservation is about land management, and the Project does not have the right to act on lands it does not own, lease, or control. The involvement of stakeholders is therefore fundamental to the NNL action program.

Figure 5-1 - The Project NNL design process

The Project aims to deliver NNL for residually impacted Natural Habitat. The Project has conducted an initial assessment of NNL requirements and actions, identified a set of Preferred Candidate NNL actions, and set out a longlist of NNL sites as part of this NNLF first phase. Once the sites have been shortlisted and agreement on implementable sites between Lenders and the Tajik Government is achieved, a detailed adaptive NNL management and monitoring plan will be produced and implemented to ensure NNL in Phase 2.

- The Project's engagement with the Government of the Republic of Tajikistan and other relevant stakeholders has provided significant context to aid in the development of this NNLF.

TAJIK POLICY: CONTEXT

- Tajikistan's National Strategy and Action Plan (NBSAP) (Convention on Biological Diversity, 2003) for conservation and rational use of biodiversity in the Republic of Tajikistan includes the following objectives and arrangements:

Restoration and conservation of genetic funds of plants and animals;
In situ and ex-situ biodiversity conservation; and
Restoration of degraded ecosystems.

- In 2018, Tajikistan signed the Astana Resolution to restore 48,000 ha of deforested or degraded forest landscapes in Tajikistan by 2030 (World Bank Group, 2022).
- Tajikistan's national Forest Sector Development Strategy aims, by 2030, to plant new forests on 15,000 ha, rehabilitate 30,000 ha of existing forests, and carry out measures that support natural forest regeneration on 120,000 ha (The Food and Agriculture Organization of the United Nations & United Nations Economic Commission for Europe, 2019).
- Tajikistan's national Forest Sector Development Strategy for 2022-2026 (Government of the Republic of Tajikistan Resolution No. 149, 2022) includes the following objectives:

Conservation of forest biodiversity, restoration and conservation of forests, increasing their area and productivity;
Improving the quality and quantity of ecosystem services provided in the face of climate change;
Cessation of grazing on 30 per cent of the forest area;
Maintaining and increasing the area, productivity, and size of forest ecosystem services; and
Conservation, creation and restoration of anti-erosion, recreational and specially protected forests.

- In June 2024, the President of the Government of the Republic of Tajikistan announced the National Program for Greening of the Republic of Tajikistan for the period up to 2040, with a target of planting 2 billion trees by 2040. This comprises implementing tree and shrub planting in all districts of the country. The program is aimed at reducing greenhouse gases, restoring the ecological state of the atmosphere, maintaining a stable natural balance, and adapting to the processes of climate change.
- Additionally, the National Green Country Program for 2023-2027 aims to plant 65 million trees and shrubs along roadsides on a total area exceeding 4,000 hectares by the end of 2025. Multiple tree species will be planted, with 200 to 275 hectares allocated for each.
- At present, 22% of the country's territory is designated as Specially Protected Natural Territories (SPNTs), but the CEP seeks to increase this to 30% by 2030 (from in person meeting with the SFA, 15 November 2024).

TAJIK FOREST: CONTEXT

- Forests cover ~3% of Tajikistan's land area (The Food and Agriculture Organization of the United Nations & United Nations Economic Commission for Europe, 2019). The major forest types are juniper, wild fruit and nut (including walnut-maple, almond, and pistachio forests), native riparian woodland, and saxaul. Forest cover in Tajikistan was 16 – 18%

about 100 years ago, but much of this was cleared for agriculture and mining, followed by timber and firewood collection pressures after the Soviet period, when wood imports fell drastically, and the economic complexities and civil strife of the 1990s, which promoted further unregulated fuelwood collection (The Food and Agriculture Organization of the United Nations & United Nations Economic Commission for Europe, 2019; Chemonics International Inc., 2001). Increasing livestock numbers (both local and transhumance) have led to overgrazing, preventing forest regeneration, and continues to be a major cause of forest landscape degradation.

TAJIK FLOODPLAIN: CONTEXT

- No known policies were found to be available relating to floodplain protection or future restoration within Tajikistan, although floodplain areas covered with native riparian woodland are considered major biodiversity hotspots in arid and semi-arid Central Asian zones (Schulz, C. & Kleinschmit, B., 2023).

TAJIK POLICY: OPPORTUNITIES

- Tajikistan's policy context highlights the importance of forest habitats to the country, with a clear desire to increase the range and extent of forest and woodland habitats evidenced by the implementation of tree planting and forest restoration targets and initiatives. The Project supports national policies by ensuring NNL of Natural Habitat forest cover.
- Engagement undertaken with the SFA has provided further clarity on the most appropriate partnership for delivering NNL. Land in Tajikistan is under the exclusive ownership of the State, and the SFA own large areas of State Forest Fund Land. The SFA have prior experience of delivering forest projects in support of national policies, have defined available regions where such projects could be implemented, and have ambition to contribute to existing and new initiatives.

- NO NET LOSS PRINCIPLES

- Adherence to the World Bank ESS6 mandates that NNL must be achieved for any Natural Habitat identified as being adversely affected by the Project.
- The NNLF adheres to ESS6 requirements, which aligns with other Lenders requirements and good international industry practice, as follows:

1. *Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development, and persisting after appropriate avoidance, minimization, and restoration measures have been taken.*

   The Project first aims to avoid, minimize, and restore impacted features where possible, as per the mitigation hierarchy. Earlier mitigation actions will be applied as described in Volume 3: Biodiversity Management Plan. The NNL actions are designed to compensate for the residual loss of Natural Habitat due to the Project.

2. *The design of a biodiversity offset will adhere to the "like-for-like or better" principle* (World Bank Group, 2018).

The principle of “like-for-like or better” means that in most cases biodiversity NNL actions should be designed to conserve the same biodiversity values that are being affected by the project (an “in kind” NNL action). In certain situations, however, areas of biodiversity affected by a project may be neither a national nor a local priority, and there may be other areas of biodiversity with similar values that are a higher priority for conservation and sustainable use, and under imminent threat or in need of protection or effective management. In these situations, it may be appropriate to consider an “out-of-kind” NNL action that involves “trading up” (i.e., where the NNL action targets biodiversity of higher priority than that affected by a project). The Project will exercise appropriate consultation with government, development, and conservation stakeholders, as well as consideration of the national biodiversity strategy, to ensure the appropriateness of any like-for-like or like-for-better NNL action options and alignment with ESS6 requirements.

3. *The Borrower will demonstrate the long-term technical and financial feasibility of undertaking the offset.*

   Actions will be put in place to ensure NNL for residual losses. Long-term management responsibilities for the NNL action will be transferred to the appropriate government bodies for delivery. Sustained management of this sort requires continuity in legal authority and in availability of labor and financial resources. Options for long-term financing of the NNL actions are set out in Section 5.5 and will be confirmed by the Lenders and the Tajik Government in Phase 2. This includes both initial creation and establishment costs and ongoing annual protection, maintenance, and monitoring costs. Any funding arrangement will be subject to regular third-party verification to ensure appropriate use of funds and adequacy of long-term management and financial commitments.

4. *A biodiversity offset will be designed and implemented to achieve measurable, additional, and long-term conservation outcomes that can reasonably be expected to result in no net loss.*

   The NNL actions are designed considering global and regional biodiversity value and the ecological processes and functions of the landscape. This includes habitat contiguity and functionality through connectivity with other habitats.

   Loss/gain accounting will be undertaken as part of Phase 2 to ensure that the activities result in a measurable NNL outcome.

   Only activities that would not have occurred in the absence of the Project will qualify as NNL actions and contribute to the loss/gain accounts. The NNL action must not replace an existing and adequately functioning and funded restoration or conservation project/programme. Funding actions to meet policy ambitions or national targets for habitat restoration would be suitable.

   Local community involvement is fundamental to the long-term success of any conservation project such as these NNL actions. The Project will work in collaboration with local communities to develop conservation projects of mutual interest for livelihoods, conservation, and the sustainable use of natural resources. The Project will establish appropriate collaborations with community-based organisations and the government to ensure long-term sustainable NNL outcomes.

5. *The design of a biodiversity offset will be carried out in alignment with any additional Lenders requirements and good international industry practice.*

   NNL actions are designed to compensate for any impact on local community livelihoods. Livestock grazing is widespread in Tajikistan. The Project will work in collaboration with the Government and local communities to undertake NNL actions on land of little or no socioeconomic benefit and to develop sustainable pasture management plans (see Section 4.4) to mitigate impacts of any land lost to NNL areas.

NO NET LOSS ACTION REQUIREMENTS

- NATURAL HABITAT REQUIRING NO NET LOSS ACTIONS

– This NNLF focuses on the final step of the mitigation hierarchy to deliver off-site compensation measures and a NNL outcome for the following residually impacted Natural Habitat:

185 ha of juniper woodland
77 ha of floodplain

– These habitats are currently degraded and would likely to continue experiencing pressures from local communities, such as grazing or harvesting, in the absence of the Project. Floodplain habitat loss is anticipated to occur around 2027 when 1185m inundation level is reached. Juniper habitat loss is anticipated to occur between the years 2034-36, allowing for pre-flooding clearance and inundation. The reservoir is anticipated to be fully inundated by 2038. A timeline for Phase 2 and a timeframe for implementation can be found in Section 5.3 and 4.7, respectively.

- ACCOUNTING FOR UNCERTAINTY AND DELIVERY RISKS

– To account for delivery risks and uncertainty of NNL action success, safety margins shall be incorporated by using area-based multipliers to deliver a greater area of habitat restoration than the area of loss. This is recognized as part of good international industry practice for offsite compensation.

– An area-based **3:1** multiplier has been applied for both like-for-like and like-for-better delivery in phase 1 of the NNLF. This assumption is based upon literature review (Bull, J.W., Lloyd, S.P., Strange, N., 2016; Gibbons, P. et al., 2015), existing biodiversity offset plans on similar large infrastructure projects (Golder Associates Ltd., 2017a; Golder Associates Ltd., 2017b), tree survival rates from previous in-country reforestation schemes, and consultation with Bio-Diversity specialists. Additionally, it takes into consideration potential site-specific uncertainties, such as geographic distance from the residual impact, ecological connectivity, and existing local pressures.

– The 3:1 multiplier was used in phase 1 to help determine whether sufficient sites and areas for NNL actions can be confidently sourced in this first phase of work to demonstrate the feasibility of achieving a NNL outcome. Once specific NNL sites have been selected in the next phase of work, site-specific assessments of biodiversity value and existing local pressures at impact and NNL sites will permit more accurate calculations of the areas required to demonstrate a NNL outcome. As a result, the final multiplier may be further refined in phase 2 of the NNLF.

– **Table 5-2** summarizes the predicted area of NNL actions with multipliers applied.

Table 5-2 – Residual Project impacts on Natural Habitat and approximate area of NNL action requirements, with multipliers applied

Natural Habitat	Predicted Residual Impact (ha)	3:1 NNL action requirement (ha)
Juniper woodland	185	555
Floodplain	77	231
Total	**262**	**786**

IDENTIFYING NNL ACTION OPPORTUNITIES

- THE PROCESS

– NNL action opportunities were identified in a two-step process:

Identifying potential NNL actions; and
Screening these actions to evaluate their feasibility and to identify Preferred Candidates for recommendation.

- IDENTIFYING POTENTIAL NNL ACTIONS

– Potential NNL actions were identified through stakeholder meetings, expert input, and supporting research using the following criteria which relate to the ecological requirements of achieving NNL:

Restoration of habitats with native species within Tajikistan;
Actions that could deliver and/or protect like-for-like habitat types, or habitat types of similar or greater biodiversity value and national significance;
Actions that could deliver areas of habitat at sufficient scale to meet multiplier requirements; and
Actions that would align with Tajikistan's policy context and national targets and strategy.

– 16 NNL actions have been prioritized for further investigation in the screening stage. They are presented in **Table 5-3** and summarized across Section 3.4 and Annex A.

- NNL ACTION SCREENING

METHODS

– NNL actions were then screened based on ecological, political, and technical and/or social criteria.

– Ecological criteria were based on the likely level of contribution that the NNL action could make to achieving NNL for the Project. These included:

Whether the biodiversity value of the habitat delivered by the NNL action adheres to the "like-for-like or better" principle;
The deliverable size of the NNL action;
Whether NNL actions are additional, demonstrating biodiversity gains above and beyond those already anticipated due to other ongoing interventions;
The existing biodiversity value known to be present in the location of proposed NNL actions;
Whether the NNL action sites were large enough to be ecologically functional and linked to nearby habitats;
The distance of NNL actions from the Project; and
Whether the NNL action is in or adjacent to a protected area.

– Political feasibility was assessed based on the evidence of government support for habitat restoration, including for long-term management, protection, and monitoring. This would include evidence of previous or ongoing habitat improvements/restoration in-country, supported or delivered by the Government of the Republic of Tajikistan.

– Technical and social feasibility of gains were assessed based on scale and type of restoration and management activities that would be required to deliver NNL for the long-

term and to reduce the existing pressures on habitats in the intended region. Evidence included:

Previous implementation of the NNL actions in-country or globally;
Existing policies and / or plans;
Local community support;
Existing channels of communication or agreement with local communities;
Measures to mitigate for any impacts on local communities (e.g. through sustainable pasture management); and
Whether there is social and technical capital and infrastructure in place or that could be assembled.

- Based on the results of this process, the NNL actions were classified as follows:

Preferred Candidate NNL actions: actions where sufficient gains for biodiversity are feasible and aligned with the Lenders and the Government of the Republic of Tajikistan's priorities.
Other Candidate NNL actions: actions that could be considered for inclusion in the NNL action portfolio pending more Government support, provisioning of evidence, and further analysis.
Not Suitable: sites where there are significant technical or social barriers to generating biodiversity gains, ecological feasibility is uncertain, and/or where there is a risk of poor alignment with the Lenders and the Government of the Republic of Tajikistan's priorities.

- NNL ACTION SCREENING RESULTS

- Summary results of the assessment are presented in **Table 5-3**.

Three actions were identified as Preferred Candidate NNL actions
One action was classed as Other Candidate NNL actions
Twelve actions were considered unsuitable (hereafter 'Not Suitable')

- Details of the assessment for the Preferred Candidate NNL actions follow in this section. Assessment of the options classified as Other Candidate NNL actions and Not Suitable NNL actions are presented in Annex A.
- Recreating biodiverse natural habitats is the key objective of NNL actions.
- The three Preferred Candidate NNL actions identified are restoration and protection of: juniper woodland, native riparian woodland, and native fruit and nut woodland.
- Forest restoration is the process of repairing and re-establishing the ecological integrity and biodiversity of degraded or deforested habitats. This can be through planting or seeding (reforestation) and/or the minimisation of existing pressures for long-term biodiversity uplift. All restoration sites are to be in locations that are historically and ecologically suitable for the proposed habitat recreation.
- This NNLF seeks to deliver NNL habitats that are the same type or are ecologically similar to those being lost. Juniper woodland restoration provides quantifiable like-for-like biodiversity uplift to achieve NNL for juniper habitats to be lost. Native riparian woodland restoration provides quantifiable like-for-better biodiversity uplift to achieve NNL in a similar riparian system to the floodplain habitat to be lost. These options are therefore prioritized over native fruit and nut woodland restoration, which is not as similar as those habitats that are being lost even though it is an important conservation priority globally and in Tajikistan and is therefore like-for-better. Therefore, native fruit and nut woodland restoration is a contingency option that would provide like-for-better uplift to achieve NNL for the loss of

juniper and/or floodplain, if juniper and/or native riparian woodland restoration is insufficient or unsuccessful.

- ESS6 requirements for like-for-better options (as set out in Section 1.6) have been met as both native riparian woodland and native fruit and nut woodland are globally important, of high conservation priority in Tajikistan, and need protection and effective management in Tajikistan and wider Central Asia.
- The SFA have proposed a feasible longlist of locations for the Preferred Candidate NNL actions in Section 4.2, including methods and estimated costs.

Table 5-3 - Summary results of screening for the three Preferred Candidate NNL actions, one Other Candidate NNL actions, and twelve Not Suitable actions

NNL action	Ecological feasibility of NNL	Political feasibility of NNL	Technical and social feasibility of NNL	Screening outcome
Restoration and protection of: Juniper woodland Native riparian woodland Native fruit and nut woodland	**High** **Delivers like-for-like or like-for better Natural Habitat, with sufficient area available from the SFA to meet compensation requirements with appropriate multipliers.**	**High** **Projects have already been delivered in-country via the SFA, thus political will is there. Actions align with Tajik policy and targets. The SFA has expressed desire to deliver woodland restoration. Sustainable pasture management plans (see Section 4.4) and other interventions have previously been implemented to compensate local communities.**	**High** **Projects have already been delivered in-country, thus plans and technical capacity are available. Direct Afforestation Manual produced which can be further adapted for biodiversity-focused restoration. Nurseries have been developed near key planting sites. Actions provide indirect ecosystems service benefits to local communities. The SFA has proposed areas that are historically and ecologically suitable for restoration, and which they believe will be on land of little or no socioeconomic benefit and acceptable to local communities.**	**Preferred Candidate NNL actions.**
	Low	High	Low	Not Suitable.

NNL action	Ecological feasibility of NNL	Political feasibility of NNL	Technical and social feasibility of NNL	Screening outcome
Joint Forestry Management (JFM) approach for: Juniper woodland with fruit and nut plots for community harvesting Native riparian woodland, with fruit and nut plots for community harvesting Fruit and nut woodland Fruit and nut woodland, including native IUCN Red List species	If areas of Natural Habitat can be delivered alongside fruit and nut plots for community harvesting, then these are like-for-like or like-for-better. However, site visits and stakeholder engagement revealed that in reality JFM prioritizes agroforestry which is not Natural Habitat and cannot achieve NNL. Leases to local communities are also currently only for 20 years, therefore long-term security of any biodiversity uplift after that is unknown.	JFM projects have already been delivered in-country in collaboration with local communities, thus political will and community engagement is present, particularly for the agroforestry element of the JFM plots.	Project plans and technical capacity are available. JFM Manual has been produced. The delivery of JFM agroforestry plots would be of significant direct social value and have existing community support. However, creating and maintaining the natural habitat areas will not have long-term community buy-in or commitment without the provisioning of harvestable benefits. Only the agroforestry plots will receive committed buy-in.	
Tigrovaya Balka: cleaning channels	Low	High	High	Not Suitable.
	A globally ecologically significant site, but biodiversity benefits cannot be secured long-term using this method.	International and intergovernmental support for enhancement works to this globally ecologically significant site.	Works have been previously implemented and plans exist.	
	Low	Medium	Low	Not Suitable.

NNL action	Ecological feasibility of NNL	Political feasibility of NNL	Technical and social feasibility of NNL	Screening outcome
Tigrovaya Balka: creating new channels connecting Tigrovaya Balka to the Vakhsh river	Biodiversity uplift could be provided at a globally significant conservation area. However, a comprehensive hydroengineering feasibility study would be required to first determine the type, extent and longevity of uplift.	Support for enhancement works to a globally ecologically significant site, but financial costs would likely be high and some sensitive cross-boundary engagement with riparian neighbors would be needed.	A comprehensive feasibility study would be required, as increased flow into the system could pose a heightened risk of erosion and salinisation, and impact downstream land use.	
Tigrovaya Balka: restoring the hydrological regime to Tigrovaya Balka by coordination of artificial flood pulses through the Vakhsh cascade	High	Low	Low	Not Suitable.
	Significant biodiversity uplift could be provided at a globally significant conservation area and native riparian woodland habitat by seeking to replicate historic natural flow regimes	Requires significant political will at the highest level in Tajikistan, economic agreement on cascade flow harmonisation, and sensitive cross-boundary engagement with riparian neighbors.	A comprehensive feasibility study would be required, as introducing floods could have significant effect on any downstream land use.	
Upstream of Rogun floodplain enhancement	Medium	High	Low	Not Suitable.
	Could succeed to valuable native riparian woodland, but uncertainties remain on the potential uplift until sites could be further studied as part of the loss/gain accounting in Phase 2.	International conservation support for enhancement to native riparian woodland. In line with Tajik policy priorities	Planned upstream HPP additions to the Vakhsh cascade remove long-term certainty over flow provisioning and biodiversity uplifts.	
	Medium	Low	Low	Not Suitable.

NNL action	Ecological feasibility of NNL	Political feasibility of NNL	Technical and social feasibility of NNL	Screening outcome
Downstream of Rogun-Nurek complex: floodplain restoration or enhancement, by coordination of artificial flood pulses through the Vakhsh cascade	Could succeed to globally valuable native riparian woodland, but significant uncertainties remain on the potential uplift until sites could be further studied with hydrological and habitat modelling and as part of more detailed loss-gain accounting in Phase 2.	Requires significant political will at the highest level in Tajikistan, economic agreement on cascade flow harmonisation, and sensitive cross-boundary engagement with riparian neighbors	A comprehensive feasibility study would be required, as introducing floods could have significant effect on any downstream land use.	
Wetland creation along the river between Rogun and the Nurek reservoir	Low	High	Low	Not Suitable.
	Unlikely to recreate like-for-like habitat and it is unlikely to be considered like-for-better habitat. Significant uncertainty regarding the habitat value that could be created until further hydrological, topographical, and habitat modelling is conducted.	No known political obstructions emerged during stakeholder meetings.	The planned Shurob HPP between Nurek and Rogun removes long-term certainty over flow provisioning and biodiversity uplifts in this area.	
Wetland creation or enhancement along the Nurek reservoir	Low	High	Low	Not Suitable.
	It would not be like-for-like of a dynamic riparian habitat, and it is unlikely to be considered like-for-better habitat. Significant uncertainty regarding the habitat value that could be created until further hydrological and habitat modelling is conducted.	No known political obstructions emerged during stakeholder meetings.	A comprehensive hydrological feasibility study would be required to assess the areas, topographies, and extent of wetland creation.	
	Low	High	High	Not Suitable.

NNL action	Ecological feasibility of NNL	Political feasibility of NNL	Technical and social feasibility of NNL	Screening outcome
Saxaul regeneration around Tigrovaya Balka	Not considered a like-for-like or like-for-better habitat, given the regional abundance of saxaul in Central Asia. Unconfirmed whether the area around Tigrovaya Balka for restoration could be enough to quantifiably demonstrate NNL.	Ongoing saxaul natural regeneration projects in the buffer zone indicate current political will for anti-desertification measures.	Existing plans for the ongoing project demonstrate technical ability and could be expanded. Anti-desertification provides social benefits, and ongoing projects in the area indicate local community support.	
Extending protected area boundaries to protect existing areas of Natural Habitats	Medium At this time, no evidence of averted loss has been provided. Therefore, no known quantifiable biodiversity gains to demonstrate NNL. It may be possible to protect existing like-for-like or better habitat and represents good conservation priorities to protect existing habitats and expand existing protected areas.	High The SFA has expressed willingness to extend boundaries of Category III protected areas, which are within their jurisdiction.	Low At this time, no known methods or effectiveness of protection measures within proposed protected areas, or the existing protected area to be extended.	Other Candidate NNL action. There is currently a lack of evidence to prove averted loss or effectiveness to quantifiably achieve NNL. With Government support to extend protected areas, and the provisioning of suitable evidence, this action could, in time, be considered as a Preferred Candidate NNL action.

JUNIPER WOODLAND RESTORATION

HABITAT SUMMARY

- Juniper woodlands are the predominant forest type in Tajikistan, constituting nearly 50% of Tajikistan's forest cover, and are particularly common in moderate and high-altitude mountain areas in northern Tajikistan, within the Hissar, Kuramin, Turkestan, and Zeravshan ranges (Convention on Biological Diversity, 2003). Juniper trees dominate these habitats, primarily *Juniperus semiglobosa*, *Juniperus seravschanica*, and *Juniperus turkestanica*, with an understory of shrubs, grasses, and herbaceous plants. Juniper woodlands typically grow at elevations between 1,800 and 3,500 meters above sea level and are often found in regions with steep slopes and rocky soils. They are adapted to survive in areas of low precipitation which fluctuate between cold winters and warm summers, where they provide erosion control, water regulation, and carbon sequestration services.
- Stakeholders, including the SFA and the Aga Khan Development Network reported that juniper woodland reforestation projects have been undertaken in the Tajik ranges of the Pamir-Alay, including in the Ayni, Panjikent, and Rasht districts. There have also been efforts to reforest natural juniper woodland on steep slopes above roads to reduce erosion and landslip threats, from which Tajikistan is increasingly vulnerable. Juniper woodlands are generally remote or harder to regularly access from villages, however, they are still threatened by overgrazing and illegal logging, with mountainous communities favoring juniper trees over coal, to save coal (30-40% of household budgets) for the winter season. The burning of juniper also plays a cultural role in the preparation of shashlyk and bread. The main areas of Tajikistan's juniper forests are annually reduced by 2-3% (Rahmonov, O. et al., 2021).

NNL ACTION

- Restoration of juniper woodland by the SFA, with long-term management, protection, and monitoring for the operational lifespan of the Project. This NNL action will further augment the Direct Afforestation Manual (Forestry Agency of the Republic of Tajikistan, 2018) to focus on delivering biodiverse natural habitat and minimize existing pressures. Establishing physical barriers to these sites is likely to be required, with the establishment of sustainable pasture management plans (see Section 4.4) to mitigate the loss of grazing lands for nearby communities. Local communities will not initially be able to directly access the areas of restoration. Following establishment, management scenarios could include eventual sustainably controlled access to the afforested juniper woodland, once they have established and can naturally regenerate.

ECOLOGICAL

- Pros: NNL actions to restore natural juniper woodland would be a direct and quantifiable like-for-like compensation of the natural juniper woodland to be lost due to the Project. It is therefore most favorable for meeting Lender NNL requirements for juniper loss. Stakeholders have communicated that existing projects have already shown that juniper woodland can be reforested at scales larger than the area of residual Natural Habitat loss

for the Project, such that these NNL actions would enable demonstrable NNL of biodiversity.

POLITICAL FEASIBILITY

- Pros: The SFA and the Aga Khan Development Network have reforested juniper woodland in Tajikistan for conservation and slope and soil stabilisation, with a particular focus on the Panjikent and Ayni districts. This highlights the SFA's ambition to increase the reforestation of juniper woodland in Tajikistan, especially to meet the National Greening Programme for 2040 planting targets and the Tajik Forest Sector Development Strategy. The SFA confirmed this in a meeting on 23rd October 2024, expressing their willingness and capacity to restore juniper woodland to fully compensate for the loss of Natural Habitat as part of the Project, with its long-term management, protection, and monitoring.

TECHNICAL / SOCIAL FEASIBILITY

- Pros: The SFA have identified and proposed a feasible longlist of locations for juniper restoration, which include sufficient area to compensate for the residual impact with the multiplier applied. They have also provided their methodology for establishment and long-term management, protection, and monitoring, plus estimated costs. Proposed rehabilitation will be on historically and ecologically suitable areas, which includes currently degraded land of little socioeconomic benefit. SFA have previous and ongoing juniper woodland restoration and management projects, plus their own Direct Afforestation Manual for reforestation, developed in partnership with KfW (Kreditanstalt für Wiederaufbau, 2019). For example, the reforestation of 18 ha of juniper woodland outside the city of Panjikent with the support of the Aga Khan Foundation. Therefore, previous and current plans for implementation are available, with a proven method in-country. Stakeholders also reported instances where local communities had also been supportive of natural juniper woodland reforestation for soil and slope stabilisation alongside highways or in steep or less accessible areas, with KfW currently implementing their 'Enhancing Rural Development through Adapted Land Use and Natural Disaster Risk Mitigation' project (the tender has been awarded and the project is in its early stages). Additionally, stakeholders stated that specialist nurseries exist in Tajikistan near to key restoration areas in the Rasht, Panjikent, and Ayni districts.
- Cons: Juniper forests can grow slowly, with low regeneration from seed (Rahmonov, O. et al., 2021). Areas for juniper restoration are also often in dry, mountainous terrain which may causes additional logistical difficulties when reforesting, managing, protecting, and monitoring sites. As local communities would not initially be able to directly access these NNL juniper areas, areas should be strategically selected to minimize land-use conflicts, such that juniper is not reforested in areas valued for pasture, agriculture, or profitable Joint Forestry Management (JFM) plot creation (see Section 8.1 for further detail on JFM). It will be necessary for the State Forest Enterprises (SFE), local district divisions of the SFA, to invest in communicating to local communities the long-term ecosystem services provided by juniper restoration, and the benefits of sustainable pasture management plans. Existing livestock grazing and harvesting pressures mean that the restored juniper woodlands would need to be actively managed, protected, and monitored long-term by the SFA, with associated labor and expenses.

NATIVE RIPARIAN WOODLAND RESTORATION

HABITAT SUMMARY

- Viable, long-term, and direct like-for-like NNL options are technically challenging for floodplains in Tajikistan, both in terms of location identification, engineering, and expenses. Therefore, like-for-better options of similar dynamic riverine habitat types should also be considered. This is in line with the World Bank's ESS6, provided that the following can be evidenced. (1) The biodiversity area impacted by the Project is of neither a national nor local priority; (2) the NNL action targets biodiversity of higher priority for conservation and sustainable use, and which are under imminent threat or need of protection or effective management. Restoration of native riparian woodland meets these requirements as floodplain is not currently recognized as a national priority in Tajikistan, and native riparian woodland is a dynamic riverine habitat which is among the most important and productive ecosystems of the Central Asia region (The Food and Agriculture Organization of the United Nations & United Nations Economic Commission for Europe, 2019).
- Native riparian woodland habitat is adapted to fluctuating water levels and is often dominated by poplar and willow, with tamarisk species and *Elaeagnus angustifolia*. Understories vary depending on levels of water fluctuation but include herbaceous and reed species. They also provide vital ecosystem services in arid regions, such as water regulation, erosion minimisation and bank stabilisation, significantly strengthening the case for their urgent restoration.
- In Tajikistan they exist most commonly in the Amu Darya watershed in Khatlon province, including in the lower reaches of the Vakhsh, Panj, Zerafshan, and Kafirnigan (Chemonics International Inc., 2001). Stakeholders, including the SFA and KfW reported that native riparian woodland restoration projects have been undertaken in these regions and should, therefore, be the focus area for native riparian woodland restoration. Native riparian woodlands also exist along other mountainous rivers and along the inflow and outflow of the Kayrakkum Reservoir in northern Tajikistan. Native riparian woodland was previously cleared for agriculture and suffered from reductions in river runoff due to water removal for irrigation. The remaining areas constitute just 2-3% of original Tajik native riparian woodland cover, and continue to suffer from tree felling, fuelwood collection, and grazing (The Food and Agriculture Organization of the United Nations & United Nations Economic Commission for Europe, 2019).

NNL ACTION

- Restoration of native riparian woodland by the SFA, with long-term management, protection, and monitoring for the operational lifespan of the Project. This NNL action will further augment the Direct Afforestation Manual (Forestry Agency of the Republic of Tajikistan, 2018) to focus on delivering biodiverse natural habitat and minimize existing pressures. Establishing physical barriers to these sites is likely to be required, with the establishment of sustainable pasture management plans to mitigate the loss of grazing lands for nearby communities. Local communities will not initially be able to directly access these areas of restoration, therefore delivery should be in areas with lower competition with other land-uses and where communities benefit most from ecosystem service provisioning related to water retention and soil stabilisation. Given that native riparian woodland inhabits

riparian areas that often have competition for other land-uses, and that native riparian woodland tree species grow quickly, management scenarios could include eventual sustainably controlled, once the native riparian woodland habitats have established and matured.

ECOLOGICAL

- Pros: Native riparian woodland restoration is a like-for-better biodiversity compensation measure for the vegetated floodplain to be lost due to the Project. This is because it is a similarly dynamic habitat that can be restored on floodplain or riverine areas, and it is of globally significant conservation value and a conservation priority within Tajikistan and Central Asia. Whereas the vegetated floodplain to be lost is not currently identified as a national priority. Additionally, WSP ecologists identified that native riparian woodland is the likely climax community for the vegetated floodplain to be lost, if existing human and livestock pressures were removed, with *Tamarix*, *Elaeagnus* and *Hippophae* species characteristic of native riparian woodland present in shrub-form. Native riparian woodland would also reduce erosion, landslips, and sedimentation, and increase water retention and soil infiltration capacity, which is key to extended water release during dry months, and beneficial to local river and terrestrial ecology. Sufficient areas for native riparian woodland restoration have been identified by the SFA which would be sufficient to compensate for the Project's floodplain loss, enabling demonstrable NNL of biodiversity through this NNL action.

POLITICAL FEASIBILITY

- Pros: The SFA and KfW have previously restored native riparian woodland in Tajikistan. This highlights the SFA's ambition to increase reforestation of native riparian woodland in Tajikistan, especially to meet the National Greening Programme for 2040 planting targets and the Tajik Forest Sector Development Strategy. The SFA confirmed this in a meeting on 23rd October 2024, expressing their willingness and capacity to restore native riparian woodland to fully compensate for the loss of Natural Habitat as part of the Project, with its long-term management, protection, and monitoring.

TECHNICAL / SOCIAL FEASIBILITY

- Pros: The SFA have identified and proposed a feasible longlist of locations for native riparian woodland restoration. These are in historically and ecologically suitable locations, including currently degraded land of little socioeconomic benefit, which provide sufficient area to compensate for the residual impact with the multiplier applied. They have also provided their methodology for establishment and long-term management, protection, and monitoring, plus estimated costs. SFA have previous native riparian woodland restoration and management projects, plus the Direct Afforestation Manual for reforestation. Likewise, KfW successfully reforested native riparian woodland at Farkhor through the Climate Adaptation through Sustainable Forestry in Important River Catchment Areas in Tajikistan (CAFT) (Kreditanstalt für Wiederaufbau, 2019) project. Stakeholders stated that specialist nurseries for key native riparian woodland species exist or have been developed in Tajikistan near to key restoration areas. Therefore, previous and current plans for implementation are available, with a proven method in-country.

- Cons: As local communities would not initially be able to directly access these NNL native riparian woodland areas, at least initially, areas should be strategically selected to minimize land-use conflicts, such that native riparian woodland is not created in areas valued for pasture, agriculture, or profitable JFM plot creation. It will be necessary for the SFEs to invest in communicating to local communities the long-term ecosystem services provided by native riparian woodland restoration, and the benefits of sustainable pasture management plans. Existing livestock grazing and harvesting pressures mean that the afforested native riparian woodlands would need to be actively managed, protected, and monitored long-term by the SFA, with associated labor and expenses. Establishing physical barriers to prevent degradation of these areas presents challenges to mitigate due to the proximity to watercourses and risk of flooding, which could damage or destroy fencing and require a greater degree of maintenance.

NATIVE FRUIT AND NUT WOODLAND RESTORATION

HABITAT SUMMARY

- The wild ancestors for numerous types of pear, apple, walnut, almond, and cherry trees are native to the unique fruit and nut woodlands of Tajikistan and the Central Asian region. These woodlands inhabit the foothills of the Western Pamirs and the Zerafshan and Hissar ranges, typically inhabiting growing between 1,000 and 2,500 meters. This globally important genetic reservoir is subject to unsustainable grazing, cutting, and firewood collection, which are degrading and fragmenting the native fruit and nut forests and the socioenvironmental benefits they provide. Tajikistan's fruit and nut woodland also harbor key conservation species such as the IUCN Critically Endangered Bukharan pear and the Endangered Niedzwetzky's apple (Fauna and Flora International, 2024). Fruit and nut woodlands in Central Asia are high conservation priorities of global significance, with international conservation NGOs such as FFI working within country to preserve and restore areas. Considering the above, restoration of native, species-rich fruit and nut woodlands meets ESS6 like-for-better requirements for both habitats to be lost to the Project.
- Stakeholders, including the SFA, KfW, GIZ, and FFI reported that native fruit and nut woodland restoration projects have been undertaken across multiple regions in Tajikistan, including in the Khovaling, Rasht, and Mu'minobod districts. This includes reforestation as well as the JFM approach. Such sites are usually near population areas or communities.
- Juniper and native riparian woodland restoration are the prioritized NNL actions as this NNLF seeks to restore habitats that are the same type or are ecologically similar to those being lost. However, the restoration of diverse and species-rich native fruit and nut woodland is a suitable contingency NNL option to undertake if the proposed juniper or native riparian woodland sites cannot be shortlisted in the next stage of works, or if juniper or native riparian woodland direct restoration is not successful.

NNL ACTION

- Restoration of native fruit and nut woodland by the SFA, with long-term management, protection, and monitoring for the operational lifespan of the Project. This NNL action will further augment the Direct Afforestation Manual (Forestry Agency of the Republic of

Tajikistan, 2018) to focus on delivering biodiverse natural habitat and minimize existing pressures. Establishing physical barriers to these sites is likely to be required, with the establishment of sustainable pasture management plans to mitigate the loss of grazing lands for nearby communities. Local communities will not be able to access the areas of restoration, at least until habitats have established and matured. Therefore, delivery areas should be strategically selected to minimize land-use conflicts, such that native fruit and nut woodland is not reforested in areas valued for pasture, agriculture, or profitable JFM plot creation Following establishment and maturation, management scenarios could include eventual sustainably controlled access to the afforested native fruit and nut woodland.

ECOLOGICAL

- Pros: Native fruit and nut woodland restoration is a like-for-better biodiversity enhancement on the more regionally common juniper woodland and the vegetated floodplain to be lost due to the Project. This is because it has global significance as a source of key species and genetic diversity and is a habitat of high conservation priority with regional scarcity in Central Asia. Areas for native fruit and nut woodland restoration have been identified by the SFA which would be sufficient to compensate for the Project's residual impact on both Natural Habitats, with a sizeable multiplier applied, such that these NNL actions would enable demonstrable NNL of biodiversity.

POLITICAL FEASIBILITY

- Pros: The SFA, in combination with KfW, GIZ, and FFI, have restored multiple sites of native fruit and nut woodland in Tajikistan for conservation and additional pollination, water retention, and slope and soil stabilisation ecosystem service benefits. This highlights the SFA's ambition to increase the reforestation of native fruit and nut woodland in Tajikistan, especially to meet the National Greening Programme for 2040 planting targets and the Tajik Forest Sector Development Strategy. The SFA confirmed this in a meeting on 23rd October 2024, expressing their willingness and capacity to restore species-rich, native fruit and nut woodland to fully compensate for the loss of both Natural Habitats as part of the Project, with its long-term management, protection, and monitoring.

TECHNICAL / SOCIAL FEASIBILITY

- Pros: The SFA have identified and proposed a feasible longlist of locations for native fruit and nut woodland direct restoration. These are in historically and ecologically suitable locations, including currently degraded land of little socioeconomic benefit, which provide sufficient area to compensate for the residual impacts to both Natural Habitats with the multiplier applied. They have also provided their methodology for establishment and long-term management, protection, and monitoring, plus estimated costs. SFA have previous and ongoing native fruit and nut woodland restoration and management projects, individually and also in collaboration with multiple development banks and NGOs, plus their own Direct Afforestation Manual for reforestation. Therefore, previous and current plans for implementation are available, with a proven method in-country. Additionally, as fruit and nut woodland has been created at scale via the JFM approach, numerous specialist nurseries exist in Tajikistan near to key restoration areas.

- Cons: As local communities would not initially be able to directly access these NNL native fruit and nut woodlands, areas should be strategically selected to minimize land-use conflicts, such that they are not created in areas valued for pasture, agriculture, or profitable JFM plot creation. It will be necessary for the SFEs to invest in communicating to local communities the long-term ecosystem services provided by native fruit and nut woodland restoration, and the benefits of sustainable pasture management plans. Existing livestock grazing and harvesting pressures mean that the restored native fruit and nut woodlands would need to be actively managed, protected, and monitored long-term by the SFA, with associated labor and expenses.

PREFERRED CANDIDATE NNL ACTIONS: PROPOSED LOCATIONS AND DELIVERY METHODS

- PROPOSALS FROM THE STATE FORESTRY AGENCY

– After identifying the Preferred Candidate NNL actions, further in-person and remote meetings were held in October and November 2024 with appropriate bodies of the Government of the Republic of Tajikistan. These were to confirm the bodies responsible for delivery and management of NNL sites, and to obtain a longlist (see **Table 5-4**) of proposed locations and areas to implement the Preferred Candidate NNL actions (as per Phase 1 in Figure 5-1).

– The SFA confirmed their authority, legality (Government of the Republic of Tajikistan, 2014 (as amended)), motivation, and capacity (land and personnel) for delivery of habitat restoration within Tajikistan, and for its management, protection, and monitoring for the operational lifespan of the Project. Additionally, the role of the CEP was confirmed as a legal environmental body, operating to ensure compliance with environmental legislation.

– The SFA set out preliminary proposals for delivery of the Preferred Candidate NNL actions to restore biodiverse natural habitats. Proposals contained:

A list of proposed locations that the SFA identified for habitat restoration and protection, with confirmation that this land is owned by the SFA and that no tenancies exist that would prevent or restrict NNL actions;

Confirmation of the biodiverse natural habitats that the SFA could restore in these locations (specifically juniper, native riparian woodland or native fruit and nut woodland);

The area of natural habitat that the SFA could restore in each location. To demonstrate a longlist of feasible areas to select from, the proposals were to show the ability to restore sufficient areas of juniper woodland, native riparian woodland, and native fruit and nut woodland.

Confirmation that the Direct Afforestation Manual approach can be used and adapted to deliver biodiverse natural habitats and minimize existing pressures:

An estimation in US dollars of the average cost for:

- Habitat restoration per hectare (for each habitat type)
- Annual long-term management, monitoring, and protection per hectare

Suitable local nurseries for obtaining saplings and seedlings;

A chart showing which bodies of the SFA would be responsible for delivering, managing, monitoring, and protecting the restored natural habitat; and

An estimated timeline for delivery by the SFA.

– The SFA adhered to the following criteria when proposing a longlist of site locations for NNL actions, with sites being on land identified as:

Historically and ecologically suitable for the proposed natural habitat, and with long-term suitability in the context of climate change

Ecologically connected / adjacent to existing areas of the natural habitat, to promote restoration of biodiverse habitats;

Currently degraded and of low or no socioeconomic benefit to minimize land-use conflicts; and

Proximal to local nurseries and irrigation sources.

- The SFA confirmed that existing degradation and lack of current regeneration at the proposed sites is due to historical deforestation (during civil strife, see Section 1.5) followed by grazing pressure, and not due to more permanent environmental reasons. These existing pressures will be mitigated through shortlisting the most effective sites for restoration and through implementation of long-term site-specific management, protection, and monitoring plans (see Phase 2 in Figure 5-1).
- Shortlisting NNL sites in Phase 2 will identify the sites with the greatest value for long-term biodiversity uplift. Further government engagement will be utilized, plus local ecological expert and community engagement at the selected sites, to identify which are most ecologically and technically suitable. Detailed biodiversity loss/gain accounting will be undertaken on the areas to be lost and restored to confirm the exact areas and quality of natural habitats that will be restored at the NNL action sites. This accounting will also take into account any positive or negative time lag between the loss and gain of habitats. Phase 2 must also consider social safeguards and customary land ownership, including the need to avoid sites actively used by local communities, and if unavoidable, compensation and livelihood restoration for any land use restrictions will be developed, such as sustainable pasture management plans.
- Details of the longlist proposals received in November 2024 from the SFA are set out in the following sections.

- LONGLIST OF LOCATIONS FOR NNL ACTIONS

- The SFA proposed the locations in **Table 5-4** for delivery of the Preferred Candidate NNL actions.
- Total proposed total area of 7,599 ha is 29:1 compared to the area to be lost, exceeding the 3:1 multiplier and providing confidence that Phase 2 can identify sufficient sites to achieve NNL.

Table 5-4 – Longlist of locations for the delivery of the Preferred Candidate NNL actions.

No.	Area (ha)	Administrative Districts of Tajikistan	Location	Habitat Type for Restoration
1	1,100	Rasht	Jamoat Dehot Boki Rahimzoda	Juniper woodland
2	844	Kushoniyon	Jamoat Dehot Zargar, Bustonqala, and Bokhtariyon	Native riparian woodland
3	536	Panjikent	Jamoat Dehot Persimmon	
4	30	Rudaki	Jamoat Dehot Esanboy	
5	1,609	Lakhsh	Jamoat Dehot Nurafshon, Surkhob, and Taylobod	Native fruit and nut woodland
6	703	Faizabad	Jamoat Dehot Javonon and Chashmasor	
7	687	Rogun City	Jamoat Dehot Sicharogh	

No.	Area (ha)	Administrative Districts of Tajikistan	Location	Habitat Type for Restoration
8	586	Sangwor	Jamoat Dehot Tavildar and Childar	
9	500	Tajikobod	Jamoat Dehot Langari Sho	
10	400	Rasht	Jamoat Dehot Boki Rahimzoda	
11	336	Nurek City	Jamoat Dehot Dukoni and Puli Sanguin	
12	145	Rudaki	Jamoat Dehot Esanboy	
13	88	Rudaki	Jamoat Dehot Guliston	
14	35	Varzob	Jamoat Dehot S. Aini	
Total juniper woodland area = 1,100 ha				
Total native riparian woodland area = 1,410 ha				
Total native fruit and nut woodland area = 5,089				
Total area = 7,599 ha (This is 29:1 compared to the area to be lost, exceeding the 3:1 multiplier and providing confidence that Phase 2 can identify sufficient sites to achieve NNL)				

- The SFA has access to large areas of State Forest Fund Land for NNL delivery. They have confirmed that they have the capacity and capability and are willing to work closely with the Project to propose additional locations and hectarage for juniper, native riparian woodland, and native fruit and nut woodland restoration beyond those listed in Table 4-1, as required.
- The only juniper woodland restoration location is upstream of the Project, in the Vakhsh catchment, and near to the Project reservoir. All longlist locations are within the larger Amu Darya catchment, apart from the proposed Panjikent site in the Zeravshan catchment, a former Amu Darya tributary that no longer reaches the Amu Darya.

- NNL DELIVERY METHODS

- The SFA will use the Direct Afforestation Manual as a starting point for the methodology for the delivery and long-term management and monitoring actions. It was developed with the SFA as part of the CAFT project (Kreditanstalt für Wiederaufbau, 2019) to introduce dense, natural planting schemes in Tajikistan. The Direct Afforestation Manual can and will be further augmented to emphasise biodiversity restoration through Phase 2's preparation of detailed NNL management plans.
- Site-specific delivery methods and how else to achieve and monitor biodiversity uplift is to be defined in Phase 2, as will a detailed adaptive NNL management and monitoring plan.
- Restoration areas must:

- Be part of the State Forest Fund Land and be owned by the SFEs, with certification for land use rights;
- Be historically and ecologically suitable for restoring the target habitats;
- Be degraded and have no or low competing land uses that could threaten restoration efforts;
- Avoid sites actively used by local communities, and if unavoidable, compensate communities through livelihood restoration such as sustainable pasture management plans;
- Be under the control of a SFE with readily available labor resources;
- Be accessible for the delivery of saplings / seedlings, fencing, and implementation of works;
- Conduct a survey of the natural characteristics in advance to assess topography, soil type, moisture levels, soil cover, and the presence of soil pests.
    - The Direct Afforestation Manual establishes the following approaches for key species' reforestation planting, management, protection, and monitoring.

Reforestation planting

- Juniper woodland key species include:

Primary species = *Juniperus seravschanica*, *Juniperus turkestanica*, *Juniperus semiglobosa*
Secondary species = *Cotoneaster* sp., *Rosa fedtschenkoana*

- Native riparian woodland key species include:

Primary species = *Populus* sp. (e.g. *Populus pruinosa*), *Salix* sp., *Tamarix* sp., *Elaeagnus angustifolia*
Secondary species = *Lycium dasystemum*, *Cydonia* sp., *Prunus cerasus*, *Prunus armeniaca*, *Rosa canina*

- Native fruit and nut woodland key species include:

Primary species = *Juglans regia*, *Acer turkestanicum*, *Platanus orientalis*, *Malus sieversii*
Secondary species = *Prunus armeniaca*, *Prunus dulcis*, *Rosa canina*

- Planting densities are habitat and site dependent, but 1000 – 2000 per hectare should generally be targeted.
- Planting will be from seedlings/saplings acquired from nearby nurseries. Opportunities for transplanting juniper trees from the inundation area will also be explored as part of Phase 2, as the proposed juniper reforestation area in Table 4-1 is nearby.
- Planting materials will have quality control measures (through commission and inspection), and poor-quality seedlings will be rejected. Supply nurseries will produce a certification of quality, and seedling/sapling transportation will be according to standards and from nearby nurseries to minimize travel time and risk.
- Autumn (November) planting is preferable in moistened soil. Spring (early-vegetation season) is also possible, directly after the snow melts.
- Traditionally, seedlings are planted in rows. Spacing between the rows depends on species, site conditions and management objectives. Common distances within the rows are 2, 3, 5, 6 or 8 meters. Spaces between the rows have a size of 3, 5, or 8 meters. However, mimicking natural forests and microclimates by planting a mixture of tree species

in troops (12 to 20 trees), groups (20 to 30 trees) or small blocks (up to 50 trees) according to site conditions is preferable for restoring natural habitats.

Maintenance and Protection

- In the first year of plantings, maintenance measures will be conducted at least 5 times per year. This includes mulching and loosening of the soil around the seedlings at a depth of 6 –14 cm, and the destruction of weeds. The first soil maintenance work will be done in early spring before weeds begin to grow, with subsequent treatments carried out after the regrowth of weeds.
- Watering and irrigation conditions will be habitat and site specific. For example, for native riparian woodland, irrigation is required for at least the first 3 years after planting and in river valleys tubes are used to filter water off from the river.
- Watering of forest plantations in the project area are necessary from at least June-August, and with at least 3 waterings per months. It is usually necessary to establish channel systems according to the planting schemes.
- Trees that fail to establish are to be replaced with individuals of the same species, typically in autumn or spring.
- The main threat to restoration in Tajikistan is livestock herds. Fencing (brushwood, ditches, and wire mesh) of the area is the most effective method to protect areas. Wildlife-friendly fences will be installed that allows the migration of small animals. To protect against the intrusion or the cutting of fences, operating a cattle prison has also proven to be a useful penalty instrument to reinforce legislation. A cattle prison is an area that is fenced and can be closed where illegal grazing cattle can be locked in until the owner has been identified and fined. Deploying rangers to externally patrol fencing areas is also an effective way to reduce the risk of incursions at restoration sites. Community engagement will seek to build awareness of the benefits and conservation needs of the restored habitat.
- Anti-fire systems such as ditches, mineralisation, patrolling rangers, and engaging with local communities will be implemented to guard against the risk of forest fires.

Monitoring

- Biodiversity will be a key monitoring indicator, amongst other site-specific key performance indicators set out in the adaptive management plan (see Figure 1). Elements for monitoring will include:

The establishment, diversity, abundance, and composition of key habitat-specific species;
Habitat type, extent and quality;
The quality of planting materials;
Plant survival rate in the habitat establishment period;
Invasive species presence; and
Evidence of grazing or extraction.

- At least three sample plots (of at least 0.05 ha) are to be assessed and distributed over each restoration plot. Larger restoration sites will seek greater sample plot areas.

- Adaptive management mechanisms with feedback loops will be in place to identify and correct issues as they arise. Where necessary, new NNL actions or sites will be established if restoration failure at a site is widespread and repetitive.

- LONG-TERM SUSTAINABILITY

- Long-term sustainability provides challenges, but there are existing methods and processes that can be applied to mitigate risks. In addition to the detailed plan for adaptive management, protection, and monitoring, the following options will promote long-term sustainability of the restored habitats for the operational lifespan of the Project:

Assigning the larger restoration areas as Category III Specially Protected Natural Areas within Tajikistan, under the jurisdiction of the SFA;
Paying local communities to undertake management tasks, as per the Direct Afforestation Manual and as is already the case in other parts of the State Forest Fund Land;
Sustainable pasture management plans where grazing is an issue; and
Social plans, such as

- Distributing improved stoves and training in energy efficiency techniques;
- Distributing fruit drying equipment and training in forest product processing and storage; and
- Seminars introducing pasture law, grazing rotation, and livestock food rations.

- Further elaboration of site-specific plans for long-term sustainable management will be determined in Phase 2, appropriate to the site and resources available.

- Sustainable pasture management plans are valuable for minimizing livestock pressures. For example, the CAFT project successfully reforested 2,382 ha of native woodland in Tajikistan using the Direct Afforestation Manual (Kreditanstalt für Wiederaufbau, 2019). Sustainable pasture management plans were developed and established by SFE staff, Pasture User Unions, and selected community members. Across four years of reporting (2015-2019), livestock conflicts were reduced by ca. 20%.

- Sustainable pasture management plans will be designed and implemented to minimize livestock pressures on NNL areas and improve local livelihoods. These will be site-specific but could include the following methods which have been implemented within Tajikistan.

Establishment of drinking water systems in community pasture areas to localize livestock;
Rotational grazing;
Reduction of community livestock movement, fencing sheepyards for overnighting in community pasture areas, and supplying living tents for community shepherds;
Supporting measures to produce winter fodder for livestock;
Pasture improvement (fencing and seeding), including demonstration plots; and
Construction of small bridges over physical barriers (such as streams) for livestock to better access existing pasture grounds.

- COSTS

- The SFA have provided capital cost estimates per hectare for reforestation in **Table 5-5**. They include a general range of costs for different planting patterns of juniper, native riparian woodland and native fruit and nut woodland. More detailed, site-specific capital and revenue requirements to deliver NNL will be developed in Phase 2 (see Figure 1).

- The SFA also provided estimates for ongoing annual revenue costs. This consists of 101,852 USD per year for a suggested 29 rangers / foresters across the total 7,599 ha for restoration in the SFA proposals. Therefore, for the 786 ha required to achieve NNL at a ratio of 3:1, the estimated annual cost is 10,535 USD, or 13 USD per hectare.
- Costs for pasture management plans have been taken from the CAFT project. Under that project, 123,937 USD was spent on pasture management plans to support the delivery of a total of 6,523 ha reforested / rehabilitated. That equates to a rate of approximately 19 USD per hectare of reforested land. On that basis, sustainable pasture management plans are estimated to cost a further 14,934 USD to support the delivery of the 786 ha of reforestation required to achieve NNL at our 3:1 area ratio. Final costs will depend on location, access to infrastructure, and the level of pasture degradation, and will be agreed with Lenders as part of Phase 2.
- Training, capacity building, budgeting, reporting and project management are included as part of the 'Other expenses, 10%' in **Table 5-5**. There is a gap between the existing and proposed habitat restoration practices within Tajikistan. The Direct Afforestation Manual represents in-country best practice however the NNL activities will require greater emphasis on biodiversity outcomes and long-term management, monitoring and protection activities. Therefore, additional training and capacity building of the SFEs and hired laborers will be required – to be detailed in Phase 2.
- The estimated total capital cost for reforestation is 7,511,213 USD, with an annual revenue cost of 10,535 USD. Depending on the need for sustainable pasture management plans, there will be an additional estimated capital cost of 14,934 USD.
- This total capital cost of habitat reforestation is based on the average of the total cost per hectare values in **Table 5-5** (i.e. 9,556.25 USD) and the need to restore 786 ha, using a 3:1 multiplier. Bespoke loss/gain calculations and site-specific costings will update this estimated total cost in Phase 2.

Table 5-5 – SFA capital costs per hectare of reforestation (USD), *as per Tajikistani Somoni to United States Dollar 30th October 2024.*

Reforestation habitat and planting type	Seedlings / saplings (to include all nursery costs)	Fencing	Organisation of drip irrigation	Maintenance of seedlings over the first 5 years	Direct labor (digging holes, planting, etc.)	Mechanical soil preparation	Transportation costs	Other expenses, 10%	Total cost per hectare (USD)
Juniper woodland planting pattern 1 (2x3m)	7,833	1,410	2,350	611	1,880	56	94	1,423	15,657
Juniper woodland planting pattern 2 (3x3m)	5,222	1,410	2,350	407	1,253	56	94	1,079	11,871
Juniper woodland planting pattern 3 (3x4m)	3,915	1,410	2,350	305	940	56	94	907	9,977
Native riparian woodland planting pattern 1 (2x2m)	4,700	1,410	2,350	367	1,128	56	94	1,011	11,116
Native riparian woodland planting pattern 2 (2x3m)	3,132	1,410	2,350	244	752	56	94	804	8,842
Native riparian woodland planting pattern 3 (3x3m)	2,089	1,410	2,350	163	501	56	94	666	7,329
Native fruit and nut woodland: walnut-apple (6x5m)	931	1,410	2,350	73	225	56	94	514	5,653
Native fruit and nut woodland: almond (5x4m)	1,175	1,410	2,350	92	282	56	94	546	6,005

- **NURSERIES**

  - Proposed NNL sites require local nurseries. These will already have capacity to provide sufficient seedlings for the areas of reforestation or will be further developed to meet the demand.
  - The SFA provided a list of nurseries (see **Table 5-6**) within Tajikistan which are suitable for obtaining saplings / seedlings.

Table 5-6 – List of local nurseries for obtaining seedlings for reforestation.

Nursery	Location	Area of saplings / seedlings (ha)	Outputs
State Unitary Enterprise Forest Nursery of the City of Vahdat	Vahdat, Jamoat Abdulvosieva, Nikholparvar village	14.5	Juniper, fruit and nut, deciduous broadleaf
State Unitary Enterprise Forest Nursery of Kabadiansky District	Kabadian district, Jamoat 20th anniversary of Independence, Nikholparvar village	14.5	Juniper, fruit and nut, deciduous broadleaf trees
State Unitary Enterprise Forest Nursery of Vosesky District	Vose district, Kh. Rajabov jamoat, Kuchabog village	18	Juniper, fruit and nut, deciduous broadleaf trees
State Unitary Enterprise Forest Nursery of Zafarabad District	Zafarabad district, Jamoat A. Jami, Saribog village	10	Juniper, fruit, deciduous broadleaf trees and shrubs
State Unitary Enterprise Forest Nursery of Rasht District	Rasht district, Jamoat Askalon, Chakikho village	4	Fruit and nut trees
Production and experimental site Navabad	Dushanbe city, I. Somoni district, Varzob hydroelectric power station village, Navabad street	2	Juniper and broadleaf trees and shrubs
State Forestry Administration of Khatlon Region	Bokhtar city, Login street - 2	1	Juniper, nut, deciduous broadleaf trees and shrubs
State Forestry Department of Shartuz District	Shartuz district, Binokor village	0.4	Juniper, nut, deciduous broadleaf trees and shrubs
State Forestry Department of Kabadiansky District	Kabadian district, Jamoat 20th Anniversary of Independence, village Nikholparvar	0.55	Juniper, nut, deciduous broadleaf trees and shrubs
GULKH Nosiri district Khusrav	District N. Khisrav , Jamoat Navruz village Sangoba	0.7	Juniper, nut, deciduous broadleaf trees and shrubs

Nursery	Location	Area of saplings / seedlings (ha)	Outputs
of Hamadoni MSA District	Hamadoni district, Moscow town	1.1	Juniper, fruit, deciduous broadleaf trees and shrubs
State Forestry Department of Parkhar District	Parkhar district jamoat Istiklol , village Fayzabad-1	1.4	Juniper, nut, deciduous broadleaf trees and shrubs
State Forestry Administration of Shamsiddin Shokhin District	Jamoat Sarichashma	1	Juniper, fruit and nut trees and shrubs
GULH Dashtijum district Shamsiddin Shokhin	District Sh. Shokhin, Jamoat Dashti Jum, Village DashtiJum	1	Juniper, fruit, deciduous broadleaf trees and shrubs
State Forestry Department of Muminabad District	Muminabad district, urban settlement . Muminabad, I. Samani street - 60	2	Juniper and fruit trees
State Forestry Department of Khovaling District	Stroiteley street	2.5	Juniper and fruit and nut trees
State Forestry Department of Faizabad District	Street. I. Samani street - 53	1	Juniper and fruit trees
State Forestry Department of Gisar District	City of Gisar, uitsa A. Bedil 53	1	Juniper and broadleaf deciduous
State Forestry University named after Kh. Sarumsokov Asht district	Asht district, Jamoat Orien village Navruz	1.7	Juniper and broadleaf deciduous
State Forestry named after N. Khuvaidulloev Asht district	Asht district, urban settlement Shaydon, F.Tursumatov street - 40	1.35	Fruit and broadleaf deciduous
State Forestry Department of Shahristan District	Shakhristan district, urban settlement. Shakhristan, Khatamova street - 65	1.6	Juniper and broadleaf deciduous
State Forestry named after Musoev, Devashtich district	Devashtich District, Jamoat Ismoili Somoni, Darkhan village	2	Juniper and broadleaf deciduous and shrubs

- DELIVERY PARTNERS AND TIMEFRAME FOR IMPLEMENTATION

– Rogun JSC is ultimately responsible for ensuring that the Project delivers NNL. **Table 5-7** provides a breakdown of the internal SFA departments identified for the implementation and long-term management of the NNL actions, with a projected timeframe for works in **Table 5-8**. Based on the timeline for Phase 2 in Section 5.3, it is estimated that implementation will commence in 2031, but a detailed programme will be confirmed as part of Phase 2.

Table 5-7 – Key structures of the SFA for reforestation.

SFA department	Role
State Forestry and Hunting Inspectorate	Exercises state control over forest and hunting resources, ensure compliance with legislation, and control the protection of forests and hunting grounds.
Forestry Research Institute	Provides scientific research support to projects, develops methodological recommendations for forest restoration and monitoring.
State Forestry Enterprises (42 units)	They carry out forestry activities on the territory of the State Forest Fund, including planting, tending, and protecting forests.
State nurseries (5 units)	They provide seed and planting material for reforestation, which is necessary for the restoration and maintenance of forest ecosystems.
State Unitary Enterprise "Tajik Forest Management Group"	Conducts forest inventories and develops forest management plans to help optimally allocate resources and manage forest areas.
State Unitary Enterprise "Center for Development and Implementation of Projects"	Coordinates the development and implementation of forest projects, including compensatory reforestation projects, and ensures project monitoring and reporting.

Table 5-8 – SFA implementation timeframe for reforestation

Restoration implementation stage	Responsible structure	Implementation timeframe (to be agreed in Phase 2)
Delivery of planting material	Forest nurseries	2031-32
Implementation (planting and establishment of seedlings)	State forestry	2033-38
Management	Forestry Agency	Ongoing for the operational lifespan of the Project. Details to

Restoration implementation stage	Responsible structure	Implementation timeframe (to be agreed in Phase 2)
Monitoring	Department of Forest Registry and Monitoring	be set out in site-specific NNL management plans
Protection	State Forest and Hunting Inspectorate	
Project execution control	State Unitary Enterprise "Center for Development and Implementation of Projects"	

CONCLUSION AND PHASE 2

- CONCLUSION

- Restoration and protection of juniper woodland and native riparian woodland are the feasible Preferred Candidate NNL actions to be taken forward into the next phase of works. Additionally, restoration and protection of native fruit and nut woodland is a contingency Preferred Candidate NNL action that can be implemented if the shortlisting or delivery of sites for juniper or native riparian woodland restoration is unsuccessful or insufficient to achieve NNL.
- There are sufficient locations and areas in the longlist of sites proposed by the SFA to give confidence that the shortlisting in Phase 2 will identify areas required to achieve NNL with the applied multiplier. There is also written commitment from the Government, alignment with Government policy targets, institutional capacity, and methodologies. Long-term sustainability provides challenges, but there are existing methods and processes that can be applied to mitigate risks.
- The Government of the Republic of Tajikistan, via the SFA, have committed their willingness and confirmed their capability to work closely with the Project and restore, manage, protect, and monitor the required area and type of Natural Habitats to achieve NNL for the operational lifespan of the Project. This aligns with Tajik policy priorities regarding reforestation and protection through the National Program for Greening of the Republic of Tajikistan for the period up to 2040, Forest Sector Development Strategy, and the NBSAP for conservation and rational use of biodiversity in the Republic of Tajikistan. In particular, the National Program for Greening is in its initial phases and requires additional external funding to help deliver its target of planting 2 billion trees by 2040.
- The SFA have access to large areas of State Forest Fund Land, which they have confirmed has the capacity for restoration and protection of the juniper woodland and native riparian woodland areas required to quantifiably demonstrate NNL, with a 3:1 multiplier applied. They have additionally confirmed the capacity to restore and protect native fruit and nut woodland as a contingency measure. They are confident these actions are feasible and have provided a longlist of proposals for restoration and protection. These proposals detail locations for restoration on historically and ecologically suitable land of no or little socioeconomic benefit to minimize land-use conflicts. They also contain delivery methods, estimated costs, suitable nurseries, organisational structures for delivery, and timeframes. The SFA has also confirmed that further proposals and areas can be identified and assigned for restoration of the required habitats, should they be required.
- Given the SFA support and capacity, alignment with Government policy priorities and Lenders requirements, relatively small areas of Natural Habitat for compensation, and the area of available land outlined in SFA proposals, restoration of juniper and native riparian woodland should be feasible to achieve NNL. Likewise, it should be feasible to achieve NNL using native fruit and nut woodland as a contingency measure for either or both Natural Habitats that will be lost.

- The outline 3:1 multiplier was used to help determine the ability to deliver at the required scale and to assure that NNL could be feasibly demonstrated with confidence. Site-specific field surveys and detailed biodiversity loss/gain accounting of the areas to be lost and restored shall be undertaken in Phase 2 to determine the exact areas and quality of natural habitats to be restored to achieve NNL. The final multiplier may therefore be further revised.
- The estimated total capital cost for reforestation is 7,511,213 USD, with an annual revenue cost of 10,535 USD. Depending on the need for sustainable pasture management plans, there will be an additional estimated capital cost of 14,659 USD.
- In addition to the Preferred Candidate NNL actions, one Other Candidate NNL action was identified and proposed by the SFA. They are not currently supported by sufficient evidence to confidently demonstrate quantifiable and long-term feasibility. However, with further SFA support, evidence, and site surveys, they could become Preferred Candidate NNL actions in the future, should they be required.

- NEXT STEPS: PROJECT NNL DESIGN PROCESS

- Next steps will follow the Project NNL Design Process set out for Phase 2 in Figure 1. The priority will be moving forward with the shortlisting of NNL sites, agreeing the final implementable and fundable sites between Lenders and the Government of the Republic of Tajikistan, and producing an adaptive management, protection, and monitoring plan to start implementing the NNL actions.
- Shortlisting and detailed NNL plan development will include site-specific ecological and socioeconomic assessments, plus bespoke loss/gain accounting of the areas to be lost and restored to confirm that the required actions effectively achieve NNL. This accounting will also consider any positive or negative time lag between the loss and gain of habitats.

- TIMELINE FOR PHASE 2

- The suggested timeline for Phase 2 is detailed in **Table 5-1**.
- Commencement of implementation is anticipated for 2031, following completion of Phase 2.

Table 5-1 – Phase 2 Timeline

Phase 2 action	Responsible party / parties	Delivery dates
Shortlisting NNL sites	International consultant; Local ecological experts; Agencies under the Government of the Republic of Tajikistan (including the SFA); Local communities; and Associated NGO representatives.	2025 – 2027
Lenders and Government approval for NNL sites	Lender consortium; Government of the Republic of Tajikistan; and International consultant.	2028

Phase 2 action	Responsible party / parties	Delivery dates
Detailed NNL management, protection, and monitoring plan	International consultant; Local ecological experts; Agencies under the Government of the Republic of Tajikistan (including the SFA); Local communities; and Associated NGO representatives.	2029 – 2030
Implementation and establishment (as per Section 4.7)	Agencies under the Government of the Republic of Tajikistan (including the SFA); Local communities; Nurseries; and Associated NGO representatives.	2031 – 2038

- SHORTLISTING NNL SITES

- A detailed review will be undertaken of the NNLF longlist of proposed sites. This will identify a preferred shortlist of NNL sites. The review will be undertaken in collaboration with key stakeholders. This review will include:

The demarcation and mapping of sites to confirm locations, total areas, and historic and ecological suitability and connectivity;

Visiting prospective sites and identifying any existing land-use pressures;

Local community engagement to minimize land-use pressures and conflicts, including engaging on their socioeconomic situation, land-use needs and any current use and community benefits derived from the sites, relationship with SFEs, sustainable pasture management, and interest in, and willingness to engage with, the restoration project and its management and monitoring plan;

Undertaking field surveys and detailed biodiversity loss/gain accounting at the sites to be lost and those to be restored, to identify the exact habitat area and quality requirements for NNL;

Further refinement of the multipliers on a case-by-case basis at selected sites, in light of the loss/gain accounting; and

Evaluating and specifying additional management, protection, and monitoring methods required at individual sites to maximize biodiversity, beyond the Direct Afforestation Manual. These methods may vary between sites depending on the habitat type, local conditions and topography, and local community context.

- The shortlisted sites will be those which provide the greatest biodiversity value and ecological connectivity, and are socially most appropriate, accepted, and effective for securing long-term uplifts with limited land-use pressures or conflicts.

- **LENDERS AND GOVERNMENT APPROVAL FOR NNL SITES**

  - Lenders and the Government of the Republic of Tajikistan are to approve shortlisted sites and funding arrangements. This will include desired outcomes and objectives, plus any agreement by the Government for the legal designation of the NNL sites as reserves. Confirming Lenders and Government buy-in of these NNL actions and sites is key to enabling the initiation of NNL delivery.

  - Funding is required to cover:

Initial capital expenditure for the SFA to prepare the sites and successfully restore the habitats for NNL; and

Ongoing revenue expenditure for the SFA to cover management, protection, and monitoring activities for the duration of the operational lifetime of the Project.

  - Funding is being sought to cover these costs from:

A percentage of the annual profits from the operation of the Project; or

A lump sum from Lenders; or

A combination of the above two options

  - Estimates for these capital and revenue costs are provided in Section 4.5, but more detailed, site-specific capital and revenue costs and agreements on the sources of funding to meet these costs will be developed as part of Phase 2. This will be delivered through a signed Memorandum of Agreement between the President of the Government of the Republic of Tajikistan, Rogun JSC, and the Lenders that sets out:

A detailed breakdown of the sites and activities to deliver No Net Loss of Natural Habitats;

Capital and revenue costs for delivering Natural Habitats for the operational lifetime of the Project to include activities associated with site preparation, restoration, management, protection and monitoring;

A detailed breakdown of sources, amounts and timing of funding contributions to cover these costs;

Roles and responsibilities for the delivery of the costed activities; and

Reporting checks and performance against key indicators.

  - Any funding arrangement will be subject to regular third-party verification to ensure appropriate use of funds and adequacy of long-term management and financial commitments.

- **MANAGEMENT, PROTECTION, AND MONITORING PLAN**

  - Once the shortlist and funding for NNL is agreed, a legally agreed adaptive NNL management, protection, and monitoring plan will be designed and implemented for NNL. This will include the following elements:

Steps and equipment to prepare the NNL sites and restore habitats (building upon the Direct Afforestation Manual to maximize biodiversity);

Long-term steps for the management, protection, and monitoring of the NNL sites (building upon the Direct Afforestation Manual);

Key biodiversity performance indicators to measure performance and success;

A schedule for reporting against key performance indicators;

Feedback loops to dynamically update the plan and NNL sites if key performance indicators are missed;

A breakdown of roles and responsibilities;
Budgeting and reporting;
Training and capacity building for the SFEs and local staff;
Ongoing local community engagement;
Long-term measures for sustainability, such as sustainable pasture management plans to reduce pressures on restored habitats, limit conservation leakage, and to improve local livelihoods; and
Any additional partnership development beneficial for in-country delivery and maintenance (e.g. FFI or other).

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Annex A

ADDITIONAL NNL OPTIONS CONSIDERED

ANNEX INTRODUCTION

This Appendix includes the NNL options that were classified as Other Preferred NNL actions or Not Suitable.

Other Preferred NNL actions include options that could, in the future with more Government support and evidence, be considered Preferred Candidate NNL actions. However, they are not currently able to quantifiably demonstrate NNL feasibility.

Not Suitable NNL actions feature significant technical or social barriers to generating biodiversity gains, ecological feasibility is uncertain, and/or there is a risk of poor alignment with the Government of the Republic of Tajikistan's priorities.

NNL actions and their feasibility are summarized using the following structure: habitat summary, NNL action, and the pros and cons of each option for ecological, political, and technical and/or social feasibility.

NNL OPTIONS CLASSIFIED AS OTHER CANDIDATES

- OTHER CANDIDATED NNL ACTIONS FOR JUNIPER WOODLAND AND FLOODPLAIN COMPENSATION: DESCRIPTION AND FEASIBILITY ASSESSMENT

EXTENDING / CREATING PROTECTED AREA BOUNDARIES

Habitat Summary

- The SFA identified the two following sites.

The ~30,000 ha Bakhri Norak Reserve is situated in rugged terrain near to the inflow of the Nurek reservoir and is currently under SFA jurisdiction as a Category III Specially Protected Natural Area in Tajikistan. Juniper woodland can be found within the reserve and in adjacent areas (see Section 3.4 for further details on juniper woodland).

The Kayrakkum Reservoir in northern Tajikistan features native riparian woodland vegetation on separate patches located on inaccessible channel islands where the Syr Darya flows into the eastern end of the reservoir. As a result of the felling and cattle grazing the native riparian woodland became degraded and is now only represented by native riparian woodland shrub species (see Section 3.4 for further details on native riparian woodland).

NNL Action

- The SFA proposed extending the existing boundary of Bakhri Norak Reserve to encompass up to 1,500 ha of existing juniper woodland which exists on adjacent SFA-owned State Forest Fund Land. This would reclassify the lands from State Reserve to a Category III Specially Protected Natural Area.
- Additionally, the SFA proposed creating a new Category III Specially Protected Natural Area on land easternly adjacent to the Kayrakkum Reservoir, covering a total area of more than 3,000 hectares and encompassing the existing native riparian woodland vegetation.
- These NNL actions propose to compensate for losses at Rogun through averted loss of habitats. No plans are currently proposed for additional restoration actions, such as those already proposed as the Preferred Candidate NNL actions. Where such additional restoration actions are proposed, these sites could be added to the list of Preferred Candidate NNL actions.

Ecological

- Pros: It may be possible to protect existing like-for-like juniper or like-for-better native riparian woodland habitat and represents good conservation practice to prioritize protection of existing habitats. Protection could remove existing sources of degradation and allow natural regeneration and enhancement to occur.
- Cons: At this time, the SFA's proposed action is just to legally extend the protected area boundary, or to legally designate a new protected area. There is currently no evidence to indicate that protecting the area would lead to quantifiable averted loss. Further evidence is required nor of existing pressures such that a counterfactual scenario could be developed

to assess biodiversity gain. Therefore, there is no known quantifiable biodiversity gain to demonstrate NNL for either site.

Political Feasibility

- Pros: The SFA has expressed willingness and legal capacity to designate both sites proposed as Category III Specially Protected Natural Areas.

Technical / Social Feasibility

- Cons: Measures have not been proposed by the SFA to actively reforest areas of degraded existing juniper woodland or native riparian woodland in the proposed protected areas. There is also insufficient evidence of current effectiveness of the Bakhri Norak Reserve's designation. Therefore, there is not currently sufficient evidence to show how this action would quantifiably and demonstrably achieve NNL without the restoration actions already proposed as the Preferred Candidate NNL actions.
- This option is assessed to be an Other Candidate NNL action. With Government support to extend protected areas, and the provisioning of suitable evidence, this action could, in time, be considered as a Preferred Candidate NNL action.

NNL ACTIONS CLASSIFIED AS NOT SUITABLE

- NNL ACTIONS CLASSIFIED AS NOT SUITABLE: DESCRIPTION AND FEASIBILITY ASSESSMENT

JOINT FORESTRY MANAGEMENT APPROACH: JUNIPER, NATIVE RIPARIAN WOODLAND, FRUIT AND NUT FOREST

Habitat Summary

- Joint Forestry Management (JFM) approaches have been and could be implemented across multiple Tajik districts, including for juniper in the Zerfashan range in Ayni and Panjikent, native riparian woodland along riverbanks of major river systems, e.g. in the Zerafshan Valley, the Panj Valley, or along the Vaksh River, and fruit and nut woodland in central Khatlon.

NNL Action

- JFM involves the local population for the sustainable use of forest resources, and for the preservation, restoration, and cultivation of forests. The approach was developed by GIZ and has been successfully implemented with the SFA and local communities across Tajikistan. JFM promotes local community buy-in by designing and delivering the woodland restoration projects in combination with local communities, clearly setting out product community benefits through sustainable harvesting of fruit and nut, firewood, and timber products. JFM establishes a 20-year contract between localized SFEs and a family or community residing exclusively in adjacent State Forest Fund Land. This contract includes continued management and monitoring of the plots, with an option for renewal after the 20-year period. Jointly agreed management plans regulate the use of forests, and the volume of activities aimed at preservation and restoration of forests. These plans further establish the shared-benefits agreement, pre-agreed between the SFE and forest users, which is the amount of forest products that can be harvested sustainably by communities over a given amount of time, and the split of harvest products which is shared between both parties. Roles, responsibilities, rights, and obligations of the parties are clearly defined in the contract, which guarantees to the State the preservation of forest resources and provides the residents with a legitimate source of income from forests.
- The JFM manual, produced by GIZ and used by the SFA, and the CAFT project report, indicate that juniper, native riparian woodland, and fruit and nut forests can and have been incorporated through JFM approaches in Tajikistan. These areas are afforested in addition to the JFM plots from which forest user harvesting is permitted. Local, native species are used to ensure ecological sustainability, strengthen adaptive capacity and resilience, and contribute to the conservation of forest biodiversity.
- Additionally, the wild ancestors for numerous types of pear, apple, walnut, almond, and cherry trees are native to Tajikistan and the Central Asian region. This globally important genetic reservoir is subject to degradation through unsustainable grazing, cutting, and firewood collection. These species include the IUCN Critically Endangered Bukharan pear (*Pyrus korshinskyi)* and the Endangered Niedzwetzky's apple (*Malus niedzwetzkyana*),

which FFI have been planting using the JFM approach, and could be included in NNL actions for enhanced biodiversity uplifts.

- Specific NNL actions using JFM could include creation, restoration and natural regeneration of the following:

1. Juniper woodland with fruit and nut plots for community harvesting
2. Native riparian woodland, with fruit and nut plots for community harvesting
3. Fruit and nut woodland, focusing on commercially productive species
4. Fruit and nut woodland, including IUCN Red List species

Ecological

- Pros: NNL actions to create or enhance juniper, native riparian woodland, or fruit and nut woodland would be a direct like-for-like or like-for-better compensation for the Natural Habitats lost due to the Project, as established in Section 3.4.
- Cons: The areas assigned for harvesting from forest users are typically akin to agroforestry plots, with planting rows of commercially productive species in a manner which does not equate to natural habitat. This was confirmed during site visits to JFM plots in the Khovaling, Rasht, and Vahdat districts. Therefore, these areas could not be considered when quantifiably demonstrating NNL.

Political Feasibility

- Pros: There are already JFM projects across Tajikistan supported by the Government, local communities, international NGOs and development banks, including those which have planted natural habitat areas alongside the harvestable plots. The harvestable plots are favorable to both the SFEs and to local communities as they provide additional forest product benefits.
- Cons: Methods to establish JFM woodlands, including fencing extended areas and creating any required irrigation systems, is expensive and labor-intensive, with initially high investments and economic benefits that only arrive and accumulate later. However, such costs and risks can be shared with local communities, subject to contract details, by balancing initial payments to communities with the timing and amount of rental income from communities once the site is productive.

Technical / Social Feasibility

- Pros: Development banks and NGOs have already successfully developed and carried out multiple JFM approach projects on the ground in Tajikistan, alongside the SFA. Therefore, there are already existing plans and successful methods for local community and delivery partner engagement. Likewise, there are ongoing development bank plans for JFM projects with technical and capital infrastructure in place. Specialist nurseries have been established or developed near to key woodland restoration areas for JFM in Tajikistan.
- Cons: The prosperity and viability of the created or enhanced woodlands are reliant upon long-term community buy-in and sometimes additional pasture management schemes. Saplings require active weeding and watering management during their first years, while inadequate irrigation can increase the risk of soil erosion and increases in soil salinity.

Stakeholders also noted that if better quality grazing pasture is created through sustainable pasture management plans, local communities could increase their herd size, increasing grazing pressures elsewhere or on the JFM site, such that long-term continued physical separation of NNL areas may be required. Furthermore, interviewees suggested that local people may cut through fences and access NNL areas if grazing is not available elsewhere or if grazing conditions deteriorate, highlighting the reliance of the long-term viability of the NNL areas on community buy-in and sustainable pasture management.

- Most significantly, there is a gap between the theoretical feasibility of this approach and the on-the-ground reality in Tajikistan. The JFM manual sets out that natural habitat reforestation is possible alongside JFM plots, and the CAFT project showcases success of this approach after three years of management and monitoring. However, when JFM sites were visited in Tajikistan, there was no evidence of reforestation creating natural habitats at these locations. Solely plots consistent with agroforestry were present. In-country conversations with JFM practitioners and additional stakeholder engagement revealed that, without the direct benefits of harvesting, there would be no initial buy-in or long-term commitment to create, manage, monitor, and protect afforested natural habitat areas by local communities through a JFM approach. Whilst the CAFT project showcased successful areas of reforestation excluded from local community use, this was only after 3 years of maintenance, covered by SFE personnel and finance. Maintenance eroded or was only partially completed in subsequent years when funding reduced, suggesting that the method is not sustainable for natural habitat creation. It is therefore not a viable option for the long-term delivery of a biodiversity NNL action, in line with the ESS6 requirement for long-term conservation outcomes.

TIGROVAYA BALKA

Habitat Summary

- Tigrovaya Balka is a large State Nature Reserve and UNESCO World Heritage property approximately 200km downstream of the Rogun Project. The Tajik Forestry Agency's Department for Special Protected Areas is responsible for the Reserve. The site is characterized by groundwater level close to the surface and is composed of a series of floodplain terraces, oxbow lakes, and channels comprising native riparian woodland floodplain and riverine forests with highly specific biodiversity, surrounded by steppe, semi-desert, and mountainous areas. The floodplain sits in a wide valley at the interfluve of the Vakhsh and Panj rivers, and connects the Vakhsh with Central Asia's largest river, the Amu Darya, on Tajikistan's southwestern border with Afghanistan. The Reserve's native riparian woodland floodplain habitat, a globally unique and threatened ecosystem, represents the largest and most intact native riparian woodland of this type in Central Asia. Tigrovaya Balka is considered the most important Protected Area in Tajikistan, in terms of ecosystem diversity and values for species (Lethier, H., 2020) and has recently been declared a UNESCO World Heritage Site. Therefore, restoring or increasing the extent of native riparian woodland floodplains at Tigrovaya Balka would be of significant biodiversity value.
- Tigrovaya Balka is almost cut off from natural flow dynamics, with water availability (and seasonal flux) at the site having been reduced by the building of previous upstream dams on the Vakhsh and current water extraction by neighboring industry and water use for irrigation (BirdLife International, 2024). This has led to a decrease in groundwater levels

and reduced water intake into the Tigrovaya Balka system, a trend which is predicted to be further influenced by future climatic changes. Water quality is also being degraded by the release of fertilizers and/or pesticides from neighboring industry, with the sediment load silting up canals and lakes. Water extraction and pollution by local communities is present but outweighed by the impacts of industry and upstream damming. Notable invasive species issues are present, including a species of snakehead fish in the oxbow lakes and a non-native parasitic strangler plant that can lead to poplar tree mortality in the native riparian woodland. Finally, as the floodplains become drier, there is increased access for poaching and illegal logging and grazing.

NNL Action

- The Tigrovaya Balka Feasibility Mission Report (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2019) set out potential actions to restore the native riparian woodland floodplain system and waterbodies at the site. The following three are considerations for biodiversity NNL actions:

3. Cleaning the channels that connect the Vakhsh to the site and those between the lakes from reed and sediments. This process must be conducted every 5-10 years and will enable an inflow of freshwater into the floodplain and lakes.
4. Enhancing freshwater intake into the system by creating new artificial channels that connect the Vakhsh river with new areas of the Reserve. The water would need to be channelled or pumped from above the sanctuary into a canal for distribution.
5. Artificial flooding through increased water discharge from the Rogun-Nurek complex during the summer months, seeking to replicate historic natural flow regimes. This option was suggested in the original 2014 ESIA for this Project and has been mentioned in unpublished studies. Rogun will need to supply the increase in current flow, which must pass through Nurek and the other downstream dams by agreement. The Tigrovaya Balka Feasibility Mission Report highlights that this artificial flooding could be achieved by releasing a flow of water approximating the natural outflow of the Vakhsh from the reservoir in the summer months for 10 days a year. The report also suggests that extensive hydraulic changes would be required to slow the river's flow velocity at the NNL area, such as building barriers into the Vakhsh, enhancing the distribution of water throughout the Reserve's floodplain system. Hydrological and biodiversity modelling would be required to determine the locations and area of uplift within Tigrovaya Balka.

Ecological

- Pros: The globally recognized ecological value of the Tigrovaya Balka native riparian woodland floodplain habitat makes it an attractive site for biodiversity NNL actions, which would most likely result in considerable net biodiversity uplift when compared with the ecological value of the natural floodplain habitat lost on-site. In addition, Tigrovaya Balka has multiple habitat designations, including State Nature Reserve, Ramsar Site, and UNESCO World Heritage property. Finally, increases in summer flows with NNL action (3.) may also positively impact floodplain areas between Rogun/Nurek and Tigrovaya Balka.

- Cons: NNL action (1.) will not be able to stop the long-term siltation of the oxbow lakes in Tigrovaya Balka due to the degradative impacts of upstream dams and surrounding water extraction, even if the intervention is routinely carried out every 5 to 10 years. It is therefore not a viable option for the long-term delivery of a biodiversity NNL action, in line with the

ESS6 requirement for long-term conservation outcomes. For NNL action (2.), comprehensive hydroengineering and feasibility studies would be required to understand the type, extent and longevity of biodiversity uplift, and whether long-term NNL could be achieved. Furthermore, the Tigrovaya Balka Feasibility Mission Report indicates for NNL actions (2.) and (3.), there may be unintended consequences to channel and corridor ecology from introducing water flows into an ecosystem which has not experienced these flow dynamics since Nurek was constructed over 40 years ago.

Political Feasibility

- Pros: Given the site's varied habitat designations and global ecological significance, there would also be international/intergovernmental support for enhancement works. For example, the Rivers without Borders Public Fund have emphasized their preference for the design of an environmental flow regime with flood releases sufficient for the safeguarding and recovery of the Tigrovaya Balka ecosystems, in line with option (3.). Similarly, the World Heritage Committee requests the State Party to secure and maintain a natural hydrological regime for Tigrovaya Balka, with sufficient provision of water to the property to maintain its Outstanding Universal Value.
- Cons: Undertaking NNL action (3.) would require significant political will at the highest level in Tajikistan, political and economic agreement to harmonize all upstream dams between Tigrovaya Balka and Rogun, such that the required water flows are achieved, and would require sensitive cross-boundary engagement with neighboring riparian nations. Hydraulic engineering adjustments in the riverbed would have to accompany this process to direct the necessary volume of water into the Reserve, which would be accompanied by considerable financial expenditures. The Tigrovaya Balka Feasibility Mission Report indicates that the economic situation in Tajikistan does not suggest there would be economic support for the required actions. The hydraulic works and channel creation in NNL action (2.) may similarly be hampered by sensitive cross-boundary engagement and expenditures.

Technical / Social Feasibility

NNL action (1.)

- Pros: The cleaning of canals between the lakes was practiced during the Soviet Era and WWF Russia planned and carried out cleaning measures in 2012, therefore plans and technical and social capacity should exist.

NNL action (2.)

- Pros: WWF Russia previously considered plans to create additional channels and supply more areas with water, although the required funding did not materialize.
- Cons: Designs to create new channels require careful consideration as the Tigrovaya Balka Feasibility Mission Report indicated that increased flow into the system could pose a heightened risk of erosion and salinisation if not modelled and managed carefully. A comprehensive hydroengineering and feasibility study would therefore be required. This NNL action is therefore not viable as per the ESS6 requirements for long-term conservation outcomes, with demonstrable long-term technical and financial feasibility.

NNL action (3.)

- Cons: A comprehensive hydrological and feasibility study would be required to assess whether introducing floods could have any significant effects on downstream land use and developments. As with the risks associated with NNL action (2.), if not effectively modelled and managed, the Tigrovaya Balka Feasibility Mission Report indicates that increased volume of water released from artificial summer pulses could increase the erosion of the river and thus damage the floodplain more than help in the long term. This NNL action is therefore not viable as per the ESS6 requirements for long-term conservation outcomes, with demonstrable technical and social feasibility.

UPSTREAM OF ROGUN: FLOODPLAIN ENHANCEMENT

Habitat Summary

- WSP ecologists identified pockets of vegetated floodplain upstream of the Rogun reservoir maximum fill which had been subject to less degradation than most of the floodplains in the area. A potential example is a hard-to-access ~18ha vegetated flooded plain on the eastern bank of the Vakhsh, opposite Gharm. High-level Google Earth estimates have also mapped large areas of hard-to-access vegetated floodplain habitat ~7km upstream of Kalanak, but the extent and condition would require further in-situ investigation and confirmation. WSP ecologists have reported the widespread nature of invasive vegetation species in the project zone, and it could be that the presence of invasive species at these upstream floodplains is causing their identification in the satellite imagery.
- If these floodplains are indeed in a less degraded condition, it may be due to their reduced grazing accessibility, since they are located on the opposite side of the riverbank to the road and settled areas in the region. However, community engagement and site surveys would be required to confirm the pressures and strategies for their alleviation. WSP ecologists noted that native riparian woodland floodplain is the climax community of vegetated floodplain on the Vakhsh, and that the identified floodplains may succeed to native riparian woodland floodplain if suitably enhanced and protected.

NNL Action

- NNL actions would seek to enhance the upstream pockets of vegetated floodplain by creating physical barriers to limit access, enabling the floodplain's natural regeneration and succession. Wire fencing would be most suitable, considering the floodplain dynamics. If community engagement and site surveys confirm grazing pressures, then a sustainable pasture management scheme should also be developed and implemented to mitigate any local community grazing land loss. If site visits identify notable invasive vegetation species presence in the floodplains, then the removal and control of these invasives should improve the habitat condition. In addition, proactively managing and limiting erosion may prevent or reduce the amount of sedimentation choking up existing floodplains and may be a suitable floodplain enhancement action at sites where floodplain access is complicated by steep surrounding topography.

Ecological

- Pros: The NNL sites are likely to be within 50km of the Rogun reservoir's maximum fill extent, and of ecological equivalence to the natural floodplains requiring compensation. Any

successful succession to native riparian woodland floodplain (as considered possible by WSP ecologists) will signify an increase in biodiversity value, in comparison with the degraded floodplain lost to Rogun.

- Cons: The area and condition of these hard-to-access floodplains for enhancement are still yet to be formally identified and assessed with detailed loss/gain accounting, preventing projections for quantifiable uplifts and demonstrable NNL.

Political Feasibility

- Pros: Succession to native riparian woodland floodplain habitat will be attractive to local or regional conservation groups, given the ecosystems increasing scarcity in Central Asia.

Technical / Social Feasibility

- Pros: The successful use of fencing to delineate planted or naturally regenerating areas, the implementation of sustainable pasture management, and productive local stakeholder engagement have all been evidenced through habitat creation or restoration approaches in Tajikistan. This, therefore, suggests that such measures could suitably be applied to secure vegetated floodplains for natural regeneration. There are international examples of wire fencing successfully protecting floodplain areas from livestock disturbance, with the wire preventing no restrictions for continuation of the necessary floodplain dynamics, although the type of ground substrate and degree of variation in flow may determine success. In addition, the existing presence of established floodplain vegetation will promote natural regeneration and reduce sapling success/survival risks associated with manual planting schemes, which would have proved technically challenging given the changeable floodplain environment. Sustainable pasture management plans have already successfully been developed and implemented in-country to reduce pressures on habitat creation or restoration areas, so there is evidence in favor of local communities being receptive to the outlined measures. Furthermore, the Rogun resettlement programme may reduce existing local grazing pressures on potential NNL floodplain sites, boosting the potential success of sustainable pasture management plans.
- Cons: There are plans for developing two additional HPP cascades on the Surkhob and Obihingou, the two rivers which at their confluence form the Vakhsh. Combined they would comprise 9 HPPs and would add greatly to river fragmentation. The planned future upstream additions to the Vakhsh cascade create significant uncertainty that any floodplain creation or enhancement along these rivers will be secured long-term. This NNL action is therefore not viable as per the ESS6 requirements for long-term conservation outcomes, with demonstrable long-term technical and financial feasibility.

DOWNSTREAM OF ROGUN-NUREK COMPLEX: FLOODPLAIN CREATION OR ENHANCEMENT, BY COORDINATION OF ARTIFICIAL FLOOD PULSES THROUGH THE VAKHSH CASCADE

Habitat Summary

- Within Tajikistan and downstream of the Rogun-Nurek complex, between Nurek and Tigrovaya Balka State Nature Reserve, there are pockets of floodplain on the Vakhsh with the potential for restoration and enhancement. Satellite imagery indicates a potential ~175 ha of vegetated floodplain directly upstream of Sarband, and an extended floodplain of

vegetated and gravel floodplain as the Vakhsh arcs around the city and agricultural zones of Qurghonteppa. As with Tigrovaya Balka, the water availability (and seasonal flux) and condition of these sites is likely to have been deleteriously reduced by the building of previous upstream dams on the Vakhsh, and from the increasing pressures of irrigation, grazing, timber and aggregate collection, and agricultural land-use associated with the large population centers of Sarband and Qurghonteppa.

NNL Action

- As with Tigrovaya Balka, artificial flooding through increased water discharge would be required from Nurek/Rogun during the summer months to improve water availability towards a pre-dam system state. Rogun would need to supply the increase in current flow, which must pass through Nurek and the other downstream dams by agreement. Some hydraulic changes may also be required to stem the river at NNL areas, such as building barriers into the mainstream to slow the flow velocity and restore summer season flow dynamics across floodplain channels. Vegetated floodplain regeneration would be supported by limiting access to the floodplain area using fencing and a sustainable pasture management to mitigate any loss of grazing land to the surrounding population centers. Community engagement and site surveys are required to confirm the pressures and targeted strategies for their alleviation.

Ecological Feasibility

- Pros: Vegetated floodplains along the Vakhsh may succeed to native riparian woodland floodplain climax community. Therefore, downstream floodplains will likely be of equal or greater ecological equivalence to the degraded natural floodplains requiring compensation. Additionally, increases in summer flows may also positively impact floodplain areas further downstream at the ecologically significant Tigrovaya Balka (see option: Tigrovaya Balka)
- Cons: Significant uncertainties remain on the potential biodiversity uplift available until sites could be further studied with hydrological and habitat modelling and as part of more detailed loss-gain accounting in Phase 2.

Political Feasibility

- Cons: Creating artificial flood peaks would require significant political will at the highest level in Tajikistan, political and economic agreement to harmonize all upstream dams, between the target site and the Rogun reservoir, such that the required water flows are achieved, and would potentially require sensitive cross-boundary engagement with downstream nations. Hydraulic engineering adjustments in the riverbed may also have to accompany this process to slow and direct the necessary volume of water into target areas in a manner that doesn't erode the sites, which would be accompanied by considerable financial expenditures.

Technical / Social Feasibility

- Cons: A comprehensive hydrological and feasibility study would be required to assess whether introducing floods could have any significant effects on downstream land use and developments. Floodplains downstream of the Rogun-Nurek complex are limited to populated urban and agricultural zones. Grazing, native riparian woodland product collection, and irrigation pressures are high in such areas and may limit the floodplains'

ability to naturally regenerate, even with artificially reestablished peak summer flows. In addition, increases in summer flows may also reach floodplain areas further downstream at the ecologically significant Tigrovaya Balka (see option: Tigrovaya Balka), and a comprehensive feasibility study would be required to understand and impacts.

WETLAND CREATION/ENHANCEMENT ALONG THE NUREK RESERVOIR

Habitat Summary

- The Nurek dam and reservoir, ~50km downstream from the Rogun dam, is ~40 km in length and >6km at its widest point. The Nurek State Complex Area encompasses much of the eastern shore, and the Sarykhosorsky Nature Refuge covers the shoreline area as the Vakhsh widens out into the reservoir upstream of the Nurek dam. Once Rogun is complete and the flow between Rogun and Nurek becomes run of river, the Nurek reservoir extent will have limited seasonal variation and there may, therefore, be opportunities for additional wetland creation along the banks of the Nurek reservoir. WSP ecologists noted established reedbed communities along the reservoir, likely receiving water from groundwater or seepage via a channel from elsewhere.

NNL Action

- Wetland creation may be possible along the banks of the Nurek reservoir. This is primarily anticipated to be via natural regeneration for wetlands, coupled with protection from human and livestock grazing disturbance through fencing.

Ecological

- Pros: Parts of the banks of the Nurek reservoir exist within the designated Nurek State Complex Area and the Sarykhosorsky Nature Refuge. Habitat creation/enhancement within these refuges presents opportunities to complement existing protection measures and increase the quality and ecological resilience of the protected areas.

Cons: Wetland creation along the reservoir would not be like-for-like of a dynamic riparian habitat, and it is unlikely to be considered like-for-better habitat. This NNL action is therefore not viable as per the ESS6 requirements. There is significant uncertainty regarding the biodiversity value that could be created until further hydrological and habitat modelling could be conducted, as well as detailed loss/gain accounting in Phase 2.

Political Feasibility

- Pros: It is already politically and operationally agreed that the Nurek reservoir will become run of river as a result of Rogun's construction and operation. Areas of the current Nurek reservoir banks already sit within protected areas with controlled access. Therefore, natural regeneration or habitat creation in these areas will be legally protected and managed through existing mandates.

Technical / Social Feasibility

- Pros: There is currently controlled access to the Nurek reservoir.
- Cons: A comprehensive hydrological feasibility study would be required to assess the areas, topographies, and extent of wetland creation.

WETLAND CREATION ALONG THE RIVER BETWEEN ROGUN AND THE NUREK RESERVOIR

Habitat summary

- Between Rogun and the Nurek reservoir, the Vakhsh flows quickly through a steep-sided valley and the Sarykhosorsky Nature Refuge. Once Rogun is complete and the flow between Rogun and Nurek becomes run of river, there could be opportunities for wetland creation along the banks of the Vakhsh between Rogun and the Nurek reservoir.

NNL Action

- Wetland creation may be possible along the banks of the Vakhsh river between Rogun and the Nurek reservoir. This would be through protection from human or livestock grazing disturbance through fencing and natural regeneration.

Ecological

- Pros: Any NNL action areas would occur within the Sarykhosorsky Nature Refuge. Habitat creation/enhancement within this refuge presents opportunities to complement existing measures and increase the quality and ecological resilience of the protected areas.

Cons: Unlikely to recreate like-for-like habitat in the steep-sided valley and it is unlikely to be considered like-for-better habitat. This NNL action is therefore not viable as per the ESS6 requirements. There is significant uncertainty regarding the habitat value that could be created until further hydrological, topographical, and habitat modelling is conducted.

Political Feasibility

- Pros: Areas of the current riverbanks between Rogun and the Nurek reservoir already sit within protected areas. Therefore, natural regeneration or habitat creation in these areas will be legally protected and managed through existing mandates.

Technical / Social Feasibility

- Cons: WSP ecologists have suggested that the riverbanks immediately downstream of the Rogun reservoir are too steep, and thus the river's flow too fast, for significant wetland creation. Based on topography reviews with Google Earth, this appears to be the case along the entire stretch between the Rogun and Nurek reservoirs. Critically, the planned Shurob HPP between Nurek and Rogun creates significant uncertainty that any habitat creation or enhancement along the Vakhsh will be secured long-term. Therefore, this NNL action is not viable as per the ESS6 requirements for long-term conservation outcomes, with demonstrable long-term technical and financial feasibility.

SAXAUL REGENERATION COMPENSATION

Site Summary

- Tigrovaya Balka (~62,248 ha, including ~17,500 ha of buffer zone) is a large State Nature Reserve approximately 200km downstream of the Rogun Project. The site is composed of valuable native riparian woodlands with highly specific biodiversity, and is surrounded by steppe, semi-desert, and mountainous areas. Anti-desertification efforts in the semi-desert buffer zone surrounding the Reserve include ongoing natural regeneration of saxaul

(*Haloxylon ammodendron*) vegetation by local NGOs, including the Youth Ecological Center of Tajikistan. Areas of the buffer zone have been leased out to an industrial company for cotton agriculture, however, the ongoing saxaul natural regeneration project remains in a buffer zone of the Reserve which cannot currently be used for agricultural purposes.

NNL Action

- Delivering areas of saxaul natural regeneration areas and planting that are in addition to the current natural regeneration efforts.

Ecological

- Pros: The areas of potential saxaul natural regeneration and planting reside within the Tigrovaya Balka State Nature Reserve's buffer zone, and thus have multiple habitat designations, including State Nature Reserve and UNESCO World Heritage Site. Whilst the semi-desert buffer zone may itself not be a Ramsar wetland, its buffer function seeks to protect the site from agricultural advances. Increasing saxaul vegetation around the buffer zone is an anti-desertification measure to protect the Reserve.
- Cons: Not considered a like-for-like or like-for-better habitat, given the regional abundance of saxaul in Central Asia. This NNL action is therefore not viable as per the ESS6 requirements. Additionally, it is unconfirmed whether the area around Tigrovaya Balka for restoration would be enough to quantifiably demonstrate NNL without detailed loss/gain accounting in Phase 2.

Political Feasibility

- Pros: Ongoing saxaul natural regeneration projects in the buffer zone indicate current political will.

Technical / Social Feasibility

- Pros: The saxaul natural regeneration project is ongoing, implying that implementation risks are in hand and manageable, project plans exist which could be duplicated or expanded upon for NNL implementation, and that there is local community support.

Annex B

INFORMATION LETTERS

[Original version of Letter 1, in Russian]

РуководителюWSP

Г-ну Neal Barker

Агентства лесного хозяйства при Правительстве Республики Таджикистан выражает Вам признательность за плодотворное сотрудничестве в рамках работы по осуществлению ОВОСС Рогунской ГЭС.

Агентства лесного хозяйства отмечает, что в рамках принятых стратегических документов в сфере лесного хозяйства, в том числе Программой развития лесного сектора на 2022-2026 годы и Государственной программой по озеленению Республики Таджикистан на период до 20240 года перед органами лесного хозяйства поставлены задачи по восстановлению лесов на площади 15 тысяч гектаров, а в рамках реализации Плана действий программы по озеленению за период 2025-207 годы увеличению площади лесных питомников более чем на 100 га и посадки более 500 тысяч саженцев декоративных, вечнозелёных и фруктовых древесных и кустарниковых пород и др. Реализация вышеуказанных мероприятий планируется осуществлять за счет средств государственного бюджета, собственных средств государственных учреждений лесных хозяйств и в основном за счет средств партнёров по развитию.

Агентства лесного хозяйства подтверждает, что выделенные земли на площади 7599 гектаров для прямого лесовосстановления являются дополнительными к заранее планируемым мероприятиям по лесовосстановлению.

В связи с этим Агентство лесного хозяйства предполагает, что для создания естественной среды обитания и достижения целей программы «Без чистых потерь» потребуется дополнительные средства сверх существующих положений третьих сторон.

Таким образом, финансирования проекта Рогунская ГЭС для создания среды обитания будет дополнительным.

С уважением,

Директор Юсуфзода А.Г.

[Directly translated version of Letter 1, using Microsoft Word Translate]

To WSP's Director of Environment

Mr Neal Barker

The Forestry Agency under the Government of the Republic of Tajikistan expresses its appreciation to you for your fruitful cooperation within the framework of the Rogun HPP ESIA.

The Forestry Agency notes that within the framework of the adopted strategic documents in the field of forestry, including the Forest Sector Development Programme for 2022-2026 and the State Programme on Greening of the Republic of Tajikistan for the period up to 20240, the forestry authorities are tasked to restore forests on the area of 15 thousand hectares, and within the framework of the implementation of the Action Plan of the programme on greening for the period 2025-207 to increase the area of forest nurseries by more than 100 hectares and plant more than 500 thousand seedlings of ornamental, vegetative and planting trees. Implementation of the above-mentioned activities is planned to be carried out at the expense of the state budget, own funds of state forestry institutions and mainly at the expense of development partners.

The Forestry Agency confirms that the 7,599 hectares of land allocated for direct reforestation are additional to the pre-planned reforestation activities.

Therefore, the Forestry Agency anticipates that additional funds over and above existing third-party provisions will be required to create natural habitat and achieve the objectives of the No Net Loss programme.

Therefore, the Rogun HPP project funding for habitat creation will be additional.

Sincerely,

Director Yusufzoda A.G.

[**To be inserted** – Letter 2, written commitment from the Government of the Republic of Tajikistan for restoring the required areas and sites to achieve NNL]

Enviromental Social Commitment Plan

- As per the Environmental and Social Commitment Plan, the No Net Loss Program is a part of the Biodiversity Managemet Plan and adoption of the BMP is a withdrawal condition under Section III.B.1(b) of Schedule 2 of the Financing Agreement for the Project.
- The ESCP also mentions that the implementing agency will ensure revegetate with native species, monitoring until vegetation is self-sustaining upon Upon completion of construction and prior to departure of contractor from the Project area.