Supplemental Site-Specific Environmental and Social Management Plan for the Construction of a Category V Road on the Left Bank of Rogun Reservoir

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Project Management Group
for Energy Facilities Construction
Under the President of the Republic of Tajikistan
and
State Enterprise
“Directorate of the Flooding Zone of Rogun HPP”

Contents

Tables

Figures

Abbreviations and Acronyms	
AIIB	Asian Infrastructure Investment Bank
CEP	Committee for Environmental Protection Under the Government of the Republic of Tajikistan
DFZ	State Enterprise "Directorate of the Flood Zone of Rogun HPP
E&S	Environmental and Social
EPC	Engineering, Procurement, and Construction
ESHS	Environmental, Social (including labor and stakeholder engagement), Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FSL	Full supply level (of Rogun reservoir)
GRC	Grievance Redress Committee
HPP	Hydropower project
GIIP	Good International Industry Practice
IFI	International financial institution
OJSC	Open Joint Stock Company
km	Kilometer
m	Meter
masl	Meters above sea level
PMC	Project Management Consultant
PMG	Project Management Group for Energy Facilities Construction under the President of the Republic of Tajikistan
S-ESMP	Supplemental ESMP

1. Introduction

The Government of the Republic of Tajikistan is developing the Rogun hydropower project (HPP) on the Vakhsh River in Tajikistan. The HPP has been under construction intermittently since the 1980s and continuously since 2016. The Project will include a dam 335 meters high, a reservoir 170 square kilometers in area and 70 kilometers long, and an underground powerhouse with a total generation capacity of 3680 megawatts. The project is being constructed by Open Joint Stock Company (OJSC) Rogun HPP.

The dam will reach its maximum elevation of 1 300 meters above sea level (masl) in about 2032. The reservoir will not be filled to its full supply level (FSL) of 1 290 masl immediately but will be allowed to fill to a higher elevation each year until it first reaches its FSL in about 2038. Although flows in the Vakhsh River are highest in spring and summer, electricity demand is highest in winter. As a result, the reservoir will not simply be filled and then maintained at a constant level but will be drawn down in winter and filled in summer. The maximum level will be increased incrementally from 2032 through about 2038. As of mid-2025, the reservoir was at an elevation of 1 075 masl and occupied an area of about 12 square kilometers. By late 2025, the reservoir had been filled to 1 100 masl and its area increased to about 17 square kilometers.

Over 6 700 households and 50 000 people in 69 villages reside within the area that is to be inundated by the reservoir and will need to be resettled in new locations. State Enterprise Directorate of Rogun HPP Flooding Zone (DFZ) was established to manage the resettlement program and other activities related to the reservoir area. Through March 2025, over 1 000 households and 10 000 people have been resettled, with the remainder to be resettled in phases through 2032.

The Project Management Group for Energy Facilities Construction Under the President of the Republic Tajikistan is responsible for overseeing construction of the HPP by OJSC Rogun HPP and of the resettlement and reservoir program being implemented by DFZ. To ensure the Project is designed, constructed, and operated in compliance with environmental and social safeguard standards, an Environmental and Social Impact Assessment (ESIA) is being prepared under Technical Assistance grants from the World Bank and the Asian Infrastructure Investment Bank. The ESIA and its associated E&S instruments[1] assess the potential impacts on people and the environment of dam construction and the physical and economic displacement of the population that will result from filling the reservoir.

The ESIA includes an Environmental and Social Management Plan (ESMP) that defines measures that must be taken to avoid or reduce the significant impacts on people and the environment. Among the potential impacts caused by filling the reservoir will be the loss of several bridges across the Vakhsh River. At present, these bridges serve to connect villages on the left bank with each other and with the International Road that runs along the right bank and provides access to Rogun City, Nurobod, and the rest of Tajikistan. The Asian Infrastructure Investment Bank is providing financing for construction of a new bridge across the river about 50 kilometers upstream of the dam.

[1] The instruments include an updated Environmental and Social Impact Assessment (ESIA), a series of technical annexes, and an Environmental and Social Management Plan (ESMP) that includes plans to manage potential environmental and social impacts. An annex to the ESIA assesses impacts on left bank villages from the loss of the cross-river bridges as well as a Resettlement and Livelihood Restoration Framework and Phase 2 Resettlement Action Plan and Livelihood Restoration Plan for 2017-2025.

The impacts of the loss of bridges — the increased distance and travel time for residents in left bank villages to reach the right bank -- will be mitigated by the new road and new bridge over the Khingob river. Furthermore, the road along the left bank of the Rogun Reservoir will provide shorter, year-round, and uninterrupted road connections between the aforementioned settlements located along the left bank of the Rogun Reservoir. The length of the road, thanks to reconstruction and new construction (including removal from the flood zone) of certain sections in more favorable locations, will be reduced by at least 10 km. This does not include the existing mileage required for vehicles traveling from one bank of the Vakhsh and Khingob rivers to the other to traverse difficult sections of the road on the left bank.

The road along the left bank that connects the villages and that currently connects the villages to the current bridges is in poor condition. At present, its status under Tajik transport regulations is such that it is not the responsibility of local Jamoats but is left to the villages, who have no significant sources of income. As described below, the road crosses several tributary streams, and these are damaged or destroyed periodically due to flooding, and the lack of resources prevents repair for extended periods.

The current road runs through several villages, while other villages are at some distance from the road. As a result, AIIB is also providing financing to replace the road that currently connects the villages on the left bank, to construct new roads to connect villages that are some distance away, and to extend the road to the new bridge provide access to the new bridge in the future ("the Project"). As described below, the new road follows the route of the existing road for much of its distance. The implementation of the left bank road works will be undertaken on a schedule that is accelerated in relation to Implementation of the Rogun HPP ESMP. In addition, the organizational and contracting structures for construction of the road are somewhat different than those of the HPP construction program. These factors necessitate a works-specific ESMP to manage the risks of road construction, many of which are identified in the ESIA and ESMP. This Supplemental (S-ESMP) has been prepared to meet this need.

2. Organizational Roles and Responsibilities

The major organizations with responsibilities for planning, implementing, and overseeing the Project are identified in Table 1.

Table 1. Organizational Responsibilities

Entity	*Role*
Government of the Republic of Tajikistan	Project Owner, Borrower. Overall responsibility for the Project.
Ministry of Finance	Responsible for coordination of foreign assistance.
Ministry of Transportation	Responsible for establishing standards for public roads and overseeing local authority jurisdiction of roads
State Enterprise Design Institute for Transportation Infrastructure	Responsible for design of the Category V left bank road
Nurobod District	Local authority responsible for maintenance of Category V roads, to include the reconstructed left bank road and access roads

Entity	*Role*
Project Management Group for Energy Facilities Construction under the President of the Republic of Tajikistan (PMG)	• Oversight of OJSC Rogun and DFZ environmental and social performance, liaison with international Lender(s) • Contracting entity for Rogun PMC and Rogun HPP construction • Contracting entity for left bank road design and construction
Open Joint Stock Company (OJSC) Rogun	Responsible for construction of Rogun HPP
State Enterprise "Directorate for Flooding Zone of Rogun Hydropower Project" (DFZ)	• Responsible for implementation measures to avoid or reduce impacts due to the flooding of the reservoir, including the resettlement and livelihood restoration of people affected by the reservoir • Executing agency for construction of the road, including supervision of E&S performance of the contractor that will construct the road
Employer's Representative (ER)/Project Management Consultant (PMC)	Responsible for supervising technical and E&S performance of the construction contractors for Rogun HPP on behalf of PMG and OJSC Rogun (the Employer)
Engineering, Procurement, and Construction (EPC) Contractor	Responsible for construction of the left bank road, including compliance with permits and this S-ESMP
Committee for Environmental Protection Under the government of the Republic of Tajikistan	• Responsible for performing State Environmental Review (ecological expertise based on S-ESMP and final design) • Responsible for issuance of environmental permits to the construction Contractor for the crushing plant()s, concrete batching plant(s), stationary source emissions, fuel stations, quarries/borrow pits, and waste generation/disposal.
Service for State Supervision of Works Safety in Industry and Mining Under the Government of the Republic of Tajikistan	Responsible for State regulation of occupational health and safety, and for issuing permits for cranes and other lifting equipment
Forestry Agency Under the President of the Republic of Tajikistan	• Responsible for managing forest lands in Tajikistan, including land used as pastures • Involvement in decisions regarding conversion of forest land to other uses
Rogun City	Local authority responsible for: • Coordinating with DFZ for engaging residents and others who may be affected by construction of the road and bridges (Jamoats and local government) • Responsible for allocating land to Contractor for temporary use (Jamoats) • Local authority responsible for maintenance of Category V roads, to include the reconstructed left bank road and access roads
Nurobod District	Local authority responsible for maintenance of Category V roads, to include the reconstructed left bank road and access roads
Jamoat Sicharogh of Rogun city	Responsible for providing information on settlements and population, as well as direct participation in the consideration

Entity	*Role*
	of grievances (active member of the Grievance Redress Committee (GRC)
Jamoat Izzatullo Halimov of Nurobod district	Responsible for providing information on settlements and population, as well as direct participation in the consideration of grievances (active member of the GRC)
Asian Infrastructure Investment Bank (AIIB)	International financial institution (IFI) responsible for providing financing for the left bank road and partly responsible for providing financing for Rogun HPP construction
World Bank, AIIB, Asian Development Bank, Islamic Development Bank, and other IFIs	IFI responsible for providing financing for Rogun HPP

DFZ has a well-established structure for managing the resettlement program and has appointed an Occupational Health and Safety (OHS) Manager and an E&S Manager/Specialist to manage these aspects of their programs, including construction of the left bank roads. The structure is shown in **Figure 1** below. The OHS Manager will reside in the Construction Department and the Environmental Specialist in the Resettlement and Livelihood Restoration Department. Grievances from external stakeholders are managed by the GRM commission of DFZ and grievances from workers by the Human Resources Department.

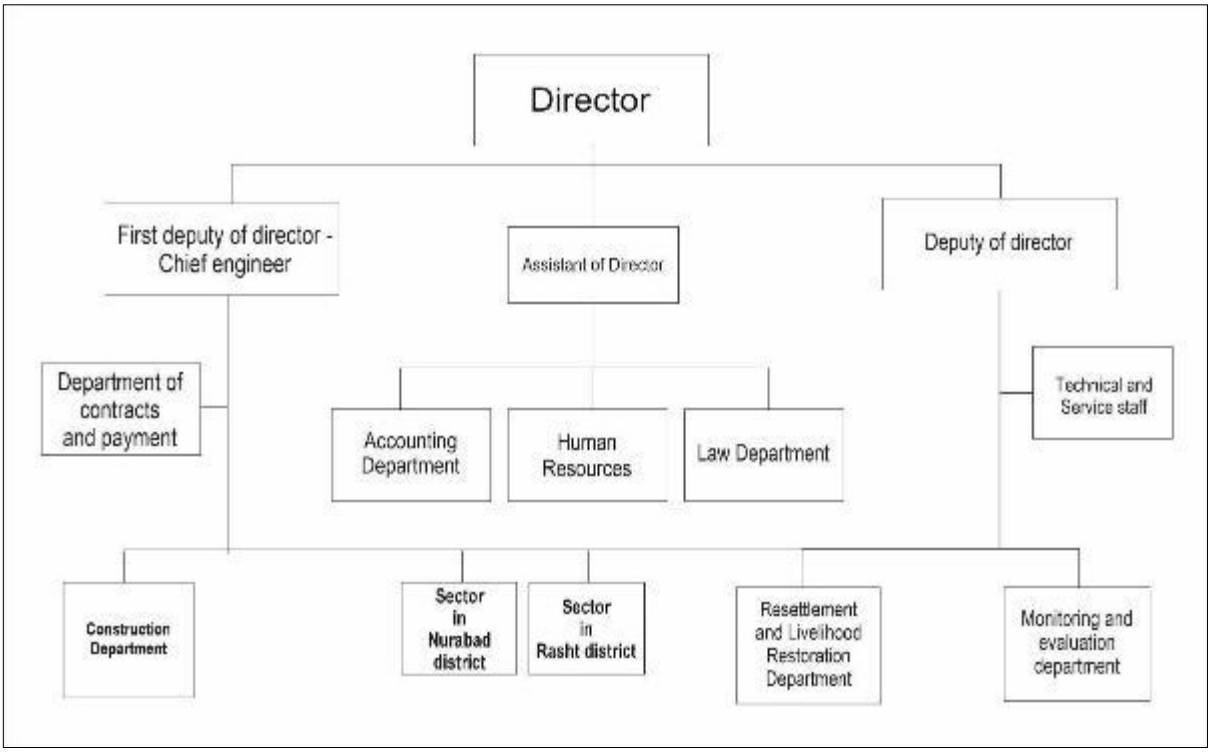

Figure 1. DFZ Organizational Structure

DFZ will require that the Contractor's key personnel include a full-time HSE Manager, who will be required to have relevant experience in implementing HSE programs at similar construction projects. In addition, the Contractor will ensure that the supervisors for all work crews receive training in the potential impacts that the crew's activities could cause and the mitigation measures that must be implemented in order to avoid or control the impacts. This training must be approved by the DFZ HSE

Manager before it is provided[2]. The supervisors will then be responsible for ensuring their crews have the necessary skills and training that will allow them to perform their tasks safely and with minimal impacts on the environment and communities.

3. Legal and Regulatory Framework

3.1. Tajikistan Legislation and Regulations

Tajikistan has a suite of legislative and regulatory requirements that will apply to the environmental and social performance of the Project, including those listed in Table 2.

Table 2. Relevant Tajikistan Legislation and Regulations

Law/Decree/Regulation	*Relevant Topic*
Water Code, April 2020 (No. 1688)	Water uses, permits, planning, management, allocations
Labor Code, July 23, 2016 (No. 1329)	Safeguards the rights of workers and children. Incorporated into the labor management practices for the project.
The Law of the Republic of Tajikistan "On Equality and the Elimination of All Forms of Discrimination", June 22, 2022 (No. 1890).	Establishes the legal framework for protection against discrimination, including direct and indirect forms, harassment, and segregation. The prohibition extends to discrimination based on race, gender, religion, nationality, age, disability, and other grounds.
The Law of the Republic of Tajikistan "On the Prevention of Domestic Violence", adopted in 2013 and amended in 2024 (No. 954)	Aims to combat physical, psychological, economic, and sexual violence. Provides for the protection of family members, the issuance of 15-30-day protective orders to aggressors, and criminal liability for systematic battery and torture.
The law of the Republic of Tajikistan on appeals of individuals and legal entities, 23.07.2016 (No.1339)	Regulates relations related to the procedure for submitting and considering appeals from individuals and legal entities, in order to protect the rights, freedoms and their legitimate interests, to government bodies, self-government bodies of settlements and villages, public associations, organizations, institutions, enterprises, regardless of their organizational and legal form.
Law On Environmental Protection, 2 August 2011 (No. 760, as amended 2014, 2017))	Standards for environmental protection.
Law On Ecological Expertise, 16 April 2012 (decree 4, as amended 2005, 2007, 2012) and Law on Environmental Impact Assessment, 18 July 2017 (no. 532)	Ecological expertise for the road, possibly for quarries
Law On Protection of Fauna, 15 January 2008 (No. 354)	Protection of fauna

[2] It is expected that the HSE Managers of both DFZ and the Contractor will consult with the Rogun HPP ER HSE Manager in their development of appropriate training materials.

Law/Decree/Regulation	*Relevant Topic*
Law On Environmental Monitoring, 2011 (No. 707, as amended 2014))	Monitoring data, public participation in monitoring
Law On Waste Production and Consumption, 2002 (No. 44, as amended 2011 by No. 736)	Waste disposal and reuse
Law On Protection of Atmospheric Air, 1996 (No. 3, as amended 1997, 2007, 2012)	Protection of air quality
Law on Soil Protection, 2009 (No. 685)	Protection of soil
Law on Subsoil, 1994 (No. 983, as amended 1995, 2008, 2010, 2013)	Protection of subsoil
Law On Protection and Use of Flora, 2004 (No. 5, as amended 2007, 2008)	Protection of vegetation and plants
Law On Plant Protection, 2019 (No.1567)	Protection of vegetation
Forest Code, 2011 (No. 761)	Protection and use of forests
Law On Specially Protected Natural Areas, 2011 (as amended 27 November 2014)	Protected areas
Land Code, 1996 (No. 327, as amended 1999, 2001, 2004, 2006, 2008, 2011, 2012, 2012, 2016)	Rational use and protection of land and soil fertility
Law On Land Administration, 2008 (No. 356)	Land mapping, planning, and rational use
Law On Land Assessment, 2001 (No. 356, as amended 2007)	Cadastral assessment of land
Law On Land Reform, 1992 (as amended 1997, 2006)	Land management, rights of possession, tenure, etc.
Law On Land Valuation, 2001 (as amended 2007	Valuation of land
Labor Code, 2016 (No. 1329, as amended)	Rights and freedoms of employers and employees
Government Decree “On the Rules of Attestation of Workplaces according to Conditions at Work”, 2014 (No. 429)	Occupational health and safety, safety and hygienic norms
Law On Provision of Sanitary-Epidemiological Security of the Population, 2003 (No. 49, as amended 2008, 2011, 2013)	Rights and obligations for clean air, water, waste, living quarters, working conditions, disease control, etc.
Law On Hydrometeorological Activity, 2002 (No. 86, as amended 2016)	Monitoring of certain conditions
Road Transport Code (Law No. 1689)	• Framework for vehicle operations on public roads, including oversized and hazardous load transport • Driver licensing, vehicle compliance, speed limits, and access controls
Law on Roads and Activities (Article 46)	Movement of dangerous goods
Regulations on Vehicle Inspection and Licensing (2005)	Procedures for inspection and licensing
Law on Road Transport (Law No. 477)	Overarching law: operator responsibilities, safety standards, operational protocols

3.2. International Obligations

The primary international obligations that will apply to the Project are international conventions of the International Labor Organization, which have been incorporated into Tajikistan law. These include the following:

- Forced Labor (C029) and Abolition of Forced Labor (C105)
- Minimum Age (C138) and Worst Forms of Child Labor (C182)
- Discrimination (C111)
- Freedom of Association and the Right to Organize (C087)
- Right to Organize and Collective Bargaining (C098)
- Equal Remuneration (C100)

3.3. International Standards

As noted, the Project will be financed by AIIB. AIIB has an Environmental and Social Framework (ESF), most recently amended in 2024, that includes three Environmental and Social Standards (ESSs) that define the minimum E&S (ES) standards that must be achieved on all projects that AIIB finances. The ESF and ESSs are presented as Appendix A; the ESSs include:

- ESS 1: Environmental and Social Assessment and Management
- ESS 2: Land Acquisition and Involuntary Resettlement. At present, the Project affects partially 27 households, including 1 residential building and 45 non-residential buildings and auxiliary facilities. If any are determined to have suffered displacement, the impacts will be addressed by the requirements of the Abbreviated Resettlement Action Plan for the Left Bank.
- ESS 3: Indigenous Peoples. This ESS will not apply, as no indigenous peoples could be affected by the Project.

ESS1 requires the application of Good International Industry Practice (GIIP) to avoid or minimize potential impacts throughout design, construction, commissioning, operation, and decommissioning of Projects. The most widely recognized GIIP include Environmental Health and Safety (EHS) Guidelines promulgated by the World Bank Group, of which three guidelines would be relevant to the Project

- WBG EHS General Guidelines (included as Appendix B)
- WBG EHS Guidelines for Construction Materials Extraction (included in Appendix C)
- WBG EHS General Guidelines for Toll Roads (included as Appendix D—the new road will not be a toll road but the Guideline includes relevant GIIP for road construction).

3.4. Permits and Authorizations

Besides conducting the Environmental Review of the Project, as noted in Table 1. the Committee for Environmental Protection will also issue permits to the Contractor for such facilities and activities as:

- Crushing plants
- Concrete batching plants, asphalt plants
- Fuel stations
- Quarries and borrow areas
- Water extraction (groundwater or surface water)
- Waste generation/disposal
- Stationary sources of air pollutant emissions (e.g., generators)

In addition, the Service for State Supervision of Works Safety in Industry and Mining issues permits for cranes and other lifting equipment.

4. Project Description

4.1. The Road

The roads to be replaced include about 40 kilometers (km) of the current road between Sayidon and Labijar, and about 15km of similar roads that provide access to the main road by left bank villages. These are not formal roads under the jurisdiction of the relevant Municipality or Jamoat, but rather are more informal tracks that are maintained by local Jamoats and communities. They are semi-compacted earthen roads with limited or no drainage control and are subject to periodic damage from rainfall and runoff. The road crosses perennial and/or ephemeral streams on the surface and becomes impassable during certain times of the year when mudflows or water cover the road. Indeed, some sections may be out of service for weeks or months after being washed out or affected by mudflows. **Figure 2** shows typical sections of the current road during dry weather.

The project also includes the construction of several permanent and temporary bridges. All risks and mitigation measures are identical to those planned for the road. Please see the specifications of the proposed bridges below.

Figure 2. Typical Sections of the Existing Road During Dry Weather (June 2025)

The new replacement road will begin about 11km from the dam and extend for 40.5km between Sayidon and Labijar and there will be 12.5km of access roads that run to various villages that do not lie directly on the road. About half of the main road (20km) and all of the access roads will follow the exact same routes as the current roads, in the same rights-of-way. The remaining 20km of the main road will be on new ground, although in most cases it will be close by and immediately adjacent to the existing road. Where the current road runs through villages, the new road will follow the same route and use the same right-of-way, with no encroachment on gardens or residential properties, except 27 affected households as described above. The routes of the old and new roads are shown on Figure 3.[3]

[3] On the figure, the current main road is blue, the new one is yellow, and access roads are red.

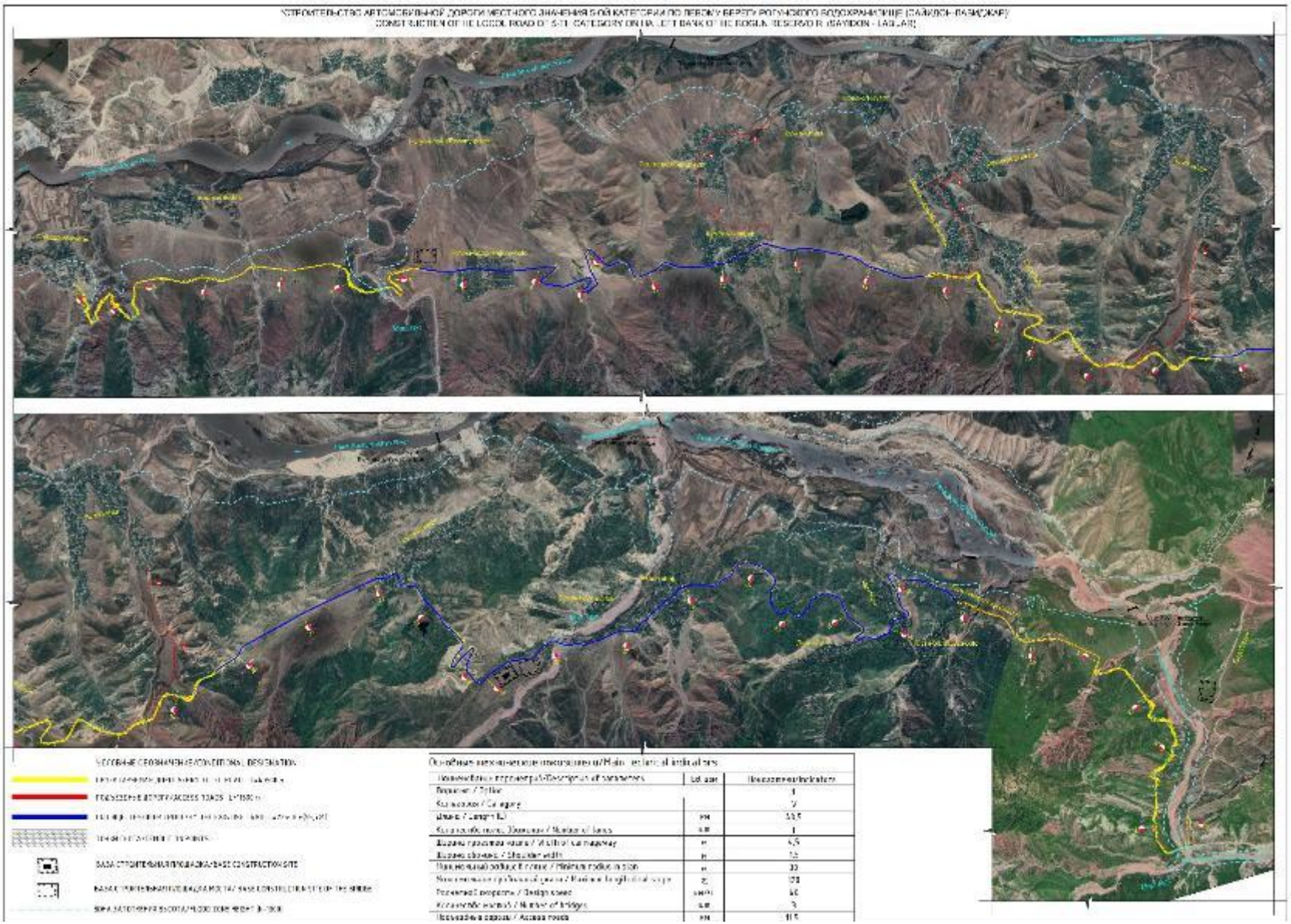

Figure 3. Routes of Existing and New Sections of the Road and Access Roads

The new road will be designed and constructed as a Category V Road under Tajikistan standards for public roads (Clause 4.13 of GOST 33100-2014 "Rules for design of motorways"). Table 3 provides the specifications for the road that were provided to the Design Institute for Transportation Infrastructure, which has prepared the final design.

Table 3. Design Specifications for the New Category V Road

No.	*Design element*	*Left bank road*
1	Type of work	New construction
2	Road category	V
3	Construction length (km)	40.0 (12.5 access roads)
4	Number of traffic lanes	1
5	Roadway width (m)	4.5
6	Width of the subgrade (m)	7.5 (can be reduced to 6.5 in case of topography constraints)
7	Category of road surface	Transition (layered base of sand and gravel/soil)
8	Type of road surface	Crushed stone/gravel (possibly reinforced with organic binders in the future)
9	Design loads: - Road - Artificial structures	• Road: AK10.0 (≈4 tonnes) • Artificial structures: NK14 (≈5.6tonnes)
10	Artificial structures (medium and large bridges, culverts, causeways, drainage blocks, etc.)	≈ 135 total, including • 3 bridges • 35 pipes/culverts • Unspecified others
11	Transport interchanges	None
12	Buildings and structures of the road and motor transport services	None

The specific layout of a Category V road may vary depending on the specific project, terrain conditions (e.g., flat or mountainous), climatic factors, and the purpose of the road. The main elements of the cross-section of a Category V road, and current planning for the left bank road, include the following:

- **Subgrade**: This is the road base, built from soil/sand, which ensures the stability of the entire structure. For the left bank road, it will be 6.5m wide.
- **Road surface:** Consists of layers laid on the subgrade. Includes the base and the covering, which can vary depending on climatic conditions and loads (e.g. crushed stone, soil, asphalt concrete). In this case, it will be crushed stone or gravel and will be 4.5m wide, except on some curves where it will be slightly larger.
- **Roadway:** This is the part of the road intended for vehicle traffic to travel on the road surface. Category V roads may have one or two traffic lanes and may be marked with markings or side lines, if any. In this case, the road will have one unmarked lane.

- **Shoulders:** Strips of land along the roadway that serve to ensure traffic safety and temporary stops. In this case, some sections may have narrow areas up to 1.5 meters wide to serve as shoulders.
- **Drainage system:** Depending on the terrain and groundwater levels, water drainage elements may be provided to prevent the destruction of the road surface from runoff or snowmelt. In those places, shallow drainage features will run alongside the road.

Three bridges are planned to be built to connect left and right banks of the river to secure connectivity for rural villages.

Table 4. Design Specifications for the bridge No.1

N	Name of indicator	Unit of measurement	Value of the indicator
	Start of PC 56 + 70 – End of PC 58 + 00		
1	Bridge category	–	V
2	Total bridge length	м	131,00
3	Bridge layout	м	33,0x63,0x33,0
4	Bridge width, including:	м	9,4
	– roadway between barriers (clearance)	м	6,5
	– sidewalks	м	2x1,0
5	Total bridge area, including:	sq. m	1231,7
	– roadway	sq. m	851,5
	– sidewalks with barrier fences	sq. m	380,0

Table 5. Design Specifications for the bridge No.2

N	Name of indicator	Unit of measurement	Value of the indicator
	Start PC 265 + 25 – End PC 266 + 10		
1	Bridge category	–	V
2	Total bridge length	м	82,22
3	Bridge layout	м	24x33x24
4	Bridge width, including:	м	9,4

	– roadway between railings (clearance)	м	6,5
	– sidewalks	м	2x1,0
5	Total bridge area, including:	кв. м	772,7
	- road access	кв. м	534,3
	– sidewalks with barrier fences	кв. м	238,4

Table 6. Design Specifications for the bridge No.3

N	Name of indicator	Unit of measurement	Value of the indicator
	Start PC 400+15 – End PC 402+45		
1	Total length of the bridge	м	230,0
2	Bridge layout	м	24+168,6+12
3	Bridge width, including:	м	10,5
	Bridge dimensions	м	6,5
	– sidewalks	м	2x1,0
4	Total area of the bridge, including:	кв. м	2320,5
	- roadway	кв. м	1495,0
	– sidewalks with barrier fences	кв. м	460,0

Table 7. Design Specifications for the temporary bridge No.1

N	Name of indicator	Unit of measurement	Value of the indicator
	Start of PC 4 + 91.742 – End of PC 5 + 35.523		
1	Total length of the bridge	м	42,6
2	Bridge layout	м	1x42,6
3	Bridge width, including:	м	5,6
	Bridge dimensions	м	4,5
4	Total bridge area, including:	кв. м	238,6

	- road passage	кв. м	191,7

Table 8. Design Specifications for the temporary bridge No.2

N	Name of indicator	Unit of measurement	Value of the indicator
	Start of PC 6+ + 96.65 – End of PC 7 + 89.85		
1	Total length of the bridge	м	93,2
2	Bridge layout	м	1x90
3	Bridge width, including:	м	6,1
	Bridge dimensions	м	4,5
	– sidewalks	м	0
4	Total bridge area, including:	кв. м	420,7

Figure 4 illustrates typical configurations of a Category V road (note that the illustrations show a two-lane road, whereas the left bank road will be single-lane, and other features may be somewhat different as well). The left bank road will be designed to support speeds of from 20 to 40 kilometers per hours. Figure 5 shows bridges reported to be similar to the new bridges that will be constructed and Figure 6 then shows typical Category V roads.

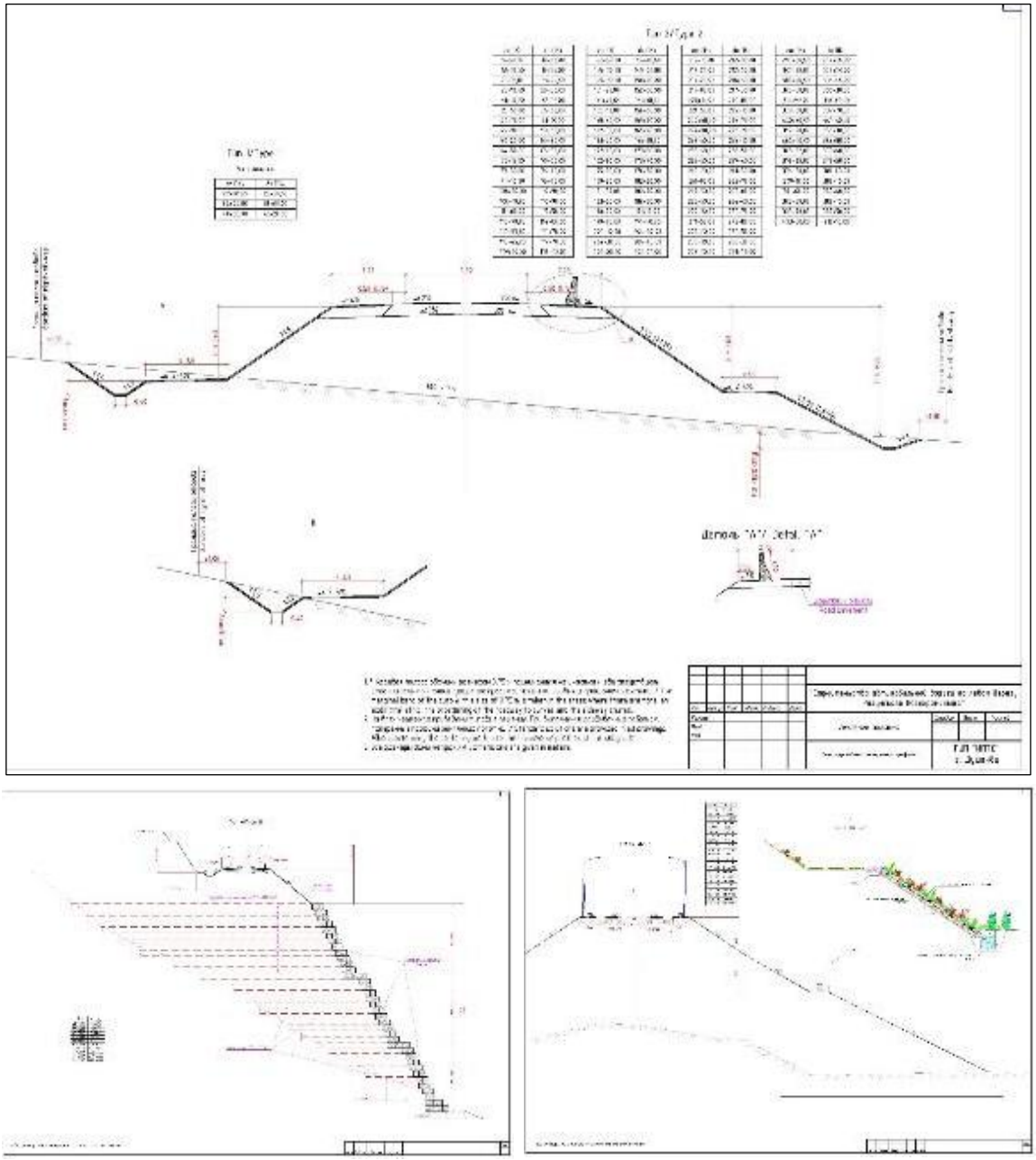

Figure 4. Cross-Sections of Typical Category V Road

Figure 5. Bridges Similar to the New Bridges

Figure 6. Typical Category V Roads

A total of 15 villages are on the left bank of the river and future reservoir, and the road will pass directly through nine of them. The villages are identified in Table 9.

Table 9. Left Bank Villages

	Village name	*Distance from Dam*	*Mile/km marker*	*Population*	*Length of access road connecting to main road*	*Length of road through village*
1	Rogun bolo	16-17	6.8-7.7	419	-–	0.9
2	Kumbak	20-21	11.8-12.6	497	-–	0.8
3	Sangdevor	20-21	12.8	840	2.1	-–
4	Dehi kuhna	21-22	12.8	72	3.5	-–
5	Miyonadara	23-24	14.9-15.3	642	0.3	0.4
6	Sarijuy	23-24	15.1	356	3.1	-–
7	Ainy sulh	24-25	16.2-16.4	438	0.3	-–
8	Yakhch	27-28	18.5	1506	2.5	-–
9	Iston	32-33	21.8-22.8	884	-–	1.0
10	Zumanak	34-35	25.2-26.1	93	-–	0.9
11	Yakhak	35-36	26.1-28	862	-–	1.9
12	Dara	43-44	31.5	124	-–	0.1
13	Yust (Yustibolo)	44-45	31.7-32.8	708	-–	1.1

	Village name	*Distance from Dam*	*Mile/km marker*	*Population*	*Length of access road connecting to main road*	*Length of road through village*
14	Ta`giJamol	47-48	34.1-34.6	210	-–	0.5
Total Population				***6 145***		

Note:
- Some villages are shown as having both an access road that connects to the main road (column 6) and some length of the min road through the village (column 7). These are villages that lie partly along the road and partly away from the road.

The present road also crosses fourteen ephemeral and perennial streams, of which two are crossed by suspension bridges and the remainder on the surface (The two suspension bridges are on sections of the road between the dam and New Sayidon, before the beginning of the new road, and these will remain in place--that is, they are not part of the new road). The remaining surface crossings are, as noted above, simply at-grade level crossings (i.e., rock fords) that cross the streambed at grade (see Figure 7 for examples). These are made impassable at times by high water or mudflows and require frequent repair, often annually.

Figure 7. Existing Stream Crossings at Ground Level

It is expected that the new road will cross three of the waterways on bridges, two on at-grade fords (known as "open tray" crossings), and the remainder over pipe or box culverts that will convey water under the roadway.[4] An open tray level crossing under construction (on another road) is shown in **Figure 8**, and typical box and pipe culverts are shown on **Figure 9**.

Figure 8. Typical At-Grade Open-Tray Crossing Under Construction

[4] As noted, current plans may change based on the final engineering design. It is also possible that final designs will determine that additional rock fords or other at-grade passages may be used instead of culverts at some crossings.

Figure 9. Typical Pipe and Box Culverts

The culverts are being designed so they can convey streamflows with a return interval of about 50 years, the bridges 100 years[5]. Characteristics of the stream crossings are listed in Table 10.

Table 10. Characteristics of Stream Crossings by the New Road

No.	*Name of river/stream*	*km marker (no. km)*	*Perennial or Ephemeral?*	*Type of crossing (bridge, culvert/pipe, surface causeway)*	*Number and Length of pipes/boxes in culvert, or Length of open tray or bridge*
1	Sai Sayidon	0.695	*Perennial*	Culvert	6 x 4.5m
2	Sai Sayidon-2	1.590	*Perennial*	Culvert	6 x 4.5m
3	Sai Darai-Namak	5.455	*Ephemeral*	Bridge 1	133m
4	Sai Kumbak	12.035	*Perennial*	Culvert	4 x 2.5
5	Sai Miyonadara	14.860	*Perennial*	Culvert	6 x 4.5m
6	Sai Sulh	16.180	*Perennial*	Culvert	6 x 4.5m
7	Sai Yakhch	18.395	*Ephemeral*	Culvert	6 x 4.5m
8	Sai Iston	22.465	*Perennial*	Open tray	50 x 7.5m
9	Sai Yakhak	26.105	*Ephemeral*	Bridge 2	81m
10	Sai Dara	32.300	*Perennial*	Open tray	50 x 7.5m
11	Sai Tagijamol	34.160	*Perennial*	Culvert	6 x 4.5m
12	Khingob River	39.00	*Ephemeral*	Bridge 3	210m

[5] The calculations to determine design flows considered climate change projections.

Table 11 shows the land uses and vegetation cover of the land through which the new road will pass. As can be seen, most of the route is rocky, barren land that is not used for any purpose, while most of the rest will be on land that is used for pastures or is in villages. Only a small distance passes through cropland or forests.

Table 11. Land Uses Along the New Route

Type of land	*Land affected by road (ha)*
Developed land (routes through villages)	11
Forest land	1.24
Shrubs/bushes	1
Crops	4.2
Grassland (used as pasture)	22.35
Rocky barren land	62.72
Gorge/valley	1
Total	***42***

4.2. The Construction Process

This section outlines the process by which the road will be constructed by the EPC Contractor. It is important to note that the Contractor will be responsible for designing the actual construction program, including the process and certain locations. These will be specified in prospective Contractors' proposals and considered in the evaluation of the proposals. Thus, the descriptions in this section should be considered as estimations based on professional judgement.

A single contract will be awarded by PMG and will require construction to be completed within two years. Construction is expected to begin in the spring of 2026. It is likely that some activities will continue year-round, although most of the construction itself would occur in the warmer months, approximately March to November, with stream crossings primarily later in the season when spring floods have abated. The sequence of construction of the various sections of the road, including stream crossings, will be determined by the Contractor. Options could include starting at one or both ends and will likely include multiple work sites at intermediate locations.

It is expected there will be at least three construction camps to serve the construction program for the three bridges (Darrai Namak bridge, Zumanak bridge, and Yonur bridge), and the Contractor may elect to have one or more additional camps to serve other sections of the road. to serve the individual sections under construction. If additional locations are to be established by the Contactor, they will be selected using criteria specified in part in this S-ESMP and in consultation with the relevant Jamoat, which will be responsible for allocating the land for temporary use. The camps will likely include workshops, storage and staging areas, accommodations and parking as well as small concrete batching plants. The three known locations are shown on **Figure** 10 and described in Table 12. The locations of these camps were selected based on proximity to bridge construction and the availability of land that is not being used productively.

Figure 10. Locations of Construction Camps

Table 12.Locations of Construction Camps

No.	*Nearest bridge*	*Mile/km marker (no. km)*	*Name of nearest village*	*Distance to nearest village*	*Current land use*
1	Darrai Namak	900 m	Kumbak	600 m	Rocky barren land
2	Sai Yakhak	400 m	Zumanak	500 m	Rocky barren land
3	Yonur	1400m	Khingob River	800 m	Rocky barren land

Each work site, and there could be five or more at the height of the construction seasons, would likely involve up to 15-20 workers and at least one or two trucks and loaders to move material. Construction of the three bridges and some culverts will be somewhat more complex and time-consuming than the road itself, so there will be more workers and equipment. Figure 11 shows mid-2025 construction of a temporary bridge[6] near Bedikho and New Sayidon—it is not part of the Project but shows a typical site.

Figure 11. Ongoing Construction Considered Typical of Future Construction (Bridge Pier at right)

As noted previously, the road will be constructed with a subbase of fine sand or soil overlain by crushed stone and/or gravel, with an average total thickness of about 40 cm. Figure 4 provided schematics of the general road design. This will require a shallow excavation up to about 6.5 meters wide to remove surface material, which would be either the surface of the existing road or soil on the new sections, into which the subbase material will be deposited. If the excavated material is suitable for use in the new road, it will be processed as needed and used. Otherwise, is will be stored as topsoil and used in the restoration of areas disturbed by construction and other activities. On relatively level ground, there should be very limited activity beyond the 6.5m width of the subbase, as most work can take place in the road width.

In some areas of steep terrain (see Figure 2), standard cut-and-fill techniques will be used when the uphill side must be excavated (cut) and the downhill side must be built up (fill) in order to allow the width of the road to be level, as was shown on Figure 4. Where needed, the slopes will be protected

[6] All associated facilities, including temporary bridges ensure consistent application of standards and compliance with. This bridge meets all lender requirements and is intended to mitigate the impact of road construction on the left bank of the reservoir. The bridge design was developed by the State Unitary Enterprise (SUE) "Design Institute of Transport Structures" under the Ministry of Transport of the Republic of Tajikistan and approved by the State Expertise. It should be noted that this SUE developed and executed the entire design documentation package for the construction of the left-bank road (including all bridges).

with gabions or vegetation, also as shown on Figure 4. Wherever possible, excavated material will be used as fill, and side-casting will be used only as a last resort.

The Contractor will require substantial amounts of sand, gravel, and rocks to establish the road base and road surface and of larger rocks to fill gabions that will be placed in locations where it is necessary

Figure 12. Typical Small Batching Plants

to stabilize roadside slopes. The sources and amounts of these materials are not known at present but are likely to require the expansion of quarries (at present, none are known to exist) and borrow areas (if any), or the establishment of new ones. Some gravel may be mined from ephemeral stream channels as permitted by the Committee for Environmental Protection. The Contractor will determine if blasting is required at quarries and road cuts—at present, the Design Institute does not anticipate the need for blasting for any purpose.

Concrete will be used for bridge pilings, for other stream crossings (for concrete slabs and culvert/pipes), and possibly for other purposes. Thus, there will be one or more concrete batching plants, most likely small mobile plants, such as shown in **Figure 12**. This will require fairly large amounts of water, primarily for concrete but also for equipment washing, dust control, drinking, and other purposes. Technical water would likely be taken from perennial streams or existing wells, as permitted by the Committee for Environmental Protection, and potable water would be brought to the site in bottles or other containers. The Contractor will also store some amount of diesel fuel at the camps, either in tanker trucks or in temporary tanks.

It is expected the Contractor will employ a total of an estimated 75-150 workers, of which perhaps 65 percent or more could come from local villages.[7] Non-local workers would be housed in tailor-made

[7] It is noted that many local skilled and semi-skilled workers were employed in the construction of the International Road, which is now complete. As a result, local workers are considered likely to form a substantial portion of the workforce for the left bank road.

accommodations in camps or possibly, if adequate housing is available in nearby villages, in rented accommodations.

The working corridor of the road will not extend more than one or a few meters to either side of the 6.5-meter subbase width, and in most cases much less. Because the road will follow the same route or be immediately adjacent to the existing road for most of its length, including in all populated areas, construction activities will not affect wells, graves, infrastructure and other property, and other such valued features.

5. Risks, Impacts, and Mitigation

Construction of the road is intended ultimately to benefit the population on the left bank, but construction could also result in adverse impacts on people and the environmental resources. This section identifies the receptors that can be affected by and the potential impacts they may be caused by construction. The first subsection describes potential impacts on communities and people, while the second describes potential impacts on the environment.

Environmental and biodiversity specialists from the State Unitary Scientific and Production Enterprise "Tabiat", which is part of the Committee for Environmental Protection under the Government of the Republic of Tajikistan, collected baseline information during visits to the left bank route in May 2025, during which they sampled water, air, noise, and vibration and also made observations of flora and fauna. In addition, a consultant traveled the existing left bank road during the first week of July 2025 and reported on current conditions.

The potential risks and impacts that may result from various construction activities are described in sections 5.1 and 5.3, along with measures to avoid or minimize the risks and impacts. The separate coverage of community health and safety risks in section 5.1 and of environmental risks in section 5.3 is artificial and separated only for the ease of presentation, since many of the various risks affect both human and environmental receptors and the mitigation measures are intended to avoid or minimize the effects on all receptors.

5.1. Potential Risks and Impacts on Community Health, Safety, and Well-Being

Construction of the left bank road and bridges can affect the health and safety of communities and people in a number of ways, which are described in the following subsections, along with measures that will be required in order to avoid or minimize impacts.

5.1.1. Traffic

The traffic load on the current road is very light, with relatively few vehicles per hour or per day. Most vehicles are passenger cars and light trucks, with very few heavier trucks or other heavy goods vehicles. There are few pedestrians, except in villages, although some livestock use more remote areas of the road to travel to and from pastures and other grazing land. The condition of some sections of the road limit speeds to no more than a few kilometers per hour, only rarely allowing more than 25 kilometers per hour. The new road will be designed to allow speeds up to 40 kilometers per hour.

Construction traffic will primarily include dump trucks carrying rocks and other material from quarries to work sites, construction vehicles traveling from construction camps to work sites, and lighter vehicles carrying workers between camps and work sites or home villages. In addition, there will be occasional movements of mobile cranes or trucks carrying excavators or other construction

equipment. The number of trucks and heavy vehicles will increase over the current traffic load, but will remain at a low level, no more than one or a few per hour during peak periods.

This increased traffic, and in particular the increase in large vehicles, will increase the potential for traffic accidents involving passenger cars and pedestrians, especially in villages but also in the more remote areas. There will also be some minor disruption of existing traffic in construction zones at locations and periods where the new road is being replaced on the same route, including in villages.

Mitigation for Impacts due to Project Traffic. The potential for accidents involving cars and pedestrians will be reduced by the following actions:

- Require and ensure that drivers are licensed and trained on the vehicles and equipment they will operate
- Assign a discrete identifier (e.g., number/letter combination) and places it on the front, back, and sides of all vehicles so that the identifier can be read at a distance of at least 25 meters (this will allow Contractor, Engineer, DFZ, and law enforcement personnel to identify the vehicle and driver when violations of rules are observed)
- Establish, strictly adhere to, and enforce speed limits of less than 20 kilometers per hour on the existing road and 25 kph on completed sections of the new road, with a limit of 15 kilometers per hour in populated areas. Where feasible, engines should be adjusted to limit speeds to no more than 25kph.
- Require drivers to inspect their vehicles and complete a checklist before each day's use, and put the vehicle in use only if it is equipped with proper safety equipment, including working lights, reverse alarms, horn, intact glass, treaded tires, fire extinguisher, cleanup kit, etc.
- Where the existing road is being removed to allow replacement in the same roadbed and there is no room for two "lanes" (e.g., on steep slopes or beside streams, preserve at least enough room beside the ongoing work for a light vehicle, except possibly for short periods when traffic must be stopped while a temporary lane is prepared.

5.1.2. Noise

The State Unitary Scientific and Production Enterprise "Tabiat" monitored noise at 33 locations in 17 villages and at one bridge. Noise levels were measured in the daytime and at night. Daytime noise levels at all locations were found to be below the national standard of 53dB for residential areas, typically ranging between from 40-45dB and none as high as 50dB. Similarly, nighttime levels were below the national standard of 45dB for residential areas, ranging from 30 to 38dB.

Vehicle traffic and construction activities (e.g., passage of vehicles, excavation of the existing roadway, transportation of earthen materials, movement and dumping of materials, operation of concrete plant, etc.) will produce noise that can exceed the standard for residential areas for at least short periods.

This could have an impact on people when construction is taking place in or near villages and when trucks pass through villages when carrying materials or workers to work sites. The duration of exposure would be limited to the short periods when construction was taking place in or near villages (when the duration would be on the order of days) and when trucks were passing (on the order of minutes). Although this could extend for a few days when the road through a village was being

replaced, even then construction activities would not be continuous but would be intermittent throughout the day. Thus, impacts should be very limited.

"Tabiat" also made baseline vibration measurements in five settlements through which the project road passes and will continue to pass. They used benchmark threshold criteria from CALTRANS USA (2013) for residential buildings: 2.5 mm/s of ground vibration, converted to VdB. No excess vibration levels were found for sensitive receptors such as schools, hospitals, childcare facilities and residential areas.

Mitigation for Impacts due to Noise. The Contractor will implement the following measures to minimize impacts from noise:

- All construction will take place during daylight hours unless otherwise authorized by the Engineer (no earlier than 07:00 and no later than 21:00 in any location and no earlier than 08:00 and no later than 18:00 within 300 meters of populated areas
- Engines of construction equipment and heavy vehicles will be shut off when not in active use
- Mufflers and other noise-dampening equipment will be maintained in good condition and checked as part of the daily pre-use checklist that will be completed by drivers.
- Noise complaints will be investigated by monitoring at the point of concern, with additional measures (barriers, new equipment, etc.) taken as needed to reduce noise to below limits
- Noise will be monitored by the Contractor as required by the Committee for Environmental Protection.

The relatively low level and slow speeds of truck traffic through villages and the short periods during which construction activities will take place on roads within villages should not result in vibration that can damage buildings. No mitigation is required for vibration beyond those noted for noise above and the speed limits noted above and below.

5.1.3. Air Quality, Including Dust

The State Unitary Scientific and Production Enterprise "Tabiat" also sampled for air pollutants in and at the margins of 17 villages and at one bridge. Samples were analyzed for the pollutants listed in Table 13. All samples were well within national standards at all locations.

Table 13. Air Pollutants Monitored by CEP

Air Pollutant	Sulfur dioxide (SO_2)
Carbon monoxide (CO)	Total suspended particulate matter (TSP).
Carbon dioxide (CO_2)	PM 2.5 -µm.
Nitric oxide (NO)	PM10 10 microns.
Nitrogen dioxide (NO_2)	

Vehicle traffic and construction activities will generate dust, particularly during the dry periods that occur frequently from late spring through early autumn. As with noise, this could have an impact on people when construction is taking place in or near villages and when trucks pass through villages when carrying materials or workers to or from work sites. Potential impacts would be confined to a

nuisance level, since the duration of exposure would be limited to the short periods when construction was taking place in or near villages and when trucks were passing.

Construction vehicles, generators, and other engines will emit not only particulates but also nitrogen oxides, sulfur dioxide, carbon monoxide, and carbon dioxide. Given the relatively limited number of engines that will be in use, the emissions will be very minor and will not have a significant effect on ambient air quality.

Mitigation for Impacts on Air Quality. Even though the expected levels will not present a significant risk, the Contractor will be required to implement several measures to reduce dust generation, including:

- The Contractor will prevent overloading of trucks in order to prevent spillage
- During dry periods, dump trucks carrying earthen materials (rocks and soil) will be covered.
- Contractor drivers will be trained to reduce speed to no more than 15 kilometers per hour when passing through villages at any time, and 10kph during dry periods.
- When supervisors or construction managers observe visible dust, or if there is a complaint by any person, the Contractor will be required to mobilize bowsers or other means to suppress dust with water as frequently and as long as necessary to minimize dust.
- Engines will be maintained in accordance with manufacturer's recommendations, and vehicles that emit black smoke for more than three seconds after ignition will be removed from service until they are repaired.
- Complaints about dust or air quality will be investigated to determine the cause (speed, failure to water, etc.) and corrected if caused by construction.
- Air quality will be monitored the Contractor as required by the Committee for Environmental Protection.

5.1.4. Physical and Economic Displacement and Community Health and Safety

Neither physical nor economic displacement is expected. If construction of the road requires the temporary or permanent use of land on which households or individuals reside, however, that would cause physical displacement. Similarly, if construction affects land on which individuals gain some economic benefit, they could be economically displaced. Neither is expected to occur. Jamoats will allocate only communal land for the road and for the construction camps. They will not allocate land that is important for any communal users, except possibly some land used that is used for crops or grazing. In those cases, wherever possible, the Jamoat will provide other communal land to replace that which is lost. Similarly, Jamoats will substitute communal land for land where the new road deviates from the current route.

For the 20+ kilometers where the roadway will deviate from the current route (which as noted will in most cases be immediately adjacent to the existing road), the surface of the current roadway, whose surface will have been compacted by traffic will be scarified to allow restoration of grass, shrubs, or other vegetation and returned to communal use.

During pre-construction period DFZ will be obliged to compensate for any auxiliary infrastructure and household assets to be affected by rehabilitation or construction of intervillage roads, and will ensure

land availability before construction begins. DFZ will assess any impacts and provide appropriate compensation/entitlements to those affected in accordance with the requirements of the Rogun HPP's Resettlement Action Plan 2 and Livelihood Restoration Plan 2.

Mitigation measures to avoid displacement. Several measures will ensure there will be no physical displacement, and any economic displacement will be fully compensated.

- Under no circumstances will DFZ or the Contractor require the resettlement of any household.
- All camp facilities (accommodations, offices, storage areas, concrete and asphalt plants, etc.) will be located at least 300 meters from populated areas
- Camp facilities will be located on land that is not used or suitable for agricultural purposes (that is, not on fertile land).
- Wherever possible, camp facilities should be located on State land. Where this is not possible, and where land is currently in use, the Contractor will enter into voluntary agreements with the current user(s) or identify other land for use.
- If fences, walls, livestock, or other property is damaged or destroyed during the course of construction, the Contractor will be compensated for the loss at full replacement value, with no depreciation.

Community Health and Safety

Community health and safety issues during the construction of proposed Project may include dust, noise, and vibration from construction vehicle transit, and communicable disease associated with the influx of temporary construction labor. Significant community health and safety issues associated with road Projects may also include:

- Pedestrian safety
- Traffic safety
- Emergency preparedness

The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The construction will result in dust pollution, noise and vibration impacts on nearby community. The labor works with different transmittable diseases (HIV/AIDS etc.) may cause spread out of those diseases in the local residents of above-mentioned settlements along the proposed Project. The construction areas located near the residential/settlements may cause accident for the people who move near to these areas. The impact significance is moderate adverse.

Mitigation Measures

- Ensure compliance national laws and World Bank Group General EHS guidelines;
- Provide safe corridors along the construction areas, and safe crossings for pedestrians and during the construction phase. Crossing locations will consider community preferences, including those related to convenience or personal safety;
- Install and maintain speed control and traffic calming devices at pedestrian crossing areas especially near the settlements;

- Install and maintain all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;
- Reduce impacts of vector borne diseases on long-term health effect of workers will be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes: Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to residential areas and by eliminating any unusable impounding of water;
- The communicable disease of most concern during construction phase, like Sexually Transmitted Disease (STDs) such as HIV/AIDS will be prevented by successful initiative typically involving health awareness; education initiatives; training heath workers in disease treatment; immunization program and providing health service; and
- Contractor will take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any un-ethical activities and to obey the local norms and cultural restrictions.

5.1.5. Employment and Economic Effects

As noted previously, about 75-150 skilled and unskilled workers will be employed by the Contractor, with more in summer season and fewer in the winter. Perhaps 65 percent or more of them will come from local villages. This will benefit local households and economies for a short period, up to two years, which will reduce the effect of unemployment caused by the completion of construction on the International Highway. In addition, it is likely the Contractor will acquire at least some goods and services (e.g., food for workers) from local suppliers, which will also benefit the local economy. DFZ will encourage the Contractor to fill positions with local people, and to obtain supplies from local sources when it is available and will not cause local people to seek other sources for themselves.

5.1.6. Labor Influx

There will be relatively few nonlocal workers, perhaps as many as 50-60 in total. Nonlocal workers will reside either in one of the construction camps or in rented accommodations in local villages, depending on preferences of the Contractor and agreements with local officials, and possibly the availability of suitable quarters. The same will be true for workers from left bank villages that are distant from their home villages, at least until sections of the new road allow faster travel.

Potential impacts that can result from interactions of workers (mostly or entirely young men) and local people can include conflict with villagers as well as sexual exploitation, abuse, and harassment. In addition, increased demand for supplies can cause inflation or other adverse economic impacts, and the introduction of additional people can overtax services such as medical care.

The small number of workers that come from outside the left bank will reduce the potential for potential impacts. The small scale of the effort is considered unlikely to increase demand sufficiently

to cause any adverse economic impacts (although as noted, it could be somewhat beneficial for a time).

Mitigation for Impacts due to Labor Influx. Although no adverse impacts are expected, the following measures will reduce the likelihood even further:

- The Contractor will require workers to agree to a Code of Conduct and will enforce violations of its requirements with appropriate sanctions, including termination of employment or referral to law enforcement if necessary. The Code of Conduct will include strict requirements to prohibit sexual exploitation, harassment, and abuse. Violations will be subject to penalties, up to and including termination of employment and/or referral to authorities
- The Contractor will provide induction training that includes information on the Code of Conduct, including provisions related to sexual exploitation, harassment, and abuse.
- The Contractor will reach agreements with medical providers, clinics, first responders, and other community services as needed to prevent overtaxing such services and providers.
- The Contractor will be encouraged to maximum employment of residents of villages on the left bank.
- As part of the stakeholder engagement program (section 6), DFZ will continue to operate and publicize its Grievance Redress Mechanism, which allows people to submit complaints and be assured they will be acknowledged and addressed.

5.2. Potential Impacts on Worker Health, Safety, and Well-Being

5.2.1. Labor Management

The relationship between employers and employees is critically important in defining the rights of both parties. The Contractor for left bank road construction will be required to develop and adopt a Labor Management Procedure (LMP) that is consistent with the LMP adopted by OJSC Rogun and DFZ[8] for the HPP project and the resettlement program, respectively. Among the procedures that must covered be in the LMP are requirements for non-discrimination and equal opportunity, workers' organizations, forced labor, terms and conditions of employment (including written contracts), workers' accommodations (see section 5.2.2), worker transportation, and the age of employment. In addition, the LMP must require the Contractor to implement a mechanism by which workers can submit complaints or grievances and by which the Contractor will receive and act on the grievances. The current Project LMP includes an example of such a mechanism.

5.2.2. Worker Health and Safety

Construction is recognized as one of the most dangerous occupations in the world. Workers involved in constructing the left bank road will be exposed to a variety of risks, perhaps the most important of which is colliding with vehicles while working on or near the road or while traveling in vehicles and falling from height when working on bridges. Workers will also use tools and other equipment with sharp edges or moving parts that could cut or entrap them, and they will be working around heavy equipment. In addition, workers will be exposed to noise and dust, and some will be exposed to hazardous substances (e.g., diesel fuel). In summer, workers will be subject to extreme heat and in

[8] https://drive.google.com/file/d/1SLnnExB2GNsYoZGWzXrY1smCAde1tFm5/view

winter to cold. Where the road is on steep slopes, workers may fall downslope or have rocks fall on them from upslope, and vehicles may fall downslope. In addition, workers may be subject to sexual exploitation, harassment, or abuse from other workers, especially in work camps. Workers in quarries will also be exposed to many of these risks and could also be subject to falls from heights if there are

Due to the rural and relatively remote nature of the left bank, the Contractor will need to provide at least some accommodations for workers. It is noted that "accommodations" include not only living quarters but also include living quarters, kitchens and dining space, break and recreation space, medical arrangements, etc. Substandard accommodations (poor sanitation, overcrowding, poor/no medical facilities or care, etc.) can affect workers' health and safety and also affect morale and productivity. The Contractor will determine what accommodations are to be provided, since that will depend upon the source of workers, the availability of rented quarters, arrangements with existing medical facilities, etc. The Contractor will prepare a Worker Accommodation Plan as part of Labour Management Plan/CESMP.

Mitigation for Impacts on Workers. To minimize the risks, the Contractor will be required to develop an Occupational Health and Safety Plan that includes a detailed risk and hazard assessment and identifies measures to avoid or control risks. The Plan will require that all workers be trained on measures needed to avoid or reduce risks, both general risks and on specific risks of their individual tasks. In addition, the Plan will require all workers to receive induction training that is repeated at least annually and for each work crew to hold (and document) daily toolbox talks on safety topics. Minimum requirements to be covered in training will include requirements for at least the following for those who will be exposed to the risks:

- Using/wearing at least the minimum PPE, which will include safety boots, hard hat, and high-visibility vest/clothing, and which will be provided by the Contractor at no cost to the workers.
- Using safety belts by drivers and all passengers in vehicles and prohibiting the use of "dummy fobs" that are used to overcome warning signals
- Allowing workers to be transported only vehicles designed for that purpose, with safety belts in all seating positions
- Completing a checklist approved by a Supervisor to ensure that safety measures on equipment and vehicles (e.g., reverse alarms and lights, horn, headlights and brake lights, glass, mirrors, mirrors, mirrors, mirrors, safety belts, tires, first aid kit, cleanup kit, etc.) are in good condition and good working order before the equipment /vehicles are put into use each day
- Providing fall protection for working at height[9], including additional PPE (e.g., harnesses) and other safety measures (e.g., barriers, scaffolds)
- Reducing the risk of falling rocks or landslides when working below steep slopes
- Providing safety measures for working near water—nets or platforms under bridges, barriers, life-saving devices, no solo workers ("buddy" system only)
- Taking other measures to address other risks to which workers may be exposed, which could include heat (shade, water, etc.), cold (warm clothing as PPE, warm refuge), snakebite (antivenin, if there is one for poisonous snakes that could be encountered),

[9] It is noted that "working at height" includes working on steep slopes, including at locations immediately above slopes where a fall could lead to injury or uphill slopes where there is a risk of slope failure.

exposure to fresh concrete (gloves, neutralizers, ointments), fuel (gloves, etc.) or other hazardous substances (as specified on Material Safety Data Sheets).

- Providing first-aid training and certification to all supervisors and, if there is not a supervisor at every work location, ensuring at least one worker is a trained first aider.
- Providing a fully equipped first aid kit at every work location and every vehicle. Kits may include only first aid supplies (bandages, sanitizers, etc.), but not medicines, and their contents must be checked on a monthly basis to verify they have all required contents.
- Providing personnel able to provide routine and emergency medical care at each of the construction camps or making arrangements with medical care facilities/professionals in nearby locations to provide such care.

All accommodations provided by the Contractor will be required to meet the standards described in the IFC/EBRD guidance note "Workers' accommodation: processes and standards (2009)[10]. It is noted that the Design Institute does not expect the Contractor will need to use explosives in quarries and excavations. However, if the use of explosives does become necessary, special requirements will need to be employed to meet the requirements of national law and to protect workers. These requirements would be recorded in the Occupational Health and Safety Plan and an Explosives and Blasting Management Plan.

5.3. Potential Risks and Impacts on Environmental Receptors

Construction of the road can also affect the physical and biological resources of the area, including those described in the following subsections.

5.3.1. Surface water

The State Unitary Scientific and Production Enterprise "Tabiat" collected 23 water samples, including four of drinking water, three of irrigation water, two in the Khingob River, one in the Vakhsh River, and 13 in "soi" (gorges), of which six were at bridges and seven at villages. Samples were analyzed for a variety of constituents, including those in Table 14.

Table 14. Water Constituents Sampled by CEP

Temperature, $^{\circ}$C	Nitrogen nitrates
pH	Dissolved oxygen, mg/l
Turbidity FAU	Oil products, mg/l
Transparency, cm	BOD 5 , mg/l
Mineralization, mg/l	COD, mg/l
Chlorides, mg/l	Sulfates
Suspended solids, mg/l	Coli index, pcs /l
Ammonium nitrogen	Copper mg/l
Nitrogen nitrites	Zinc mg/l

With the exception of two locations at Bridge No. 3 and two locations on the Kinghob River, samples of all constituents at all locations were within national standards. At these locations, turbidity and suspended solids exceeded standards, and at Bridge No. 3, mineralization, chloride, and nitrates also exceeded standards. "Tabiat" concluded the turbidity, suspended solids, and mineralization were due

[10] https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf

to the naturally high sediment load. Although they did not opine on the other exceedances, it is considered likely the nitrates and chloride were from fertilizer runoff or possibly animal waste in the streams. None of the exceedances are considered to be of great concern.

The primary ways in which construction might affect surface water is through erosion of soil into the water and by contamination, which could occur either through spills of hazardous materials such as fuel or by water coming into contact with fresh concrete. It is noted that the nine streams the road crosses are already subject to increased disturbance, and at least some increased sediment loading, at the level road crossings.

It is expected that the at-grade level crossings of all streams will remain in use during construction of the new culverts, open-tray crossings, and bridges. Currently, any increased sediment loading due to construction vehicle crossings would be very short-term, occurring only for a short time after vehicles pass.

The replacement of the current at-grade level crossings by culverts at nine streams will lead to reductions in the sediment load that results from current traffic. That is not likely to be significant at present, so the reduction will be minor. The construction of the culverts will result in more sustained disturbance at the perennial streams. This will last for at least a few days or weeks as the new roadbed is excavated and as concrete and other works are completed. The excavation and other work in the streambed can result in increased sedimentation and contact with fresh concrete can increase the pH of water to levels that would be toxic to aquatic organisms.

Mitigation for Impacts on Surface Water. In order to reduce the potential impacts on surface water, in particular at the stream crossings, the Contractor will be required to:

- Clearly mark the upstream and downstream boundaries of the works at stream crossings so the disturbance is kept to a minimum.
- Conduct works from mid-summer to early winter, when flows are at their minimum, possibly even zero.
- Take actions to prevent perennial flowing water and runoff from coming into contact with active earthworks and concrete. Before work begins and until the work is complete, establish a temporary channel so flowing water is diverted around the active works in order to minimize contact with disturbed ground and with fresh concrete.
- If gravel is to be taken from dry streambeds, provide channels for ensure flowing water
- Prevent water from coming into contact with concrete until it is fully cured, which may take as long as 28 days.
- Store diesel fuel, including parked or idling tankers, no closer than 25 meters from surface water and drainageways
- Conduct refueling operations no closer than 10 meters from surface water and drainageways, and over an impermeable surface such as a drip tray
- Do not wash trucks and equipment within 10 meters of surface water and drainageways, and prohibit truck-washing runoff from discharging into surface water unless it has passed through a settling pond

- If pumps are used to take water from streams, place the pumps on an impermeable surface at least 10 meters from the water, with a barrier between the pump and the water in order to prevent any leakage or spills from running toward the water
- Similarly, place all generators or other engines on an impermeable surface at least 10 meters from the water, with a barrier between the pump and the water in order to prevent any leakage or spills from running toward the water
- Monitor surface water quality as required by the Committee for Environmental Protection
- Provide spill cleanup kits to all work crews and in all vehicles and equipment and at all stationary engines.

The construction of the three bridges may present the same or similar or risks, but some bridge works will not take place directly in the stream channels, since some concrete piers will be installed on dry land on either of the streambed (see **Figure 11** for concrete formworks for a pier for a similar bridge). In addition to the measures listed above, measures that will be required for construction of the bridges will include:

- To the extent possible, bridge piers will be installed outside the normal streambed. If this is not possible, flowing water will be diverted around the works concrete works until concrete is fully cured.
- When possible, construction in streams or on streambanks will be scheduled during times of low flows.
- All waste concrete will be removed from work sites and disposed in a secure location away from water.
- The Occupational Health and Safety Plan will require that workers be provided with, and use, appropriate fall protection, which must include not only personal protective equipment but also such measures as nets barriers, or other devices to protect against drowning.
- A “buddy” system will be employed for all work within 10 meters of flowing and still water that could present a drowning risk; no workers may be alone in such locations. In addition, accessible lifesaving equipment will be available in all such locations.

5.3.2. Soil

Much of the richest soil is on the lower terraces of the river, which will be inundated by the rising water of the reservoir. However, even on the upper terraces where the new road will be located, the soil supports crops and grazing in many areas. Through much of its route, as described previously, the road will follow its current route, so little or no new ground will be disturbed in these sections except immediately alongside the current road. In some areas, however, the Project will necessarily affect previously undisturbed land, including over 20km of new road, plus construction camps and (if necessary) quarries. The primary risk to soil will be compaction due to the passage of vehicles and equipment and erosion of disturbed ground and stockpiled soil. Other impacts could occur if soil is contaminated by spills of fuel or other materials, including fresh concrete. Also, valuable topsoil could be lost when new ground is broken along re-routed sections of the road. Finally, unstable slopes can lead to the loss of soil.

Mitigation for Impacts on Soil. The Contractor will be required to implement the following measures to prevent or minimize impacts on soil:

- Carefully remove and store topsoil when new ground is broken on re-routed sections of the road, at construction camps and work sites, and when the new road will be wider than the existing road. Upon the completion of construction, use the stored topsoil to restore the land that has been disturbed, including the old route. Excess topsoil must be spread on the land in a way that does not completely cover vegetation.
- Scarify the compacted surface of sections of the road that are being re-routed in order to speed up the process of revegetation. Use stored topsoil to cover the surface, which must then be protected from erosion until grass or other vegetation has become self-sustaining.
- Reuse all soil that is removed from the current road and from new sections, other than the surface layer of topsoil, in the new surface that is applied to the road unless it is not suitable for this purpose. In such cases, material that could be reused must be taken to the borrow areas/quarries from which fresh soil has been brought and used as backfill material, except fertile soil may be distributed to local communities.
- Implement measures to ensure that slopes uphill and downhill of roads on hillsides are stable. Ensure gabions are stable, with stacked gabions properly secured. To protect slopes against erosion, provide diversions and/or drainage to protect the upper end and the slopes and provide drainage at the foot.
- Clean up fuel and other spills immediately and manage the contaminated soil as a hazardous waste. This includes spills of fresh concrete and asphalt.
- When disturbed land is no longer needed once construction is complete, place excessive stored topsoil on the disturbed land and protect the area from erosion until grass or other vegetation has become self-sustaining.

It is noted there is a one-year warranty period against erosion. Therefore, the final payment will not be made until the Engineer confirms that landforms that have been affected by construction are stable.

In addition, several measures that will be required to protect surface water (section 5.3.1) will also be needed to protect soil, including:

- Clearly mark the upstream and downstream boundaries of the works so the disturbance can be kept to a minimum.
- Conduct refueling operations over an impermeable surface such as a drip tray
- Provide spill cleanup kits to all work crews and in all vehicles and mobile equipment and at all stationary engines.

5.3.3. Habitat

A certain amount of terrestrial habitat will necessarily be affected by construction. Existing terrestrial habitats along the road (on the sides of the sections that will be replaced and for some width along the new sections) will be permanently converted to roadways and construction camps will be temporarily converted. In general, relatively small areas of habitat will be affected (see Table 11 and Table 12 for the approximate areas of terrestrial habitat that will be affected).

Construction could also affect aquatic habitat at some stream crossings[11]. There could be effects at culverts and open-tray crossings, and possibly at bridges, and for some distance downstream of construction works. However, it is important to note that aquatic habitats have already been damaged or destroyed at the current road crossings, and downstream reaches are already subject to increased sedimentation. Therefore, there should be very limited or no additional or increased adverse impacts on aquatic habitats due to construction of the new road. In addition, the installation of culverts and the use of concrete open-tray crossings will significantly reduce downstream sedimentation.

Mitigation for impacts on habitats.

The mitigation measures identified above and below will minimize the extent and potential significance of impacts on both terrestrial and aquatic habitats. In addition, DFZ will work with CEP to arrange for a biodiversity specialist to inspect the expected construction sites at the beginning of the construction season to provide guidance on measures to minimize impacts on habitats and biodiversity, and immediately before the end of the season to verify their implementation and provide instruction for winter stabilization.

Flora. As was shown on Table 11, the road passes through forest for less than two kilometers (less than five percent) of its length. Forest trees in this area include wild almond (*Amylolacus bucharica*), hawthorn (*Crategus pontica*), small-leaved maple (*Acerregelii*), Caucasian hackberry (*Celtis caurasica*), jujube (*Zuzyphus jujuba*), and serviceberry (*Cotoneasterra cemiflores*). In addition, Walnut, apple, plane, poplar and willow trees may grow in the upper or lower gorges and floodplains of some of the tributary rivers (none are at the locations where the crossings will be, which are all rocky). None of the tree species is of conservation concern, and no juniper forests[12] were found to be along the route.

The grasslands, which cover about 11 kilometers (about 25 percent) of the route, including those used for pasture, is dominated by wheatgrass (*Elytrigia trichofora*), barley (*Horleum bulbosum*), viviparous bluegrass (*Poa bulbosa*), scutch grass (*Cynodon dactylon*), and bearded grass/yellow bluestem (*Bortriochloa ischaemum*). Similarly, none of these species is of conservation concern.

A number of plant species listed in the Tajikistan Red Book are known to occur in the region, including:

- Cousinia corymbose (*Cousinia corymbose)*
- Rosenbach's onion (*Alium Rosenbachianum)*
- Persian shallot (*Alium spititatinum)*
- Suvorov's onion (*Alium Suworovi)*
- Tulip ascendant (*Tulip apraestans)*
- Anemone bucharica (*Anemone bucharica)*
- Iris Guga *(Iris Haoliana*)

The species of concern are known to typically grow on the slopes of ridges, rocky screes, in steppe or meadow zones, and not to create continuous formations. Since the road will mostly follow the existing disturbed route, and most of the rest will be immediately beside the current route, there is not

[11] It is noted that aquatic habitats are limited or absent at crossings of ephemeral streams and significantly degraded at crossings of perennial streams.

[12] Some areas of juniper forests in the footprint of the future reservoir were considered to be "natural habitat within the meaning of World Bank ESS6 and thus required special measures to achieve no net loss of biodiversity. No such forests will be affected by construction of the new road.

expected to be any significant impact. "Tabiat" concluded that no special measures are needed for their protection and conservation. However, they did recommend installing "roadside stands" with information about these plants with their photos or drawings.

Mitigation for Impacts on Habitats and Flora. Although no significant impacts on habitats or on terrestrial or aquatic fauna are expected to occur and "Tabiat" did not recommend special measures, several measures will be required in order to reduce even minor potential impacts as much as possible, including:

- Measures described above for reducing erosion and for preventing and responding to spills of hazardous substances
- Marking the boundaries of all construction sites and areas, prior to construction, in order to prevent disturbance of other land unnecessarily
- Forbidding workers from collecting specimens of plants while at work or in the vicinity of construction activities.
- Local camp facilities in such a way as to avoid or minimize the loss of trees
- Provide sufficient fuel for camps and accommodations to make the collection of wood by workers unnecessary and prohibit workers from cutting trees or other woody plants for fuel.

5.3.4. Fauna

Tajikistan is home to over 10,000 species of invertebrates, 49 species of fish, two species of amphibians, 44 species of reptiles, 400 species of birds, and 84 species of mammals. Animals live in almost all natural ecosystems, from deserts in the south of Tajikistan to the highest peaks in the Pamirs, as well as in most water bodies of the country. The distribution and habitat of the various species are influenced by the features of the relief, orography, altitudinal distribution of habitats, climate, soil and vegetation cover, and many other factors.

Tajikistan is divided into five zoogeographic areas (the Pamir region, the Tajikistan region, the Western Tien Shan region, the Eastern Tien Shan region and the Kashgar region), of which the Tajikistan region covers most of the country, including the left bank area. This region is the richest in animal species, with almost 80 percent of all animal species in the country represented here. The area of the road is in the center of the Tajikistan region and according to "Tabiat" is considered to support a fairly rich fauna.

Amphibians. Two amphibian species could be affected, the Green toad (*Bufotes viridis*) and Marsh frog (*Pelophylax ridibundus*). "Tabiat" considers them to be "key to ecosystems of the country", although neither are listed in the Red Book. Both are considered to be of Least Concern to the International Union for the Conservation of Nature (IUCN). It is expected they would be found primarily in and near the 12 drainageways and streams and isolated specimens and populations could be affected in the immediate vicinity of the works if they are not successful in moving away. As noted above, there would already be impacts due to the existing at-grade level crossings, and those impacts should be reduced once the culverts, open trays, and bridges are in place.

Reptiles. There are 47 species of reptiles in Tajikistan, and a number of snakes and lizards live in the project area. Common lizards in the region include the Naked-toed gecko or Gray thin-toed gecko (*Cyrtopodion russowi* or *Mediodactylus russowi*) and Turkestan rock agama (*Laudakia lehmanni*), both of which live at altitudes of up to 2000 meters and which IUCN considers to be of Least Concern.

There are nonvenomous and venomous snakes as well. Nonvenomous species include the Dice or Water snake (*Natrix tessellata*), Spotted Whip Snake or Multicolored snake (*Hemorrhois ravergieri*), Sand boa (*Eryx miliaris*) and the Steppe's rat snake or Patterned snake (*Elaphe dione*). Poisonous snakes include the Gyurza or Lebetine viper (*Macrovipera lebetina*), which is listed in the Red Book of the Republic of Tajikistan (2015, 2017), and the less dangerous Copperhead or Halys pit viper (*Gloydius halys*). All the snake species are of Least Concern to IUCN, including the Red-Listed ones.

During warmer months, which is when most construction activity will take place, all the species would be mobile and could be expected to avoid the noise, vibration, and other human activity involved in road construction and camps. From November through March, when snakes would be hibernating, it is very unlikely that dens would be close enough to the existing road to be affected by the reduced level of construction activity.

Birds. "Tabiat" noted that 150 species of birds occur in the region, of which 56 species may nest in this area. Most nests are in areas with trees and shrubs, with a few species in undisturbed grasslands and rocky areas, even a few on scree slopes. The valleys of the Vakhsh and Surkhob Rivers are known to serve as migration pathways for migrating birds. Several species of conservation concern may be found in the area, including three vulture species and four raptors:

- Egyptian vulture (*Neophron percnopterus*)—IUCN Endangered
- Bearded vulture (*Gypaetus barbatu*) —IUCN Least Concern
- Black vulture (*Aegypius monachus*) —IUCN Least Concern
- Golden eagle (*Aquila chrysaetos*) —IUCN Least Concern
- Booted eagle (*Hieraaetus pennatus)* —IUCN Least Concern
- Shahin (*Falco pelegrinoide*s) —IUCN Least Concern
- Turkestan saker falcon (*Falco cherrug*) —IUCN Endangered
- Laughingthrush or Streaked laughingthrush (*Trochalopteron lineatum*) —IUCN Least Concern
- Paradise flycatcher or Indian flycatcher(*Terpsiphone paradisi*) —IUCN Least Concern
- Sicklebill or Ibisbill (*Ibidorhyncha struthersii*)—IUCN Least Concern
- Rufous-tailed (or Rusty-tailed) flycatcher (*Muscicapa ruficauda*) —IUCN Least Concern
- Whitefoot or Little Forktail (*Enicurus scouleri*) —IUCN Least Concern
- Blue bird or Blue Whistling-thrust (*Myophonus caeruleus*) —IUCN Least Concern

Two of the species, the Sicklebill and the Whitefoot, inhabit mountain streams and could be displaced for up to a season from stream reaches where crossings or bridges will be constructed and for some distance downstream. It is very unlikely they would occur near the stream crossings, since the existing crossings provide some level of disturbance. Even if these species are found in the streams where new disturbance will occur, they are mobile and can readily leave the area for the duration. Even so, mitigation measures intended to reduce erosion would limit the impact on these species.

Mammals. Many of the 84 species of mammals in Tajikistan live in the area of the left bank road. The most common are the Turkestan rat (*Rattus turkestanicus*), Forest dormouse (*Dryomys nitedula*), Gray hamster or Gray dwarf hamster (*Cricetulus migratorius*), Juniper vole (*Microtus juldaschi*), Ural field mouse/Wood mouse/Herb field mouse (*Apodemus uralensis*), Tolai hare (*Lepus tolai)*, Eurasian

badger (*Meles meles*), Golden marmot/Red marmot/Long-tailed (*Marmota caudata*), Indian crested porcupine (Hystrix indica), Common mole vole or Northern mole vole (*Ellobius talpinus*), {Red) Fox (*Vulpes vulpes*), (Gray) Wolf (*Canis lupus*), Brown bear (*Ursus arctos*), European pine marten (*Martes martes*). In addition, Siberian ibex (*Capra sibirica*), Snow leopard (U*ncia uncia*), and Least weasel (Mustela nivalis) are found in the upper part of the ridge. There are eight bat species present in Tajikistan, of which "Tabiat" reported that the Common (dwarf) pipistrelle (*Pipistrellus pipistrellus—IUCN LC*) is the most common and that this species and others may roost in area buildings, cliffs, and/or hillside openings. The project is unlikely to affect bat colonies, as there will be little or no disturbance of such areas/locations and very little effect on their foraging territories.

Several of these species are of conservation concern at the national and/or international level, including Snow leopard (IUCN Vulnerable), Brown bear (Tajikistan Red List, IUCN LC globally), Porcupine (Red List, IUCN LC), Least weasel (Red List, IUCN Least Concern), and Forest dormouse (Tajikistan Red List, IUCN Least Concern). However, "Tabiat" noted that their habitats are not near the route, so they would not be affected.

Fish. "Tabiat" identified no fish species of concern among the three to four freshwater species known to be in the area. They could be present in the perennial streams, but very likely not in the ephemeral ones. An introduced species, Rainbow trout (*Oncorhynchus mykiss*—IIUCN Least Concern8j) is sought by local people as a food source but is not a major one.

Potential Impacts on Fauna.

"Tabiat" concluded that it is very unlikely there would be any effect on any of the bird species other that the two species that spend time in streams since the existing road is in place and most of the new road will follow the exact same route. They concluded there could be a few nesting sites within a few meters of the route, but that these would be in such small numbers there would be no effect on any species. In any case, "Tabiat" concluded that no special measures are needed to protect these or other species due to their mobility.

Even so, the two species IUCN considers to be Endangered--Egyptian vulture and Saker falcon--could be at risk from disturbance to active nests or nesting birds, if any are present. It is unlikely there will be active nests of these cautious species near enough to the existing road to be of concern, however, so the only risk would be along the 20 kilometers of new route and at the new construction camps.

The existing route passes through this area and will have displaced terrestrial fauna to some extent, with the result that their territories have adjusted to the presence of the road. The new road will be in the same footprint or in close proximity to the current road along most of its route, so there will be essentially no impact. except possibly on a few animals in a few locations. Even then, the effect on local populations, if any, would be of short duration, on the order of days for the road and weeks for bridges.

Similar to reptiles and birds, mammals will have become acclimated to the presence of the existing road, so the temporary disturbance caused by construction of the new road will have little or no effect, which would be short-term in any case. Also similar to the other animal Groups, "Tabiat" concluded that no special measures were needed in order to protect mammals.

Small animals can enter or fall into excavations and find it difficult or impossible to escape. This is considered unlikely to occur since excavations for the roadbed will be relatively shallow.

Similarly, the current at-grade crossings along the existing road and a short distance downstream, as far as sediment is transported, would already have disrupted any fish presence at the perennial streams (there would be none in ephemeral streams). During construction of new open trays, culverts, and bridges, there will be an increase in sedimentation for a short period and as noted above, fresh concrete could add alkalinity to the water. Neither of these impacts is expected to be significant due to their short duration, lasting only as long as construction, their relatively small areas of impact, and the fact that any existing fish species would already be affected. Over the longer term, the impact will be somewhat positive: at and downstream of bridge and culvert crossings, there will be less sedimentation than at present, and at the concrete causeways that will cross the current earthen fords, the new concrete open-tray crossings will not contribute sediment at all.

Mitigation for Impacts on Fauna. Although no significant impacts on terrestrial or aquatic fauna are expected to occur, the same measures as for flora will also serve to reduce even minor potential impacts as much as possible, and in addition:

- Measures described above for reducing erosion, for preventing and responding to spills of hazardous substances, for minimizing noise, and for protecting soil and surface water.
- Marking the boundaries of all construction sites and other areas prior to areas that will be affected, prior to construction, in order to prevent disturbance of other land.
- When roadbed or other excavations are to be left open overnight or for a day or more, they will be covered or an escape ramp or plank (less than 45-degree slope) will be installed/placed at one end to allow escape.
- Before disturbance on the new sections of the road and the construction camps in spring or summer, a biodiversity specialist will conduct a nesting survey to a distance of 500 meters to identify nests of Egyptian vultures or Saker falcons, or other species of conservation concern. If planned construction could affect active nests, construction will be delayed until the young have fledged and left the nest.
- Forbidding workers from collecting specimens of plants or animals while at work or in the vicinity of construction activities.
- Consulting with the relevant departments of the Committee for Environmental Protection to identify fish spawning periods and avoiding instream works in those periods whenever possible.

5.3.5. Hazardous Materials and Wastes

As will have been recognized for many of the impacts described above, some construction activities can affect multiple types of receptors, and some receptors can be affected by many types of activities. In particular, the transport, storage, and use of hazardous materials, and the generation, storage, and disposal of hazardous wastes can affect many or most human and environmental receptors. Exposure to hazardous materials or wastes can present a risk to workers and to community safety and health, contaminate the soil and water, and injure or kill plants and wildlife, and can continue to do so for extended periods after initial exposure. Therefore, proper management of materials and wastes is an essential element of the HSE program.

The main hazardous materials to be used by the project will include fuels and various petroleum-based lubricants and solvents and paints, with diesel fuel likely to be the only one present in significant quantities. Most storage and use will be at construction camps, but there will be extensive use at

bridges and to a lesser extent at work locations along the roadway. Hazardous wastes will include containers that held hazardous substances, inert materials that have absorbed hazardous substances, spilled hazardous material (e.g., fuel or spilling paint), and residue such as cleanup media and contaminated soil from spills. Waste concrete that is not fully cured will also be managed as a hazardous waste, and waste asphalt will also be managed as a hazardous waste.

Mitigation measures for hazardous materials and wastes. Most measures will apply to all hazardous materials and/or hazardous wastes, although some will apply to specific materials or wastes. Proper management of essentially every product that contains hazardous substances is described in a Safety Data Sheet (SDS) (formerly known as Materials Safety Data Sheet, or MSDS) promulgated by the manufacturer and/or distributor and typically available on the internet. Contractors will ensure they have an up-to-date SDS for every hazardous material that may be used or present, and for every hazardous material whose constituents are present in a waste.

Measures to be implemented by the Contractor will include the following, unless they conflict with requirements of the hazardous material's SDS, in which case the SDS requirements will apply:

- Contractors will minimize their use of hazardous materials and will use the least hazardous and the least amounts that are feasibly possible.
- Contractors will maintain an up-to-date inventory of hazardous materials and wastes, including the names and the amounts, locations, and management methods of each
- Hazardous materials, and the wastes that result from or are derived from a hazardous material, must be managed as specified in the SDS for the hazardous material. This will include the transport, storage, handling, and use of hazardous materials and the generation, storage, recycling or reuse, treatment, and transport of hazardous wastes.
- Hazardous materials and wastes will be transported in vehicles designed and authorized for that purpose.
- Drivers of vehicles transporting hazardous materials or wastes, on- or off-site, will be trained in the risks, in proper management, and in responding to spills or other emergencies.
- Hazardous materials and wastes will be stored in bins or spaces designated for that purpose, and storage areas must have impermeable floors, walls, and ceilings/roofs. Only compatible materials and/or wastes may be stored in close proximity to one another. Spaces will be well-marked with warning pictograms and signs, and accessible only by authorized personnel.
- Valves and nozzles ("guns") used for dispensing fuel or other liquid hazardous materials will be in the off position and locked when not in use.
- Hazardous materials and wastes must be stored at least 25 meters from surface water, 50 meters from worker accommodations and offices, and 300 meters from populated areas.
- SDSs will be available and accessible at all locations where hazardous materials or wastes are present and in all vehicles in which they are transported. The SDS must be in the language(s) of the personnel who are authorized to handle, use, and transport the material or waste.
- All personnel who are authorized to handle, use, transport, or who otherwise may be exposed to a hazardous material or waste must be trained in the risks to which they may

be exposed and in proper management of those risks, as specified in the SDS. This will include first responders, first aiders, and medical personnel.

- Fuels storage containers will be located over impermeable surfaces and bunded with secondary containment that can hold at least 110 percent of the capacity of the largest container or 125 percent of the combined capacity if there are multiple containers. Bunded areas should be covered where feasible, and rainwater must be stored and subject to oil-water separation before discharge (with settled solids managed as hazardous waste).

5.3.6. Non-hazardous wastes

Construction will also generate non-hazardous wastes, both solid and liquid wastes. Solid wastes may include food and household waste, scrap metal, glass, plastic, earthen spoil (rocks and soil), wood, and other nontoxic and nonreactive materials. Liquid wastes may include sanitary wastes from toilets, grey water from showers and kitchens, and washwater from truck and equipment washing stations, and other aqueous wastes. The only waste that would be generated in any significant quantity will likely be spoil, although there will also be a substantial amount of mixed construction debris.

Mitigation for non-hazardous wastes. Even non-hazardous wastes can contaminate soil and water if not managed properly, so the following measures will be required:

- All liquid wastes will be collected and either used for other purposes or allowed to settle or be treated before discharge to the ground or surface water, or allowed to evaporate.
- Gray water and washwater (except from cement or asphalt trucks) should be used for dust suppression.
- Sanitary wastes must be screened, disinfected, biologically treated, or otherwise treated before being disposed. All management, including storage, treatment, and disposal) will meet the requirements of Tajikistan law and the approval of the Committee for Environmental Protection. Solid waste must also be managed in accordance with Tajikistan law. No waste may be dumped on the ground but must be stored and/or disposed in areas designated for that waste. Different types of waste may be managed together only if they are determined to be compatible.
- Spoil must be managed separately from other solid wastes and as described by the measures required for soil above.
- No wastes may be burned unless specifically by the Engineer.

5.4. Cultural Heritage

The Institute of History, Archaeology, and Ethnography of the National Academy of Sciences of Tajikistan (NAST) conducted an archaeological assessment along the proposed route of the left bank road in order to identify the presence, value, or absence of archaeological and cultural heritage within the designated construction zone. The survey covered not only the road route and a 50-meter buffer zone on both sides, but also a broader area in most places.

Parts of the route had been previously studied in 2013 for the 2014 ESIA for the Rogun HPP project, including the lower terraces near the villages of Yakhch, Sarizhu, and Dekhikukhna, which date from the late 18th to 19th centuries, as evidenced by ethnographic ceramics, wooden utensils, metal lamps,

and manuscripts. No historical monuments were found and the remnants of early structures seen along the local roads lack historical significance. On the upper terraces, much less of interest was found.

In 2025, the survey began at Tagikamar village and proceeded point by point per the road plan. Between Tagikamar and Sayidon (point 0) and Kumbak village, no historical sites were found along or near the route. Similarly, further along the route to Sulkh village, no sites were discovered. A fortress ruin was identified below Sangdevor village (see Figure 14).

Figure 14. Sangdevor Fortress (square hill in center)

The road passes through Kumbak village at a higher elevation, so the fortress lies outside the road construction zone. Based on ceramics found there, it dates from the 18th–19th centuries. Northeast of Sarijuy village, the ruins of a small fortress known to locals as Kala Nok was also identified as 18th-19th century, again based on ceramic fragments (Figure 13)

Figure 13. Ceramic Fragments from Kala Nok

From Sulkh to Yakhak village, the road passes through deserted land devoid of ancient or modern settlements. The stretch from Yakhak to Yusti Bolo yielded similar results—no historical or archaeological sites. A third fortress, the Jamhur Fortress near Yusti Bolo village, had been identified in the 2013 survey and considered likely to be from the medieval period. It was re-examined as part of the current survey and confirmed to lie well above the area that may be affected by road construction.

Figure 15. Area of Jamhur Fortress

The Institute concluded that there are no significant historical or archaeological sites in the studied area. This was considered to be due to two main factors:

- Historical Settlement Pattern. The right bank hosted the Great Silk Road and associated settlements, trade, and fortifications. The left bank lacked such development, with poor connectivity and unreliable ferrying methods.
- Natural Conditions. The area's terrain consists of variously aged river terraces (mainly third and fourth) that lack loess cover and fertile soil. These terraces are composed of re-deposited gravel masses from the Vakhsh Ridge slopes.

The region remained largely uninhabited through history due to the harsh natural conditions, with the exceptions of sparse 18th–19th century rural settlements during times of political and economic upheaval, and the early medieval Jamhur fortress, which was built to control the road to Darvaz via Obikhingou.

Mitigation for Impacts on Cultural Heritage. No known cultural heritage is expected to be affected, since no known archaeological sites lie along the route. In addition, no known grave sites will be affected. To ensure there are no unexpected impacts, the following measures will be required:

- If construction camps are within two kilometers of known sites, the Contractor will appoint NAST to conduct surveys of the locations and to implement measures identified by NAST to relocate or preserve the heritage.
- The Contractor will implement the chance find procedure developed as part of the Rogun HPP Cultural Heritage Management Plan.

6. Stakeholder Engagement

Most people that reside on the left bank will have long been aware of the coming inundation of many bridges and the need for additional travel to reach a new bridge over the Vakhsh River. There were consultation meetings on the ESIAs and other environmental and social instruments in Rogun City and Dushanbe in 2014 and on the updated instruments in Rogun and several right-bank municipalities in 2024. In addition, the population being resettled will have been consulted as part of that process.

On July 18, 2025, DFZ held a meeting in the village of Yakhchi in Izzatullo Khalimov Rural Jamoat of Nurabod District specifically for people of the left bank to discuss the left bank road project, including the loss of bridges as the reservoir is filled and the replacement of the road. More than 130 residents from the villages on left bank (including some from villages that will be resettled in the future) attended the meeting (Figure 16).

Figure 16. Stakeholder Meeting on July 18, 2025

Many attendees took the opportunity to discuss the project and have their questions answered by representatives of DFZ, the Nurabod District (including officials responsible for urban planning, land management, and environmental protection), and the Jamoat. DFZ described the work that would take place and answered questions.

Questions and discussions in the meeting primarily revolved around the following:

- Details of the road (length, width, road surface, design speeds, etc.
- Timing of construction
- Location of the road and new bridge
- Whether households, gardens, and pastures would be affected
- Location of camps
- Employment opportunities.

There was widespread support and enthusiasm for the project.

Before the contractor mobilizes to the left bank: DFZ will convene one or more meetings (as many as needed to allow access by every village) to once again describe the road and the construction project, including the activities, the timing, and how impacts will be minimized, and also to hear any concerns they may have. At least two weeks before the meeting(s), DFZ will post announcements on notice boards in Jamoat offices and in each village to “advertise” the meetings. If possible, at least one representative of the Contractor will participate.

Once the construction program begins, DFZ will convene additional meetings to inform villages that will be affected within the next 30 to 60 days and to communicate what activities will take place in what locations and what effects can be expected, and to listen to people's concerns.

DFZ will also install a sign or posterboard in each left bank village. Information posted will include information on the progress and timing of construction activities, summaries of past meetings, and notices of future meetings. Also posted will be information on how people can use the DFZ grievance redress mechanism (GRM), or the Contractor's (see section 5.2.1) to submit comments or complaints.

DFZ will ensure that a female representative is present at each meeting to discuss issues with women who may be reluctant to speak in a public setting.

7. Environmental and Social Management[13]

In order to ensure compliance with applicable standard, the Contractor will prepare a series of management plans and/or work procedures. The Contractor will submit the plans/procedures to DFZ for review and approval before being authorized to mobilize to the site and undertaking activities that may present risks to people or the environment. The plans/procedures will include, at a minimum, the measures described in section 5 and summarized in Table 19 to address risks and impacts that could affect:

- Occupational health and safety
- Traffic
- Erosion control
- Air quality (specifically, dust control)
- Water quality (other than from erosion of soil)
- Community health and safety (procedures for workers and works performed in and near populated areas)
- Human resources (labor management, including worker grievance management)
- Worker accommodations (if accommodations are provided)
- Biodiversity
- Blasting and explosives (if blasting is required)

For each plan and procedure, which will be targeted at specific risks and impacts, the plan/procedure will define and describe:

- The activities that will be undertaken and the potential risk to human health, safety, the environment, or communities that could result in these activities in the locations where they will be undertaken.
- The measures that will be undertaken to avoid or minimize the risks and impacts, including at a minimum the measures described in section 5 and summarized in Table 19, unless

[13] It is noted that the requirements described in this section are for the left bank road construction only and may differ from requirements for Rogun HPP and its Contractors.

there is a convincing reason for their omission (e.g., another measure would be equally or more effective.

- The records that will be kept to document site conditions, work performed, monitoring and inspections, and actions taken to correct deficiencies
- The training that will be provided to workers, supervisors, and managers to ensure the mitigation measures are understood and able to be implemented.

The Contractor may use the management plan frameworks that are part of the Rogun HPP ESMP for guidance as needed.

The Contractor will review and revise the plans/procedures as needed to ensure standards are met, including:

- No less than semi-annually (twice per year)
- Following a significant incident that requires immediate notification to DFZ
- Following an event or change that could lead to a significance change in potential risks and impacts (see section 7.5 and Table 18).

7.1. Training

All Contractor managers and workers will have some responsibility for the implementation of required mitigation measures and must be aware of that responsibility. Therefore, they must receive appropriate training in the risks, impacts, and mitigation measures that are relevant to their tasks. This will begin with general induction training, which will cover site-wide rules and risk management; this training must be repeated at least annually.

In addition, the Contractor will provide all personnel with training in how to do their work safely and in compliance with standards, with managers and supervisors trained in the work of all personnel under their supervision. This training will be based on the tasks to be performed by the individual(s) and the management plans and procedures described in section 7. Besides the induction training and task training, each work crew will participate in a “toolbox talk” prior to commencement of daily construction activities. Some training, such as for drivers or blasters, will require issuance of a certificate, license, or special authorization, and such authorizations must be described in the relevant plan or procedure.

The Contractor will make records of all training, including toolbox talks. The records will include the date and time, the topic of the training, the materials used, the trainer, and the participants, whose participation should be demonstrated by signature. Also, the Contractor should conduct SEAH sensitization training for all its workers.

7.2. Monitoring and Enforcement

The Engineer, the Contractor, and DFZ will all monitoring environmental and social performance in order to:

- Verify that potential impacts have been identified in the relevant procedure or management plan and accurately predicted

- Identify instances where mitigation measures are not in place or not being implemented as required, where mitigations are being implemented but actual impacts are more significant than predicted, and/or where there are impacts that were not expected.
- Inform the relevant authorities (including contractor's construction site management, DFZ) in case of noncompliance observed and to propose changes to this S-ESMP and/or the Contractor's management program.
- Take enforcement action to compel compliance, if needed.

The first level of monitoring will be undertaken by the Contractor, whose supervisors will be primarily responsible for ensuring that required mitigation measures are implemented and who will observe the works continuously. It is emphasized that management of environmental and social performance is a primary responsibility of supervisors, so any instance of noncompliance[14] at a work site should be considered a failure of the supervisor to fulfill his or her duties, not only a failure by other personnel or equipment, and penalties should be considered for the supervisor. In addition, the Contractor's HSE manager or a qualified designee will visit each workplace on a daily basis to observe the ongoing work and the proper and timely implementation of mitigation measures. If noncompliance is observed, instruction must be given that require correction as soon as possible. For noncompliance that does not present an imminent hazard to workers, communities, or the environment (including air, soil, water, flora, and fauna), enforcement actions should begin with verbal warnings and, if violations continue or are repeated, actions should progress through written warning/reprimands, removal of personnel, and/or temporary suspension of works. If the noncompliance does present an imminent hazard and cannot be corrected immediately, the works must be suspended until the hazard is corrected.

The Engineer will be responsible for supervising the Contractor's technical and ESHS performance and will visit all work sites not less than weekly for purposes of verifying that mitigation measures are being implemented as required and as needed to minimize impacts. The Engineer will also enforce instances of noncompliance, using the same hierarchy but taking into account previous enforcement by the Contractor. In case of imminent hazard or of repeated violations, the works at that location should be suspended until the works are brought into compliance and the risk is abated. In addition, if there are continuing or egregious violations, the Engineer will recommend that DFZ withhold payment certificates until the violations have been corrected and the works are in compliance with ESHS requirements (and thus in compliance with the .contract).

DFZ will visit the left bank for purposes of monitoring the Contractor's ESHS performance and the Engineer's supervision at least monthly. Following the Contractor's completion of work at any location, the Engineer will inspect that location before authorizing the Contractor to demobilize from that location. DFZ will not issue instructions to the Contractor but may instruct the Engineer to do so. Similar to the Contractor, enforcement actions in response to noncompliance will proceed from verbal warnings to written warnings, written notices of noncompliance, and removal of personnel.

Table 15 identifies indicative requirements for different types of monitoring by the various parties.

[14] Further, it is noted that "noncompliance" means the failure to implement measures to mitigate potential impacts, not whether there are impacts in the first place, and to rectify previous issues of noncompliance.

Table 15. Indicative Monitoring Requirements

Type of Monitoring	*Objective*	*Responsible party*	*Approximate Frequency*	*Output*
Broad observation	Identify and correct issues of concern (e.g., visible dust, unsafe conditions, SEA)	• Engineer managers and HSE personnel, Contractor site managers, Supervisors, HSE personnel	Continuous	• Issues recorded/ reported as appropriate. • Actions taken, including enforcement actions commensurate to violations/impacts
		• Senior managers • HSE Manager and specialists	Weekly	• Conditions/practices observed • Issues recorded/ reported • Instructions to correct issued • Actions taken, including commensurate enforcement actions
		• Senior managers • HSE Manager and specialist	At least bi-weekly	
Targeted workplace/site inspection	Targeted inspection of practices and conditions (OHS, environmental, labor, etc.)	• Engineer HSE specialists • Contractor site managers • Contractor HSE Manager and specialists	• As specified in management plans/ procedures • All workplaces at least quarterly	• Conditions/ practices observed. • Improvements needed. • Actions taken.
Routine labor inspection	Assess labor management practices and conditions (worker contracts, grievances, grievances)	• Engineer specialists • Contractor HR managers/ specialists • DFZ HR/HSE Manager and specialists	Spot checks, records reviews	• Practices/conditions /documents reviewed • Labor register • Actions taken

The Contractor, Engineer, and DFZ will maintain records of all inspections and observations, including compliance status and actions taken.

7.3. Reporting

7.3.1. Contractor and Engineer ESHS Reports

Following internal review and approval by the Contractor's site manager, the Contractor will submit information on environmental and social performance as part of the monthly progress reports to the Engineer. The reports will cover the Contractor's performance and that of any subcontractors. Information in the reports will include, at a minimum:

- A description and map of the locations where work was performed during the period, keyed to the type of work being undertaken, including locations where work was completed and where work was begun and not yet completed.
- A listing and current status of all permits issued by the Republic of Tajikistan or subordinate authorities that cover Contractor equipment operation and other actions that are related to environmental and social management and performance.
- The number of workers (including subcontract workers), number of local vs other Tajikistan vs foreign, number of women and men, number of new hires, and number of terminations and the reason.
- A summary of HSE supervision activities undertaken (e.g., inspections) and completed in the previous month, including HSE related training.
- A concise description of health and safety near-misses, minor injuries and serious incidents (including injuries that lead to absence of at least one shift, major spills, etc.).
- A description of environmental and social non-conformances (spills, improper materials storage, improper waste management, violations of Code of Conduct, etc.), of enforcement actions (if any) taken in response, of corrective actions taken to bring into compliance, and the current status.
- Status of environmental and social non-conformances and enforcement actions reported as outstanding in the previous month's report.
- The number of worker and stakeholder grievances received during the period and to date, the number of grievances that were closed during the period, and the number that remain outstanding. For each grievance not resolved as of the end of the period, the report should provide a description of the grievance, reason for lack of resolution, and actions to be taken in the coming period.
- A summary of ongoing and outstanding revisions to the Contractor's HSE management programs, including management plans and work procedures and in HSE staffing.

The Engineer will prepare a monthly report for DFZ that summarizes the Contractor's report and that also includes information on ESHS supervision activities, such as number of times workplaces were inspected, issues identified, actions taken (warnings or dismissals, written notices of noncompliance, stop work orders, requirements for safety equipment or new PPE, other actions), corrective actions taken by the Contractor, and the current status) .

In addition to the scheduled reports, the Contractor will notify the Engineer and DFZ immediately of significant incidents and events[15]. Initial notice by email or telephone must be provided within 24 hours, with a World Bank Form B or equivalent submitted as soon as practicable thereafter, within 48 hours unless otherwise allowed by DFZ. The Engineer and the Contractor will then promptly investigate the root causes of the incident and the Contractor will submit to the Engineer a World Bank Form C or equivalent that describes the incident, the root causes, and the actions taken to prevent recurrence. Once approved, the Engineer will submit the report to DFZ. The investigation is expected to be undertaken jointly by the Engineer and the Contractor, independent of any

[15] Incidents that must be reported immediately include, at a minimum, lost-time and other severe injuries or fatalities to workers that cause the worker to miss one or more shifts, damage to private property or injuries to community members, significant spills or releases of hazardous substances to the environment, and protests or incidents of unrest associated with the Project.

investigation led by the Service for State Supervision of Works Safety in Industry and Mining or other authority. Such incidents will also be summarized in the Contractor's monthly reports to the Engineer, in the Engineer's reports to DFZ, and in DFZ's reports to PMG.

7.3.2. DFZ Reports to PMG

DFZ will submit quarterly reports to PMG that summarize the Contractor's and its own performance, with Contractor monthly reports provided as annexes. DFZ reports will contain a summary of the items reported by the Contractor and will also include, at a minimum:

- Summary of DFZ management and HSE staffing changes.
- Summary of DFZ's HSE oversight activities.
- Description of consultations with local authorities and local community members, including participants, reasons, and outcomes.
- Summary of DFZ employee and stakeholder grievances received during the period and to date, the number of grievances that were satisfactorily resolved during the period, and the number that remain outstanding. For each grievance not resolved as of the end of the period, the report should provide a description of the grievance, reason for lack of resolution, and actions to be taken in the coming period.

7.4. Costs of Environmental and Social Management

The most significant cost for developing and implementing the Contractor's program for environmental and social management will be for labor, which are shown in Table 16.

Table 16. Estimated Labor Costs for Implementing S-ESMP

No.	*Position/Expertise*	*No. Positions*	*Input (Person Months)*	*Remuneration (USD)*	*Percentage of time on HSE*	*Cost for HSE (USD)*
A	***International Key Experts***					
1	Team Leader/Highway Engineer	1	36	432 000	5.00%	21 600
2	HSE Coordinator	1	18	144 000	100.00%	144 000
3	Procurement Specialist	1	6	36 000	5.00%	1 800
Subtotal A		*3*	*60*	*612 000*		*167 400*
B	***National Key Experts***					
1	Resident Engineer	1	36	108 000	5.00%	5 400
2	Highway Engineer	1	36	90 000	5.00%	4 500
3	Bridge Engineer	1	36	90 000	5.00%	4 500
4	Geotechnical Engineer	1	36	68 400	2.00%	1 368
5	Materials Engineer	1	36	79 200	1.00%	792
6	Quantity Surveyor	1	36	79 200	1.00%	792
7	Surveyor Engineer	1	36	72 000	2.00%	1 440
8	Safety Engineer (OHS Manager)	1	18	32 400	100.00%	32 400
9	HSE Manager/Specialist	1	36	64 800	100.00%	64 800
10	Contract Specialist	1	18	27 000	5.00%	1 350
11	Laboratory Technician	1	36	46 800	5.00%	2 340

12	CAD Specialist	1	36	46 800	2.00%	936
Subtotal B		*12*	*396*	*804 600*		*120 618*
C	***National Non-Key Experts***					
I	Administrator	1	36	32 400	10.00%	3 240
ii	Translator	1	36	43 200	5.00%	2 160
Subtotal (C)		*2*	*72*	*75 600*		*5 400*
Total A+B+C				**1 492 200**		**293 418**

There will be other costs, including for transportation of HSE personnel, instruments, and other required items. These are summarized in Table 17.

Table 17. Estimated Non-Labor Cost for ESHS (USD)

Cost item	*Initial cost*	*Cost per year (rental, O&M)*	*Total cost (3 years)*
Dedicated transport (4WD vehicle)	50 000	5 000	65 000
Office space/IT	3 000	500	4 500
Measuring instruments (noise, etc.)	1 000	100	1 300
Bowser operation	0 (assumed to be in inventory or rented)	5 000	15 000
PPE (Initial = 250 workers x $200, annual $40	50 000	10 000	80 000
Miscellaneous	10 000	2 000	16 000
Totals	***114 000***	***17 600***	***191 800***

7.5. Management of Change

No project is designed and constructed without change, and many changes can have a major effect on the project's environmental and social impacts. Thus, it is essential that the Contractor has a formal process for managing change during the design and implementation of the construction process[16], and this will be a key qualification in the selection of the Contractor.

Changes can be planned or unplanned and can be of many types. Most changes fall into a few categories, and many can result in changes to the Project's environmental and/or social risks and impacts. Such changes therefore require various types of actions in response.

Table 18. Actions to be Taken for Various Types of Change

Type and nature of change	*Change in potential impact*	*Minimum required action*
Design and Development		
Change in route or location of construction camp	Additional land need, additional disturbance,	• Jamoat and DFZ confirm no resettlement or livelihood restoration

[16] The overall design of the road may also be changed, and this could have a profound effect on the potential impacts. As can be seen in Table 18, such changes would trigger the requirement for DFZ to revisit the impacts described in this S-ESMP and modify required mitigations as needed to ensure that impacts are avoided or kept at acceptable levels.

Type and nature of change	*Change in potential impact*	*Minimum required action*
	increased impacts on communities, biodiversity	will be required (otherwise, change will be rejected) • Design Institute and DFZ review and approve (sign-off by DFZ Director) • Contractor and DFZ HSE specialists review area and assess potential impacts • Contractor proposes new or changes to HSE plans/procedures • DFZ Director approval before implementation
Change in road or bridge design	• Additional land disturbance • Additional or new impacts on communities, biodiversity	• Design Institute and DFZ review and approve • Contractor and DFZ HSE specialists review area and assess potential impacts • Contractor proposes change to relevant HSE procedures • DFZ Director approval before implementation
Expansion of camps or quarries/borrow areas	Additional land disturbance, impacts on communities, biodiversity	• Contractor and DFZ HSE specialists review area and assess potential impacts • Contractor proposes change, including changes to relevant HSE procedures • DFZ Director approval before implementation
Planned disturbance of new ground (new work location)	Damage to property, topsoil, people, flora, fauna, etc.	• Contractor Site Manager and HSE Manager establish work zones and demarcate clear boundaries • DFZ and Jamoat review and consent prior to disturbance • Contractor informs/trains workers prior to disturbance
Operational		
Unexpected impact or unexpectedly large impact (failure of prediction or of current mitigation)	Unexpected impact or more significant impact (pollution, injury/fatality, property damage, violation of law)	• Contractor takes immediate action to eliminate/reduce/control impact • Contractor and DFZ HSE managers assess incident to determine causes • Contractor implements remedial measures to correct damages, as needed, and identifies corrective actions • Contractor reviews and updates relevant management program, including plans/procedures, training • DFZ HSE manager reviews and approves
Change in major equipment types or work procedure	Different/increased risk to workers	• Contractor assesses change in risk/impact, modifies work procedures

Type and nature of change	*Change in potential impact*	*Minimum required action*
		and HSE management program accordingly • DFZ reviews and approves
Noncompliance with HSE management program	Impacts on people, property, environmental resources	• Contractor and/or DFZ take enforcement action as needed • DFZ and Contractor review management, training, enforcement program • Contractor modifies program as needed • DFZ review and approve • Contractor modifies/increases training • Contractor and/or DFZ augments/improves HSE program, including contract terms and conditions and Code of Conduct, as needed • DFZ approves changes to HSE management program
Complaint from external stakeholder (change in community support)	• Loss of "social license to operate", community opposition • Health, property, or nuisance impacts on community	• Contractor implements Grievance Redress Mechanism to address and resolve complaint • Contractor reports to DFZ • DFZ verifies resolution
Disturbance of new ground (new work location)	Damage to property, topsoil, people, flora, fauna, etc.	• Contractor establishes work zones and demarcates clear boundaries, with DFZ and Jamoat consent • Contractor informs/trains workers
Extension of construction period (over two years)	Additional impacts	• Contractor proposes extended period • DFZ approves or rejects • Contractor reviews and updates HSE management program as needed
Need for blasting	Noise, vibration, worker safety, community safety	• Contractor applies for and receives required permits for transporting, storing, and using explosives • Contractor develops Blasting and Explosives procedure/plan consistent with the Rogun HPP Blasting and Explosives Management Plan Framework • DFZ approves Contractor procedure/plan (in consultation with Rogun HPP ER HSE Manager) prior to transport, storage, or use of explosives • DFZ and Contractor notify Jamoat and villages that could be affected
Organizational		

Type and nature of change	*Change in potential impact*	*Minimum required action*
Appointment of new Contractor project manager or HSE manager/personnel	Reduced level and quality of HSE supervision, more risk and impacts	• Contractor proposes replacement • DFZ approval of proposed replacements prior to their mobilization • Some work postponed until candidate approved—to be determined by DFZ HSE Manager
Change or new supervisor or workers, including (especially) drivers)	Failure to implement required mitigation measures (primarily OHS, also other impacts of all sorts)	Training and clearance by Contractor HSE manager prior to initial shifts
Appointment of new subcontractor	New managers and personnel, more risks and impacts of all sorts	• DFZ approval of subcontractor prior to mobilization • Full training program prior to initiation of works
Document and Record		
Contractor changes to approved management plans/ procedures	Mismatch between risk/ impacts and mitigation measures	DFZ review and approval
Supplier and External		
New concrete supplier	Untrained drivers and operators, safety and labor risks	Contractor verifies training and safety/labor records prior to use
Regulatory and compliance		
Changes in design specifications required for Category V roads	• Changes in material required and associated impacts • Changes in land required and associated impacts • Changes in potential impacts	• Design Institute modifies road/ bridge design • DFZ assesses potential effects • DFZ revises S-ESMP as needed to mitigate new or additional impacts • Contractor revises HSE plans/procedures as needed • DFZ approval of modified plans/procedures

8. Summary of Mitigation Measures

Table 19 summarizes the measures that are described and presented in more detail in section 5 that the Contractor must include in the HSE management program and implement during construction. As part of its construction planning and management program, the Contractor is expected to develop detailed work procedures that describe how each task will be accomplished. For each of the major categories of impacts/receptors (such as noise, air quality, etc.), except for occupational health and safety and for emergency preparedness and response, the Contractor will either:

- Develop a management plan that is consistent with the requirements of the relevant Management Plan Framework(s) that form part of the Rogun HPP ESMP) and that includes, at a minimum, the mitigation measures summarized in Table 19., or

- Develop or modify existing work procedure(s) for the task(s) that will cause the relevant impact(s) to include the measures that must be implemented in order to minimize the impact, including the measures summarized in Table 19.

For occupational health and safety, the Contractor must prepare an Occupational Health and Safety Management Plan that is consistent with the Occupational Health and Safety Management Plan Framework that is part of the Rogun HPP ESMP.

Similarly, the Contractor must prepare an Emergency Preparedness and Response Management Plan that is consistent with the Emergency Preparedness and Response Management Plan Framework that is part of the Rogun HPP ESMP.

Regarding potential loss of land, including pastures, mitigation measures will include the provision of adequate replacement for the lost land.

The management plans and procedures must be approved by the Engineer before the Contractor is authorized to undertake the actions that would cause the impacts of concern.

Table 19. Summary Overview of Mitigation Measures, Receptors, Methods, and Monitoring

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
5.1.1	***Traffic and Transport***			
1	Driver licensing and training	• Community and worker H&S • Air quality	• Issuance of project authorization for vehicle type • Training • Driver suspension/dismissal	• Spot checks on roads and records by Contractor managers and by Contractor, Engineer, and DFZ HSE and management
2	Establish and enforce speed limits (15ph in villages, 20kph on existing road, 25kph on new road)		• Signs • Training • Vehicle tracking if feasible • Enforcement	• Continuous observation by Contractor management and HSE and by Engineer • Spot checks by Contractor HSE and DFZ
3	Daily vehicle checklist completed by driver/operator before operation		• Removal from service for checklist failures • Return to service approved by supervisor	• Daily sign-off by supervisor • Periodic checks by HSE • Targeted checks by Contractor, Engineer, and DFZ
4	Minimize road closures	Community H&S	• Temporary lanes • Detours • Warnings for drivers (cones, signs, barriers, flaggers)	• Contractor HSE and Engineer approve measures to overcome narrow workings • Weekly inspections by Contractor HSE • Spot checks by Engineer DFZ
5	Safe loads	Communities, workers	• Strict rules on truck loading to prevent spillage	• Continuous observation by Contractor management and HSE • Spot checks by Engineer, Contractor HSE and DFZ
6	Enforcement of traffic rules	Communities, workers	• Inventory of vehicles, with Contractor name and discrete number/letter assigned to each vehicle • Signs with the identifiers visible and vehicle on all four sides	• Continuous observation by Engineer, Contractor management and HSE • Spot checks by Engineer, Contractor HSE and DFZ
7	Address complaints	Community or worker H&S	• Refer external complaints to DFZ GRM • Operate worker GRMs	• Weekly HSE and Engineer checks • Monthly DFZ checks

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
5.1.2	***Noise***			
8	Daylight working hours unless approved by Engineer—in no case: • Before 07:00 or after 21:00 in all locations, except • Before 08:00 or after 18:00 within 300m of populated area	• Community and worker H&S • Nocturnal fauna	• Construction program • GRM monitoring	Spot checks by Engineer, Contractor and DFZ
9	Engine shutoff when not in use	Air quality	• Driver training • Driver penalties	• Frequent observation by supervisors and Contractor HSE • Spot checks by Contractor HSE, Engineer and DFZ
10	Mufflers and sound-dampening equipment on all engines	• Community and worker H&S • Fauna	• Removal from service if not operable or not effective in reducing noise • Maintenance as required	• Daily pre-use checklist by drivers • Weekly checks by shop supervisor • Spot checks by Engineer, Contractor HSE and DFZ
11	Address complaints	Community and worker H&S	• Refer external complaints to DFZ GRM • Operate worker GRMs	• Weekly HSE and Engineer checks • Monthly DFZ checks
12	Noise control	Communities	Locate asphalt and concrete batching plants and quarries at least 300 meters from populated areas	• Plants: approval by Engineer of initial locations and relocations • Quarries: Approval by Engineer of location
13	Monitor noise	Communities, workers	Comply with CEP requirements	• As specified by CEP
5.1.3	***Air quality***			
14	Cover dusty loads	• Community and worker H&S • Flora	• Maintenance • Driver training, penalties	• Daily checklists by drivers • Continuous observation by Engineer and Contractor HSE • Targeted checks by all parties
15	Reduce speed limits in villages: 15kph anytime, 10kpy in dry periods:	Community and worker H&S	• Driver training • Driver suspension/dismissal	• Continuous observation by all parties • Targeted checks by all parties

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			• Speed humps • Signs/lights	
16	Apply water to dampen dust		• Awareness of dry periods • Operable bowser	Continuous observation by supervisors and HSE in dry periods and by Engineer
17	Control engine emissions, prevent black smoke		Maintain engines	• Daily checklist by drivers • Observation by all parties
18	Address complaints		• Refer external complaints to DFZ GRM • Operate worker GRMs	• Weekly HSE and Engineer checks • Monthly DFZ checks
19	Reduce plant and quarry nuisance emissions	Communities	Locate asphalt and concrete batching plants and quarries at least 300 meters from populated areas	• Plants: Engineer approval of initial and location and relocation • Quarries: Engineer approval location
20	Monitor air quality	Communities, workers	Comply with CEP requirements	As specified by CEP
5.1.4	***Displacement and Community Health and Safety*** *(other than for measures not otherwise required by other categories)*			
21	Provide replacement land, compensate for economic loss (damage to fences, walls, livestock, community assets, loss of use of land, etc.)	Community H&S, households economic loss	Implement ARAP: full replacement value compensation without depreciation	GRM monitoring (weekly Engineer and HSE observation, monthly reporting to DFZ)
22	Consultation with neighboring land users	Land users	• Consult with neighbouring land users prior to land disturbance • Reach voluntary agreement with current user(s) for use of land currently in use • If land users are compensated for the use of land, restore land to satisfaction to landowner when land is no longer needed	• Engineer verifies consultation before authorizing establishment of camps or other areas • Engineer inspects restored land before authorizing demobilization
23	Avoidance of fertile land and land in use		• Locate camps, asphalt and concrete plants, quarries, spoil	• Engineer to approve location of all camps, quarries, plants, etc.

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			storage/disposal sites, etc. on state land • Locate on land not used or suitable for agriculture • Local asphalt and concrete plants as permitted by CEP	• DFZ to approve any occupation of fertile land • CEP Department of Environmental Protection To approve location of plants
24	Respond to community complaints	External stakeholders	• Refer community grievances to DFZ for recording in Grievance Log • Assist in developing and implementing resolution as needed (as specified by DFZ) • Report grievance details and actions in monthly reports	• Engineer to monitor Contractor's response/resolution actions as directed by DFZ • DFZ HSE review Grievance Log to identify patterns • DFZ HSE review monthly reports • Engineer and DFZ HSE spot checks of resolutions
25	Install and maintain all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or vehicles;	Community H&S	Develop and implement Traffic management plan	• Engineer to approve plan and supervise implementation
26	Timely public notification on planned construction works; Regular consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;	Community H&S	Develop and implement Community H&S plan	• Engineer to approve plan and supervise implementation
5.1.4	***Employment and Economic***			

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
27	Employ local workers	Community H&S	• Contract goals • Advertise positions locally • Train workers, upgrade worker skills • Provide transport	Spot checks of employment statistics by all parties
28	Use local sources of materials, food		• Contract goals • Train/support local suppliers	Contractor and DFZ HSE spot checks of sources of supplies
5.1.5	***Labor Influx***			
29	Control worker behavior, including prohibition of SEA/SH	Community H&S	• Code of Conduct • Camp location • Training • Enforcement	GRM monitoring (as above)
30	Provide support to overtaxed community services (medical care, commodity suppliers, etc.)		Identify other sources for services/supplies	• GRM monitoring • Monthly checks with community leaders by Contractor HSE • Spot checks by Engineer and DFZ
5.2.1	***Labor Management***			
31	Prohibition of child labor	Workers	• Pre-employment age checks • Mutually agreed employment contracts for all workers • Adherence to requirements of Rogun HPP LMP (or development of Contractor LMP)	• Initial verification by Contractor HR/HSE • Spot checks of records and individuals by all parties
32	Prohibition of forced labor			
33	Clear terms of employment (job responsibilities, duration of employment, wages and payment terms, work hours, benefits, GRM, etc.)			
5.2.2	***Worker Health and Safety***			
34	Using/wearing PPE,	Workers	• No-cost PPE provided initially and as needed • Training workers • Daily checks by supervisors • Toolbox talks • Enforcing use	• Continuous observation by supervisors, Contractor HSE, and Engineer • Daily checks of use and periodic inspections of condition by Engineer and Contractor HSE • Bi-weekly observation by DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
35	Using safety belts in vehicles and mobile equipment		• Good-condition safety belts for all seating positions in all mobile equipment • Prohibition of seat belt fobs to stop warning signal • Completion of daily checklist by driver • Training of drivers and workers to use belts • Enforcement, with penalties for drivers and workers	• Verification by Contractor HSE of presence and condition of safety belts before vehicle is first used • Verification annually thereafter by Contractor HSE • Spot checks of moving vehicles by Engineer, Contractor, and DFZ
36	Transporting workers only in passenger vehicles with safety belts		• Maintenance • Completing daily safety checklists before vehicle use • Training of drivers and workers • Enforcement, with penalties for drivers and workers	• Spot checks of moving vehicles by Engineer, Contractor, and DFZ HSE • Occasional roadblocks and checks by Engineer and Contractor HSE
37	Fall protection		• PPE (harnesses) and safety equipment (safe scaffolding, nets/platforms under bridges, barriers) • Toolbox talks • Barriers to prevent rockfall onto work site • Watchers for warnings of landslide and rockfall • Hydration, heat/cold refuges, cold-weather clothing/PPE,	• Pre-work inspection by supervisor • Weekly inspection by Engineer and Contractor HSE Spot checks by all parties
38	Quick attention to injuries		• All supervisors trained to be first aider • Trained first aider at each work site • Emergency preparedness and response training for all workers	• Spot-checks of first aid credentials on work crews by Engineer and Contractor HSE • Spot checks of supervisor training and credentials by Engineer and Contractor HSE • Spot checks of credentials by DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
39	Readily available first aid supplies		• First aid kit with every crew and vehicle • Standard contents in first aids • Immediate replenishment for used items	• Engineer approval of standard box contents • Contractor HSE approval of all boxes • Monthly inspections of first aid kits and contents by Contractor • Spot checks by Engineer, Contractor, and DFZ
40	All accommodations provided by the Contractor (including medical and other services, etc.) to meet standards in IFC/EBRD guidance note "Workers' accommodation: processes and standards (2009)[17].		• Supplied medical office/facility and nurse or doctor at each construction camp • Arrangements with nearby facilities/personnel • Engagement and agreements with first responders and nearest clinics/hospitals • Accommodations designed to meet standards	By Engineer and Contractor HSE: • Initial verification of camp accommodations and medical facilities/personnel • Monthly inspections by Contractor HSE of camp facilities/personnel or agreements with existing facilities • Verification by Contractor HSE of arrangements with existing facilities/personnel • Verification of engagement with first responders and hospitals By Engineer and DFZ: • Initial verification and periodic spot checks of the above
41	Sanitary, safe, comfortable accommodations, shops, and offices		• Professional design and operation: • Sturdy construction • Sufficient space • Climate control in buildings • Sanitary facilities (showers, washing, toilets) • Potable water, wastewater management • Cleaning and laundry services	• Design approval by Contractor HSE • Approval of commissioning by Engineer Monthly inspections by Engineer and Contractor HSE • Quarterly inspections by DFZ

[17] https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			• Separate female and male quarters and sanitary facilities Firefighting equipment • Other requirements of IFC/EBRD guidance and Tajik law	
5.3.1	***Surface Water***			
42	Minimize disturbance of streams	• Surface water • Biodiversity • Soil • Worker H&S	Mark upstream and downstream work boundaries at crossings	• Inspection by Engineer and Contractor HSE of markings before work begins • Weekly verification by Contractor HSE that work is within the boundaries • Spot checks by Engineer and DFZ that work is within boundaries
43	Avoid high-water seasons where feasible		Schedule and conduct work in or near water in low-flow periods wherever possible	• Review by Engineer and Contractor HSE of work schedules for crossings work • Spot checks by Engineer, Contractor, and DFZ HSE to verify work in/near water is authorized
44	Minimize water contact with bare ground and active works		• Divert flowing water and around where ground will be disturbed • Divert runoff round active works and fresh concrete • Maintain diversions in good working over	• Engineer approves diversions/drainage before work between streambanks begins • Weekly inspections by Contractor HSE of diversions/drainageways • Bi-weekly spot checks by Engineer and DFZ
45	Prevent water from contact with fresh concrete		• Divert water around concrete works until cured • Apply heat or other fast-curing aids	• Daily checks at crossings by Contractor HSE • Bi-weekly checks by Engineer • Spot checks by DFZ
46	Store diesel and keep tankers at least 25m from water and drainages.		• Storage at greater distances • Markers to prevent tankers from parking or idling near drainages and water • Tanker driver training	• Daily checks at crossings by Contractor HSE • Bi-weekly checks by Engineer • Spot checks by DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			• Cleanup kit at all storage tanks and in all tankers	
47	Refuel over drip tray or other impermeable surface, at least 10m from water or drainages		• Define fueling stations at all crossing works • Keep drip tray in all tankers • Cleanup kit in all vehicles and equipment and in tanker	• Daily checks at crossings by Contractor HSE • Weekly inspections by Contractor HSE • Bi-weekly checks by Engineer • Spot checks by DFZ
48	Keep pumps and engines on impermeable surface at least 10m from water or drainages, keep barrier between pump/engine and drainage/water		• Locations designated by HSE • Placement of barriers	• ·Weekly inspections by Contractor HSE • Bi-weekly checks by DFZ
49	Spill cleanup kits in all vehicles and equipment and at all stationary engines, train all drivers in using kits		• Place kits in all vehicles, to include warning signs, absorbents, containers, gloves, etc. • Train drivers in cleanup and hazmat management	Weekly checks by Contractor HSE Spot checks by Engineer, Contractor HSE, and DFZ
50	Monitor surface water quality	Communities, workers	• Comply with CEP requirements	As specified by CEP
5.3.2	***Soil***			
51	Recover, preserve, store, and restore topsoil	• Soil • Surface water • Flora	• Recover topsoil when breaking new ground • Store recovered topsoil • Place topsoil on disturbed land when construction is complete • Spread excess so as not to smother grass	Spot checks at all disturbed areas by Engineer, Contractor HSE, and DFZ
52	Restore surface of old road when the new road is not in the same footprint		• Scarify the surface • Spread stored topsoil • Protect from erosion until vegetation matches surroundings	• Inspection by Engineer and Contractor HSE immediately after new route is operating • Weekly spot checks by Contractor HSE until vegetated

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
				• Spot checks by Engineer and DFZ until vegetated
53	Restore other disturbed land (roadside, construction camps, etc.) as soon as it is no longer needed		• Remove all buildings, equipment, scrap, fencing, etc. • Manage scrap and other wastes as required by law • Spread stored topsoil • Protect from erosion until vegetation matches surroundings	• Inspection by Engineer HSE when land is no longer needed (instructions for cleanup) • Weekly spot checks by Contractor HSE until vegetated • Spot checks by Engineer and DFZ until vegetated •
54	Minimize use of fresh soil/gravel in new roadbed, road surface, and fill. Maximize reuse of material removed from current roadbed and surface and from upslope cuts.		• Store gravel and soil removed from old roadbed and surface and from cuts • Reuse in new roadbed and road surface, or use for fill, as much as possible • Take excess soil to stable storage/ disposal area (quarry/borrow area)	• Inspection and advice by Contractor HSE when removal of old road begins and weekly spot checks thereafter • Inspection and advice by Contractor HSE when construction involves cut and/or fill • Spot checks by DFZ
55	Minimize contamination of soil from spills of fuel, fresh concrete, other hazmats		• Implement mitigations for surface water • Clean up fuel and other spills immediately • Manage cleanup residue soil a hazardous waste • Replenish cleanup kits	• Immediate inspection of major and minor spills by Engineer and Contractor HSE to verify cleanup and waste management • Followup checks by Engineer and DFZ
56	Minimize loss of soil due to erosion		• Keep bare ground to a minimum (limited works to demarcated construction areas) • Install drainage measures at top and foot of steep slopes as needed to divert and/or control runoff • Divert streams and runoff around bare ground	• Inspection by Engineer and Contractor HSE at time of ground-breaking and weekly thereafter until construction is complete • Inspection by Contractor HSE after major precipitation/snowmelt events and at end of construction season • Spot checks and bi-weekly inspections by Engineer

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			• Control runoff from disturbed areas to minimize off-site sedimentation • Stabilize disturbed areas and install drainage where needed before the end of each construction season • Avoid working on slopes in wet weather where possible, manage run-on and runoff if work cannot be avoided • Establish self-sustaining vegetation on all disturbed areas • Withhold final payment until landforms are stable with minimal erosion	• Spot checks by DFZ • Inspection by Engineer and/or DFZ prior to final payment
57	Implement measures for surface water above		See requirements under 5.3.1 above	
58	Prevent impacts on fertile soil		• Avoid location of soil and spoil storage areas, laydown areas, camps, quarries on land used or suitable for agriculture • Locate on state lands where possible	Engineer approves all stockpiles and other areas to be disturbed, prior to disturbance
5.3.3	***Habitat***			
59	Implement measures for surface water, soil, flora, and fauna		See requirements under 5.3.1, 5.3.2, 5.3.4, 5.3.5, and 5.3.6 above	• See measures under 5.3.1, 5.3.2, 5.3.4, 5.3.5, and 5.3.6 • Annual inspections/audits by CEP biodiversity specialists at beginning and end of construction seasons (at discretion of CEP)
5.3.4	***Flora***			

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
60	Implement measures under 5.3.2 (soil) for reducing erosion and preventing/responding to spills of hazardous substances		See requirements under 5.3.2 above	
61	Minimize work areas and removal of vegetation		• Mark boundaries of all construction sites and areas • Forbid disturbance of land and vegetation outside markers • Train workers	• Inspection by Engineer and Contractor HSE before new construction • Weekly spot checks by Contractor HSE • Spot checks by Engineer and DFZ
62	No plant collection		• Forbid workers from collecting plants, and enforce • Train workers	Spot checks by Engineer, Contractor, and DFZ
63	Minimize removal of trees and other woody vegetation		• Micro-adjustments to route if possible • Provide construction camps with adequate fuel to prevent firewood harvesting by workers or illegal harvesting by fuel suppliers • Prohibit collection of wood for fuel or other purposes	• Engineer and DFZ approve final route before trees are cut • Contractor HSE reviews fuel planning and approves all wood purchases or imports • Engineer and Contractor HSE approve and observe all tree-cutting • Engineer inspects areas where tree-cutting occurred within one week
64	Restore vegetation before demobilization		• Regrade disturbed land as needed to restore approximate original contour • Plant grass or other vegetation as required by DFZ and Forestry Agency • Monitor throughout warranty period, final payment when vegetation restored as required	• Engineer inspection and approval of final land configuration • Engineer inspection and approval approve final vegetation cover prior to authorizing demobilization • Engineer and/or DFZ Inspection before final payment
5.3.5	***Fauna***			

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
65	Implement measures to minimize construction area		• Demarcate boundaries of construction zones • Train workers	• Inspection and approval by Engineer and Contractor HSE of site boundaries before land disturbed • Weekly checks by Engineer and Contractor HSE • Spot checks by DFZ
66	Implement measures to protect soil (5.3.2) and water (5.3.1), and reduce noise (5.1.2)		See requirements under 5.1.2, 5.3.1, 5.3.2	
67	Prevent entrapment of fauna in excavations		• Cover excavations left overnight or for multiple days • Install gentle-slope escape ramps or planks to allow escape	• Weekly inspections and spot checks of excavations by Contractor HSE • Spot checks by Engineer and DFZ
68	Avoid disturbance of nesting Egyptian vultures or Saker falcons by construction in new areas		• Pre-construction survey by qualified biologist(s) within 500m of new construction areas within 30 days of planned construction • If active construction, delay construction until young birds have fledged	• Contractor HSE to commission surveys and verify results • Engineer and/or DFZ to verify work undertaken and results
69	No loss of fauna due to hunting or collection		• Forbid hunting and collection of fauna by workers on or near construction zones • Train workers	• Verification of training by Contractor HSE • Spot checks by Engineer, Contractor HSE, and DFZ
70	Minimize disruption of fish spawning		• Consult with the Fisheries and Oceanography Department of State Control of the Use and Protection of the Plant and Animal World and Fish Stocks and the Department of State Control of Water Resources Use and Protection of the Committee for	• Engineer approval before works in surface water or on streambanks • Spot checks by Contractor, Engineer and DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			Environmental Protection to determine fish spawning periods • Schedule in-stream works outside these periods where feasible and approved by authorities	
5.3.6	***Hazardous Materials and Wastes***			
71	Minimize use of hazardous materials	Community H&S Worker H&S Flora and fauna Surface Water Soil	• Identify and use nonhazardous replacements • Identify and use less hazardous replacements • Use minimum amount necessary	• Contractor HSE to approve before use of any hazardous material • Spot checks by Engineer and DFZ
72	Awareness of hazardous materials and wastes		• Record date, name, amount, and location of hazardous materials when they come on-site • Record date, amount, and location of hazardous waste generation, storage, and transport • Maintain inventory and management methods	• Contractor HSE inspects all shipments that come on-site and records information on inventory • Contractor HSE updates inventory on at least a weekly basis • Spot checks of records and inventory by Engineer and DFZ
73	Manage hazmats and hazardous wastes as specified in SDS: - Transport, storage, handling, and use of hazardous materials - Generation, storage, recycling or reuse, treatment, and transport of hazardous wastes.		• Acquire SDS for all hazmats and wastes derived from hazmats • Design and implement management methods according to SDS • Segregate all wastes by type, with no mixing of hazardous and nonhazardous wastes • Provide bins or discrete areas for waste types • No burning of wastes without Engineer approval	• Initial approval of all hazmat and waste management by Engineer • Weekly inspection by Contractor HSE of management methods • Periodic inspections by Engineer and DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
74	Transport hazardous materials and wastes in safe vehicles		• Select vehicles based on design and condition • Verify haulers' vehicles meet standard	• Initial and semi-annual inspection of vehicle by Contractor HSE • Spot checks by Engineer and DFZ
75	Knowledgeable and competent drivers of vehicles transporting hazardous materials and wastes		• Train workers in risks and risk avoidance for the materials to be transported • Train workers in handling, and responding to spills	• Verification of training by Contractor HSE before driver is licensed (see measure 1) • Spot checks by Engineer and DFZ
76	Store hazardous materials and wastes in designated space with limited access		• Design and construct storage in accordance with SDS: impermeable walls and floor, covered • Verify compatibility of materials stored together • Close and lock fuel storage valves and nozzles ("guns") when not in use • Place signs and hazard pictograms at access points • Provide access only to authorized personnel	• Design approved by Engineer • Weekly inspection of stores and records by Contractor HSE • Spot checks by Engineer and DFZ
77	Maintain safe distances from hazmats and wastes to water and occupied buildings, including accommodations.		• Maintain distances for use and storage: - Aat least 25m from water - 50m from offices and accommodations	• Locations approved by Engineer • Weekly checks by Contractor HSE • Spot checks by DFZ
78	SDS made available where needed		• Acquire SDS for all hazardous materials, including those that contribute to hazardous wastes • Post/store SDS in all locations where hazmats and wastes are present (including SDS for fuel type	• Contractor HSE to acquire SDS or verify proper SDS has been acquired • Weekly inspections of stores and use sites by Contractor HSE • Spot checks of vehicles by Contractor HSE • Spot checks of vehicles and locations by DFZ

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			at pumps, generators, other engines) • SDSs to be in language(s) of workers • Keep SDS in transport vehicles (including SDS for type of fuel type in all vehicles)	
79	Limit access and contact with hazardous materials and wastes to authorized personnel		• Limit access and contact with hazardous materials and wastes to personnel whose tasks require access/contact • Authorized personnel to include those who are required to have access/contact, first responders, first aiders, and medical personnel • Provide training in risks, proper management, and response actions to all authorized personnel	• Contractor HSE to provide authorization for all personnel • Contractor HSE to lead training • Spot checks by Contractor HSE and DFZ
80	Minimize contamination of soil and water from spills		• Impermeable containment (bottom and sides) with 110% of largest capacity or 125% of combined capacity • Cover all bunded areas where possible • Prevent runoff of rainwater from bunded areas until after oil-water separation • Manage solids from oil-water separation as hazardous wastes	• Engineer to approve designs of secondary containment • Weekly inspections by Contractor HSE • Bi-weekly inspections by Engineer • Spot checks by Engineer and DFZ
81	Clean up spills	Soil, water, workers, communities	• Immediate stop work • Quick identification of spills • Spill kits located wherever hazmats are stored and/or used	• Contractor (all spills) or Engineer (major spills) approval of cleanup before work is resumed • Engineer and Contractor HSE approval of waste management

#	*Mitigation measure*	*Receptor(s) of concern*	*Means to achieve*	*Types and frequency of monitoring*
			• Workers trained in emergency response and cleanup • Manage contaminated materials and cleanup media as hazardous waste	
5.3.4	***Cultural heritage***			
82	Identify potential impacts and additional measures needed to protect known cultural heritage sites		• Identify distance of new routes and construction camps to known sites • Appoint NAST to survey new routes and construction camp if they will be within 2km of known sites • Implement protective or preservation methods recommended by NAST	• Contractor HSE to verify if sites are at risk, Engineer to confirm • Contractor management to appoint NAST to monitor if measures are needed
83	Identify and take action to protect/preserve cultural heritage if discovered		• Implement chance find procedure in Rogun HPP Cultural Heritage Management Plan • Train supervisors and workers in application of chance find procedure	• Contractor HSE to lead training • Spot checks of sites by Contractor HSE and DFZ