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PR 017140

Environmental and Social Impact
Assessment Report

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List of Abbreviations

Aol	- Area of Influence
API	- Air Pollution Index
BBS	- Beineu-Bozoy-Saksaulsk
BAT	- Best Available Technologies
CH	- Critical Habitat
CHMP	- Cultural Heritage Management Plan
CIA	- Cumulative Impact Assessment
CVRA	- Climate Change Vulnerability and Risk Assessment
EAAA	- Ecologically Appropriate Areas of Analysis
EHS	- Environmental, Health and Safety
EIA	- Environmental Impact Assessment
EU	- European Union
EBRD	- European Bank for Reconstruction and Development
EC	- European Commission
EGU	- Engineering Geological Units
EIA	- Environmental Impact Assessment
ESDD	- Environmental and Due Diligence
ESIA	- Environmental and Social Impact Assessment
ESAP	- Environmental and Social Action Plan
ESMP	- Environmental and Social Management Plan
ESP	- Environmental and Social Policy
ESR	- Environmental and Social Requirement
FGD	- Focus Group Discussion
FS	- Feasibility Study
GAP	- Gender Action Plan
GBVH	- Gender-Based Violence and Harassment
GIP	- Good Industry Practice
HR	- Highest Repeatability
IBA	- Important Bird Area
IBRD	- International Bank for Reconstruction and Development
IFC	- International Finance Corporation
ILO	- International Labor Organization
ITS	- Intelligent Transportation System
IUCN	- International Union for Conservation of Nature
JSC	- Joint Stock Company
KBA	- Key Biodiversity Area

LARF	- Land Acquisition and Resettlement Framework
LLP	- Limited Liability Partnership
NGO	- Non-Governmental Organization
NTS	- Non-Technical Summary
OHS	- Occupational Health and Safety
OTL	- Overhead Transmission Line
PAP	- Project Affected Person
PBF	- Priority Biodiversity Feature
PCR	- Public Consultation Report
RoK	- Republic of Kazakhstan
RF	- Russian Federation
RMU	- Road Maintenance Unit
RSA	- Road Safety Audit
RSE	- Republican State Enterprise
RoW	- right-of-way
SEP	- Stakeholder Engagement Plan
SI	- Standard Index
SPNA	- Specially Protected Nature Areas
SR	- Scoping Report
ToR	- Terms of Reference
TRACECA	- Transport Corridor Europe-Caucasus-Asia
TLV	- Threshold Limit Value
TMP	- Traffic Management Plan
VEC	- Valued Environmental and Social Component
WB	- World Bank

1 Introduction

1.1 Background

The construction of the 559-km Beineu-Bozoy-Saksaulsk (BBS) Road to Category II technical standards will form part of the Transport Corridor Europe-Caucasus-Asia (TRACECA), transport corridor, facilitating overland trade between China and Western Europe via Kazakhstan. The BBS Road will enhance the transport and logistics potential of the Mangystau and Aktobe regions by improving the road's technical standards, increasing its capacity, and reducing travel times. As part of the "Centre-West" Transport Corridor, the road will also contribute to the development of modern transport infrastructure, thereby supporting improved regional connectivity and more efficient movement of people and goods.

The European Bank for Reconstruction and Development (the "EBRD" or the "Bank") has considered providing a sovereign-guaranteed loan to JSC¹ National Company "KazAvtoZhol" (the "Company", the "Client", or "QAJ"), a 100% state-owned national road operator in Kazakhstan, to finance the design, construction and maintenance of Lots 1 to 4 (km 0+000 to km 160+000; approximately 161.5 km) of the BBS Road Project, including its components (such as access roads, road maintenance units, and other ancillary infrastructure).

The Bank engaged a consultant (the "Consultant") to undertake the **Environmental and Social Impact Assessment (ESIA) and prepare the full ESIA disclosure package for Lots 1 to 7 (km 0+000 to km 286+000)** of the Project in accordance with the EBRD Environmental and Social Policy (ESP, 2024) and the Environmental and Social Requirements (ESRs). **Under a Reliance Letter agreed between EBRD, the Consultant and the World Bank, the World Bank may rely on these ESIA deliverables, in the same way as EBRD, for its own financing, appraisal and supervision of Lots 5 to 7.**

The Project has the potential to result in significant adverse future environmental and/or social impacts. Accordingly, under the EBRD Environmental and Social Policy (ESP, 2024), it has been classified as a **Category 'A'** project. As such, **the Project is subject to a comprehensive ESIA, together with the preparation of associated environmental and social documentation.** The ESIA disclosure package will be made publicly available for a minimum period of 120 days prior to the Project being considered for approval by the EBRD Board of Directors.

The 559 km BBS Road is financed by the EBRD, the International Bank for Reconstruction and Development (IBRD) / World Bank, the Asian Development Bank (ADB), and the Republic of Kazakhstan, through the Development Bank of Kazakhstan (DBK), with the road divided into four financing sections (lot groups), each allocated to a different financier:

- EBRD: Lots 1 to 4 (km 0+000 - km 160+000),
- IBRD / World Bank: Lots 5 to 7 (km 160+000 - km 286+000),
- ADB: Lots 8 to 10 (km 286+000 - km 410+000),
- DBK: Lots 11 to 14 (km 410+000 - km 559+166).

¹Joint Stock Company

1.2 Objectives and Scope of Works

The objective of this ESIA study is to identify and assess any potentially significant future adverse Environmental and Social (E&S) impacts associated with the proposed Project; assess the Project's compliance with applicable national legislation, the EBRD ESP (2024) and the ESRs; determine the measures required to avoid, minimise, mitigate, or compensate for adverse impacts; and identify opportunities to enhance the Project's environmental and social performance and sustainability.

This ESIA is also intended to provide the Bank with the information, analysis, and recommendations required to comprehensively assess, structure, and approve the Project. It will also support the national environmental assessment and approval process in accordance with applicable local regulations by assessing the Project's potential impacts on the Ustyurt saiga population and identifying appropriate mitigation measures.

This ESIA has been undertaken by the Consultant in accordance with the requirements of the EBRD ESP (2024) and relevant national legislation. The E&S studies were implemented in the following two stages and included a combination of desktop studies, field surveys, and consultations with Project stakeholders:

- E&S Scoping Study and preparation of the Scoping Report; and
- ESIA Study, the results of which are presented in this report.

1.3 Summary of the Scoping Study

The E&S Scoping Study was undertaken as the first stage of the ESIA process to identify the key environmental and social issues and potential impacts associated with the Project, define the scope and level of detail required for the subsequent ESIA studies, and establish the key assessment requirements in accordance with the EBRD ESP (2024).

The Scoping Study included a review of available Project documentation and baseline information, applicable national E&S legislation and permitting requirements, relevant EBRD ESRs, as well as available information on the E&S characteristics of the Project area. It also included preliminary consultations with relevant Project stakeholders and site reconnaissance to identify key environmental and social sensitivities and potential constraints.

Particular attention during the scoping stage was given to biodiversity issues, including the Ustyurt saiga population and potential impacts associated with habitat fragmentation and barriers to movement; land acquisition and livelihood impacts; impacts on local communities and settlements; community health, safety and security; cultural heritage; air quality, noise and vibration; waste management; resource use and pollution prevention; cumulative and associated-facility impacts, etc.

Based on the findings of the Scoping Study, the key E&S issues requiring further assessment were identified and the scope of the ESIA investigations was defined. The ESIA therefore includes targeted baseline studies, field surveys and stakeholder consultations, as appropriate to the identified risks and impacts. These studies include, in particular, detailed biodiversity and habitat assessments, including surveys and assessment of potential impacts on saiga and other sensitive species; land acquisition and socio-economic assessment; assessment of community health, safety

and security risks; cultural heritage assessment; traffic, noise, air quality and other environmental baseline assessments.

1.4 Content of the ESIA Report

This ESIA Report has been prepared as based on the outputs the Project's ESIA studies. It is structured to address the requirements set out in the Project's Terms of Reference (ToR) and includes the following chapters:

- Introduction and background information,
- Project overview, including alternative options and justification,
- Applicable legal and regulatory framework,
- The proposed ESIA process and methodology,
- Delineation of the Project area,
- Environmental and social baseline,
- Stakeholder engagement and consultations,
- Environmental and social impacts, benefits and opportunities, mitigation measures, cumulative impact assessment,
- Environmental and social monitoring and management.

1.5 Sources of Information

The key information/data sources that have been used to prepare the Scoping Report include:

- Project ToR,
- Feasibility Study (FS) for the Construction of the Beineu-Saksaulsk Road to Category II Technical Standards in the Mangystau, Aktobe and Kyzylorda Regions, Almaty, 2026,
- Environmental Impact Assessment (EIA) Report for the Construction of the Beineu-Saksaulsk Road to Category II Technical Standards in the Mangystau, Aktobe and Kyzylorda Regions, Almaty, 2026,
- Results of the Consultant's study visit to the Project site conducted on 22-26 June 2026,
- Outputs of the socio-economic and LARF consultations conducted by the Consultant on 10-14 August 2026,
- Biodiversity survey for the Project carried out by Association for the Conservation of Biodiversity of Kazakhstan (ACBK), August 2026,
- Meetings/discussions with the Project local FS consultant,
- Meetings/consultations with the Project stakeholders,
- Documents relating to the land use and allocation for the Project needs,
- Available maps, layouts, reports, etc. related to the Project area.

2 Project Overview

2.1 Location

The alignment of the Beineu-Bozoy-Saksaulsk road and its planned connections with Kazakhstan's existing road network are shown in **Figure 1**. The proposed BBS Road crosses the Mangystau, Aktope and Kyzylorda regions. **Figure 2** provides a more detailed overview of the road alignment, showing its distribution across the three regions and the respective sections to be financed by the EBRD, IBRD, ADB and DBK.

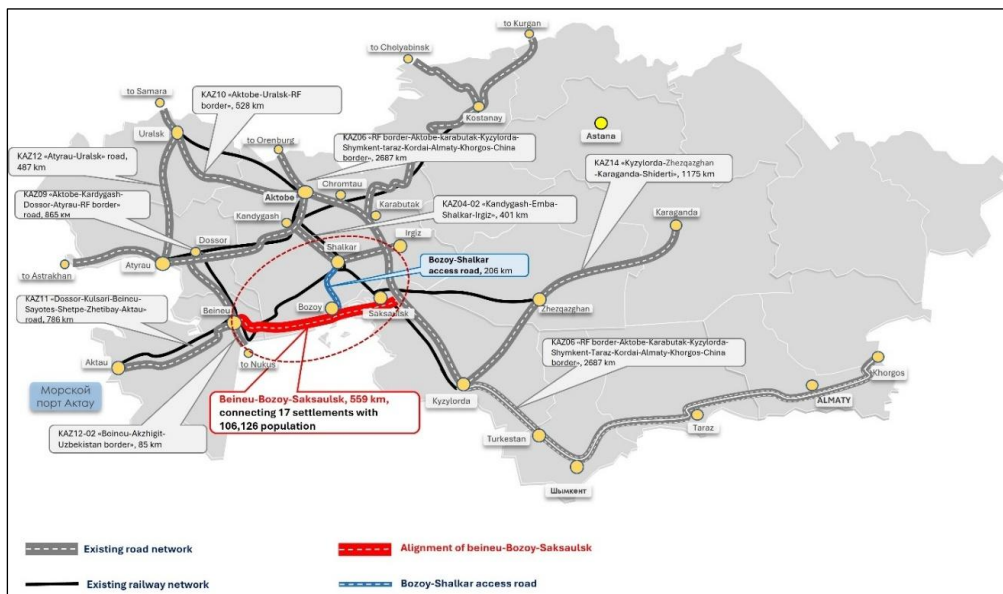


Figure 1 - Existing road network in the wider Project area and the location of the BBS road

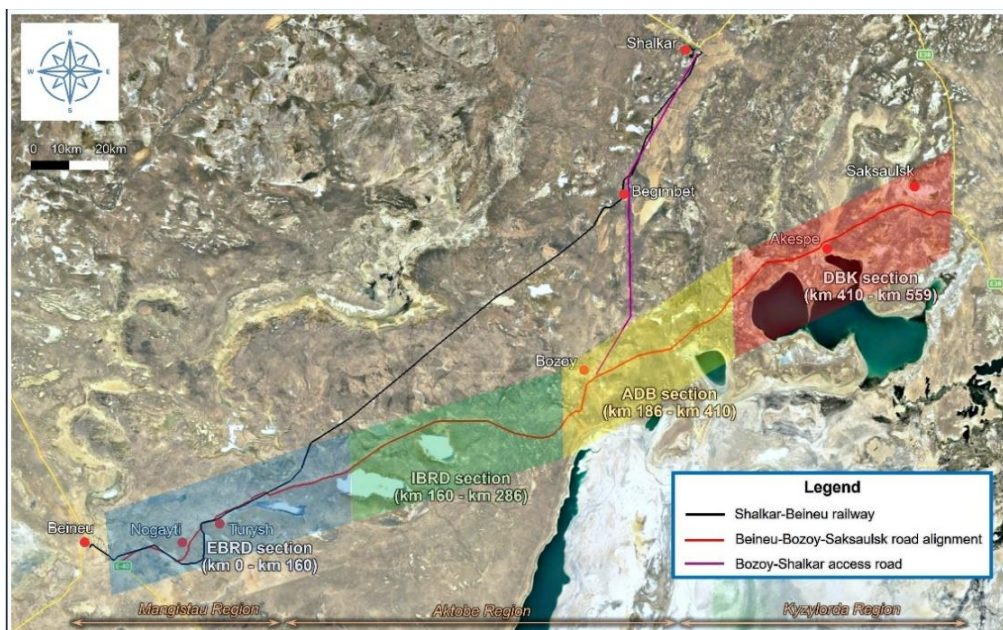


Figure 2 - BBS road alignment and division of the EBRD-, IBRD-, ADB-, and DBK-financed sections

2.2 Project Description

The local Feasibility Study envisages the construction of the Category II Beineu-Bozoy-Saksaulsk (BBS) road in two phases:

Phase I:	Reconstruction/construction of the main road, including grade-separated interchanges, divided into 14 construction sections. The total length of the BBS road is 559.166 km, of which: • 125 km within the Beineu District of Mangystau Region, • 245 km within the Baiganinsky and Shalkar Districts of Aktobe Region, • 189.166 km within the Aral District of Kyzylorda Region.
Phase II:	Installation of the Intelligent Transportation System (ITS), construction/major rehabilitation of Road Maintenance Units (RMUs), and construction of access roads to settlements, divided into 3 construction packages. The total length of roads to be constructed/rehabilitated to ensure access to the settlements is 240.5 km, of which: • 1.487 km long Category V access road to Turysh village, • 206 km long Category IV access road to Shalkar town, • 33 km long Category IV access road to Saksaulsk village. Construction/rehabilitation of the following RMUs are planned: • Construction of a RMU in Beineu District of Mangystau Region, north of Turysh village, on a 2.7 ha site, • Construction of a RMU in Shalkar District of Aktobe Region, north of Shalkar village, on a 2.7 ha site, • Rehabilitation of the existing RMU in Shalkar District of Aktobe Region, in Shalkar village, • Construction of a RMU in Aral District of Kyzylorda Region, north of Akespe village, on a 2.7 ha site.

The division of the 559 km BBS Road into four sections (lot groups), the financial institutions financing each lot group, and the associated auxiliary components included within each lot group are presented in [Table 1](#).

Table 1 - Division of the 559 km BBS road into four sections and the financial institutions responsible for financing each section (lots group)

Road	Beineu-Bozoy-Salsaulsk			
Financier and its share	EBRD (26.7%)	IBRD (20.4%)	ADB (27.9%)	DBK (25%)
Sections / lots	km 0+000 - km 160+000	km 160+000 - km 286+000	km 286+000 - km 410+000	km 410+000 - km 559+166
	km 0-40	km 160-200	km 286-326	km 410-450
	km 40-80	km 200-246	km 326-370	km 450-490
	km 80-125	km 246-286	km 370-410	km 490-530
	km 125-160	ITS 125 km	ITS 333 km	km 530-559

Road	Beineu-Bozoy-Salsaulsk			
	ITS 1+720 RMF (DEU) Turkish Access road to Turish	ITS 229 km	RMF (DEU) Bozoy RMF (DEU) Shalkar Access road to Shalkar	ITS 439+920 km ITS 558+000 km RMF (DEU) Akеспе Access road to Saksaulsk

The 286-km Project road section that is a subject of this ESIA study will traverse the Mangistau and Aktope regions of the Republic of Kazakhstan (RoK). The main Project components and their locations in relation to nearby settlements are outlined below:

Mangistau Region

The km 0 - km 125 section of the Project road comprises the following components:

Subsection 1: km 0 - km 40

Planned structures include:

- interchange at the beginning of the road with an overpass,
- two cattle crossings,
- one overpass over the railway line.

Subsection 2: km 40 - km 80

Planned structures include:

- four overpasses for agricultural machinery crossing,
- one cattle crossing,
- one bridge,
- nine culverts,
- six bus stops,
- two large rest areas.

Subsection 3: km 80 - km 125

Planned structures include:

- RMU located north of Turysh village,
- a 1.487-km Category V access road to Turysh village,
- one cattle crossing,
- one railway overpass,
- ten culverts,
- one large rest area.

The proximity of the Project road alignment to residential areas is as follows:

- 1400 m from the nearest residential house in Syngyrlau village,
- 138 m from the nearest residential house in Sam village,
- 207 m from the nearest residential house in Nogayti village,
- 825 m from the nearest residential house in Turysh village.

The proximity of the Project's auxiliary components to residential areas is as follows:

- The RMU north of Turysh village is located 1,200 m from the nearest residential house,
- The access road to Turysh village is located 2,200 m from the nearest residential house.

Aktobe Region

The km 125 - km 326 section of the Project road comprises the following components:

Subsection 4: km 125 - km 160

Planned structures include:

- one bridge,
- seven culverts,
- one large rest area.

Subsection 5: km 160 - km 200

Planned structures include:

- seven culverts,
- one large rest area.

Subsection 6: km 200 - km 246

Planned structures include:

- four bridges,
- three culverts,
- one large rest area.

Subsection 7: km 246 - km 286

Planned structures include:

- four bridges,
- four culverts,
- one large rest area.

The local Feasibility Study (FS) consultant proposed 24 wildlife crossings along the entire 559 km Beineu-Bozoy-Saksaulsk road, with a nominal spacing of approximately 5 km. Of these, four are located in the Mangistau Region, 10 in the Aktobe Region, and 10 in the Kyzylorda Region. Thirteen of the 24 proposed wildlife crossings are located within the Project Road section (km 0-286), as shown below.

<i>Mangistau Region</i>			
1	km 15+235 km 20+235	45°17'6.92"N, 55°33'18.21"E	45°17'59.79"N, 55°36'55.01"E
2	km 45+120 - km 50+120	45°15'48.82"N, 55°53'24.71"E	45°18'12.55"N, 55°54'56.26"E
3	km 61+500 - km 66+500	45°23'30.46"N, 55°58'48.59"E	45°25'54.01"N, 55°59'59.27"E
4	km 115+500 - km 120+500	45°36'2.30"N, 56°32'44.73"E	45°37'2.44"N, 56°36'19.04"E
<i>Aktobe Region</i>			
1	km 126+800 - km 131+800	45°38'3.06"N, 56°40'56.10"E	45°38'38.38"N, 56°44'41.55"E
2	km 142+000 - km 147+000	45°40'24.22"N, 56°52'3.91"E	45°41'8.06"N, 56°55'45.92"E
3	km 152+300 - km 157+300	45°41'52.28"N, 56°59'42.29"E	45°42'59.24"N, 57° 3'10.64"E

4	km 172+700 - km 177+700	45°47'57.03"N, 57°12'42.25"E	45°49'31.79"N, 57°15'50.09"E
5	km 188+200 - km 193+200	45°52'20.32"N, 57°22'51.54"E	45°53'28.68"N, 57°26'21.82"E
6	km 203+600 - km 208+600	45°55'47.09"N, 57°33'41.98"E	45°56'57.73"N, 57°37'10.90"E
7	km 220+400 - km 225+400	45°58'12.92"N, 57°45'59.21"E	45°58'13.01"N, 57°49'51.50"E
8	km 245+300 - km 250+300	45°57'41.10"N, 58° 5'6.35"E	45°56'32.32"N, 58° 8'36.60"E
9	km 276+200 - km 281+200	45°53'19.88"N, 58°27'53.03"E	45°54'14.63"N, 58°31'28.44"E

The main road components (including bridges, railway crossings, and road maintenance units (RMUs)), together with settlements located along the EBRD-financed road section (km 0 - km 160), are shown in **Figure 3**.

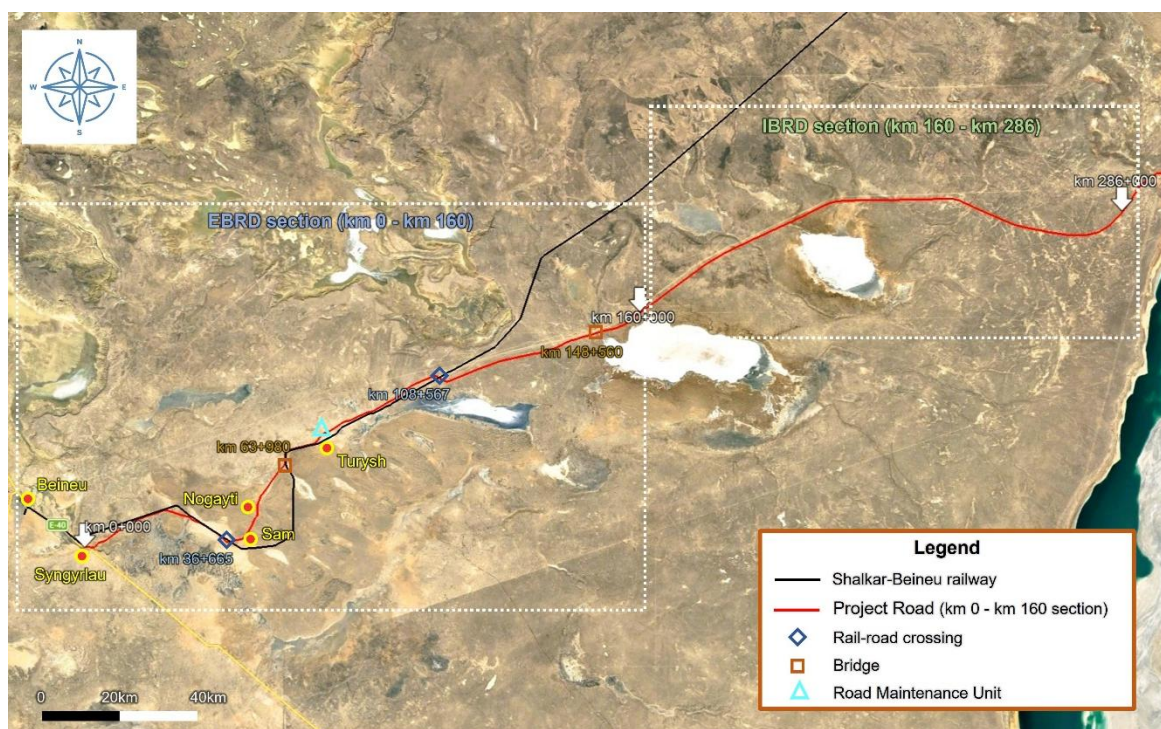


Figure 3 - Project road Section and division between the EBRD- and IBRD-financed sections

The main technical design standards adopted during the preparation of the Feasibility Study, in accordance with the applicable provisions of SP² RK 3.03-101-2013 *Highways*, are presented in the **Table 2**.

Table 2 - Key Technical and Economic Indicators

No	Indicator	Adopted in the FS study	
		Requirements of the SP RK 3.03-101-2013 <i>Highways</i>	Adopted for the BBS road
1	Road category	II	II
2	Projected Traffic Volume for the Design Year 2046, Expressed in Passenger Car Units (PCU/day)	6,000 - 14,000	13,626

²SP - Code of rules

No	Indicator	Adopted in the FS study	
		Requirements of the SP RK 3.03-101-2013 <i>Highways</i>	Adopted for the BBS road
3	Design Speed (km/h)	120	120
4	Number of Traffic Lanes	2	2
5	Traffic Lane Width (m)	3.75	3.75
6	Shoulder Width (m)	3.75	3.75
7	Carriageway Width (m)	7.5	3.75×2=7.5
8	Pavement Width (m)	9.0	9.0
9	Roadbed Width (m)	15.0	15.0
10	Cross Slope of the Carriageway, ‰	15	15
11	Maximum Longitudinal Gradient, ‰	40	40
12	Minimum Embankment Height Required to Prevent Snow Drifting (m)	0.7	2.1
13	Embankment Side Slope (≤ 3 m)	1:4	1:4
14	Embankment Side Slope (> 3 m)	1:1.5	1:1.5

The total construction period, assuming parallel implementation of the construction works and overlapping construction phases, is estimated at 34 months, including a 3-month preparatory period.

2.3 Sources and Delivery of the Construction Materials

According to the Project Feasibility Study (FS) report³, the entire volume of road construction materials is planned to be sourced from existing operating production facilities and quarries/borrow-pits:

Potential supplier	Materials to be supplied	Location
LLP "TAU-KEN" - Utegen Limestone Deposit	- Crushed stone of various fractions - Crushed stone-sand mixture - Sand from crushing screenings - for use in asphalt concrete mixtures - Rubble stone for erosion protection and other strengthening works	Aktobe Region, Shalkar District
LLP "Shalkar Sroy Service" - "Ulpan" Sand and Gravel Mixture Deposit	Coarse aggregate for use in concrete (cement concrete)	Aktobe Region, Shalkar District
JSC "Koktas-Aktobe"	- Crushed stone from hard rock - Graded crushed stone-gravel-sand mixtures - Sand from hard rock	Aktobe Region, Mugalzhar District

³Feasibility Study for the Construction of the Beineu-Saksaulsk Road to Category II Technical Standards in the Mangystau, Aktobe and Kyzylorda Regions, Almaty, Kazdorproject, 2026

Potential supplier	Materials to be supplied	Location
LLP "Mugalzhar Neftestroy"	- Crushed stone from hard rock - Graded crushed stone-gravel-sand mixtures - Sand from crushing screenings - for use in asphalt concrete mixtures	Aktobe Region, Shalkar District
LLP "80-BM"	- Crushed stone from hard rock - Graded crushed stone-gravel-sand mixtures - Sand from crushing screenings - for use in asphalt concrete mixtures	Aktobe Region, Shalkar District
LLP "Aqshat SU"	- Crushed stone from hard rock - Graded crushed stone-gravel-sand mixtures - Sand from crushing screenings - for use in asphalt concrete mixtures	Aktobe Region, Shalkar District
LLP "AZMK"	Precast reinforced concrete products for bridge structures	Almaty City
-	Precast reinforced concrete products for small artificial structures	Aktobe City

Construction materials will be delivered to the Project sites using a combination of rail and road transport.

2.4 Project Alternatives

The following alternatives have been reviewed during the ESIA study:

- Zero alternative,
- Alternative road alignments,
- Acceptability of alternative road alignments in relation to the Ustyurt saiga population,
- Alternative design options for road components, including different types of intersection.

2.4.1 Zero Alternative (No Project)

Currently, travel between Saksaulsk and Beineu is only possible via the existing 1,460 km route: 'Saksaulsk-Irgiz-Karabutak-Khromtau-Aktobe-Kandyagash-Dossor-Kulsary-Beineu'. In contrast, the proposed 559 km Beineu-Bozoy-Saksaulsk road will provide a direct connection between these two settlements. Assuming an average travel speed of 81 km/h, including allowances for stops, the proposed BBS road will reduce the travel distance by approximately 900 km and decrease the travel time between Saksaulsk and Beineu by around three times (see [Table 3](#)).

Table 3 - Reduction in travel distance and travel time relative to the existing 1460-km Beineu-Saksaulsk route via Aktope

Item	Distance, S, km	Speed, V, km/h	Time		Note
			t, hours	t, min.	
Existing route	1460	81	18.02	1081.2	Beineu-Saksaulsk route (no Project)
Via proposed BBS road	559	81	6.9	414.0	Project road
Reduction in travel distance and time	901	-	11.12	667.2 (1081.2-414.0)	

From a regional transport perspective, the international TRACECA corridor extends for approximately 3,898 km within Kazakhstan, with an estimated travel time of 48.1 hours, assuming an average travel speed of 81 km/h, including stops. The implementation of the proposed Beineu-Bozoy-Saksaulsk road, with a total length of 559 km, will shorten the Kazakhstan section of the TRACECA corridor by approximately 901 km, thereby improving the efficiency of this key international transport route.

In addition, the proposed BBS road will reduce the travel distance between Beineu and Astana by approximately 950 km (from 2.582 km to 1.632 km) by providing access to the Centre-West Transport Corridor via 'Irgiz-Torgay-Arkalyk-Zhanteke-Astana' route. This will reduce travel time by approximately 11.1 hours, from 31.9 hours to 20.2 hours.

Accordingly, implementation of the Project road will provide the following benefits:

- Reduced travel distance and time for drivers and travellers,
- Reduced fuel consumption and vehicle operating costs (including vehicle wear and depreciation),
- Uninterrupted movement of transit traffic,
- Reduced atmospheric emissions in urban areas, including Greenhouse Gas (GHG) emissions,
- Reduced number of road traffic accidents and fatalities.

2.4.2 Alternative Alignments

Three road alignment options from village Beineu to village Saksaulsk were considered during the Project feasibility study, including:

- Option 1 (red) - Beineu-Bozoy-Saksaulsk (559 km),
- Option 2 (Green) - Beineu-Tassay station-Saksaulsk (577 km),
- Option 3 (Blue) - Beineu-Begimbet-Saksaulsk (580 km),

The road alignment options considered are shown in the **Figure 3**.

Based on the comparative assessment of the alternative road alignments, Option 1 - Beineu-Bozoy-Saksaulsk route (559 km) was selected as the preferred option, as it was considered the most optimal in terms of route length, connectivity to population centres, and overall technical and socioeconomic considerations.

One of the principal factors supporting the selection of the 559-km road alignment is its ability to provide connectivity to 17 settlements with a combined population of approximately 106,126; thereby offering substantially greater socio-economic benefits than the alternative alignments considered.

During the route selection process, concerns were raised by residents of several settlements located along the preferred alignment regarding the potential exclusion of their communities from the proposed corridor, which is regarded as a vital transport link for local mobility, access to services, and economic development. In response, extensive public consultations were undertaken across the Mangistau, Aktobe, and Kyzylorda regions, involving local settlements, civil society representatives, relevant government authorities, and other stakeholders under the coordination of the Ministry of Transport of the Republic of Kazakhstan.

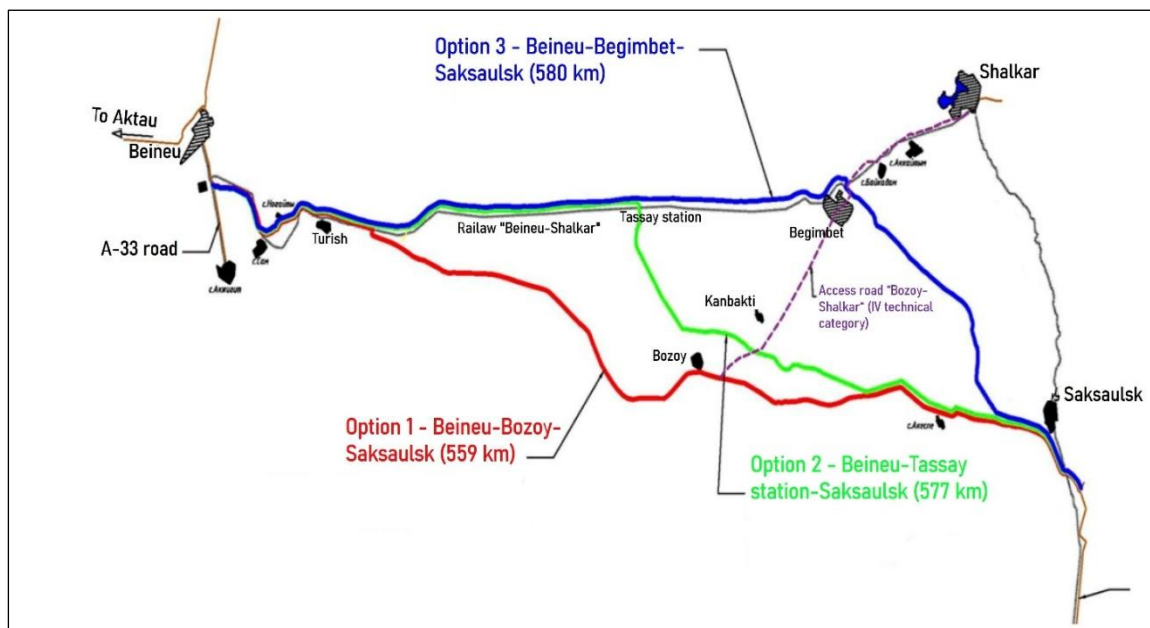


Figure 4 - Beineu-Saksaulsk road alignment options considered during the Feasibility Study

Taking into account the outcomes of these consultations, the 559-km BBS road alignment has been selected as the preferred option. The selected alignment was considered to provide the most balanced solution in terms of public interest, environmental and social performance, transport connectivity, and overall logistical efficiency.

2.4.3 Acceptability of Alternative Road Alignments in relation to the Ustyurt Saiga Population

When comparing the three proposed road alignment alternatives, particular attention should be paid not only to the direct crossing of animal habitats, but also to the cumulative impact of the new road in combination with the existing Shalkar-Beineu railway.

The results of GPS telemetry analysis of the Ustyurt saiga population indicate that the construction and subsequent operation of the Shalkar-Beineu railway have significantly altered the spatial behaviour of the animals. Following the commissioning of the railway, saigas were observed approaching the railway considerably less frequently, while access to areas on the opposite side of the railway line was substantially reduced. The railway is considered to function as a near-complete

barrier to animal movement, as no crossings of the railway line by tagged animals have been recorded since 2016.

An additional indication of the barrier effect is the significant reduction in the number of approaches by saigas to the railway. Prior to 2016, approximately 3.5% of GPS locations were recorded within 5 km of the future/existing railway, whereas following its construction, this proportion decreased to 0.064%, representing a reduction of approximately 98%. Analysis of the spatial distribution also indicates that the animals have shifted further away from the railway and have reduced their use of the adjacent areas (see [Figure 5](#)).

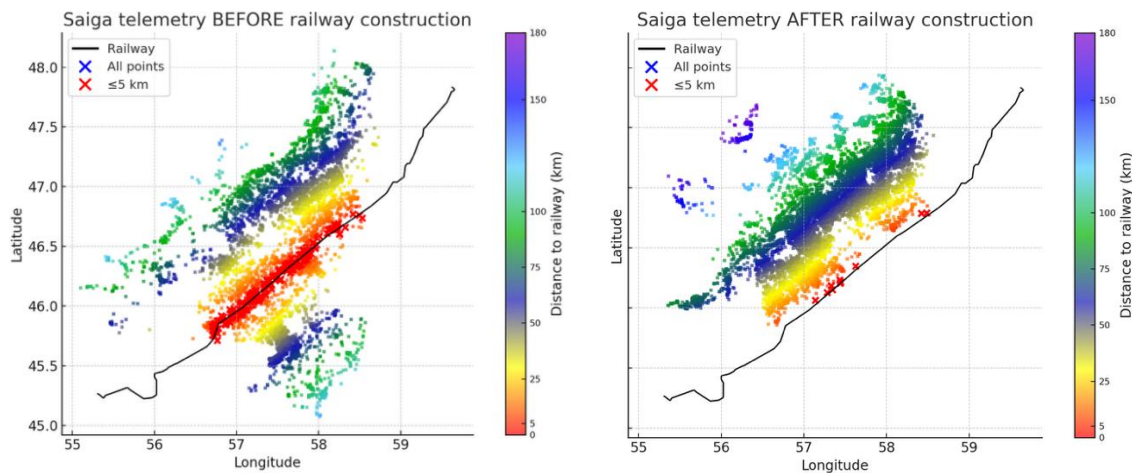


Figure 5 - Saiga telemetry before and after Shalkar-Beineu railway construction

Alternative Options 2 and 3

The main disadvantage of Alternatives 2 and 3 is that, over a significant length, they run parallel to the existing Shalkar-Beineu railway.

From the perspective of maintaining migration connectivity, this is potentially the most problematic configuration. Construction of a road immediately adjacent to an existing barrier could create a **cumulative transport corridor comprising both the railway and the road**, potentially further strengthening the existing barrier effect and reducing the permeability of the landscape for saiga movement.

The construction period is particularly important. Earthworks, the movement of heavy machinery, the presence of personnel, noise, lighting, and increased traffic activity may further deter saigas from approaching the railway. As a result, the animals may avoid even those sections of the railway where restoring landscape permeability or identifying suitable crossing locations may potentially be feasible in the future.

The negative influence of the alternative options 2 and 3 is outlined below:

- Increase the width of the zone of anthropogenic influence;
- Strengthen the existing avoidance of the railway corridor;
- Further reduce the likelihood that saigas will explore potential crossing locations;
- Make future measures to restore the permeability of the railway corridor more difficult;

- Create a *double-barrier* effect, whereby animals would need to cross two transport infrastructure corridors located in close proximity to each other.

When comparing Alternative Options 2 and 3, the Option 3 appears to be somewhat less adverse, as part of its alignment runs further north and farther from the main concentration zone of animal movements identified in the available telemetry data.

Option 1

From the perspective of the Ustyurt saiga population, Option 1 appears to be the **most preferable of the three alternatives under consideration**.

Its main advantage is that the new road would not run directly adjacent to the Shalkar-Beineu railway over a significant length. This would help avoid the formation of a single, wider transport corridor and reduce the likelihood of exacerbating the existing barrier effect of the railway.

An important advantage of Option 1 is the preservation of open space between the new road and the railway. This spatial separation of the two infrastructure corridors may allow saigas to continue approaching the railway and exploring it in search of potentially passable crossing locations. This is particularly important for the long-term potential to restore migration connectivity.

A disadvantage of Option 1 is that it would form a new, independent linear infrastructure corridor south of the existing railway and, in some sections, would pass through areas used by saigas according to the available telemetry data.

Therefore, for this option appropriate design measures should be incorporated to ensure that the new road does not become another impermeable barrier to saiga movement.

Conclusion

Based on the available data, **Option 1 is considered the preferred option from the perspective of minimising impacts on the migration of the Ustyurt saiga population**.

The main reason is not necessarily the absence of impacts from the road itself, but rather the opportunity to avoid creating a double, parallel barrier along the Shalkar-Beineu railway. Option 1 provides spatial separation between the two infrastructure corridors, preserves the area between them, and, importantly, maintains the possibility for saigas to approach and interact with the existing railway. This provides greater opportunities for the animals to identify potential crossing locations over time and for targeted measures to restore the permeability of the railway corridor to be implemented in the future.

2.4.4 Alternative design options for road components

An interchange is proposed at the beginning of the BBS road, near the settlement of Beineu. Three alternative layouts for the trumpet-type interchange were evaluated during the preparation of the local Feasibility Study (FS):

- Option 1: Horizontal curve radius of 500 m,
- Option 2: Horizontal curve radius of 550 m,
- Option 3: Horizontal curve radius of 800 m.

Following a comparative assessment of the three options, Option 3 was selected, with a minimum horizontal curve radius of 800 m, as it complies with the requirements of Table 8 of SP RK 3.03-101-2013 *Highways*.

2.5 Project Justification

According to the message of Kassym-Jomart Tokayev, the President of the Republic of Kazakhstan dated 8th of September 2025:

- It is essential to continue developing the transport and logistics sector. As is well known, our country (Kazakhstan) serves as a key link between Europe and Asia. The development of the Trans-Caspian Transport Route is also of strategic importance for Kazakhstan. All these routes should function as a unified system, generating substantial revenue for our country, attracting new investment in infrastructure, and creating high-quality jobs. Digital solutions should be widely implemented, as efficiency cannot be achieved without them.
- It is also necessary to continue developing highways along the key transport corridors. At present, 13,000 kilometres of roads are under construction or rehabilitation across the country. Priority attention should be given to international transit corridors. Construction of the "Saksaulsk-Beineu" road should be accelerated, as it will reduce transit time for freight travelling from China to Europe through the territory of Kazakhstan by almost one-third.

The construction of the BBS road will facilitate the redistribution of existing traffic flows, establish access for the rural settlements located along the BBS road to the existing road infrastructure, reduce travel times for both passengers and freight, improve travel comfort and safety, lower transportation costs for freight operators, and contribute to a reduction in the number of road traffic accidents.

The most significant socio-economic benefits associated with the development of the road network, including the Project Road, are expected to include:

- a) Improved living standards and social conditions,
- b) Stimulation of economic activity through enhanced access to new territories and resources, and expansion of market opportunities,
- c) Reduction of the transport component in the cost of goods and services,
- d) Improved transport services for the agricultural sector,
- e) Improved year-round accessibility to rural settlements through the construction of paved access roads,
- f) Creation of new employment opportunities,
- g) Reduction of the adverse environmental impacts associated with the transport sector,
- h) Enhanced resilience and response capacity in emergency situations.

2.6 Associated Facilities

According to the EBRD ESP (2024), facilities or activities that are not financed under the Bank's loan agreement but are, in the EBRD's view, significant for the success of the Project or for achieving agreed project outcomes are considered Associated Facilities⁴.

Based on the Consultant's review, the 273 km section of the BBS Road (km 286 to km 559), to be financed by the ADB and DBK, together with its associated supporting infrastructure, including RMUs, access roads, and other auxiliary facilities may be considered **associated facility**.

The High-Level Environmental and Social Assessment of the Project's associated facility is presented in **Annex 3**.

⁴These are new facilities or activities: (i) without which the project would not be viable, and (ii) which would not be planned, constructed, expanded or carried out if the project did not exist.

3 Applicable Legal and Regulatory Framework

3.1 National requirements

3.1.1 Environmental Legislation

- The Environmental Code of the RoK (2021)⁵,
- EIA Organization and Implementation Procedure (approved by the Order No. 280 dated 30.07.2021 of the RoK Minister of environment, geology and natural resources)⁶,
- Instruction on Determining the Category of a Facility Having a Negative Impact on the Environment (approved by the Order No. 246 dated 13.07.2021 of the Minister of Ecology, Geology and Natural Resources)⁷,
- Rules for Conducting Public Hearings (approved by the Order No. 286 dated 03.08.2021 of the RoK Minister of environment, geology and natural resources)⁸,
- Rules for Issuing Environmental Permits, the Submission of Environmental Impact Declarations, and the Forms of Environmental Impact Permits and the Procedures for Their Completion (approved by the Order No. 319 dated 09.08.2021 of the RoK Minister of environment, geology and natural resources)⁹,
- The Law on Permits and Notifications (2014)¹⁰,
- The Water Code (2025)¹¹,
- The Law on Soil Protection (2026)¹²,
- The Land Code of the RoK (2003)¹³,
- The Code on Subsoil and Subsoil Use of the RoK (2017)¹⁴,
- The Forest Code of the RoK (2003)¹⁵.

3.1.2 Social Legislation

- The Constitution of the RoK (1995)¹⁶,
- The Labor Code of the RoK (2015)¹⁷,
- The Law on State Guarantees of Equal Rights and Equal Opportunities for Men and Women (2009)¹⁸,

⁵<https://adilet.zan.kz/rus/docs/K2100000400>

⁶<https://adilet.zan.kz/rus/docs/V2100023809>

⁷<https://adilet.zan.kz/rus/docs/V2100023538#z21>

⁸<https://adilet.zan.kz/rus/docs/V2100023901>

⁹<https://adilet.zan.kz/rus/docs/V2100023928>

¹⁰<https://adilet.zan.kz/rus/docs/Z1400000202>

¹¹<https://adilet.zan.kz/rus/docs/K2500000178#z1655>

¹²<https://adilet.zan.kz/rus/docs/Z2600000341>

¹³<https://adilet.zan.kz/rus/docs/K0300000442>

¹⁴<https://adilet.zan.kz/rus/docs/K1700000125>

¹⁵<https://adilet.zan.kz/rus/docs/K0300000477>

¹⁶<https://adilet.zan.kz/rus/docs/K950001000>

¹⁷<https://adilet.zan.kz/rus/docs/K1500000414>

¹⁸<https://adilet.zan.kz/rus/docs/Z0900000223>

- Rules for Compulsory Periodic Certification of Production Facilities for Working Conditions (approved by the Order No. 1057 dated 28.12.2015 of the RoK Minister of health and social development)¹⁹,
- Law on State Property of the RoK (2011)²⁰,
- Social Code of the RoK (2023)²¹,
- The Public Health and Healthcare System Code of the RoK (2020)²²,
- The Law on Education of the RoK (2007)²³,
- The Anti-corruption Law of the RoK (2015)²⁴.

3.2 Applicable EBRD, EU and Other Requirements

The main requirements to EBRD clients are described in the Bank's ESP (2024). In order to achieve sustainable outcomes when implementing their projects, the clients shall follow the specific E&S PRs.

Based on the review of the available data / information, the following EBRD ESRs are considered applicable to the Project:

- ESR 1: Assessment and Management of Environmental and Social Risks and Impacts,
- ESR 2: Labour and Working Conditions,
- ESR 3: Resource Efficiency and Pollution Prevention and Control,
- ESR 4: Health, Safety and Security,
- ESR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement²⁵,
- ESR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources²⁶,
- ESR 7: Indigenous Peoples²⁷,
- ESR 8: Cultural Heritage²⁸,
- ESR 9: Financial Intermediaries²⁹,
- ESR 10: Information Disclosure and Stakeholder Engagement.

The list of EU substantive environmental standards relevant to the Project includes but is not limited to the following directives/regulations:

¹⁹<https://adilet.zan.kz/rus/docs/V1500012743>

²⁰<https://adilet.zan.kz/rus/docs/Z1100000413>

²¹<https://adilet.zan.kz/rus/docs/K2300000224#z3394>

²²<https://adilet.zan.kz/rus/docs/K2000000360>

²³<https://adilet.zan.kz/rus/docs/Z070000319>

²⁴<https://adilet.zan.kz/rus/docs/Z1500000410>

²⁵Land acquisition issues can be raised when the land-plot allocation for the road lane enlargement is needed.

²⁶Biodiversity impacts will occur due to the new land-plot to be allocated for road enlargement purposes.

²⁷Not relevant to this study.

²⁸As earth / excavation works are required, archaeological, historic or cultural remains may be discovered.

²⁹Not relevant to this study.

- Directive 2011/92/EU, as amended by Directive 2014/52/EU, on assessment of the effects of certain public and private projects on the environment (the EIA Directive)³⁰,
- Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) (the Industrial Emissions Directive)³¹,
- Directive 2009/147/EC on the conservation of wild birds (the Birds Directive)³²,
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive)³³,
- Directive 2008/98/EC on waste (Waste Framework Directive)³⁴,
- Directive 2003/10/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)³⁵,
- Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)³⁶.

The listed below international conventions and protocols relating to E&S, as transposed into national legislation, may also be applied:

- Convention on Biological Diversity and Cartagena Protocol on Biosafety,
- Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters,
- As of now, the RoK ratified 26 **International Labor Organization (ILO) conventions** including 10 fundamental conventions³⁷:
 - No. 29 - Forced Labour Convention, 1930,
 - No. 87 - Freedom of Association and Protection of the Right to Organise Convention, 1948,
 - No. 98 - Right to Organise and Collective Bargaining Convention, 1949,
 - No. 100 - Equal Remuneration Convention, 1951,
 - No. 105 - Abolition of Forced Labour Convention, 1957,
 - No. 111 - Discrimination (Employment and Occupation) Convention, 1958,

³⁰Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. <https://eur-lex.europa.eu/eli/dir/2014/52/oj>.

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification). <https://eur-lex.europa.eu/eli/dir/2011/92/oj>

³¹Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (recast). <https://eur-lex.europa.eu/eli/dir/2010/75/oj>

³²Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version). <https://eur-lex.europa.eu/eli/dir/2009/147/oj>

³³Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. <https://eur-lex.europa.eu/eli/dir/1992/43/oj>

³⁴Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. <https://eur-lex.europa.eu/eli/dir/2008/98/oj>

³⁵Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise). <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:042:0038:0044:EN:PDF>

³⁶Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration). https://eur-lex.europa.eu/resource.html?uri=cellar:546a09c0-3ad1-4c07-bcd5-9c3dae6b1668.0004.02/DOC_1&format=PDF%20

³⁷ILO. 2021. Ratifications for Kazakhstan.

https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:103542

- No. 138 - Minimum Age Convention, 1973,
- No. 155 - Occupational Safety and Health Convention, 1981,
- No. 182 - Worst Forms of Child Labour Convention, 1999,
- No. 187 - Promotional Framework for Occupational Safety and Health Convention, 2006.

3.3 Good Industry Practice (GIP) Guidance

Specific E&S requirements applicable to the Project are set out in the EBRD's Sub-sectoral Environmental and Social Guidelines: Building and Construction Activities (2010)³⁸. They elaborate on typical E&S risks related to construction, operation, maintenance and decommissioning of facilities. Other relevant EBRD guiding documents used in the ESIA relate to resettlement; forced labour; gender issues, non-discrimination and equal opportunity; workers' accommodation; and other E&S topics.

The International Finance Corporation (IFC) **General Environmental, Health and Safety Guidelines (2007)**³⁹ (General EHS Guidelines) are technical reference documents with general and industry-specific examples of GIP. The General EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in facilities by existing technology at reasonable costs.

³⁸https://www.ebrd.com/downloads/about/sustainability/Building_Construction_Activities.pdf

³⁹<https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-en.pdf>

4 The Proposed ESIA Process and Methodology

4.1 ESIA Process

The key stages of the ESIA study are as follows:

- Screening,
- Scoping,
- Baseline Study,
- Impact Assessment and Mitigation,
- Management and Monitoring,
- Stakeholder Engagement and Public Consultations.

The ESIA process will be undertaken in accordance with the EBRD policies and standards and the national legislation requirements.

4.1.1 Screening

Screening is the process of determining the likely significance of a project's E&S risks and impacts, thereby establishing the need for an ESIA. In accordance with the EBRD ESP (2024), the Project has been classified as a Category A project. Consequently, a comprehensive ESIA, together with the associated environmental and social documentation and management plans, must be prepared and publicly disclosed for a minimum period of 120 days.

4.1.2 Scoping

The results of the scoping phase are described in the Scoping Report. Scoping is one of the major parts of the ESIA process. Scoping involves the preliminary identification of **aspects** of the Project and related **E&S impacts/risks**⁴⁰. Specific components of the natural or social environment that might be affected by the Project are referred to as **environmental or social receptors**⁴¹.

Potential environmental and social interactions are identified by cross-referencing the Project activities (i.e. construction, operation, maintenance) with the surrounding environmental and social baseline conditions. Potential interactions and impacts are identified using scoping matrices, impact trees, expert judgement, and stakeholder consultations. Based on this assessment, impacts are scoped either into or out of the subsequent ESIA process, as follows:

- No interaction identified, or no discernibly significant interaction identified; therefore, no discernible impact is anticipated. Such interactions are scoped out of the ESIA process.
- An interaction is identified with the potential to result in moderate to significant negative or positive impacts. Such interactions are scoped into the ESIA process for detailed assessment.

⁴⁰The term "impact" refers to any change in the state of natural or social environment attributed to the Project.

⁴¹Example environmental receptors are habitats disturbed as a result of earthworks / construction activities; example social receptors are residents of houses located next to the Project road to be extended.

During impact identification, consideration is given to the following types of potential impacts and risks:

- **Direct impacts:** Impacts resulting directly from Project activities that occur at the same time and in the same location/space as the activity. Also referred to as primary impacts, these are the immediate consequences for the environmental or social receptors.
- **Indirect impacts:** Impacts resulting from a chain of activities associated with or induced by the Project. These typically occur later in time, may extend beyond the immediate Project area, and are reasonably foreseeable.
- **Cumulative impacts:** Impacts resulting from the interaction of the Project's impacts with each other or with those of other past, present, or reasonably foreseeable future projects and activities within the same area. These impacts arise from the incremental effect of the Project when added to other existing or planned actions.
- **Residual impacts:** Impacts that remain after the implementation of mitigation, enhancement, and other environmental and social management measures associated with the Project.

4.1.3 Baseline Study

To provide a context within which the impacts of the Project can be assessed, a description of physical, biological, socioeconomic (social, economic and health safety) conditions / environment that are expected to prevail in the absence of the Project should be presented. In this respect, it is necessary to have comprehensive data pertaining to baseline environmental, social and socioeconomic conditions that can be obtained in the course of baseline information (primary and secondary) collection process.

The secondary baseline information/data were gathered from the documentation prepared within the Project design and national EIA study and provided by the EBRD and JSC KazAvtoZhol for the Consultant's internal use. In addition, the baseline information relating to the Project region, components and associated facilities has been collected by the Consultant from the publicly available sources, reports, online databases and interactions with Project stakeholders. The list of documents/information used/to be used in the course of secondary baseline data collection is set out in **Section 1.5** of this ESIA report.

Where necessary or if there is a lack of information, the secondary baseline information should be supplemented by the primary data to be collected/obtained during the field surveys/investigations.

The biodiversity field surveys were conducted in 2025-2026. As part of the national EIA, the field surveys were conducted on 12 and 14 August, 2025. The primary objective of these surveys was to identify locations of the road crossings for migratory wild animals, primarily the saiga. As a part of the ESIA, the field survey was conducted from August 17 to 21, 2026. The objective of this study was to examine the locations previously recommended during the national EIA, assess their suitability for continued use by animals during seasonal migrations, describe the habitats of the surveyed areas, the condition and characteristics of vegetation, topography, and soil cover, and identify the main types of anthropogenic impacts.

4.1.4 Impact Assessment and Mitigation

Impact significance is determined as a function of a receptor's sensitivity (environmental or social value) and the magnitude (extent of change to the natural or social environment) of the impact. This section sets out the approach to determining impact significance through:

- Assigning receptor sensitivity (environmental or social value),
- Assigning impact magnitude,
- Assigning significance,
- Assessing residual impacts,
- Assessing cumulative impacts,
- Mitigation and enhancement.

Assigning Receptor Sensitivity

The proposed descriptors and criteria for the sensitivity of a receptor are given below.

Table 4 - Definitions for Sensitivity of Receptors

Sensitivity	Typical Criteria Descriptors
High	High or very high importance and rarity, international or national scale and very limited to no potential for substitution
Medium	Medium importance and rarity, regional scale, limited potential for substitution
Low	Low importance and rarity, local scale
Very low	Very low importance and rarity, local scale

Assigning Impact Magnitude

Magnitude relates to the "size" or "amount" of an impact. It is a function of various magnitude criteria including the impact's extent (i.e. the spatial dimension of the impact), duration (i.e. the temporal dimension of the impact), and reversibility (i.e. whether the impact is temporary (within a reasonable timescale) or permanent). In order to help define the range of impact magnitudes, the definition given in the table below will be used.

Table 5 - Definitions for Impact Magnitude

Magnitude Category	Typical Criteria Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, permanent / irreversible change, features or elements (Adverse)
	Large scale or major improvement of resource; extensive restoration or enhancement, permanent change major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not affecting integrity, partial loss of/damage to key characteristics, features or elements (Adverse)
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)

Magnitude Category	Typical Criteria Descriptors
Low	Some measurable change in attributes, quality or vulnerability, minor loss of or alteration to one (possibly more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (possibly more) key characteristics, features or elements, some beneficial impact on attribute or a reduced risk of a negative impact occurring (Beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial)
No change	No loss or alteration of characteristics, features or elements, no observable impact in either direction.

Assigning Impact Significance

Assigning impact significance relies on reasoned argument, professional judgement and consideration of the views and advice of appropriate stakeholders. Some topics may have their predicted impacts assessed using quantitative thresholds and scales in the determination of significance. Assigning each impact to one of five significance categories enables different topic issues to be placed within the same scale to allow a direct comparison. The five significance categories are given in the [Table 6](#).

Table 6 - Definitions for Impact Significance

Significance Category	Typical Criteria Descriptors
Major	Very large or large magnitude of change in environmental or socio-economic conditions. Impacts, both adverse and beneficial, which are likely to be important considerations at a national and regional level or could result in breaches of legally enforceable environmental protection mechanisms.
Moderate	Intermediate magnitude of change in environmental or socio-economic conditions. Impacts that are likely to be important considerations at a regional and local level.
Minor	Small magnitude of change in environmental or socio-economic conditions. Impacts may be raised as local issues but are unlikely to be of importance in the project's permitting process.
Negligible	No discernible change in environmental or socio-economic conditions. Impacts that are likely to have a negligible or neutral influence, irrespective of other impacts.

It is important to note that significance categories are required to be determined for both positive (beneficial) and negative (adverse) impacts / risks.

The greater the receptor sensitivity and the greater the impact magnitude, the more significant the impact. The consequence of a highly sensitive receptor suffering a major detrimental impact would be a very large significant adverse impact. The determination of impact significance is shown below in the impact significance matrix.

Table 7 - Impact Significance Matrix

Impact Magnitude	Receptor Sensitivity / Value			
	High	Medium	Low	Very Low
High	Significant	Significant	Moderate	Minor
Medium	Significant	Moderate	Minor	Minor
Low	Moderate	Moderate	Minor	Negligible
Negligible	Moderate	Minor	Negligible	Negligible

Assessment of Residual Impacts

Significance of residual impacts will be assessed using the same approach as described above. Residual impacts should be environmentally and socially acceptable. Typically, negative residual impacts assessed as being either of minor (or negligible) significance are considered to be environmentally and/or socially acceptable. Negative residual impacts assessed as being either of major or moderate significance are environmentally and/or socially unacceptable unless they can be offset by other positive impacts of the project or controlled through the imposition of permitting conditions and/or specific actions implemented through the project's E&S management and monitoring plan.

Assessment of Cumulative Impacts

Cumulative effects will be assessed as part of the ESIA process where they are predictable both within the project and in combination with existing and reasonably foreseeable future projects. Cumulative effects will be considered as either additive or interactive effects. Additive effects will be those effects for which a change in a receptor may be added to (or subtracted from) a similar change to the same receptor (e.g. the combination of several similar impacts on one receptor). Interactive effects will be those effects for which a change in a receptor may be added to (or subtracted from) a different change to the same receptor (e.g. the combination of different impacts on one receptor).

Cumulative impact assessment will be based on the stepped process described in the International Finance Corporation's "Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets" (2013)⁴².

Mitigation and Enhancement

A key component of the ESIA process is to explore practical ways of avoiding or reducing potentially significant impacts of the study. These are referred to as mitigation measures and are incorporated

⁴²Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets" (2013).

https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment.

into the Project as commitments. The objective of mitigation is to prevent, minimize or manage significant negative impacts to as low as reasonably practicable and to optimize and maximize any potential benefits / opportunities of the Project, where applicable.

A hierarchy of mitigation options is considered with the preference to avoid the impact at source, and least desirable option is to provide compensation or an offset for residual impacts that cannot be further reasonably avoided.

All mitigation measures outlined within the ESIA will be summarized in an Environmental and Social Management Plan (ESMP) for the Project and will present an overview of how the mitigation measures for this Project will be implemented during the reconstruction and operation stages.

4.1.5 Management and Monitoring

On the final stage of the impact assessment process, the basic management and monitoring measures are defined to identify whether: a) residual impacts or their associated Project objects remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

4.1.6 Stakeholder Engagement and Public Consultations

The international practice for the implementation of an ESIA and the requirements of the EBRD provide the basis to conduct active consultations with the competent supervisory agencies, experts, affected local communities and other stakeholders. This is undertaken in order to understand their views of the Project and its impacts and to take these into account in predicting and evaluating of impacts and the corresponding mitigation measures. Consultation is also valuable for the identification of data and information in the studied area.

Within the framework of this ESIA a Stakeholder Engagement Plan (SEP) will be developed (including a grievance mechanism) in order to be used, as a structured and systematic approach for stakeholder engagement, during all stages of the implementation of the Project.

5 Delineation of the Project Area

5.1 Introduction

The Project Road section of the proposed Beineu-Bozoy-Saksaulsk road comprises the construction and operation of a 286 km road section extending from km 0 to km 286. The Project begins near the town of Beineu and terminates in an uninhabited area located approximately 40 km from the settlement of Bozoy (**Figure 3**). This section constitutes the EBRD- and IBRD-financed portion of the proposed BBS road.

The Project includes all permanent and temporary facilities required for the construction and operation of the road, including, but not limited to:

- the main carriageway, shoulders, pavement structure, embankments, cuttings, drainage and erosion protection works,
- access road to Turysh settlement,
- intersection (at the beginning of the Project road),
- bridges, overpasses, agricultural machinery crossings, cattle crossings and culverts,
- bus stops, rest areas and associated roadside infrastructure,
- Road Maintenance Unit (RMU),
- road signs, road markings, safety barriers, lighting (where applicable), and traffic management facilities,
- temporary construction camps, asphalt and batching plants, construction material and spoils storage areas, temporary access roads, where these are developed specifically for the Project.

The ESIA study also considers associated facilities that are functionally linked to the Project and are necessary for its implementation or operation, where applicable, in accordance with the requirements of the EBRD ESP (2024). These facilities are described separately in this report (see **Section 2.6**).

The Project Area of Influence (Aoi) extends beyond the permanent Project footprint and includes areas that may be affected by direct, indirect and cumulative environmental and social impacts during the construction and operation phases. The extent of the Aoi has been defined separately for each environmental and social aspect, taking into account the nature and significance of the potential impacts.

5.2 Environmental and Social Study Areas

The environmental baseline study area for the Project includes:

- 1) The km 0 - km 286 road section, including its permanent footprint and adjacent areas of potential direct and indirect impact, as well as the access road to Turysh settlement,
- 2) The locations of RMUs and a 100 m sanitary protection zone around each facility,
- 3) The potential locations of spoil storage and disposal areas (to be confirmed),

- 4) The potential locations of the construction camps, as well as asphalt and concrete batching plants (to be confirmed),
- 5) Residential areas that may experience construction traffic and visual impact due to the Project activities,
- 6) A corridor extending approximately 500 m on either side of the Project road alignment for biodiversity baseline studies, including the Ustyurt Plateau area for saiga antelope surveys,
- 7) The entire Project footprint, including all temporary construction facilities and work areas, as well as a 100 m corridor on either side of the Project road alignment for cultural heritage studies,
- 8) The areas along the Project road relevant to the assessment of physical environmental parameters, including:
 - for air quality impacts a corridor extending approximately 250 m on either side of the Project road alignment during the both construction and operation phases,
 - for noise and vibration impacts a corridor of 100 m on either side of the Project Road alignment during the both construction and operation phases,
 - water quality in the water bodies/water channels that flow along with and/or cross the project road or are located in its vicinity and which may be affected by construction or operational activities.

To note: some of the Project facilities such as construction camps, asphalt and batching plants, spoil storage/disposal areas, topsoil storage areas, etc. are not currently defined and will be determined later by the Construction Contractor.

The social baseline study area (as aligned with the Project's potential socio-economic areas of Influence)⁴³ for the Project comprises:

- 1) Persons and facilities that may be affected by land acquisition and land use restrictions related to the arrangement of the Project facilities (the road, RMUs, etc.),
- 2) Villages located along the Project and access roads (for all social parameters),
- 3) Syngyrlau, Sam, Nogayti and Turysh settlements, as well as Beineu district of Mangistau region and Baigassin and Shalkar districts of Aktobe region (for demography, ethnicity, religion, and language use, employment, incomes and expenditure, and less socially protected and vulnerable groups, gender issues, public infrastructure, households' engagement in the different economy sectors),
- 4) Mangistau and Aktobe regions (for demography, ethnicity, religion, and language, employment, incomes and expenditures, and gender issues).

⁴³The socio-economic study area is aligned with the socio-economic areas of influence:

- **Core socio-economic area of influence** (study area): this area comprises the territories of the rural settlements (administrative units) that are adjacent to the proposed route and access roads and where the socio-economic receptors are exposed to impacts related to land acquisition, restricted access, and other local impacts.
- **Socio-economic area of influence** (study area): this area includes the territories of Syngyrlau, Sam, Nogayti, Turysh and Bozoy settlements, as well as Beineu district of Mangistau region and Baigassin and Shalkar districts of Aktobe region, where the socio-economic receptors are exposed to direct impacts, including employment opportunities and related impacts, tax revenues, and impacts of the associated projects and transport operations.

6 Environmental and Social Baseline

6.1 Geography, Geomorphology and Relief

The proposed Beineu-Bozoy-Saksaulsk road traverses the territories of the Beineu District of Mangystau Region, the Bayganin and Shalkar Districts of Aktobe Region, and the Aral District of Kyzylorda Region. The administrative map of the Mangystau, Aktobe and Kyzylorda regions is shown in **Figure 6**.



Figure 6 - Administrative map of Mangystau, Aktobe and Kyzylorda regions

The studied road section (km 0 - km 286) extends from the settlement of Beineu in the Mangystau Region and terminates approximately 40 km before reaching the settlement of Bozoy in the Aktobe Region. Within Mangystau Region, the road corridor passes in the vicinity of Syngyrlau, Turysh, Nogayty and Sam settlements, before crossing into Aktobe Region and terminating at Bozoy. The overall alignment of the Project road follows a predominantly north-easterly direction.

The Project area is located within the southeastern edge of the Caspian Depression. The area is sparsely populated, with relatively few permanent settlements, while the extensive territories of the Ustyurt Plateau are used as grazing lands for livestock. In addition to livestock farming, the regional economy is characterised by a well-developed extractive industry, primarily oil and gas production, supported by associated operational infrastructure. This includes temporary workers' settlements, some of which subsequently evolve into permanent settlements.

The Ustyurt Plateau is an elevated plain with an average elevation of 200-300 m above sea level, exhibiting a very gentle slope towards the northeast. Geomorphologically, the plateau is an almost perfectly flat plain, interrupted only by occasional gently undulating uplands. In some areas, shallow enclosed depressions occur, occupied by solonchaks (salt flats), shallow saline lakes, or

accumulations of sand. The plateau is bordered on all sides by steep escarpments dissected by dry valleys and ravines.

The surface of the plateau gently slopes from approximately +150 m in the northwest to +80 m in the southeast. The relief is further complicated by prominent escarpments, isolated residual hills (outliers), shallow depressions, and small topographic lows, some of which are occupied by takyr (hard clay pans). The average local relief amplitude generally does not exceed 5-10 m.

The southern part of the plateau contains a relatively large endorheic (closed) depression, up to 20 m deep, extending approximately 35 km in an east-west direction and averaging 8-10 km in width. In the southeast lies the northern extremity of the Sam Massif, characterized by stabilized hummocky and ridge-like sand dunes, where the local relief dissection reaches up to 10 m.

To the west and northeast, the Ustyurt Plateau is bounded by steep escarpments, which are particularly well developed along the western margin, where they attain heights of up to 200 m. In the northwestern part of the area, the broad valley of the Zhilandy stream deeply incises the plateau. The eastern side of the valley is high and steep in its upper reaches, whereas the western side is gentler and dissected by numerous ravines.

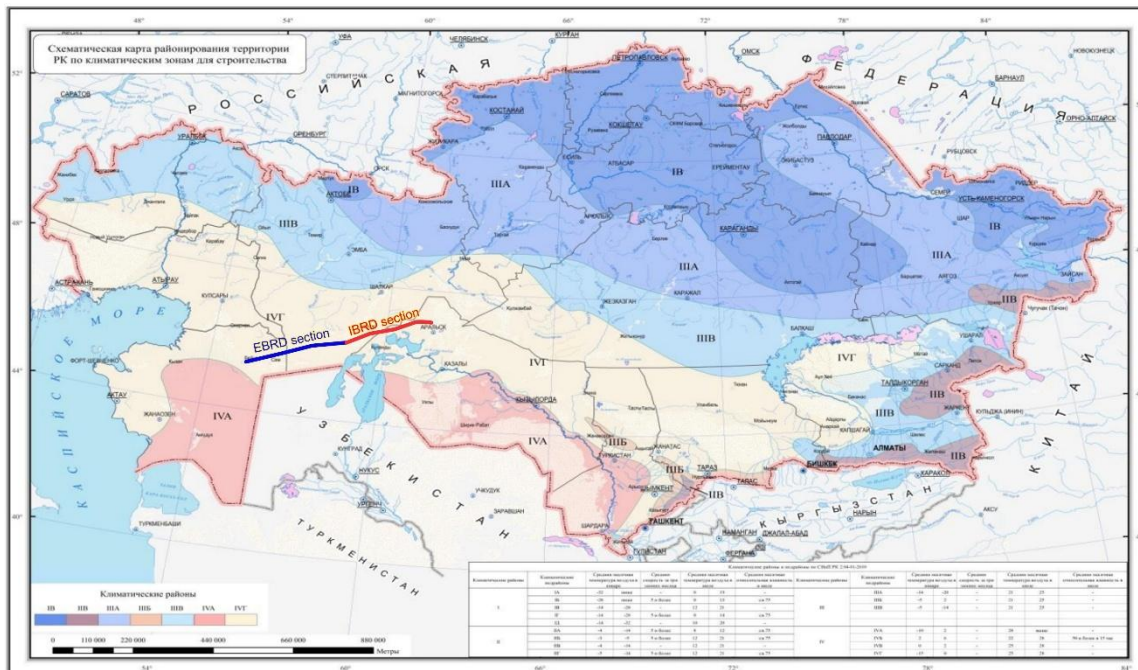
The northeastern part of the plateau is heavily dissected by ravines and is characterized by numerous promontories projecting towards the Caspian Lowland. Immediately at the foot of the Ustyurt escarpment, the surface of the lowland is interrupted by extensive closed depressions known as sors (saline playas), which form a belt ranging from 1 to 8 km in width.

The Project area is served by a network of paved and unpaved (earth) roads. During the dry season, the unpaved roads are generally passable for motor vehicles. However, the interdune depressions, the floors of which are occupied by salt flats (sors), are difficult to traverse and, in some locations, are completely inaccessible.

6.2 Landscape

The region is characterised by desert and semi-desert landscapes that exhibit low resilience to anthropogenic impacts, as the prevailing climatic conditions are generally unfavourable for the formation and regeneration of soil and vegetation cover (**Figure 7**).





6.3.1 Mangistau Region

The Mangystau Region is located east of the Caspian Sea on the Mangyshlak (Mangystau) Plateau and borders the Atyrau and Aktobe Regions to the northeast.

The climate of the Mangystau Region is shaped predominantly by Arctic, Iranian, and Turanian air masses. The mean temperature in January, the coldest month of the year, ranges from -5°C to -8°C in the northern part of the region and from -1°C to -4°C in the southern part.

Table 8 - Climatic profile of the Mangistau Region

№	Climatic parameters	Data from Beineu MS
1	Mean annual air temperature	+6.9°C
2	Mean temperature of the warmest month (July)	+23.6°C
3	Mean temperature of the coldest month (January)	-6.2°C
4	Design temperature of the coldest five-day period:	
4.1	98% probability of occurrence	-25.3°C
4.2	92% probability of occurrence	-14.9°C
5	Absolute maximum air temperature	46.1°C
6	Absolute minimum air temperature	34.7°C
7	Number of days with hail	1
8	Number of days with thunderstorms	3
9	Number of days with glaze ice	3
10	Number of days with fog	12
11	Number of days with dust storms	7

Table 9 - Average monthly and annual air temperature, °C (in Mangystau Region)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Meteorological station Beineu												
-6.2	-5.1	2.9	12.7	20.5	26.5	28.9	27.2	19.5	10.9	1.7	-4.2	11.3
Meteorological station Sam												
-7.4	-6.2	2.1	12.2	20.0	25.8	28.4	26.4	18.6	10.0	0.8	-5.1	10.5

The Project area is characterized by frequent winds, predominantly from the east and southeast during the winter months, and from the west and northwest during the summer months. The long-term average annual wind speed ranges from 2.5 to 4.1 m/s. The strongest winds typically occur during the winter months. During the summer, the prevailing winds are predominantly hot, dry winds, which contribute to arid climatic conditions.

Relative humidity follows an inverse seasonal pattern, with the lowest values recorded during the summer months (35-43%) and the highest during winter (77-85%). The long-term average annual relative humidity ranges from 58% to 62%.

6.3.2 Aktobe Region

The Aktobe Region is situated between the Caspian Lowland to the west, the Ustyurt Plateau to the south, the Turan Lowland to the southeast, and the southern foothills of the Ural Mountains to the north.

The region has a sharply continental climate, characterized by cold winters and hot, dry summers. During the summer months, hot, dry winds and dust storms are common, while snowstorms and blizzards frequently occur in winter.

Table 10 - Climatic profile of the Aktobe Region

№	Climatic parameters	Data from Shalkar MS
1	Mean annual air temperature	+5.8°C
2	Mean temperature of the warmest month (July)	+24.4°C
3	Mean temperature of the coldest month (January)	-13.8°C
4	Design temperature of the coldest five-day period:	
4.1	98% probability of occurrence	-33.0°C
4.2	92% probability of occurrence	-29.9°C
5	Design temperature of the coldest day:	
5.1	98% probability of occurrence	-36.1°C
5.2	92% probability of occurrence	-32.4°C
6	Absolute maximum air temperature of the warmest month	44.3°C
7	Absolute minimum air temperature of the coldest month	-45.0°C
8	Average wind speed	4.1 m/s
9	Annual precipitation	178 mm
10	Number of days with hail	0.03
11	Number of days with thunderstorms	14
12	Number of days with glaze ice	9
13	Number of days with fog	24
14	Number of days with snowstorms	7
15	Number of days with dust storms	3

Table 11 - Average monthly and annual air temperature, °C (in Aktobe Region)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Meteorological station Ayakkum												
-10.0	-9.2	-0.3	11.0	18.7	24.7	26.8	24.8	17.0	8.3	-0.8	-7.5	8.6
Meteorological station Shalkar												
-12.7	-12.2	-3.3	9.6	17.5	23.7	25.6	23.6	16.0	7.3	-2.4	-9.7	6,9

Relative humidity exhibits an inverse seasonal pattern. The lowest relative humidity values occur during the summer months (35-43%), while the highest values are recorded during winter (77-85%). The long-term average annual relative humidity ranges from 58% to 62%.

The Project area is characterized by frequent winds, predominantly from the east and southeast during the winter months and from the west and northwest during the summer months. The long-term average annual wind speed ranges from 2.5 to 4.1 m/s. The strongest winds typically occur during the winter months. During the summer, the prevailing winds are predominantly hot, dry winds, which are characteristic of arid and semi-arid regions.

Precipitation data from the Beineu and Shalkar meteorological stations are presented in the diagrams shown **Figure 9**.

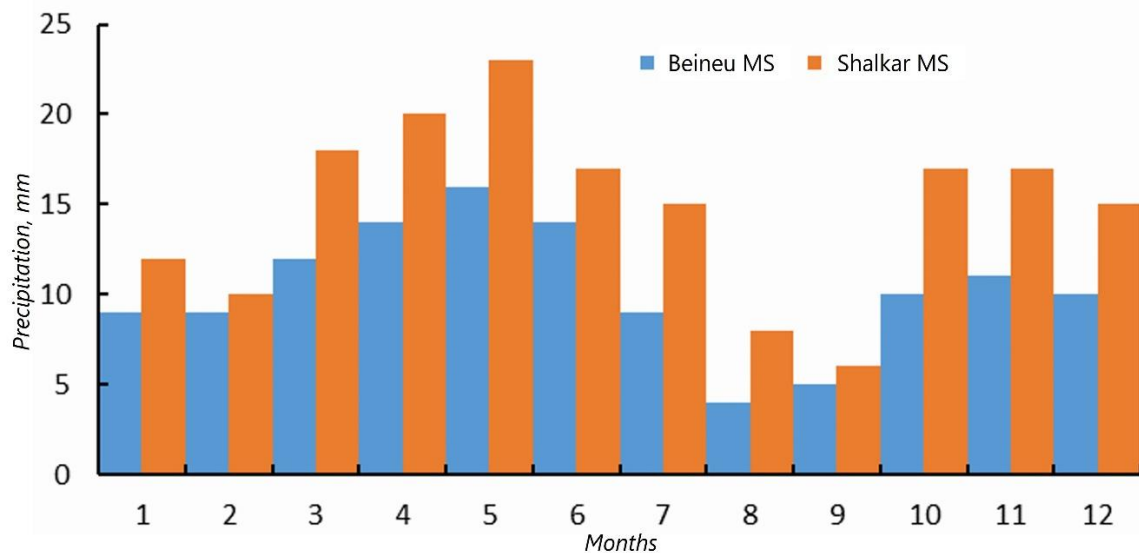


Figure 9 - Average monthly precipitation (data from Beineu and Shalkar meteorological stations)

6.4 Climate Change Profile

The Project road is located within the arid and semi-arid climatic zones of western Kazakhstan, traversing the Mangystau and Aktobe regions. These regions are characterised by low annual precipitation, high evaporation rates, frequent droughts, strong winds, and large seasonal and diurnal temperature fluctuations. The climate is highly continental, with hot summers, cold winters, and generally low humidity (see also **Section 6.3**).

According to the IPCC Sixth Assessment Report (AR6) and CMIP6 climate model projections, Kazakhstan is expected to experience significant warming throughout the 21st century under all Greenhouse Gas (GHG) emission scenarios. The World Bank Climate Change Knowledge Portal indicates that western Kazakhstan is particularly vulnerable to increasing temperatures, water stress, and climate variability.

Projected changes under the CMIP6 Shared Socioeconomic Pathway (SSP) scenarios include:

- SSP2-4.5 (Intermediate emissions scenario):
 - Mean annual air temperatures are projected to increase by approximately 2.0-3.0°C by the mid-century period (2041–2060) and 2.5-4.0°C by the end of the century (2081-2100) relative to the 1995-2014 baseline,
 - Heatwaves are projected to become more frequent, longer in duration, and more intense.

- SSP5-8.5 (Very high emissions scenario):
 - Mean annual temperatures are projected to increase by approximately 3.0-4.0°C by mid-century and 5.0-7.0°C by the end of the century.
 - Extreme heat events are expected to increase substantially, with a significant rise in the number of very hot days and tropical nights.

Precipitation projections remain more uncertain than temperature projections. Climate models generally indicate relatively modest changes in annual precipitation totals across western Kazakhstan; however, precipitation is expected to become more variable, with an increase in the frequency and intensity of short-duration heavy rainfall events interspersed with longer dry periods. Rising temperatures will also increase potential evapotranspiration, exacerbating drought conditions and water scarcity despite limited changes in total annual rainfall.

6.5 Geology and Engineering Geological Conditions

The current terrain of the study area has evolved over a prolonged period of continental development that began following the regression of the Pontic Sea. Geomorphological processes continue to shape the terrain at the present time.

Four principal genetic landform types can be distinguished within the study area:

- **Structural-Denudational Landform Type:** This landform type corresponds to the weakly dissected post-Pontic surface of the Ustyurt Plateau, which represents the oldest geomorphological unit within the study area. The morphology of the plateau is primarily controlled by the underlying tectonic structure.
- **Denudational Landform Type:** Within the study area, the denudational landform type is represented by two subtypes. The first comprises the Middle Pliocene-Quaternary erosional and landslide slopes (chinks), while the second consists of Quaternary and modern erosional landforms, primarily represented by gullies and ravines.
- **Accumulative Landform Type:** The accumulative landform type is represented by three subtypes within the study area. The first comprises the Khvalynian marine plain, the second consists of the modern proluvial piedmont apron, and the third is represented by the modern lacustrine-sor plain.
- **Deflation-Accumulative Landform Type:** This landform type is represented by Quaternary hummocky and ridge-shaped aeolian sands, including the Sam Sand Massif.

The Caspian Depression is one of the most complex structural elements of the ancient East European Platform (Russian Platform). It constitutes the world's largest salt-dome basin, underlain by a deeply buried Precambrian crystalline basement.

The depression extends from the foothills at the southern end of the Ural Mountains to the Volga River, and from the southern spurs of the General Syrt Upland to the northern coast of the Caspian Sea. The geological succession of the Caspian Depression comprises rock formations ranging in age from the Archean and Proterozoic crystalline basement to Neogene and Quaternary deposits.

The following Engineering Geological Units (EGUs) have been identified within the Project area based on soil classification, consistency, and salinity characteristics:

- **EGU-0** - Topsoil (soil-vegetation layer),
- **EGU-1** - Sandy sandy loam, stiff consistency,
- **EGU-1-1** - Silty sandy loam, stiff consistency,
- **EGU-2** - Heavy silty loam, stiff consistency,
- **EGU-2-1** - Light silty loam, stiff consistency,
- **EGU-2-2** - Light sandy loam, stiff consistency,
- **EGU-2-3** - Heavy silty loam, soft plastic consistency,
- **EGU-3** - Fine dune sand, ranging from slightly moist to moist,
- **EGU-3-1** - Fine sand, ranging from slightly moist to water-saturated,
- **EGU-4** - Silty sand, ranging from slightly moist to water-saturated,
- **EGU-5** - Weak, weathered to slightly weathered coquina (shell limestone).

No hazardous physical-geological processes have been identified in the study area.

According to SP RK 2.03-30-2017 '*Construction in Seismic Zones*', the seismicity of the region is assessed at 5-6 points on the seismic intensity scale.

6.6 Underground and Soil Cover

The Mangystau Region is endowed with a diverse and extensive mineral resource base, characterised by a wide variety of mineral deposits, substantial reserves, and favourable geological conditions for their extraction. The region is recognised as one of Kazakhstan's most important mining and hydrocarbon-producing areas. A total of 59 oil and gas fields have been identified and explored within the Mangystau Region. Proven oil reserves are estimated to exceed 3 billion tonnes. In addition to hydrocarbons, the region contains significant deposits of uranium and rare earth elements.

Limestone coquina (shell limestone) is widely distributed at or near the ground surface across much of the region. Other identified mineral resources include brown coal (five known occurrences), copper, rock salt, mineral salts, and chalk.

The Project area is predominantly covered by desert calcareous soils with very low organic matter (humus) content and a high degree of salinisation and gypsification. The vegetation is characteristic of the desert zone and is dominated by saltwort-wormwood and wormwood-saltwort communities.

In the northern part of the study area, within the brown soil subzone, vegetation is dominated by saltwort-wormwood communities with a significant proportion of wormwood (*Artemisia* spp.). The dominant salt-tolerant shrubs include biyurgun (*Anabasis* spp.), tasbiyurgun, and izen (*Kochia prostrata*). Psammophytic (sand-adapted) vegetation is well developed on sandy massifs, while saline soils (solonchaks) support various species of glasswort (*Salicornia* spp.) and Suaeda spp.

In the southern part of the study area, within the grey-brown soil subzone, vegetation is characterised by wormwood-saltwort communities dominated by salt-tolerant shrubs, particularly biyurgun (*Anabasis* spp.), boyalych (*Salsola arbusculiformis*), and other species of the genus *Salsola*. Within these communities, wormwood (*Artemisia* spp.) plays a less prominent role.

The study area is characterised by the presence of primitive marine saline (sor) soils, which lack a humus horizon and are unsuitable for agricultural use. The soils are highly saline, with sulphates being the dominant soluble salts, although significant concentrations of chlorides are also present.

Most of the area is occupied by wormwood-saltwort desert vegetation, interspersed with patches of dwarf shrub communities occurring on brown desert soils. Parts of the landscape are covered by solonchaks (saline soils), solonetz soils, and sandy areas supporting only sparse vegetation. The desert is briefly covered by ephemeral vegetation, predominantly bulbous species, during spring and, to a lesser extent, in autumn.

The soil-vegetation layer is distributed throughout the study area and has a thickness ranging from 10 to 30 cm. It consists primarily of loam and sandy loam soils. The soils are hard, slightly moist, loess-like, loose, and saline, containing only sparse remnants of herbaceous plant roots. According to GOST 17.5.1.03-86, the soils within the surveyed area are classified as marginally suitable for topsoil stripping, storage, and subsequent land reclamation.

6.7 Hydrogeology

The Mangystau-Ustyurt Region occupies the arid southwestern part of Western Kazakhstan and forms a complex artesian basin constituting the western portion of the extensive Turan Platform. The region is characterized by an extremely arid and sharply continental climate, resulting in the near absence of a permanent surface drainage network. Annual precipitation is generally low, ranging from 100-150 mm in the southern part of the region to 170-210 mm in the north and 200-220 mm in the central part of the Mangystau Peninsula.

Groundwater occurs within a variety of lithological and stratigraphic rock complexes. In the fractured metamorphosed clay shales, sandstones, mudstones, and siltstones of Permian-Triassic age, which crop out in the central part of the Mangystau region, groundwater occurs as unconfined fractured aquifers. Along the outer margins of the mountain massifs, these aquifers become confined (artesian). The depth to groundwater generally ranges from 0-50 m to 140-150 m, while within structural depressions groundwater-bearing formations occur at depths of several hundred metres to more than one thousand metres.

The Jurassic water-bearing formations consist predominantly of sandstones, sands, and siltstones interbedded with conglomerates and clay layers. Within their outcrop area in the Karatau Range, groundwater is predominantly unconfined and occurs at depths of 0-30 m. Away from the outcrop areas, the aquifers become confined and occur at depths ranging from 900 m to 2,590 m or more.

Groundwater within the Cretaceous deposits discharges at the crests, flanks, and periclinal zones of the anticlines forming the Central Mangystau-Ustyurt structural system, where it emerges as springs. Elsewhere, these aquifers are encountered at depths ranging from 10-200 m to 600-700 m, while in the remaining parts of the region they occur at depths of approximately 300-1,500 m.

The Paleogene-Lower Miocene water-bearing formations, consisting of sands, sandstones, marls, and limestones, form a continuous belt around the peripheral part of the Mangystau tectonic system. These formations are exposed along the escarpments (*chinks*) of the Ustyurt Plateau and are intercepted by boreholes elsewhere in the region. Groundwater within these deposits generally occurs at depths ranging from 50 m to 250-400 m.

Deposits of Middle Miocene to Lower Pliocene age are developed around the margins of the Mangystau tectonic system. Groundwater contained within the sandy-carbonate sequences of the Chokrakian and Konkian stages of the Middle Miocene occurs as either unconfined or weakly confined aquifers. These waters discharge as springs along the plateau escarpments (*chinks*) and within topographic depressions, and are encountered by excavations and boreholes at depths ranging from 2.5-15.5 m to approximately 80 m.

The Sarmatian and Pontian-Maeotian carbonate deposits contain predominantly unconfined groundwater, which is typically encountered at shallow depths ranging from 3-10 m to 10-30 m below ground level.

Within the sandy massifs of the northeastern part of the South Mangystau Trough, the Buzachi Peninsula, and the North Ustyurt Depression, groundwater occurs as unconfined aquifers at depths ranging from 1-6 m to 15-40 m below ground level. Groundwater within deluvial-proluvial and marine deposits is distributed sporadically and generally occurs at depths ranging from 0.5-2 m to 8-10 m.

Groundwater (shallow) recharge occurs primarily through the infiltration of atmospheric precipitation within the outcrop areas of water-bearing formations, leakage from underlying aquifers, and inter-aquifer flow between hydrostratigraphic units in accordance with their stratigraphic and topographic (hypsothetic) positions. In areas adjacent to through-flowing valleys in the central part of the Mangystau Peninsula, groundwater recharge is supplemented not only by precipitation but also by floodwaters and storm runoff.

Groundwater discharge occurs at the foothills of mountain massifs, along the escarpments (*chinks*) and ravines, and within deep depressions such as the Karagiye and Karynzhyark depressions. Additional groundwater discharge takes place through upward seepage across low-permeability strata and through groundwater abstraction from wells.

6.8 Hydrology

There is no permanent hydrographic network within the Project area. Ravines and stream channels draining towards the Zharynkuduk solonchak (km 0 - km 40), the Sam sor (km 80 - km 130), the Amantay-Matay sor (km 150 - km 160), the Kosbulak sor, and other depressions that dissect the escarpments (*chinks*) of the Ustyurt Plateau are filled with water only during heavy rainfall events and spring snowmelt. The resulting runoff flows towards local depressions, forming temporary lakes that dry out during the hot season.

6.8.1 Surface Water

Within the Mangystau region there are no surface water bodies in the immediate vicinity of the proposed Project road section, RMU) and the proposed access road to the village of Turysh.

According to Letter No. 3T-2025-04276898 dated 10 December 2025 issued by the Zhaiyk-Caspian Basin Inspectorate for the Regulation, Protection and Use of Water Resources under the Committee for the Regulation, Protection and Use of Water Resources of the Ministry of Water Resources and Irrigation of the Republic of Kazakhstan, and obtained as part of the local Feasibility Study (FS), a

review of the proposed road alignment confirmed that the Project is located outside the designated water protection zones and water protection belts of the Caspian Sea.

As per the *RoK Rules for Establishing the Boundaries of Water Protection Zones and Water Protection Belts*⁴⁶ approved by the Order № 120-NK of the Ministry of Water Resources and Irrigation of the RoK:

- **Water Protection Zone** is an area adjacent to a water body in which a special land-use regime is established to prevent the pollution, contamination, and depletion of water resources.
- **Water Protection Belt** is the portion of the water protection zone immediately adjoining a water body, where additional restrictions on land use and economic activities apply beyond those established for the water protection zone.

Within the Bayganin and Shalkar Districts of Aktobe Region, the proposed 161 km Project road section is located outside the water protection zones and water protection belts of surface water bodies.

6.8.2 Ground Water

No dedicated hydrogeological field investigations or groundwater monitoring were undertaken within the Project road corridor as part of the local Feasibility Study (FS). Consequently, the hydrogeological baseline has been developed based on available archival data and published hydrogeological information.

As described in **Section 6.7**, groundwater within the wider Project area occurs in several aquifer systems associated with Permian-Triassic, Jurassic, Cretaceous, Paleogene-Lower Miocene, Middle Miocene-Lower Pliocene and Quaternary deposits. Groundwater occurrence is controlled by the regional geological structure and varies considerably across the Project area. Shallow unconfined groundwater is generally encountered within Quaternary and younger sedimentary deposits at depths ranging from approximately 0.5 to 30 m below ground level (bgl), although depths of up to 40 m bgl may occur locally. Deeper groundwater occurs within confined or semi-confined aquifers associated with older geological formations, with groundwater typically encountered at depths of 50-400 m bgl and, in some locations, exceeding 1,000 m bgl. These deeper aquifers constitute the principal regional groundwater resources used for water supply.

6.9 Visual Amenity

An approximately 73 km earth road currently connects the town of Beineu with the village of Turysh, which is located approximately 825 m from the proposed Project road alignment. In addition to Turysh, three rural settlements: Syngyrlau (approximately 1,400 m), Sam (138 m) and Nogayti (207 m), are situated at varying distances from the existing road (**Figure 10**). The road also provides access to several sites of cultural and spiritual significance.

⁴⁶<https://adilet.zan.kz/rus/docs/V2500036238>

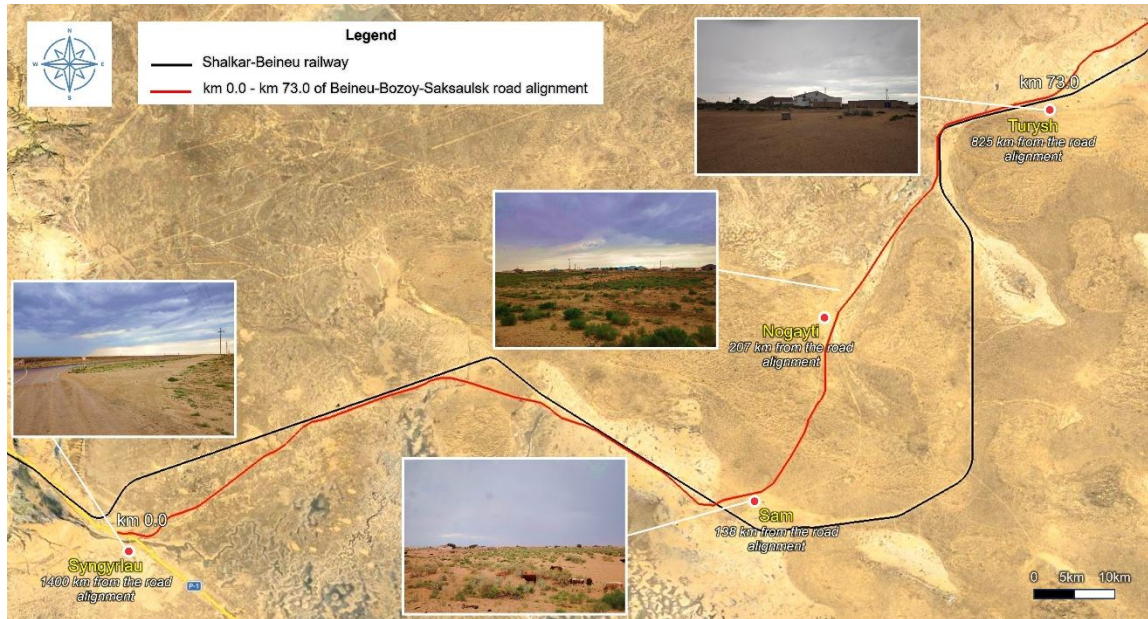


Figure 10 - Settlements along the earth road connecting Beineu town with Turysh village

No settlements are located along the Project route between km 73 and km 286, where the EBRD-study section terminates approximately 40 km before reaching the Bozoy settlement. There is currently no continuous road connecting these locations. However, a network of local unpaved access roads exists throughout this section of the Project area. These roads are primarily used to provide access to and maintain regional infrastructure, including the gas pipeline, compressor stations, overhead transmission lines (OTLs), and other utility assets.

6.10 Air quality

The baseline assessment of ambient air quality has been undertaken using monitoring data collected by the Republican State Enterprise (RSE) Kazhydromet through the national environmental monitoring network of the National Hydrometeorological Service.

The nearest to the Project area air monitoring station in Mangistau region is located in Beineu town, where up to seven ambient air quality parameters are monitored within the town:

- Particulate Matter (PM_{2.5}),
- Particulate Matter (PM₁₀),
- Sulphur dioxide (SO₂),
- Carbon monoxide (CO),
- Hydrogen sulphide (H₂S),
- Ozone (O₃),
- Ammonia (NH₃).

According to data from the Beineu monitoring station, the ambient air quality was assessed as having a low level of pollution. This assessment was based on an Air Pollution Index (API) of 3 (low), a Standard Index (SI) of 1.8 (low), determined for hydrogen sulphide (H₂S), and a Highest Repeatability (HR) of 0% (low).

There are no ambient air quality monitoring stations located in the vicinity of the Project road within the Aktobe Region. In general, ambient air quality in the region is influenced by emissions from a number of large industrial facilities, primarily associated with oil and gas production and processing. According to the 2025 ambient air quality monitoring data for the Aktobe Region, the level of air pollution was classified as very high, based on a SI of 16.1 (very high) and a HR of 3% (elevated), both recorded for H₂S.

6.11 Traffic Density

According to the traffic forecast presented in the local Feasibility Study (FS), the projected traffic volume for the BBS road section is estimated at 5,842 vehicles per day by 2045 (the 20-year design horizon), assuming an average annual traffic growth factor of 1.05, compared with 2,097 vehicles per day in the 2025 baseline year. When expressed in Passenger Car Units (PCUs), the projected traffic volume reaches 13,626 PCU/day, which is consistent with the design requirements for a Category II highway.

The traffic composition is dominated by passenger cars, which account for 58.01% of the total traffic volume. Trucks with trailers and semi-trailers represent 30.62%, while two- and three-axle trucks account for 10.21%. Buses comprise 0.95% of the traffic, with tractors and motorcycles contributing 0.18% and 0.03%, respectively.

6.12 Noise and Vibration

The settlements located along the Project section (km 0-km 326) of the proposed BBS road are situated at the following distances from the road alignment:

- Syngyrlau - 1400 m,
- Sam - 138 m,
- Nogayti - 207 m,
- Turysh - 825 m.

The Project area is characterised by a sparsely populated rural environment with generally low levels of anthropogenic noise. The existing acoustic environment is typically dominated by intermittent vehicle movements, agricultural machinery during seasonal activities, livestock, and natural sounds such as wind.

The Threshold Limit Values (TLVs) for equivalent (average) and maximum noise/sound levels established by the *Hygienic Standards for Physical Factors Affecting Humans*, approved by Order of the RoK Minister of Health No. KP DSM-15⁴⁷ dated 16.02.2022 (amended in 2025) are broadly comparable with the noise criteria set out in the *IFC Environmental, Health, and Safety General Guidelines* (2007)⁴⁸ and *WHO Guidelines for Community Noise* (1999). The national TLVs and the applicable IFC/WHO guideline values for noise are presented in **Table 12**.

⁴⁷<https://adilet.zan.kz/rus/docs/V2200026831/history>

⁴⁸<https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-en.pdf>

Table 12 - Threshold limit values (TLV) for noise

№	Premises and territories, receptors		Threshold limit values (TLV), dBA		
			National		WHO
			Equivalent to sound level	Maximum sound level	One hour equivalent to sound level
1	Workplace (occupational exposure)		80		85
2	Industrial, commercial (shops, trading halls, etc.)		60	75	70
3	Territories adjacent to residential buildings, clinics, ambulatories, rest houses, care homes, disabled persons homes, libraries, kinder gardens, schools and other educational facilities	day-time ⁴⁹	55	70	55
		night-time ⁵⁰	45	60	-

During the socio-economic consultation mission to the Project area in August 2026, the Consultant conducted 10-minute spot noise measurements at residential areas within the settlements of Syngyrlau, Sam, Nogayti, and Turysh using sound data loggers "General-DSM20". The results of these measurements are summarised in **Table 13**.

Table 13 - Results of noise measurements in Syngyrlau, Sam, Nogayti, and Turysh settlements

Equivalent (average) noise levels, dBA			
Syngyrlau	Sam	Nogayti	Turysh
53	47	48	50

Ground-borne vibration sources are also limited under existing conditions. Occasional vibration may be generated by the passage of heavy agricultural machinery or trucks on local roads; however, these events are infrequent and short in duration. Consequently, baseline vibration levels in residential areas are negligible.

6.13 Natural Hazards

The Mangystau and Aktope regions are generally characterized by low exposure to hydrological hazards but high exposure to climatic and geological hazards associated with their arid and semi-arid environments.

The typical natural hazards and their relevance to the Project area are summarised in **Table 12**.

⁴⁹09:00-22:00 on weekdays, 10:00-23:00 on weekends

⁵⁰22:00-09:00 on weekdays, 23:00-10:00 on weekends

Table 14 - Summary of typical natural hazards

Hazard	Mangystau Region	Aktobe Region (Project Area)	Relevance to the Project
Drought	High	High	Frequent prolonged droughts affecting vegetation, water availability, and dust generation.
Strong winds	Moderate to High	Moderate to High	Can affect construction activities, traffic safety, and increase aeolian erosion.
Extreme heat	High	High	Summer temperatures exceeding +40°C and winter temperatures below –30°C; affects pavement performance, equipment, and worker safety.
Frost and icing	Moderate	High	Seasonal hazard affecting road safety and construction scheduling.
Desertification	Moderate	Moderate	Progressive land degradation and loss of vegetation cover.
Wildfires	Moderate	Moderate	Driven by compounding high summer temperatures and severe drought, wildfires can result to asset deterioration, disruption of services and accidents.
Flooding	Low	Low	Limited to ephemeral streams (wadis/dry valleys) during intense rainfall or snowmelt; flash floods may occur locally.
Earthquakes	Low	Low	Project area generally lies within 5–6 MSK intensity seismic zone according to Kazakhstan seismic zoning.
Landslides	Very Low	Very Low	Due to predominantly flat terrain.
Mudflows (debris flows)	Very Low	Very Low	Not typical because of low relief.

6.14 Cultural Heritage

The protection of historical and cultural heritage sites within construction areas, as well as the procedures governing the use of such areas for economic activities, are regulated by the Law of the RoK No. 288-VI ZRK *On the Protection and Use of Historical and Cultural Heritage Objects*⁵¹ dated 26.12.2019.

The legislation of the RoK strictly prohibits any destruction or damage to archaeological heritage sites. Construction and other ground-disturbing activities within the protection zones of cultural heritage sites may only be undertaken with the permission of the competent executive authorities and following a preliminary scientific archaeological assessment. Such an assessment must be carried out by a specialized research institution holding a State licence authorizing the performance of archaeological investigations.

⁵¹<https://adilet.zan.kz/rus/docs/Z1900000288>

In accordance with the *Rules for the Delineation of the Protection Zone, Development Regulation Zone, and Protected Natural Landscape Zone of Historical and Cultural Heritage Sites, and the Regime for Their Use*⁵² approved by the Order No. 86 of the RoK Minister of Culture and Sport, a **40 m protection zone** shall be established from the outer boundaries of each cultural heritage object.

The archaeological assessment of the BBS road corridor was carried out within the Beineu District of the Mangystau Region, the Bayganin and Shalkar Districts of the Aktobe Region, and the Aral District of the Kyzylorda Region. The assessment covered the 40 m-wide road right-of-way (RoW) (20 m on either side of the road centerline) along the entire 559 km road alignment, as well as a broader Study Area extending 100 m on either side of the road centerline.

The findings of the archaeological assessment are presented in Archaeological Assessment Report No. AES-521, dated 30.06.2025, prepared by Archaeological Expertise Limited Liability Partnership (LLP).

In total, eight historical and cultural heritage sites were identified during the archaeological survey conducted within the Study Area (**Figure 11**). Of these, four sites are located within the EBRD-financed section of the Project road (km 0.0 - km 286.0) (**Table 15, Figure 12**), while the remaining four sites are located within the ADB and DBK-financed sections (km 286.0 - km 559.0).

Table 15 - Historical and cultural heritage units identified within the Project road (km 0.0 - km 286.0) Study area

No	Name of Cultural Heritage unit	GPS coordinates	Location towards the road alignment	Description
1	Burial mounds (Early Iron Age) Figure 12, a)	45°25'42.77"C 55°59'51.83"B	99 m west of the road centerline.	Located 7.6 km west of the village of Turysh, near the Sam Sands. The burial mound consists of an earthen embankment with a circular plan, measuring 10 m in diameter and 0.3 m in height.
2	Burial mounds (Early Iron Age) Figure 12, b)	45°41'05.17"C 56°55'23.21"B	Located 52 m north of the road centerline. The statutory protection zone surrounding the burial mound has been disturbed.	Located 17 km southeast of the Zharkum railway siding, the burial mound is situated on the crest of a watershed between the two large salt flats, Altaisor and Asmantay-Matay. The burial mound is an earthen construction of circular shape, with a diameter of 10 m and a height of 0.3 m.
3	Remains of desert kites (Early Iron Age) Figure 12, c)	NW angle: 45°41'29.38"C 56°57'14.11"B SE angle: 45°41'22.52"C 56°57'33.13"B	Located on the road centerline. The protection zone of the desert kite (arrow-shaped stone hunting	Located 19 km southeast of the Zharkum railway siding, on a flat area at the top of the bank of the Asmantay-Matay salt flat. The heritage site is represented by an arrow-shaped structure in plan view, known as an "aran". The aran is oriented

⁵²<https://adilet.zan.kz/rus/docs/V2000020395>

No	Name of Cultural Heritage unit	GPS coordinates	Location towards the road alignment	Description
		SW angle: 45°41'21.36" C 56°57'14.56" B	structure) has been disturbed.	in a southeasterly direction. The enclosure walls and pit traps are constructed of stone. Similar arans were used as ancient hunting structures for saiga antelope and other animals. The approximate dimensions of the entire structure are 250×475 m. The height of the remaining wall sections varies from 0.2 m to 0.6 m, while the maximum depth of the pit traps reaches 1.5 m. The total area occupied by all structural elements of this aran is estimated to be at least 0.4 ha.
4	Remains of desert kites (Early Iron Age) Figure 12, d)	NE angle: 45°41'45.52"C 56°57'25.51"B SE angle: 45°41'36.69"C 56°57'01.56"B SW angle: 45°41'31.64"C 56°57'10.85"B	117 m north of the road centerline.	Located 19 km southeast of the Zharkum railway siding, on a flat area at the top of the bank of the Asmantay-Matay salt flat, 100 m north of the similar arrow-shaped structure (Unit No. 3). In fact, the two structures represent a single heritage site, conditionally divided into northern and southern structures. Unlike the southern structure, the northern structure is oriented in a northeasterly direction. Its approximate dimensions are 255×590 m. The total area occupied by all structural elements of this aran is at least 0.6 ha. All other structural features of the two structures are generally identical. The remains of these ancient hunting structures are widespread throughout the Mangystau Region. Despite their uniqueness and the fact that they have no known analogues across Eurasia, they remain insufficiently studied to date.

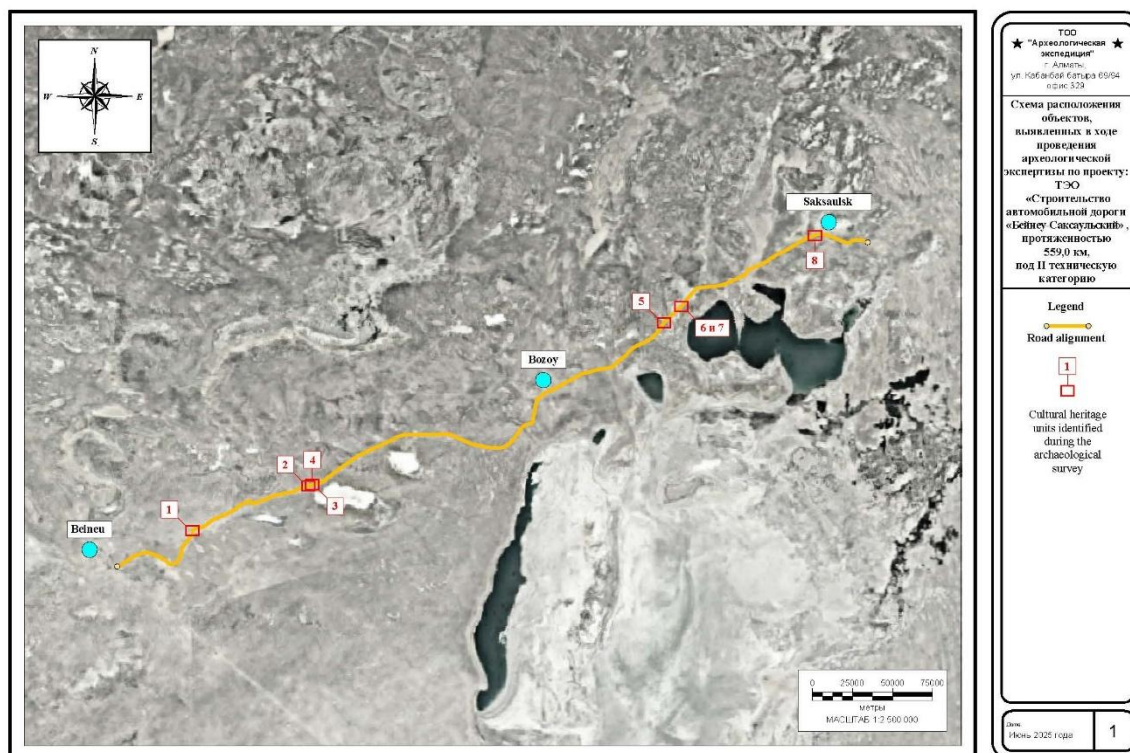
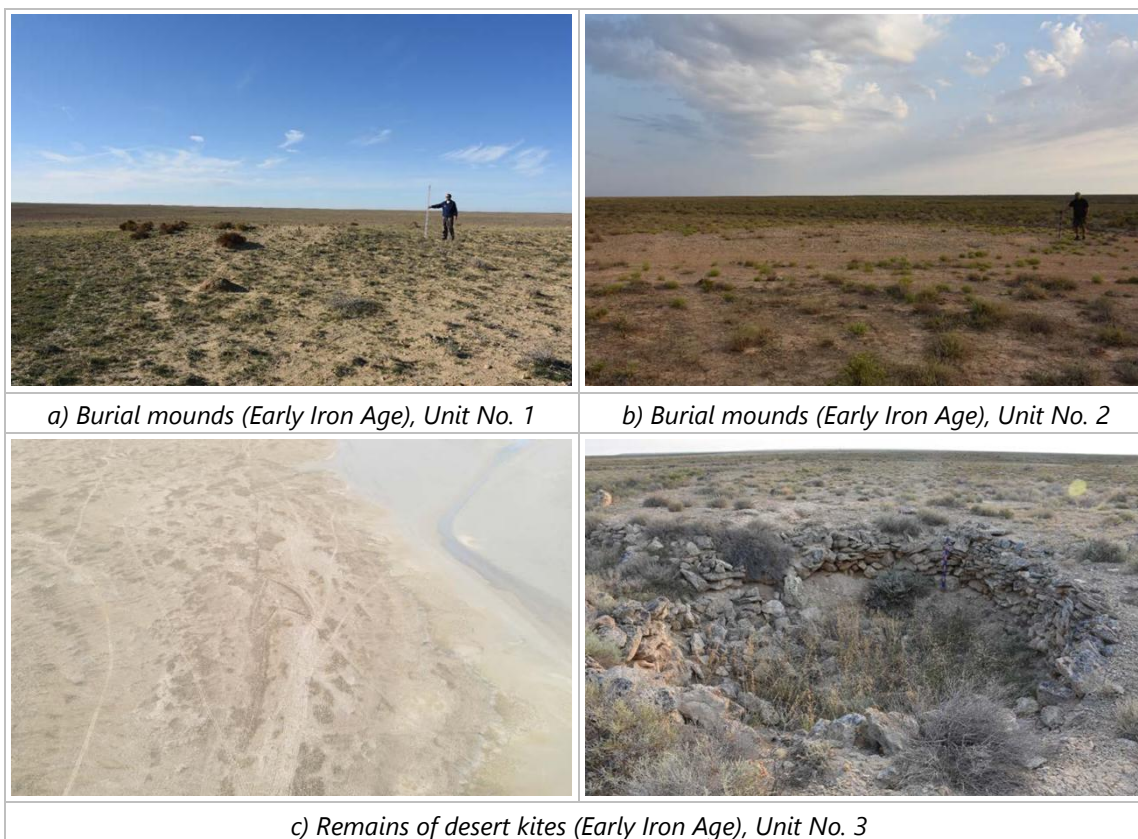


Figure 11 - Cultural heritage units identified within the Study area of the BBS road alignment





d) Remains of desert kites (Early Iron Age), Unit No. 4

Figure 12 - Photos of the identified historical and cultural heritage units

6.15 Protected Areas

Kazakhstan has 120 Specially Protected Natural Areas (SPNAs), covering more than 10% of the country's land area, with a total extent of approximately 29.3 million hectares (ha). The national protected area network comprises 10 State Nature Reserves, 14 State National Nature Parks, 7 State Nature Reserves (Nature Reserve Areas), 50 State Nature Sanctuaries (Zakazniks), 5 State Protected Zones, 6 State Botanical Gardens, 1 State Dendrological Park, and 25 State Natural Monuments of Local Importance.

The list of SPNAs in the Mangystau and Aktope regions are presented in **Table 16**.

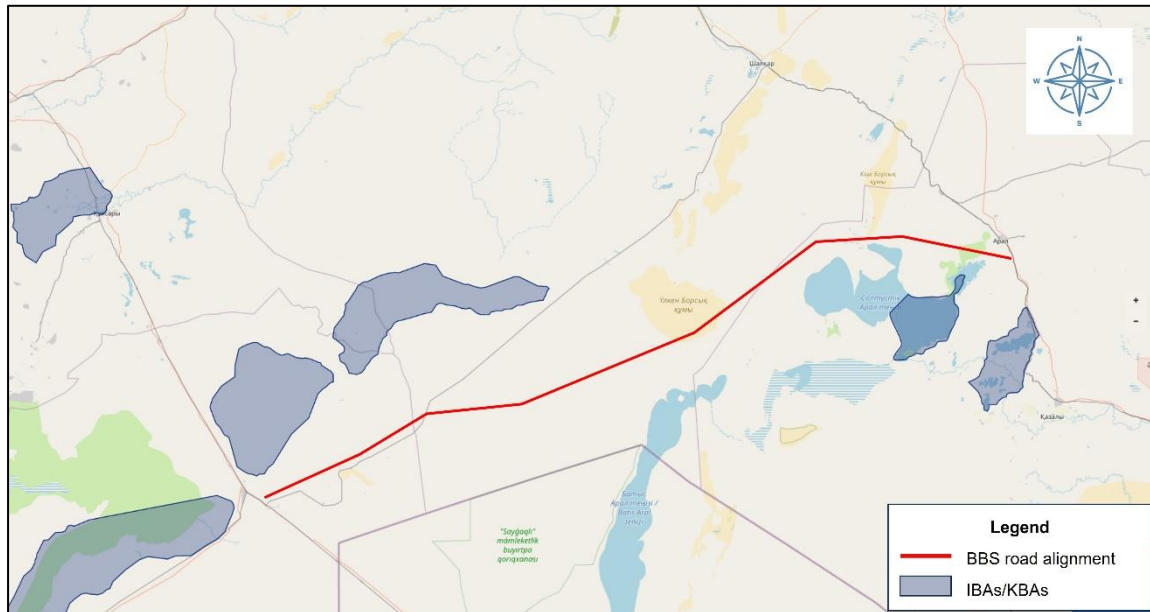
Table 16 - SPNAs in the Mangystau and Aktope Regions

No	Name of the SPNA	Area, km ²	District
Mangystau Region			
1	Ustyurt State Nature Reserve (Strict Nature Reserve)	223,342	Karakiya District
2	Aktau-Buzachi State Nature Sanctuary (Zoological)	170,000	Tupkaragan District
3	Karakiya-Karakol State Nature Sanctuary (Zoological)	137,500	Karakiya District
4	Kenderli-Kayasan State Protected Area	1,230,290	Karakiya District
5	Mangyshlak Experimental Botanical Garden	39	Aktau City
6	Caspian Seal State Nature Reserve	108,632.31	Tupkaragan and Beineu Districts
Aktope Region			
7	Turgai State Nature Sanctuary (Zoological)	296,000	Irgiz District
8	Irgiz-Turgai State Nature Reserve	1,173,511	Irgiz District

None of the eight SPNAs listed in **Table 16** are located near the Project road alignment. According to Letter No. 02-08/360, dated 14 July 2025, issued by the Mangystau Regional Territorial Inspectorate of Forestry and Wildlife, and Letter No. 3T-2025-02130679, dated 10 July 2025, issued by the Aktope Regional Territorial Inspectorate of Forestry and Wildlife, there are no Specially

Protected Natural Areas (SPNAs) located within or in the vicinity of the Project road alignment in the Mangystau and Aktoobe regions.

There are 125 important sites for birds (IBAs/KBAs⁵³) that occupy 155,920 km² area, however, as a result of the desktop review the Project road corridor does not penetrate into the IBAs/KBAs. There are no Alliance for Zero Extinction (AZE) sites in Kazakhstan⁵⁴ (**Figure 13**).



Source: [Railway and Road Infrastructure in Saiga Antelope Range in Kazakhstan](#)

Figure 13 - Locations of KBAs/IBAs in the vicinity of the BBS road corridor

Kazakhstan has not ratified the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention). Consequently, the Emerald Network is not applicable in Kazakhstan, and the country has neither designated nor officially proposed any Emerald Sites.

Kazakhstan has 10 Ramsar Sites; however, none are located within the Mangystau Region. Only one Ramsar Site is located in the Aktoobe Region, *Lakes in the Lower Reaches of the Irgiz and Turgai Rivers* (within the boundaries of Irgiz-Turgai State Nature Reserve and Turgai State Nature Sanctuary), which is situated approximately 200 km northeast of Saksaulsk.

Kazakhstan encompasses a substantial portion of the global range of the saiga antelope and represents one of the species' principal strongholds. Of the five extant saiga populations, three, the Ural, Ustyurt, and Betpak-Dala populations, occur within Kazakhstan, where they rely on the country's extensive steppe and semi-desert ecosystems for habitat and seasonal migration (**Figure 14**).

The nearest KBAs/IBAs to the Project area are the Western Cliff Faces of the Ustyurt Plateau (7,908 km²) and the North-western Cliff Faces of the Ustyurt Plateau (4,307 km²), both located approximately 30 km from Beineu, to the west and north, respectively.

⁵³Important Bird Area / Key Biodiversity Area

⁵⁴<https://datazone.birdlife.org/country/factsheet/kazakhstan>



Source: [Railway and Road Infrastructure in Saiga Antelope Range in Kazakhstan](#)

Figure 14 - Distribution of the saiga populations in Kazakhstan

6.16 Biodiversity

6.16.1 Study Area and Methods

Study area

The biodiversity study area includes the Beineu-Bozoy⁵⁵ road section (km 0 - km 326), including its permanent footprint and a corridor extending approximately 500 m on either side of the road (comprising the Area of Influence (Aoi)⁵⁶).

For the habitat assessment, a 10 km buffer along the road was selected as sufficiently representative to display stages of vegetation, soil and ecosystem transformation (see details below). Active migrants such as birds, predatory mammals and ungulates may move and forage within and beyond this zone, crossing the planned road right-of-way. Data on the presence of certain species were obtained from international electronic databases (**Sub-sections 6.16.2, 6.16.3**). Therefore, this buffer zone is considered the extended study area.

Fauna, vegetation and flora

The fauna and flora of the Project area were studied based on desktop analysis; the same basis was used to describe and categorize the types of vegetation. The flora study focused on identifying the diversity of higher vascular plants.

⁵⁵Although the study area covers the km 0 - km 286 project road section, biodiversity studies were conducted for the wider km 0 - km 326 road section.

⁵⁶Aoi - Area of Influence/Impact

These studies included an analysis of literature sources and electronic databases such as iNaturalist and GBIF, as well as Plantarium and Plants of the World Online for plants. The IUCN Red List, the Red Data Book of the Republic of Kazakhstan and the Catalogue of **Rare and Endangered Plant Species** of **Mangistau Oblast** were used to identify rare and endangered species. The Convention on Migratory Species (CMS) was used to identify migratory species in and around the Project area.

Habitats

A national classification system for Kazakhstan's habitats has not been developed (although prototypes have been elaborated for ecosystems in some geographical regions of the country). Therefore, the habitat analysis conducted for this study required the development of a habitat (ecosystem) classification system specific to the study area.

The study area is a 10 km buffer along the Project Road that was selected as sufficiently representative to capture stages of vegetation, soil and ecosystem transformation. Within roughly 2–3 km of the existing road there is the highest concentration of field tracks, bypasses and other disturbances. Further away, disturbance is more moderate and typically associated with grazing, farms, infrastructure and production sites. The outer part of the buffer includes areas that are relatively close to background conditions and where native species may occur.

The IUCN Global Ecosystem Typology was used as a basis for the system. According to the typology, the study area belongs to the Functional Group T.4 "Cold deserts and semi-deserts" of Biome T5 "Deserts and semi-deserts". Further, within the functional group, desert ecosystems were subdivided into local-level ecosystem types that characterize the diversity of deserts in the Project and surrounding areas. They were identified based on geomorphological, edaphic (soil), and geobotanical criteria.

Halophytic (saline) ecosystems are also present within the Project Area. Their influence extends over a considerable distance and is reflected in the backwater of mineralized groundwater and surface water. In the lowest areas, saltmarshes form, leading to inundation and surface salinization. These ecosystems are classified as a special class of intrazonal ecosystems, as their formation and functioning depend entirely on their water regime.

There are also types of anthropogenically transformed ecosystems that are partially transformed in localized areas (wells, storage facilities, pipelines, roads, landfills, etc.) and are surrounded by natural ecosystems that are weakly and moderately transformed.

The ecosystem map was created using archival WorldView remote sensing data from May 2025 at a resolution of 0.3 meters, in conjunction with our own archival fieldwork data for the area. The map was created by visually interpreting high-resolution satellite imagery in ArcGIS Pro, vectorizing polygonal features corresponding to individual ecosystem types, classes, and species, and assigning a specific number and other parameters in the attribute table. The map was digitized at a scale of 1:100,000 and shows the general condition and spatial distribution of various ecosystem types.

Field surveys

As part of the national EIA, the field surveys were conducted on 12 and 14 August, 2025. The primary objective of these surveys was to identify locations of the road crossings for migratory wild animals, primarily the saiga. Twenty-four such sites have been identified in the Mangistau, Aktobe and Kyzylorda regions. These sites were identified by specialists from the state regional forestry and wild animals inspectorates, the state enterprise "Okhotzooptom", and ACBK, based on previously obtained data on Saiga migrations, an ecological assessment of the territories including the terrain, and presence or absence of the other anthropogenic objects nearby.

As part of the current ESIA, the field survey was conducted along the project road route from Beineu to Saksaulsk from August 17 to 21, 2026. The primary objective of the survey was to inspect the locations (crossing points) along the proposed highway that were previously recommended during the national EIA, clarify their locations, and assess their suitability for continued use by animals during seasonal migrations.

The objectives of the survey included describing the habitats of the surveyed areas, the condition and characteristics of vegetation, topography, and soil cover, assessing the spatial characteristics of the proposed crossings, and documenting the main types of anthropogenic impacts.

Key findings of the survey include the assessment and recommendation of locations for crossing points for saigas and other migratory animals (totalling 24 crossing points along the entire road route across three oblasts); habitat types around 10 crossing locations and areas with anthropogenic impacts at six locations were also described (**Figure 29**). The construction of crossing points at the recommended locations is proposed as a key mitigation measure to restore animal migration routes (see **Sub-section 7.2.11**).

6.16.2 Vegetation and Flora

Vegetation types

According to the Kazakhstan botanical-geographical regionalization scheme, the Project area is located within the Western Northern Turanian Subprovince of the Northern Turanian Province, Irano-Turanian Subregion, Sakhara-Goby region. The road route in Mangistau and Aktobe regions passes through the actual (middle) desert and, near the settlement of Bozoy, crosses the northern desert.

In the northern desert subzone, wormwood communities dominated by *Artemisia lerchiana* and, farther east, *Artemisia semiarida* occur on sandy loams and sands, often with *Poa bulbosa*, *Agropyron fragile* and *Stipa sareptana* (**Figure 16**). Saline soils support complexes involving *Artemisia pauciflora* and *Anabasis salsa*. Sandy habitats support psammophytic shrub and wormwood associations, including *Calligonum*, *Ammodendron* and several *Artemisia* species, while shallow sands can support black saxaul (*Haloxylon aphyllum*).

The middle-desert sector is characterized by *Artemisia terrae-albae* and perennial saltwort deserts, especially *Anabasis salsa*, *Salsola arbusculiformis*, *Salsola orientalis*, *Nanophyton erinaceum* and *Anabasis brachiata* (**Figure 15**). Gravelly plains frequently form complexes where perennial saltworts and white-earth wormwood coexist. Mangystau also contains petrophytic desert variants, including wormwood, saltwort and shrub communities on stony and gravelly slopes and low hills.

Clayey substrates support relatively uniform biyorghun and biyorghun–itsigek communities, as well as black saxaul stands. Sandy terrain is more diverse and includes wormwood–psammophytic, *Calligonum*, psammophytic shrub, psammophytic subshrub and teresken communities. On fixed sands, white-earth wormwood occurs together with *Carex physodes* and grasses including *Agropyron fragile* and *Stipa caspia*. Salt marshes are dominated by *Halocnemum strobilaceum*, *Kalidium* spp., *Halostachys caspica* and, in some settings, *Limonium* and *Reaumuria* communities.

Depressions illustrate the ecological complexity of desert vegetation. Their communities form sequences from almost bare salt flats in the center, through sarzasan and potashnik associations, to *Atriplex* and *Suaeda* communities around the margins as soil moisture and salinity change. Such habitat mosaics are important because the most humid patches may support taxa that are otherwise rare in the surrounding desert and provide resource concentrations for fauna.

The area, with its wormwood-boyaluch and saltwort-boyaluch vegetation, has long been used as pasture for sheep, camels, goats, and horses. Therefore, the main factors of degradation here were livestock grazing and haymaking. Recently, large-scale development of the area for oil and gas prospects has added to these degradation factors.

Currently, the degree of soil disturbance in the area ranges from moderate to severe. For example, near wells and wintering areas, due to the large number of unauthorized roads, up to 30% of the pasture area is severely degraded. Clay and loamy soils near roads are subject to severe erosion. Vegetation along the roads is sparse, dusty, and stunted.

It should be noted that the process of regeneration of disturbed areas is very slow. Indicators of pasture digression are weed species such as ebelek (*Ceratoides arenarius*) and black wormwood (*Artemisia pauciflora*).



Figure 15 - Biyorghun (*Anabasis salsa*) - tasbiyurgun (*Nanophyton erinaceum*) perennial saltwort desert



Figure 16 - Wormwood-shrub communities on sandy areas

Flora

The greatest floristic diversity occurs during the spring. By early June, however, the vegetation cover has almost completely dried out due to the onset of the hot, arid season.

The flora of the higher vascular plants is presented by 376 species of 51 families. *Amaranthaceae* family is the largest family group with 68 taxa (18.1%), followed by *Asteraceae* with 51 taxa (13.6%),

Brassicaceae with 42 taxa (11.2%), *Poaceae* with 40 taxa (10.6%), *Fabaceae* with 28 taxa (7.4%) and *Boraginaceae* with 21 taxa (5.6%). The five leading families account for about 60.9% of the analyzed flora, and the six leading families account for about 66.5%. At the genus level, *Astragalus* is represented by 15 taxa and *Artemisia* by 14; *Atriplex* has 8, *Caroxylon* 7, and *Stipa*, *Bassia* and *Lepidium* 6 each.

The predominance of the family of *Amaranthaceae* species has significant ecological significance. This group includes numerous representatives of *Atriplex*, *Anabasis*, *Bassia*, *Caroxylon*, *Halimocnemis*, *Petrosimonia* genera, and other plants adapted to arid and often saline habitats. Representatives of this complex are primarily characterized as xerophytes; both annual species and dwarf shrubs, subshrubs, and shrubs are present. This structure is characteristic of the flora of Ustyurt and other deserts of Turan region.

The life-form structure is dominated by perennial herbs (156 taxa; 41.5%) and annuals (140 taxa; 37.2%). Woody and semi-woody forms together contribute about 51 taxa (13.6%), while biennials account for about 3.7%. Xerophytes and meso-xerophytes compose 85,4% of the total flora, clearly demonstrating the arid nature of the region's flora. 52,7% species of the flora are forage plants.

According to the desktop analysis, seven rare and protected species can be found in the study area and to the north of it (Table 1). There was obtained spatial information on the six species (Figure 3). There is no reliable spatial data for the seventh species, *Tulipa borszczowii*, around the study area. However, given the habitats suitable for the species (sandy and clay-sandy) within the study area, it can be assumed that the species occurs in some sections of the road route.

Two species are range-restricted. *Xylosalsola chiwensis* is the species with narrow distribution range in Kazakhstan, Uzbekistan, and Turkmenistan. *Tulipa borszczowii* species is primarily known from southern Kazakhstan, specifically the Kyzlorda and South Kazakhstan regions including around Lake Aral and Lake Kyzylkol⁵⁷. It also occurs in Uzbekistan, however very few subpopulations have been recorded⁵⁸.

Table 17 - Rare protected plant species occurred in the study area and adjoining areas

No	Latin name	Category in the RoK Red Data Book	Inclusion in the catalogue of Mangistau oblast	Category in the IUCN Red List
1	<i>Tulipa biflora</i> Pall. (<i>Tulipa sogdiana</i>)	I	+	
2	<i>Tulipa suaveolens</i> Roth. (<i>Tulipa schrenkii</i>)	III		
3	<i>Xylosalsola chiwensis</i> (Popov) Akhani & Roalson (<i>Salsola chiwensis</i>) (range-restricted)	II	+	
4	<i>Tulipa sylvestris</i> subsp. <i>australis</i> (Link) Pamp. (<i>Tulipa biebersteiniana</i>)	III		
5	<i>Tulipa borszczowii</i> Regel (range-restricted)	II		NT
6	<i>Oreosalsola arbusculiformis</i> (Drobow) Sennikov (<i>Salsola arbusculiformis</i>)		+	

⁵⁷ <https://www.iucnredlist.org/species/184529740/184539223>

⁵⁸ Ibid.

No	Latin name	Category in the RoK Red Data Book	Inclusion in the catalogue of Mangistau oblast	Category in the IUCN Red List
7	<i>Xylosalsola richteri</i> (Moq.) Akhani & Roalson (<i>Salsola richteri</i>)		+	LC

These plant species grow in different habitats. Sandy and weakly fixed habitats are most promising for identifying *Tulipa borszczowii* and *Xylosalsola richteri*; marl and other dry desert slopes - for *Xylosalsola chiwensis*; rocky-gravelly areas - for *Oreosalsola arbusculiformis* (Figure 18); open dry and wormwood communities - for representatives of the genus *Tulipa* (Figure 19). These species are characterized by seasonal peculiarities: species of the genus *Tulipa* are spring ephemeroïdes flowering primarily in April, but *Xylosalsola* and *Oreosalsola* species can be identified later in the vegetation season. When planning fieldwork, both habitats and seasonal characteristics have to be considered.

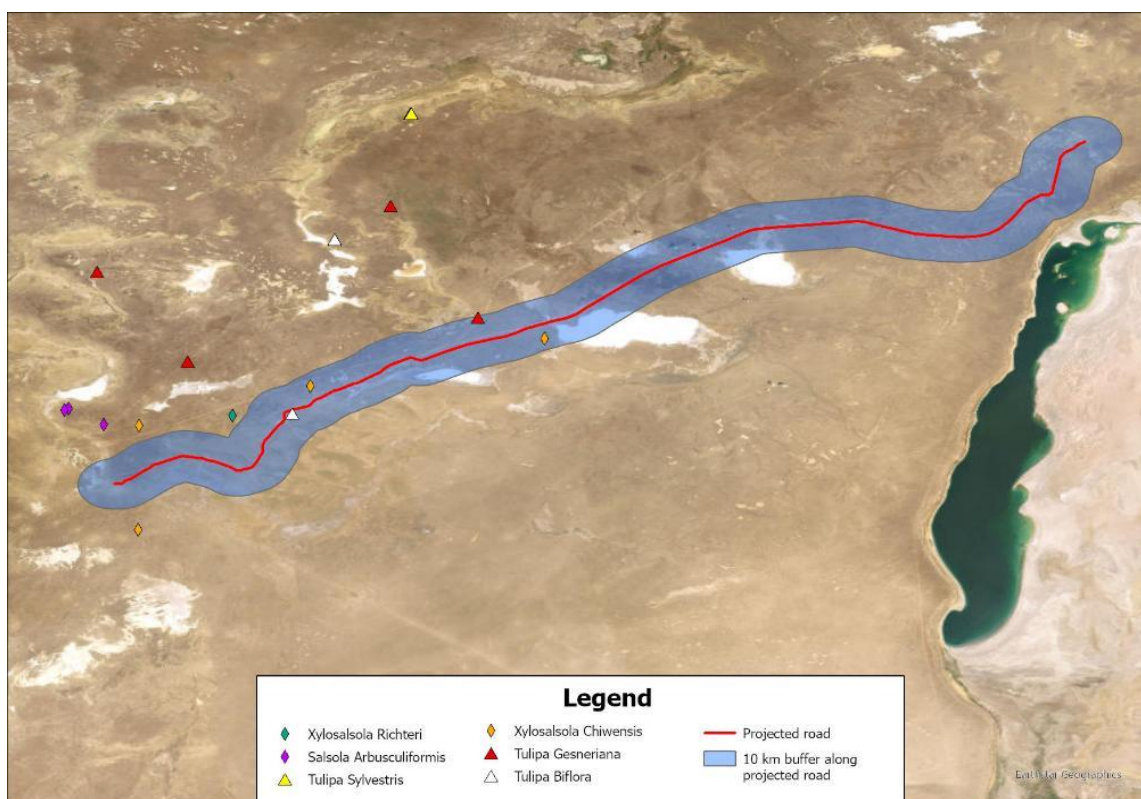


Figure 17 - Spatial data on the rare protected plant species in and around the extended study area (sources of the points' coordinates: iNaturalist, GBIF, Plantarium)



Figure 18 - *Oreosalsola arbusculiformis* (Drobow) Sennikov

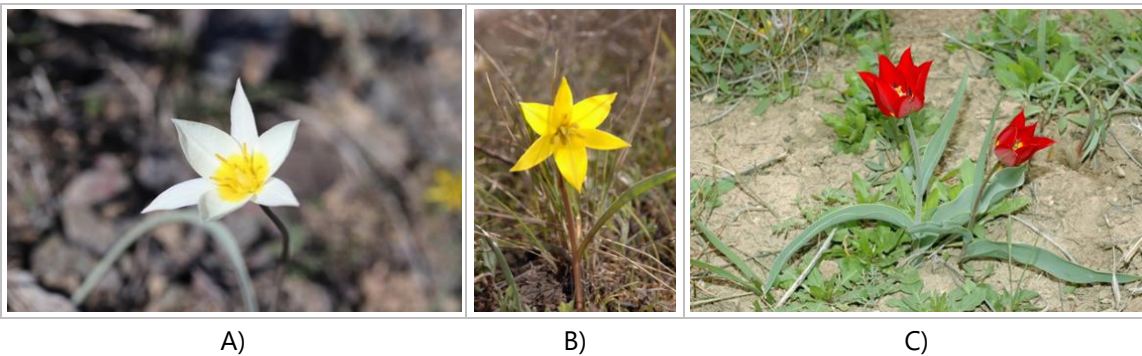


Figure 19 - Representatives of the genus *Tulipa*: A) *Tulipa biflora* Pall., photo of Osmonali B.B., B) *Tulipa sylvestris* subsp. *australis* (Link) Pamp.⁵⁹, C) *Tulipa suaveolens* Roth.⁶⁰

6.16.3 Fauna

The fauna of the northern deserts is characterized by high biological diversity, as it combines elements of desert, semi-desert, and steppe complexes. Along with xerophilous and desert species, species typical of more humid habitats are found here, including hygrophilous and intrazonal species, primarily confined to lowlands, river and lake valleys, and bodies of water.

The high biological diversity of the area is largely determined by the mosaic nature of the habitats. Within a relatively small area, sandy, clayey, gravelly, and saline substrates, areas with varying degrees of vegetation development, as well as intrazonal habitats of stream valleys and reservoirs can be found. This combination of ecologically contrasting biotopes contributes to the formation of a complex faunistic community with species from various ecological groups.

Terrestrial vertebrates

An analysis of available sources identified 222 species of terrestrial vertebrates that could potentially be found in the study area and surrounding areas including 2 amphibians, 25 reptilians,

⁵⁹<https://www.inaturalist.org/observations/98593982>

⁶⁰<https://www.inaturalist.org/observations/98593981>

144 birds (in migration period) and 51 mammal species. All the mentioned systematic groups, with the exception of amphibians, include rare and protected species listed on national and international lists (Table 18).

Table 18 - The number of species that could potentially be found in the study area and surrounding areas

No	Systematic groups	Number of species	Number of species listed in the RoK Red Data Book	Number of species listed in the IUCN Red List (threatened categories - CR, EN, VU)
1	Amphibians	2	-	-
2	Reptilians	25	1	1
3	Birds	144	22	11
4	Mammals	51	10	2
Total		222	33	14

Of the 25 species of reptiles, the blotched snake *Elaphe sauromates* is listed on the RK Red Book (category III) and Central Asian Tortoise *Testudo horsfieldii* is on the IUCN Red List (category VU).

A list of rare and protected bird species, including species protected under the Convention on the Conservation of Migratory Species of Wild Animals (CMS), is presented in Table 19. Most of the bird species are migrants through the Project area; since the Project Area is surrounded by temporary water bodies that fill in spring and autumn (and turn into salt marshes in summer), the migratory route of many bird species, including water birds, passes through the Project Area. At the same time, some rare open-space birds may potentially feed and breed in this area, including the raptors *Aquila nipalensis* and *Aquila heliaca* (Figure 20). Available data from the GBIF database indicate records (points of occurrence) of both species in the eastern part of the road right-of-way, near the remnants of the Aral Sea (Figure 21). Apparently, rodent colonies are located there, providing food for these two raptor species.

Table 19 - The rare and protected bird species that could potentially be found in the study area and surrounding areas

No	Latin name	English name	Category in the RoK Red Data Book	Category in the IUCN Red List	Listed in Appendices 1, 2 of the CMS ⁶¹
1	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	I	EN	I
2	<i>Haliaeetus albicilla</i>	White-tailed eagle	II	LC	I
3	<i>Neophron percnopterus</i>	Egyptian vulture	III	EN	I
4	<i>Falco naumanni</i>	Lesser kestrel		VU	I
5	<i>Falco cherrug</i>	Saker falcon	I	EN	I
6	<i>Falco peregrinus</i>	Peregrine falcon	I	LC	II
7	<i>Circus gallicus</i>	Short-toed eagle	II	LC	II
8	<i>Aquila heliaca</i>	Eastern Imperial Eagle	II	VU	I
9	<i>Aquila nipalensis</i>	Steppe eagle	V	EN	I

⁶¹ The Convention on the Conservation of Migratory Species of Wild Animals (CMS)

No	Latin name	English name	Category in the RoK Red Data Book	Category in the IUCN Red List	Listed in Appendices 1, 2 of the CMS ⁶¹
10	<i>Aquila chrysaetos</i>	Golden eagle	II	LC	II
11	<i>Bubo bubo</i>	Eurasian eagle-owl	II	LC	
12	<i>Pelecanus onocrotalus</i>	Great white pelican	I	LC	I
13	<i>Pelecanus crispus</i>	Dalmatian pelican	II	NT	I
14	<i>Egretta garzetta</i>	Little egret	III	LC	
15	<i>Platalea leucorodia</i>	Eurasian spoonbill	II	LC	II
16	<i>Plegadis falcinellus</i>	Glossy ibis	II	LC	II
17	<i>Phoenicopterus roseus</i>	Greater flamingo	II	LC	II
18	<i>Chettusia gregaria</i>	Sociable lapwing	I	CR	I
19	<i>Limicola falcinellus</i>	Broad-billed sandpiper		VU	II
20	<i>Pterocles orientalis</i>	Black-bellied sandgrouse	III	LC	
21	<i>Pterocles alchata</i>	Pin-tailed sandgrouse	III	LC	
22	<i>Syrrhaptes paradoxus</i>	Pallas's sandgrouse	IV	LC	
23	<i>Chlamydotis macqueenii</i>	Asian houbara	II	VU	
24	<i>Streptopelia turtur</i>	European turtle dove		VU	II
25	<i>Podoces panderi</i>	Turkestan ground jay	III	LC	
26	<i>Buteo rufinus</i>	Long-legged buzzard		LC	II
27	<i>Falco tinnunculus</i>	Common Kestrel		LC	II
28	<i>Cygnus olor</i>	Mute Swan		LC	II
29	<i>Tadorna ferruginea</i>	Ruddy Shelduck		LC	II
30	<i>Tadorna tadorna</i>	Common Shelduck		LC	II
31	<i>Anas clypeata</i>	Northern Shoveler		LC	II
32	<i>Anas penelope</i>	Eurasian Wigeon		LC	II
33	<i>Anas crecca</i>	Eurasian Teal		LC	II
34	<i>Anas platyrhynchos</i>	Mallard		LC	II
35	<i>Anser anser</i>	Greylag Goose		LC	II
36	<i>Anas acuta</i>	Northern Pintail		LC	II
37	<i>Tadorna ferruginea</i>	Ruddy Shelduck		LC	II
38	<i>Tadorna tadorna</i>	Common Shelduck		LC	II
39	<i>Netta rufina</i>	Red-crested Pochard		LC	II
40	<i>Aythya nyroca</i>	Ferruginous Duck		NT	I
41	<i>Aythya fuligula</i>	Tufted Duck		LC	II
42	<i>Circus aeruginosus</i>	Western Marsh Harrier		LC	II
43	<i>Pandion haliaetus</i>	Osprey		LC	II
44	<i>Charadrius dubius</i>	Little Ringed Plover		LC	II
45	<i>Vanellus vanellus</i>	Northern Lapwing		LC	II
46	<i>Vanellus leucurus</i>	White-tailed Lapwing		LC	II
47	<i>Arenaria interpres</i>	Ruddy Turnstone		LC	II
48	<i>Himantopus himantopus</i>	Black-winged Stilt		LC	II
49	<i>Tringa ochropus</i>	Green Sandpiper		LC	II
50	<i>Tringa glareola</i>	Wood Sandpiper		LC	II

No	Latin name	English name	Category in the RoK Red Data Book	Category in the IUCN Red List	Listed in Appendices 1, 2 of the CMS ⁶¹
51	<i>Tringa nebularia</i>	Common Greenshank		LC	II
52	<i>Tringa totanus</i>	Common Redshank		LC	II
53	<i>Actitis hypoleucos</i>	Common Sandpiper		LC	II
54	<i>Xenus cinereus</i>	Terek Sandpiper		LC	II
55	<i>Calidris minuta</i>	Little Stint		LC	II
56	<i>Calidris ferruginea</i>	Curlew Sandpiper		LC	II
57	<i>Lymnocyrtus minimus</i>	Jack Snipe		LC	II
58	<i>Gallinago gallinago</i>	Common Snipe		LC	II
59	<i>Pluvialis squatarola</i>	Grey Plover		LC	II
60	<i>Charadrius hiaticula</i>	Common Ringed Plover		LC	II
61	<i>Charadrius leschenaultii</i>	Greater Sand Plover		LC	II
62	<i>Charadrius asiaticus</i>	Caspian Plover		LC	II
63	<i>Charadrius alexandrinus</i>	Kentish Plover		LC	II
64	<i>Sternula albifrons</i>	Little Tern		LC	II
65	<i>Chlidonias niger</i>	Black Tern		LC	II
66	<i>Phalaropus lobatus</i>	Red-necked Phalarope		LC	II
67	<i>Glareola pratincola</i>	Collared Pratincole		LC	II
68	<i>Glareola nordmanni</i>	Black-winged Pratincole		LC	II
69	<i>Coracias garrulus</i>	European Roller		LC	II
70	<i>Motacilla flava</i>	Western Yellow Wagtail		LC	II
71	<i>Motacilla flava feldegg</i>	Black-headed Wagtail		LC	II
72	<i>Motacilla alba</i>	White Wagtail		LC	II
73	<i>Oriolus oriolus</i>	Eurasian Golden Oriole		LC	II
74	<i>Acrocephalus agricola</i>	Paddyfield Warbler		LC	II
75	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler		LC	II
76	<i>Acrocephalus scirpaceus</i>	Eurasian Reed Warbler		LC	II
77	<i>Hippolais rama</i>	Sykes's Warbler		LC	II
78	<i>Hippolais pallida</i>	Eastern Olivaceous Warbler		LC	II
79	<i>Hippolais languida</i>	Upcher's Warbler		LC	II
80	<i>Sylvia nisoria</i>	Barred Warbler		LC	II
81	<i>Sylvia communis</i>	Common Whitethroat		LC	II
82	<i>Sylvia curruca</i>	Lesser Whitethroat		LC	II
83	<i>Sylvia mystacea</i>	Menetries's Warbler		LC	II
84	<i>Sylvia nana</i>	Asian Desert Warbler		LC	II
85	<i>Phylloscopus trochiloides</i>	Greenish Warbler		LC	II
86	<i>Muscicapa striata</i>	Spotted Flycatcher		LC	II
87	<i>Oenanthe pleschanka</i>	Pied Wheatear		LC	II

No	Latin name	English name	Category in the RoK Red Data Book	Category in the IUCN Red List	Listed in Appendices 1, 2 of the CMS ⁶¹
88	<i>Oenanthe finschii</i>	Finsch's Wheatear		LC	II
89	<i>Oenanthe deserti</i>	Desert Wheatear		LC	II
90	<i>Oenanthe isabellina</i>	Isabelline Wheatear		LC	II
91	<i>Cercotrichas galactotes</i>	Rufous-tailed Scrub Robin		LC	II
92	<i>Luscinia svecica</i>	Bluethroat		LC	II
93	<i>Panurus biarmicus</i>	Bearded Reedling		LC	II
94	<i>Parus bokharensis</i>	Turkestan Tit		LC	II



1 - borders of countries, 2 - Dzhannatass wind power station, 3 - Karatau bridge, 4 - population groups of the eagles, 5 - water bodies

Source: G.Pulikova. Report on the project "Conservation of the threatened species of the birds of prey on Indo-Palearctic migration way in Kazakhstan", Astana, December 10, 2024⁶²

Figure 20 - Population groups of the Steppe eagle (*Aquila nipalensis*), Imperial eagle (*Aquila heliaca*) and Grater Spotted Eagle (*Aquila clanga*) in Northern Eurasia

⁶²<https://www.brcc.kz/wp-content/uploads/2024/12/%D0%9E%D0%B1%D0%B7%D0%BE%D1%80-%D0%B4%D0%B5%D1%8F%D1%82%D0%B5%D0%BB%D1%8C%D0%BD%D0%BE%D1%81%D1%82%D0%B8-BRCC-%D0%B8-%D0%BE%D1%81%D0%BD%D0%BE%D0%B2%D0%BD%D1%8B%D0%B5-%D1%80%D0%B5%D0%B7%D1%83%D0%BB%D1%8C%D1%82%D0%B0%D1%82%D1%8B-%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%D0%B0.pdf>

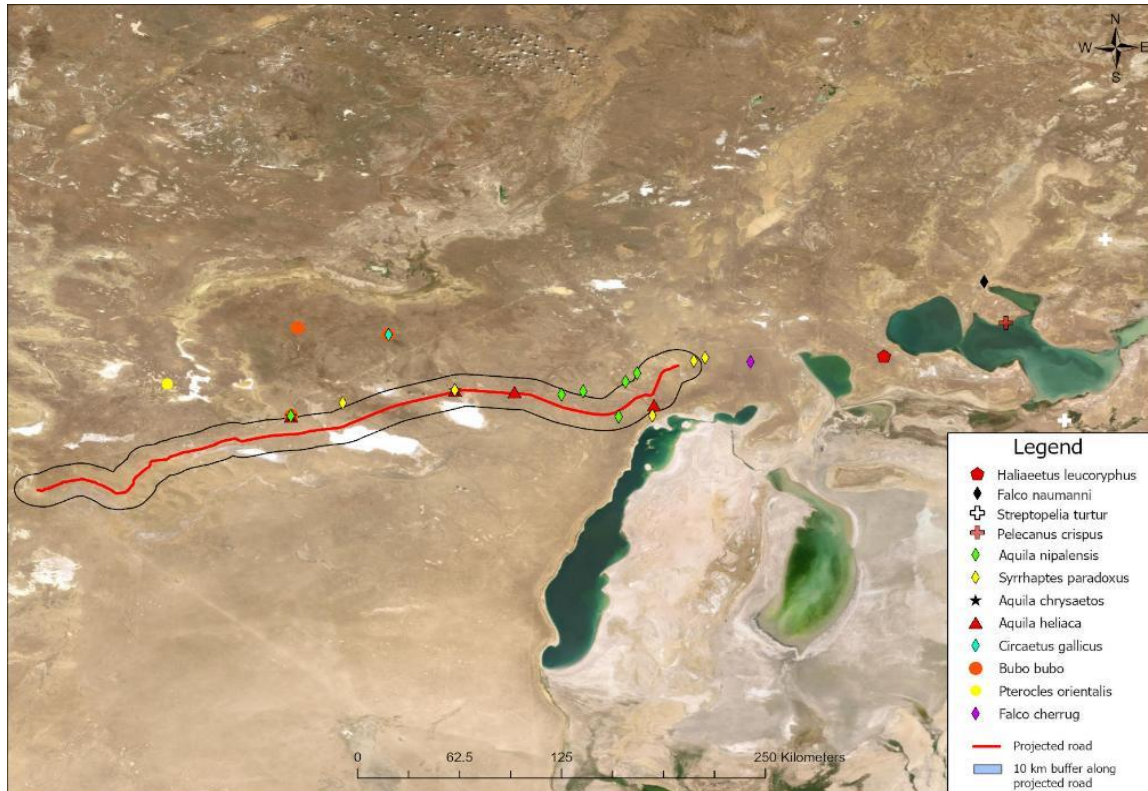


Figure 21 - The points of occurrence of protected bird species in and around the extended study area (source: GBIF)

Of the 51 species of mammals that potentially inhabit the Project area and surrounding areas, ten species are listed in the RK Red Data Book including three species classified as Vulnerable in the IUCN Red List (**Table 20**). Two species are endemic species for Kazakhstan – Bobrinski's serotine and Pale pygmy jerboa.

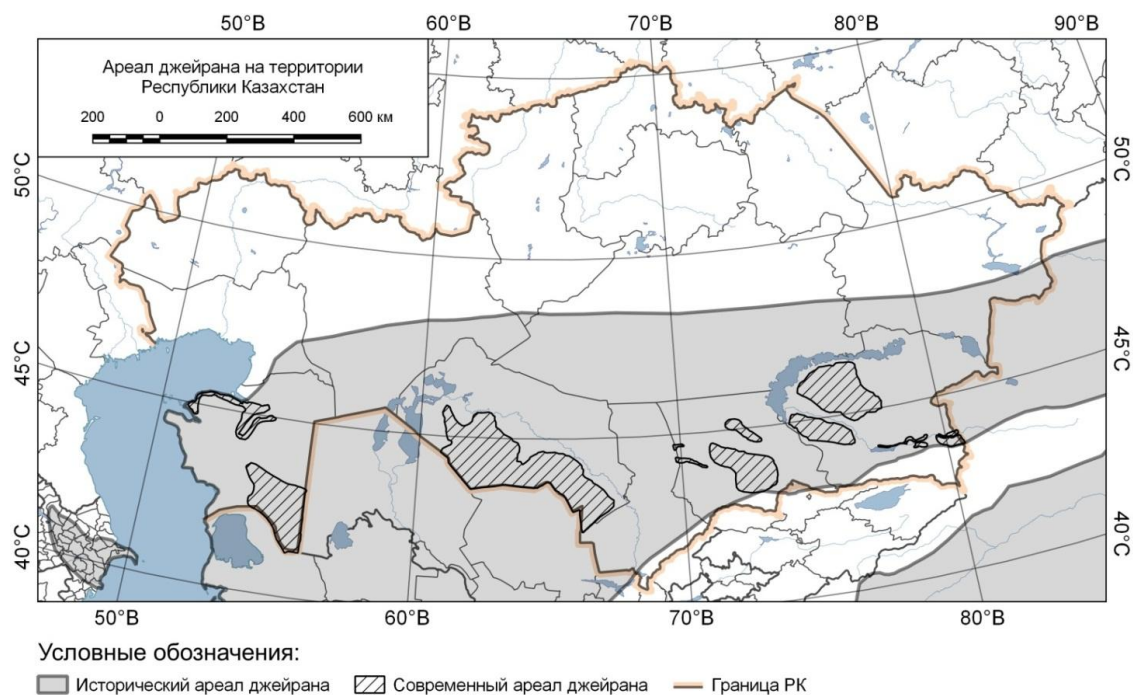
Table 20 - The rare and protected mammals that could potentially be found in the study area and surrounding areas

No	Latin name	English name	Category in the RoK Red Data Book	Category in the IUCN Red List	Listed in Appendices I or II of the CMS
1	<i>Eptesicus bobrinskoi</i>	Bobrinski's serotine	III	DD	
2	<i>Suncus etruscus</i>	Etruscan shrew	III	LC	
3	<i>Salpingotus pallidus</i>	Pale pygmy jerboa	III	DD	
4	<i>Vormela peregusna</i>	Marbled polecat	III	VU	
5	<i>Otocolobus manul</i>	Pallas's cat	III	LC	II
6	<i>Felis margarita</i>	Sand cat	III	LC	
7	<i>Caracal caracal</i>	Caracal	III	LC	
8	<i>Gazella subgutturosa</i>	Goitered gazelle	III	VU	II
9	<i>Ovis vignei</i>	Urial	III	VU	II
10	<i>Equus hemionus</i>	Asiatic wild ass	II	NT	II
11	<i>Saiga tatarica</i>	Saiga		NT	II

According to the IUCN, the ranges of several protected mammal species intersect or overlap with the planned road right-of-way: *Equus hemionus*, *Ovis vignei*, *Felis margarita* and *Vormela peregusna*. The range of *Otocolobus manul* also extends into the Project area but, according to the IUCN, the species is “possibly extinct” in this part of its range. The range of *Caracal caracal* is located further south; one occurrence of caracal was recorded in 2019, 85 km to the south, in Uzbekistan (GBIF data⁶³).

According to the IUCN, the range of the Goitered gazelle (*Gazella subgutturosa*), encompasses the Project area. However, according to actual data of the Kazakh state enterprise “Okhotzooptom”, the species’ distribution is fragmented into several areas (**Figure 22**).

During the ASBK⁶⁴ group's regular field expeditions, conducted at different times of the year to study saigas and monitor the biodiversity of Northern Ustyurt as a whole in 2020-2025, Goitered gazelles were not observed in the areas of the planned road. However, the species could potentially inhabit these areas, given that the selected road route passes close to known habitats of the species in the northern part of Kyzylkum and the eastern part of the Aral Sea.



Key to Figure 22: grey area - historical range of Goitered gazelle, striped areas - current range of Goitered gazelle, black/brown line - border of the Republic of Kazakhstan

Figure 22 - The current fragmented range of the Goitered gazelle in Kazakhstan according to the data of the state enterprise "Okhotzooptom" with amendments (source: Action Plan for the Conservation and Restoration of the Goitered Gazelle in the Republic of Kazakhstan for 2021-2025, ACBK, 2021)

Saiga Antelope (*Saiga tatarica*) in Kazakhstan since 2023 is not included in the RoK Red Data Book but listed in the list of animal species whose numbers are subject to regulation⁶⁵ and since 2025 -

⁶³<https://www.gbif.org/occurrence/search?taxonKey=QZRR&view=map>

⁶⁴Association for the Conservation of Biodiversity of Kazakhstan

⁶⁵<https://adilet.zan.kz/rus/docs/V2300033442>

in the list of valuable animal species that are objects of hunting⁶⁶. At the same time, the species is listed in the IUCN Red List as "Near Threatened"⁶⁷.

The historical range of the species covered vast areas of the steppes and semi-desert areas from southeastern Europe up to northwestern China, but due to anthropogenic impacts this range has become fragmented and remains only in a few places in Kazakhstan, Russia, Uzbekistan and Mongolia (**Figure 23**).

The construction of the Shalkar-Beineu railway in Kazakhstan in 2015 divided the migratory range of the Ustyurt saiga population into two parts. This railway dramatically altered the population migration's conditions: after construction, saiga no longer have access to their wintering habitats located to the south, including a protected area in Uzbekistan (**Figure 24**). Consequently, saigas currently migrate only within the part of the species' range located north of the railway, occasionally moving southwest along the track.

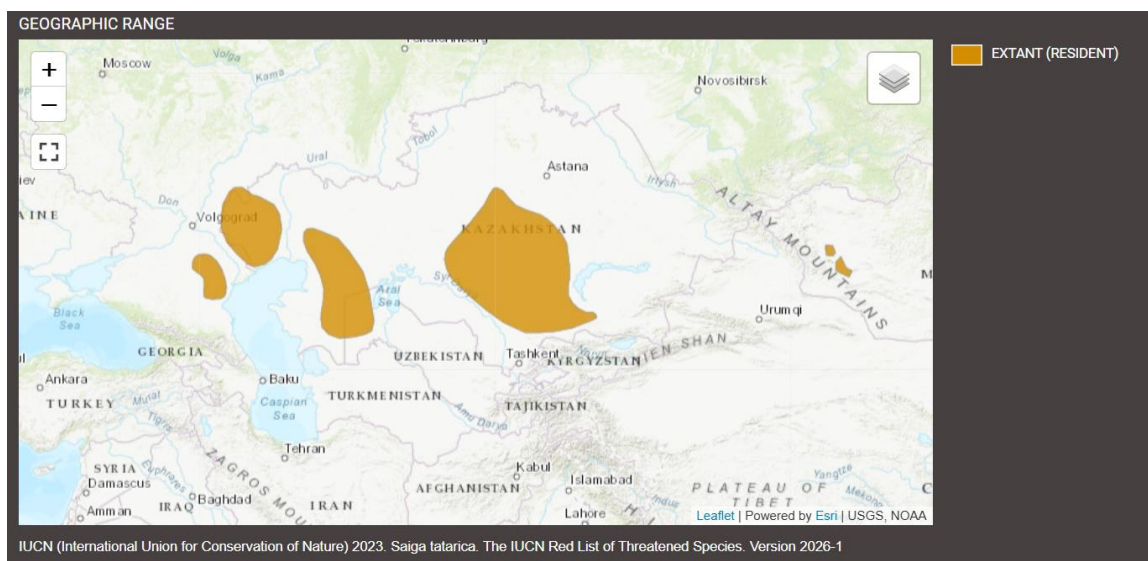
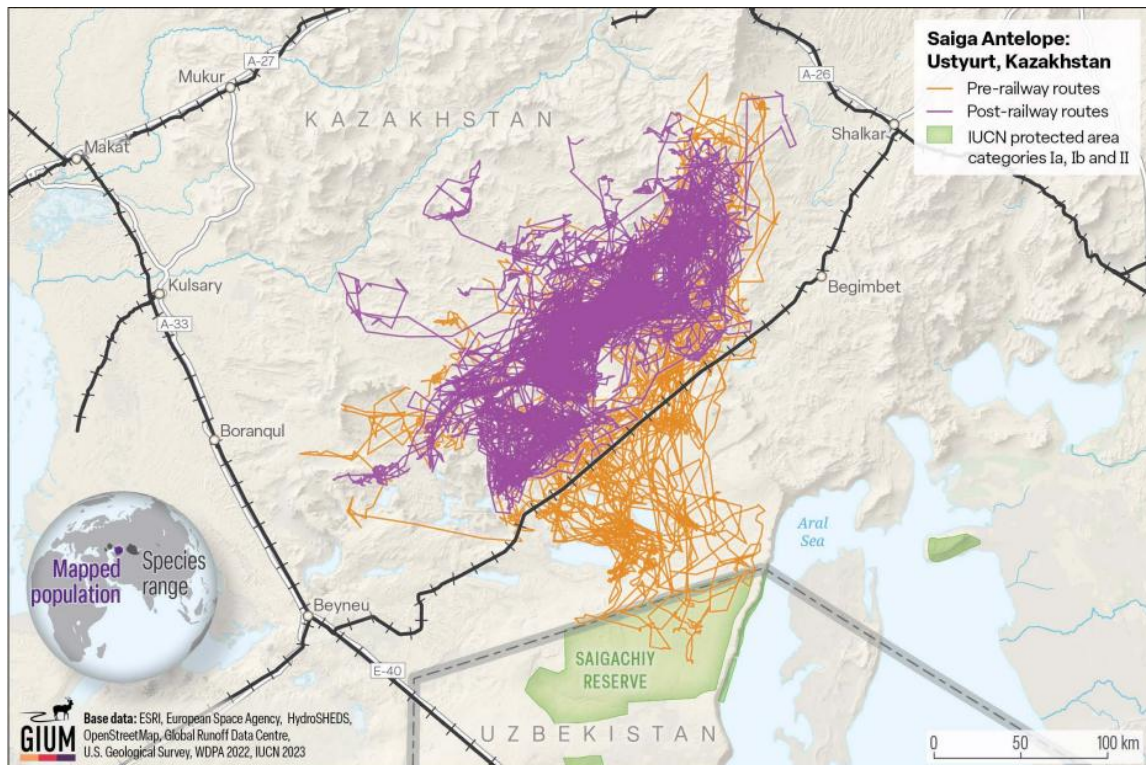


Figure 23 - The modern geographic range of *Saiga tatarica* (source: IUCN Red List⁶⁸)

⁶⁶<https://adilet.zan.kz/rus/docs/V1500010494#z4>

⁶⁷The saiga global population was critically reduced in 1993-2003 due to illegal killing; this caused the species to become Critically Endangered on the IUCN Red List. Thanks to strong conservation measures, the species has rebounded and, quite appropriately, it was reclassified as Near Threatened in the IUCN Red List in 2023 (source: Saiga Antelope: Ustyurt, Kazakhstan. Fact Sheet. CMS, GIUM. September 04, 2024).

⁶⁸<https://www.iucnredlist.org/species/19832/233712210#geographic-range>



Source: Saiga Antelope: Ustyurt, Kazakhstan. Fact Sheet. CMS, GIUM. September 04, 2024

Figure 24 - The migration range of the Ustyurt population of *Saiga tatarica tatarica*

Invertebrates: Insects

The study area is characterized by a predominance of widespread desert species associated with sandy, gravelly, and clayey biotopes. In terms of ecological structure, xerophilous species predominate, adapted to the life in conditions of high temperatures, intense solar radiation, and chronic moisture deficit. Psammophilous species associated with sandy habitats are most numerous, while petrophyllous forms predominate on gravel plains, and specialized halophilic species predominate in salt marshes.

The greatest species diversity and abundance of insects are observed in April and May, when the combination of moderate temperatures, adequate moisture, and developed vegetation creates the most favorable conditions for the reproduction and development of most species. During this period, virtually all major ecological groups of insects are active: phytophages, pollinators, predators, parasitoids, saprophages, and xylophages. In summer, high temperatures and complete drying of vegetation lead to a sharp decline in the activity of most insects, with many species entering diapause or completing their life cycle. In autumn, after the first precipitation, some insect groups experience a secondary, less pronounced peak in activity.

Preliminary assessment indicates that at least 2,600 insect species could potentially be found in the study area and surrounding areas. The basis of the entomofauna is made up of representatives of eleven orders: beetles (*Coleoptera*), Hymenoptera (*Hymenoptera*), true bugs (*Hemiptera*), Diptera (*Diptera*), Orthoptera (*Orthoptera*), lepidopterans (*Lepidoptera*), Odonata (*Odonata*), net-winged insects (*Neuroptera*), mantises (*Mantodea*), cockroaches (*Blattodea*) and earwigs (order *Dermaptera*).

Most insects in the region exhibit a short period of seasonal activity, synchronized with the spring development of ephemeral vegetation. Peak species diversity is observed in April and May, when prey availability rapidly increases following precipitation. In summer, due to rising temperatures and drying soil, the activity of most phytophages significantly decreases, while the numbers of xerophilous beetles, ants, and a number of orthopterans remain relatively high.

Of the insect species that potentially could be found in and around the study area, 20 species are listed in the RK Red Data Book including two species classified as Vulnerable in the IUCN Red List (**Table 21**). Two species are range-restricted - *Haplosoma ordinatum* (deserts of the Central Asia) and *Palaeophilotes panope* (Kazakhstan).

Table 21 - Rare and protected insect species that could potentially be found in and around the study area

No	Family	Latin name	Category in the RoK Red Data Book	Category in the IUCN Red List
Order Odonata				
1	Calopterygidae	<i>Calopteryx virgo</i>	4 (VU:A4c)	LC
2	Aeshnidae	<i>Anax imperator</i>	4 (VU:A4c)	LC
Order Mantodea				
3	Mantidae	<i>Bolivaria brachyptera</i>	4 (VU:A2c)	DD
Order Orthoptera				
4	Tettigoniidae	<i>Damalacantha vacca</i>	4 (VU:B1c)	
5	Tettigoniidae	<i>Onconotus servillei</i>	4 (VU:A4c(ii))	LC
6	Tettigoniidae	<i>Saga pedo</i>	4 (VU:A4c(ii))	VU
7	Tettigoniidae	<i>Ceraeocercus fuscipermis</i>	4 (VU:A1c; B1a (ii))	
Order Homoptera				
8	Margarodidae	<i>Porphyrophora polonica</i>	4 (VU:A4c (ii))	
Order Coleoptera				
9	Carabidae	<i>Callisthenes reticulatus</i>	4 (VU:B1a)	
10	Scarabaeidae	<i>Haplosoma ordinatum</i>	4 (VU:D2)	
11	Coccinellidae	<i>Chilocorus bipustulatus</i>	4 (VU:A4)	
12	Coccinellidae	<i>Stethorus punctillum</i>	4 (VU:B1a)	
Order Hymenoptera				
13	Scoliidae	<i>Scolia maculata</i>	4 (VU:A4)	
14	Scoliidae	<i>Scolia hirta</i>	4 (VU:A4)	
15	Megachilidae	<i>Hoplitis (Megalosmia) fulva</i>	4 (VU:A4)	VU
Order Lepidoptera				
16	Papilionidae	<i>Zerynthia polyxena</i>	4 (VU:A1+4;B1a)	LC
17	Pieridae	<i>Microzegrus pyrothoe</i>	4 (VU:A4)	
18	Lycaenidae	<i>Aricia chinensis myrmecias</i>	4 (VU:D2)	
19	Lycaenidae	<i>Scolitantides bavius</i>	4 (VU:A4;B1b(i))	
20	Lycaenidae	<i>Palaeophilotes panope</i>	2 (CR:A4)	

Available information sources, including open electronic databases such as GBIF and iNaturalist, do not contain spatial data on the occurrence of the rare protected insect species in and around the study area; the nearest obtained point is more than 200 km to the north.

6.16.4 Habitats

Habitats classification and mapping

Ecosystems (habitats) identified in the study area are classified in 15 types, which are plotted on the map (**Figure 25**) and listed in **Table 22**; colors of the habitats on the map correspond to the colors in the table.

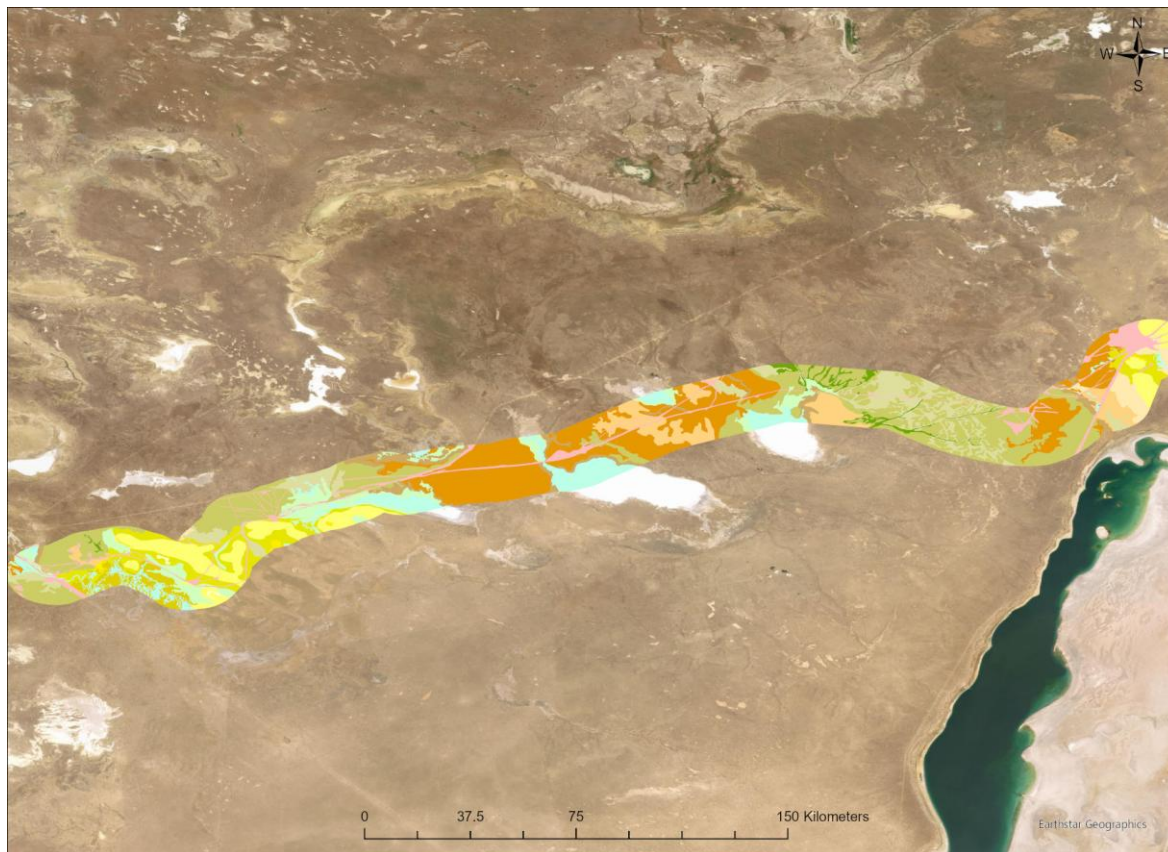
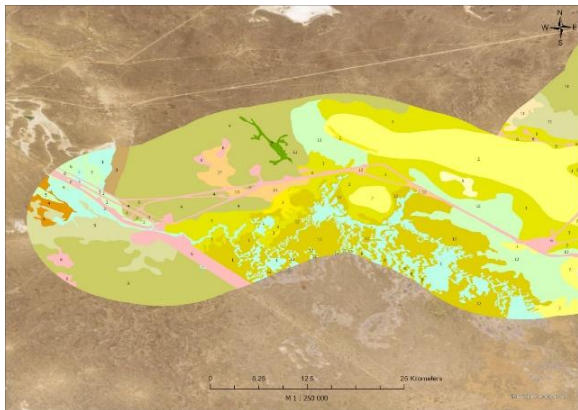


Figure 25 - Map of classified habitats (ecosystems) in the extended study area (the colors of the habitats correspond to the colors in Table 22)

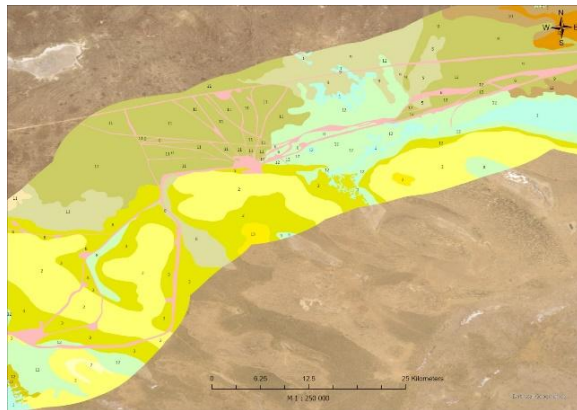
Table 22 - Description of classified habitats (ecosystems)

B. DESERTS AND SEMI-DESERTS	
I. Moderate deserts, middle	
1. Zonal ecosystems raised plains	
1	Plain subshrub deserted ecosystems with wormwood (<i>Artemisia terrae- albae</i>) vegetation with the participation of perennial saltwort (<i>Anabasis aphylla</i> , <i>Salsola orientalis</i>) on zonal gray-brown soils.
2	Plain shrub-subshrub deserted ecosystems with <i>Artemisia terrae - albae</i> , <i>Salsola orientalis</i> , cereals (<i>Agropyron fragile</i>) and keurek-biyurgun (<i>Anabasis salsa</i> , <i>Salsola orientalis</i>) communities on zonal gray-brown easy mechanical composition.
3	Plain perennial saltworts deserted sparse ecosystems <i>Anabasis salsa</i> , <i>Anabasis salsa</i> , <i>A. aphylla</i> , and <i>Artemisia terrae - albae</i> , <i>Anabasis aphylla</i> , <i>Salsola orientalis</i> communities on zonal gray-brown loamy and rubble soils.

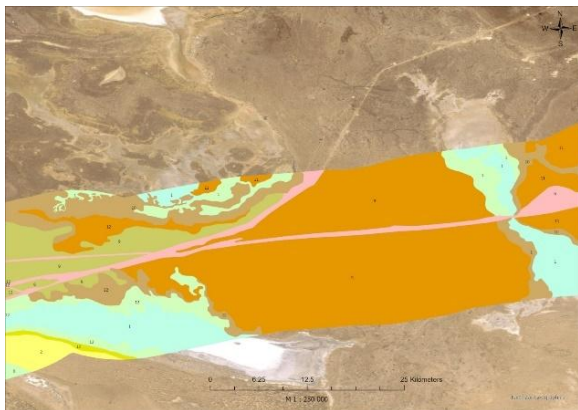
4	Plains shrubby ecosystems with a complex white earth wormwood-saltwort (<i>Salsola arbusculiformis</i> , <i>Artemisia terrae-albae</i>) and perennial saltwort (<i>Anabasis salsa</i>) plants communities.
5	Plain ecosystems with sparse semi-shrub vegetation on solonetz with <i>Anabasis salsa</i>) and wormwood (<i>Artemisia terrae - albae</i>) communities.
6	Eroded slopes and hilltops with a combination of communities of subshrubs (<i>Artemisia terrae-albae</i> , <i>Anabasis salsa</i> , <i>A. brachiata</i> , <i>A. eriopoda</i> , <i>Nanophyton erinaceum</i>) and shrubs (<i>Caragana grandiflora</i> , <i>Atraphaxis replicate</i> , <i>A. frutescens</i> , <i>Convolvulus fruticosus</i> , <i>Krascheninnikovia ceratoides</i> , <i>Limonium suffruticosum</i>) on loamy and stony soils.
2. Zonal ecosystems of elevated plains with aeolian reworking	
7	Sands ridge-hillocky and low-ridge with wormwood-psammophyte shrub-mixed saxaul (<i>Haloxylon persicum</i> , <i>H. aphyllum</i> , <i>Ceratoides papposa</i> , <i>Calligonum aphyllum</i> , <i>Astragalus brachypus</i> , <i>Artemisia terrae-albae</i> , <i>A. arenaria</i> , <i>A. songarica</i> , <i>Carex physodes</i>).
8	Sands ridge-hillocky and low-ridge with white-earth wormwood-teresken (<i>Ceratoides papposa</i> , <i>Artemisia terrae-albae</i> , <i>Agropyron fragile</i> , <i>Carex physodes</i> , <i>Atraphaxis replicata</i>) and psammophyte shrubs (<i>Calligonum leucocladum</i> , <i>Astragalus karakugensis</i> , <i>A. ammodendron</i> , <i>Salsola arbuscula</i> , <i>Artemisia tschernieviana</i> , <i>A. santolina</i>) communities on assigned sands.
9	Slightly wavy sands with white earth wormwood-teresken (<i>Ceratoides papposa</i> , <i>Artemisia terrae-albae</i> , <i>Agropyron fragile</i> , <i>Carex physodes</i> , <i>Atraphaxis replicata</i>) communities on fixed sands.
10	Ridged-hummocky, low-ridged, gently undulating sands, not fixed or weakly fixed with sparse vegetation (<i>Artemisia terrae-albae</i> , <i>Calligonum leucocladum</i>).
11	Sandy massifs with white-earth wormwood-teresken (<i>Ceratoides papposa</i> , <i>Artemisia terrae-albae</i> , <i>Agropyron fragile</i> , <i>Carex physodes</i> , <i>Atraphaxis replicata</i>) communities in combination with sores without vegetation in the frame Sarsazanovs communities.
3. Ecosystems semihydromorphic lowered plains	
12	Ecosystems sor salt marshes without vegetation in the frame sarsazan (<i>Halocnemum strobilaceum</i>) and halophytic cereals (<i>Aeloropus littoralis</i> , <i>Puccinellia dolicholepis</i> , <i>P. tenuissima</i>) communities.
13	Ecosystems salt marshes complexes with Sarsazan-Kokpek, Sarsazan (<i>Halocnemum strobilaceum</i>), annual saltwort-sarsazan (<i>Halocnemum strobilaceum</i> , <i>Climacoptera crassa</i> , <i>C. brachiata</i> , <i>Suaeda acuminata</i>), potash (<i>Kalidium caspicum</i> , <i>K. foliatum</i>), azhrekovye (<i>Aeloropus littoralis</i>), svedo-kokpek (<i>Atriplex cana</i> , <i>Suaeda physophora</i>) communities.
14	Temporary watercourses with a mix of shrubby (<i>Caragana grandiflora</i> , <i>Atraphaxis replicate</i> , <i>A. frutescens</i> , <i>Convolvulus fruticosus</i> , <i>Tamarix laxa</i>), subshrub (<i>Salsola orientalis</i> , <i>Anabasis salsa</i> , <i>Nanophyton erinaceum</i>) vegetation and areas without vegetation on rubble and loamy soils.
ANTHROPOGENICALLY TRANSFORMED ECOSYSTEMS	
15	Complex of sparse saltworts (<i>Salsola nitraria</i> , <i>Climacoptera brachiata</i> , <i>C. obtusifolia</i> , <i>C. crassa</i> , <i>Atriplex tatarica</i>) and wormwood (<i>Artemisia nitrosa</i> , <i>A. terrae- albae</i> ,) communities and groups of synanthropic species (<i>Peganum harmala</i> , <i>Lepidium perfoliatum</i> <i>Ceratocarpus utriculosus</i> <i>C. arenarius</i>) on transformed areas of infrastructure, settlements, etc.



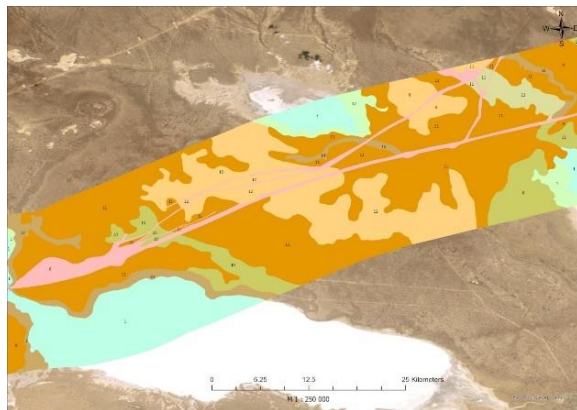
1)



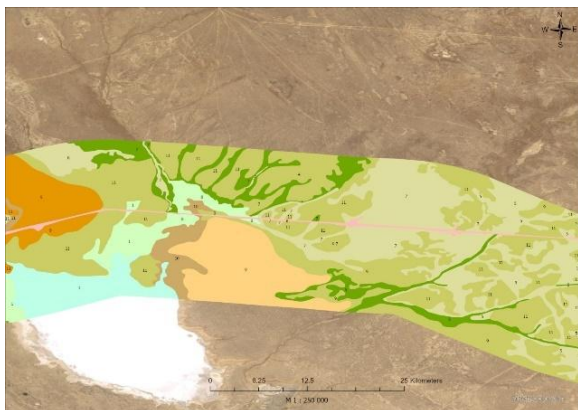
2)



3)



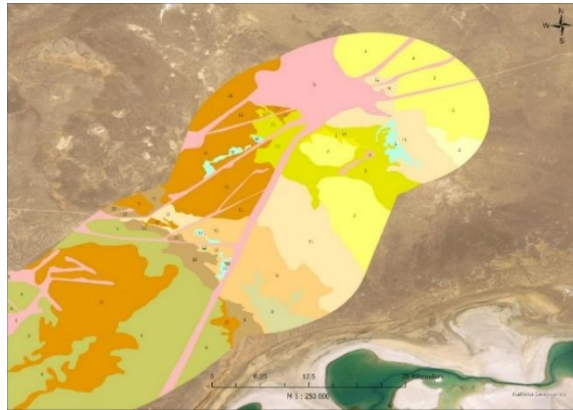
4)



5)



6)



7)

Figure 26 - Map of classified habitats (ecosystems), sections 1-7 of the extended study area in higher resolution (the colors of the habitats correspond to the colors in Table 22; anthropogenically transformed ecosystems are marked in pink)

As can be seen from the maps (Figure 25, 26), a significant portion of the project footprint area is represented by anthropogenically transformed ecosystems (No.15, marked in pink). At the same time, along the road right-of-way, natural and semi-natural areas adjoin the project footprint area, including sor salt marshes (No.12, marked in blue).

Satellite imagery analysis revealed that the eastern part of the road footprint area partially encompasses native and semi-native habitats; there are not dirt roads and clearly transformed areas there (Figure 27, 28). The total length of this section is approximately 47.5 km; since the width of the road right-of-way is 42 m, the area of this section is estimated at 199.5 ha.

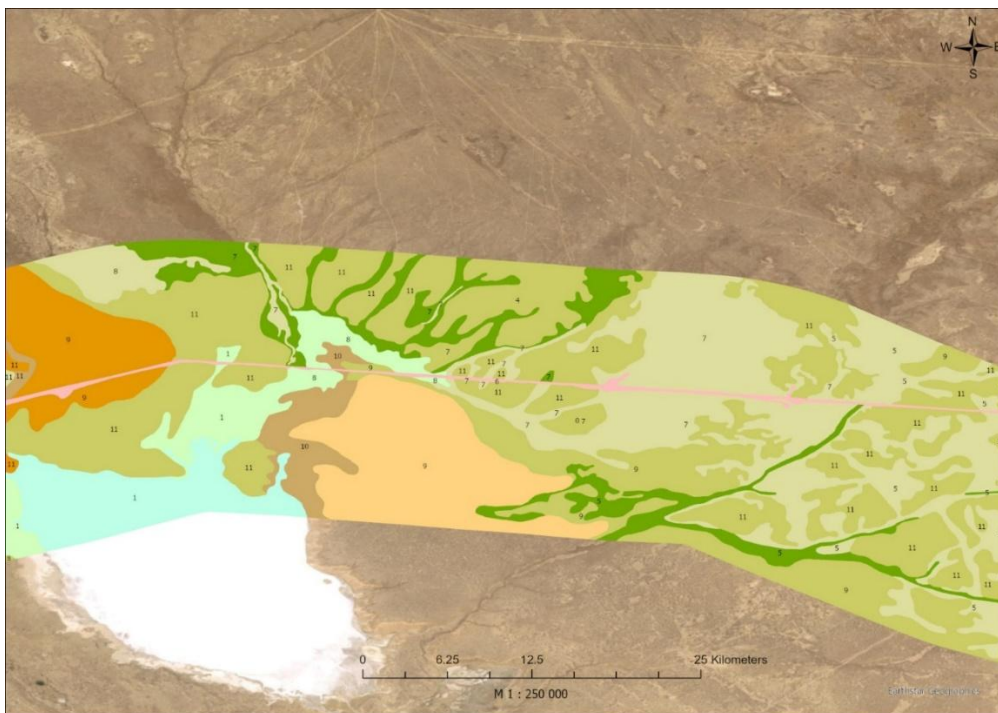


Figure 27 - Section 5 of the extended study area; the road route passes through native and semi-native habitats (the colors of the habitats correspond to the colors in Table 22)

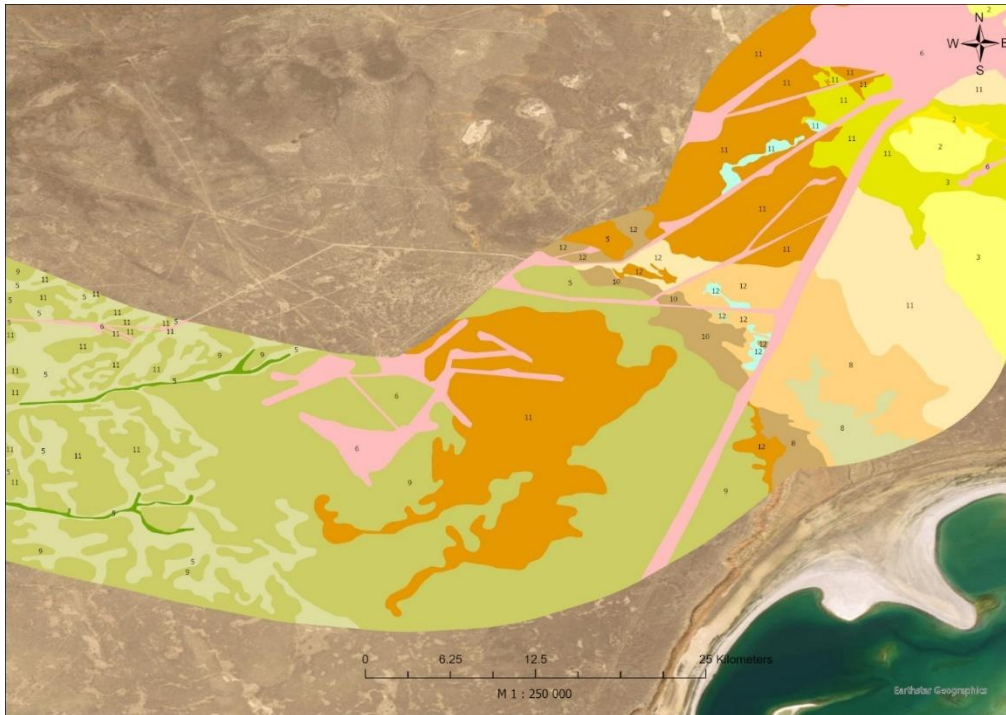


Figure 28 - Section 6 of the extended study area; the road route passes through native and semi-native habitats (the colors of the habitats correspond to the colors in Table 22)

Along with the lack of a national habitat (ecosystem) classification, priority ecosystems have not yet been identified in Kazakhstan. This makes it impossible to identify priority ecosystems in the study area.

At the same time, the Catalogue of the Rare and Endangered Plant Species of the Mangistau Oblast includes three saltwort species that are identified as rare in the oblast (see Table 17). These three shrub and semi-shrub species can be important or substantial components of certain habitats (see, for example, Habitat No. 4, Table 22).

To verify the presence of rare and endangered plant and animal species, a field survey must be conducted during the appropriate season (April - June). If this survey confirms the presence of habitats with a significant proportion of the three saltwort species, these habitats should be considered rare within the Mangistau Oblast and appropriate measures must be developed to mitigate impacts on them or compensate for their loss.

Current status

In August 2026, a field survey was conducted along the project road route from Beineu to Saksaulsk. The primary objective of the survey was to verify the previously recommended crossing points along the proposed highway.

Habitat types adjacent to the crossing locations and areas of anthropogenic impact along the road route were described, documented, and mapped (Figure 29).

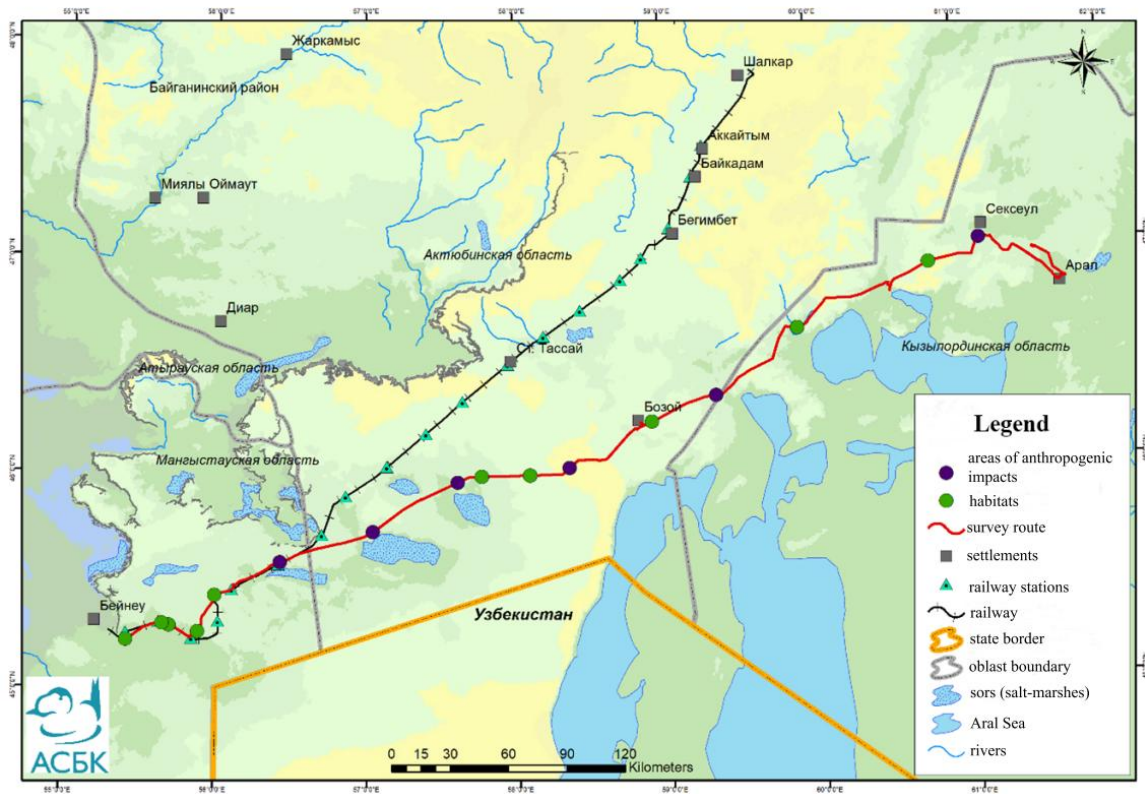


Figure 29 - The areas of the described habitats and identified anthropogenic impacts

Most of the surveyed habitats, adjacent to the road, are in natural or semi-natural state, consisting of plains mainly covered by sparse communities of wormwood and saltwort, with low sandy hills covered by shrubs and tree-shrubs, and depressions between them (**Figure 30**). This conclusion does not apply the road footprint area that is mostly dirt roads.



Figure 30 - The plains covered by communities of wormwood and saltwort (left), low sandy hills covered by shrubs and tree-shrubs (right) in the area of the road

However, various anthropogenic impacts were identified in the surveyed area, including grazing, power lines, dirt roads, quarries, land grading, including the road pre-construction works, and oil and gas infrastructure (**Figure 31**). These impact zones are scattered across a vast, flat area, at considerable distances from one another; each zone may extend for several hundred meters around the source of the impact.



1)



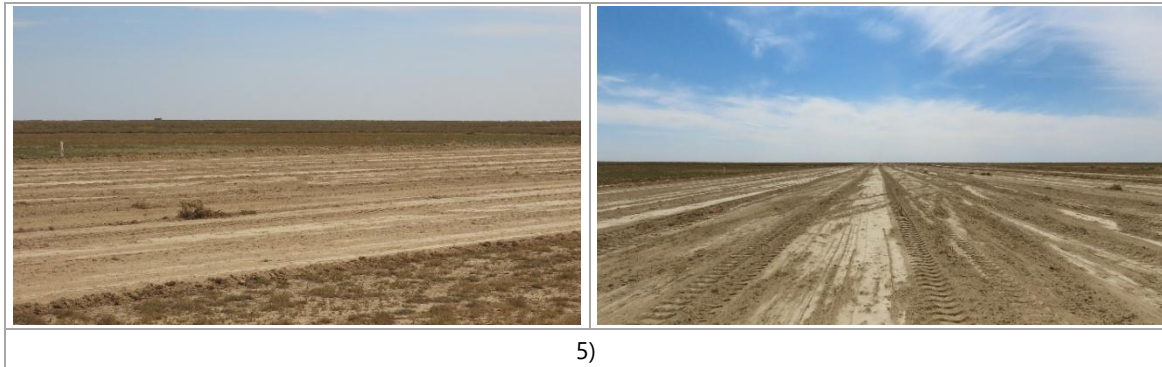
2)



3)



4)



5)

Figure 31 - The areas of anthropogenic impact along the road route (area numbers correspond to the numbers on the map in [Figure 25](#), the colors of the habitats correspond to the colors in [Table 22](#)): 1) - construction works, 2) - oil and gas infrastructure, 3)-4) - quarry 5) - the road pre-construction works

6.16.5 Critical Habitat Assessment Findings

Preliminary screening for triggers of a CH/PBF determination was conducted following the most recent EBRD Environmental and Social Requirement (ESR) 6 (2024) and its accompanying Guidance Note (November 2025) issued by the EBRD.

The Project area does not contain any highly unique or threatened ecosystem types or distinctive evolutionary processes that could result in a CH determination under EBRD Criterion 1 “Threatened ecosystems/habitats” - see Table 1 of the EBRD ESR 6 Guidance Note. Consequently, the CH screening was accordingly limited to individual species, and multi-species groupings.

Species that potentially inhabit the Project area were assessed based on the IUCN Red List, the RoK Red Data Book, and the Convention on the Conservation of Migratory Species of Wild Animals (CMS); ranges of their inhabiting were also assessed. This resulted in lists comprising 7 plant species, 2 reptile species, 94 bird species, 11 mammal species, and 20 invertebrate species (insects) ([Tables 17, 19, 20, and 21](#)).

For the final Critical Habitat Assessment (CHA), these lists were assessed against the following three criteria and relevant Critical habitat thresholds (Table 1 of the EBRD ESR 6 Guidance Note):

- **Criterion 2: Threatened Species**
 - b. IUCN Global Red List Vulnerable (VU), Endangered (EN) or Critically Endangered (CR) species;
 - c. IUCN national or regional Red List EN or CR species (or an analogous national listing).
- **Criterion 3: range-restricted species**
 - a. All range-restricted species in the area of impact
- **Criterion 4: Migratory and Congregatory Species**
 - a. All migratory species;
 - b. All congregatory species.

The status categories for species listed in the Red Data Book of the Republic of Kazakhstan (for vertebrates and plants) do not correspond directly to the IUCN Red List categories. To apply Criterion 2 to national listings, Categories I and II of the Red Data Book of the Republic of Kazakhstan were considered broadly comparable to the CR and EN categories of the IUCN Red List.

To account for the Catalogue of Rare and Endangered Plant Species of the Mangistau Oblast, **the additional criterion “Significant biodiversity features identified by a broad set of stakeholders or governments”** was used (EBRD ESR 6, item 12 (iii)).

An Ecologically Appropriate Area of Analyses (EAAA) is defined based on a species’ ecology and may fall within or extend beyond the project’s area of impact. Since field data on individual species’ distribution areas are lacking, **two EAAAs were defined by grouping the species into two ecological categories: plants and sedentary animals, and active migrants:**

- 1) **the project footprint area plus a 500 m buffer (Aol)** is considered the EAAA for the first group (plants and sedentary animals),
- 2) **the 10-km buffer zone** (coinciding with the extended study area) is considered the EAAA for the second group (active migrants).

This approach does not apply to saiga (*Saiga tatarica*), as the EAAA of the Ustyurt population, through which the project road passes, is already defined and shown in [Figure 23](#) and [Figure 24](#).

Since field data on the presence and population estimates of species in and around the Project area (excluding saiga) are lacking, it is not possible to apply the CH thresholds; therefore, **all species (excluding saiga) were currently identified as Priority Biodiversity Features (PBF)**.

According to current data, the global saiga population numbers about 4.8 mln. animals, including 4.689 million in Kazakhstan, about 60,000 in Russia, and approximately 23,000 in Mongolia. The Ustyurt population numbers 119,000 individuals. Accordingly, the Ustyurt population range supports about 2.5% of the global saiga population, which triggers the CH threshold under Criterion 4a 14iv “The EAAA supports, on a cyclical or otherwise regular basis, ≥ 1 per cent of the global population at any point of the species’ lifecycle” (Table 1, EBRD ESR 6 Guidance Note).

The final results of the CHA are presented in Table 23: PBFs comprise 104 species, including 5 plant species and 99 animal species (1 reptile species, 89 bird species, 5 mammal species, and 4 insect species). CHs include one ungulate species - saiga (*Saiga tatarica*).

Table 23 - Critical Habitat Assessment

No	Common Name	Scientific Name	IUCN Red list status	RoK Red Data Book	Criterion 2	Criterion 3	Criterion 4	Additional criterion (EBRD ESR6 12iii)	EAAA	IUCN global population estimate	Determination
Reptiles											
1	Central Asian Tortoise	<i>Testudo horsfieldii</i>	VU		×				1	Not Available	PBF
Birds											
2	Pallas's Fish-eagle	<i>Haliaeetus leucoryphus</i>	EN	I	×				2	1,000-2,499 mature individuals	PBF
3	Egyptian Vulture	<i>Neophron percnopterus</i>	EN	III	×				2	18,600-54,000 individuals	PBF
4	Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	II	×				2	16,000-20,000 mature individuals	PBF
5	Steppe Eagle	<i>Aquila nipalensis</i>	EN	V	×				2	50,000-75,000 individuals	PBF
6	Golden eagle	<i>Aquila chrysaetos</i>	LC	II	*				2	85,000-160,000 individuals	
7	Lesser kestrel	<i>Falco naumanni</i>	VU		×				2	80,000-134,000 individuals	PBF
8	Saker falcon	<i>Falco cherruq</i>	EN	I	*				2	12,200-29,800 individuals	PBF
9	White-tailed eagle	<i>Haliaeetus albicilla</i>	LC	II	×				2	20,000-60,000 individuals	PBF
10	Peregrine falcon	<i>Falco peregrinus</i>	LC	I	×				2	100,000-499,999 individuals	PBF

No	Common Name	Scientific Name	IUCN Red list status	RoK Red Data Book	Criterion 2	Criterion 3	Criterion 4	Additional criterion (EBRD ESR6 12iii)	EAAA	IUCN global population estimate	Determination
11	Short-toed eagle	<i>Circaetus gallicus</i>	LC	II	*				2	50,000-99,999 individuals	PBF
12	European Turtle-dove	<i>Streptopelia turtur</i>	VU		×				2	19,300,000-71,400,000 individuals	PBF
13	Asian Houbara	<i>Chlamydotis macqueenii</i>	VU	II	×				2	33,000-67,000 mature individuals	PBF
14	Sociable lapwing	<i>Chettusia gregaria</i>	CR	I	*				2	11,200 mature individuals	PBF
15	Dalmatian pelican	<i>Pelecanus crispus</i>	NT	II	*				2	11,400-13,400 mature individuals	PBF
16	Great white pelican	<i>Pelecanus onocrotalus</i>	LC	I	*				2	Not available	PBF
17	Broad-billed sandpiper	<i>Limicola falcinellus</i>	VU		×				2	96,000-136,000 mature individuals	PBF
18	Eurasian spoonbill	<i>Platalea leucorodia</i>	LC	II	*				2	52,800-63,900 mature individuals	PBF
19	Glossy ibis	<i>Plegadis falcinellus</i>	LC	II	*				2	119,000-860,000 mature individuals	PBF
20	Greater flamingo	<i>Phoenicopterus roseus</i>	LC	II	*				2	Not available	PBF

No	Common Name	Scientific Name	IUCN Red list status	RoK Red Data Book	Criterion 2	Criterion 3	Criterion 4	Additional criterion (EBRD ESR6 12iii)	EAAA	IUCN global population estimate	Determination
21	Eurasian eagle-owl	<i>Bubo bubo</i>	LC	II	*				2	180,000-300,000 mature individuals	PBF
22	Other Migratory/ Congregatory species (69 species, Table 19 (numbers 26-94), listed in the Appendices of the CMS but not included in the RoK Red data Book and/or in the IUCN Red List threatened categories)	NA	LC				×		2	NA	PBF
Mammals											
23	Marbled Polecat	<i>Vormela peregusna</i>	VU	III	×				2	Not Available	PBF
24	Urial	<i>Ovis vignei</i>	VU	III	*				2	18,000 mature individuals	PBF
25	Goitered gazelle	<i>Gazella subgutturosa</i>	VU	III	*				2	42,000-49,000 mature individuals	PBF
26	Asiatic wild ass	<i>Equus hemionus</i>	NT	II	*				2	65,000 mature individuals	PBF

No	Common Name	Scientific Name	IUCN Red list status	RoK Red Data Book	Criterion 2	Criterion 3	Criterion 4	Additional criterion (EBRD ESR6 12iii)	EAAA	IUCN global population estimate	Determination
27	Pale pygmy jerboa	<i>Salpingotus pallidus</i>	DD	III		*			1	Not available	PBF
28	Saiga	<i>Saiga tatarica</i>					*		Range of the Ustyurt population	Global population 4.9 million individuals, the Ustyurt population 119,000 individuals	CH (applied the CH threshold under Criterion 4a 14iv «The EAAA supports, on a cyclical or otherwise regular basis, ≥ 1 per cent of the global population at any point of the species' lifecycle»)
Insects											
29	Common Predatory Bush-cricket	<i>Saga pedo</i>	VU		*				1	Not available	PBF
30	Hoplitis fulva	<i>Hoplitis (Megalosmia) fulva</i>	VU		*				1	Not available	PBF
31	Palaeophilotes panope	<i>Palaeophilotes panope</i>		CR	*				1	Not available	PBF
32	Haplosoma ordinatum	<i>Haplosoma ordinatum</i>		VU		*			1	Not available	PBF
Plants											
33	Two-flowered tulip	<i>Tulipa biflora</i> Pall.		I	*				1	Not available	PBF

No	Common Name	Scientific Name	IUCN Red list status	RoK Red Data Book	Criterion 2	Criterion 3	Criterion 4	Additional criterion (EBRD ESR6 12iii)	EAAA	IUCN global population estimate	Determination
34	Khiva saltwort	<i>Xylosalsola chiwensis</i> (Popov) Akhani & Roalson		II	*	*			1	Not available	PBF
35	Tulipa Borszczowii	<i>Tulipa borszczowii</i> Regel (II)	NT	II	*	*			1	11,000-21,000 mature individuals	PBF
36	Oreosalsola arbusculiformis	<i>Oreosalsola arbusculiformis</i> (Drobow) Sennikov						*	1	Not available	PBF
37	Saltwort Richteri	<i>Xylosalsola richteri</i> (Moq.) Akhani & Roalson	LC					*	1	Not available	PBF

6.16.6 Supplementary Pre-Construction Biodiversity Survey

Supplementary pre-construction biodiversity surveys will be conducted in spring 2027 as a prerequisite for quantifying impacts, loss/gain analysis, updating mitigation measures, and development of offset projects, if necessary. The objectives of these surveys and their key parameters are presented in the **Table 24**.

Table 24 - Summary of pre-construction surveys

Survey and its objective	Target receptors	Methodology	Timing	Uncertainties
Habitats survey: To verify habitat mapping based on satellite imagery, focusing on native and semi-native habitats in the eastern part of the road route and habitats formed by saltwort species protected in Mangistau Oblast; if these saltwort habitats are identified, quantify the affected habitats	Habitats within the road right-of-way	Geobotanic studies (routes through habitats)	April-June	A large area may not allow for the precise determination of the habitats
Botanical survey: To verify presence of PBFs, define EAAAs, assess whether habitats of protected tulip and saltwort species are located within the Project footprint area; quantify the affected habitats and survey the surrounding areas to identify suitable habitats for tulips translocation and the protection of saltwort species	Plant species, PBFs	Botanic methods (routes and sampling plots in suitable habitats)	April - June	A large area may not allow for the registration of all tulip locations (relatively small)
Reptile survey: To identify Central Asian tortoise and its habitats, assess habitat connectivity and fragmentation resulting from road construction, and define EAAA. If habitats are located within the Aol, mark them and propose to the construction master-plan as "no-go" zones. If translocation is required, the number of potentially affected animals, survey areas surrounding the road right-of-way to identify suitable habitats with sufficient capacity to support the species or determine whether habitat enhancement is necessary	Central Asian tortoise, PBF	Routes through suitable habitats, registration of residential burrows, mapping of suitable habitats, calculation of the species density and total number	April - May	Not all animals can be registered because they hide in burrows

Survey and its objective	Target receptors	Methodology	Timing	Uncertainties
Bird surveys: To verify presence of bird species previously identified, identify their habitats; if breeding habitats or important congregation areas of priority bird species are located within the Project footprint area, quantify the affected habitats and survey the surrounding areas to identify suitable habitats for their protection	Birds identified in the desktop analysis, PBF	Routes through suitable habitats, in particular, salt marshes; binocular observation, counting individuals, observing patterns of behavior	April-June, an additional autumn migratory survey is recommended	Most of the bird species can cross, when migrating, the Project linear area in different locations, so, observer may not register birds if located in another place
Entomological survey: To verify the presence of four insect species (PBF), identify their habitats; if habitats are located within the Project footprint area, quantify the affected habitats, and survey the surrounding areas to identify suitable habitats	Four species of insects, PBF	Define suitable habitats, standard entomological methods	April-June	A large area may not allow for the registration of all tulip locations (relatively small)
Mammal survey: To identify ungulates, and marbled polecat, document signs of their presence, animal migration routes. If dens, herds, migration routes or congregation areas are identified, map them and propose for inclusion in the construction master-plan as "no-go" zones; take them into account when planning and constructing wildlife crossings. Survey of Pale pygmy jerboa burrows (can be combined with Central Asian survey)	PBF: marbled polecat, Goitered gazelle, Urial, Asiatic wild ass, Pale pygmy jerboa	Auto routes, walking routes, observation of rodent colonies, suitable habitats	March - June	All species are very rare and may not be registered

The habitat, botanical, reptile and entomological surveys can be conducted concurrently, as they are all related to plant communities and their associated fauna.

These surveys will confirm the presence of priority species. Their results will allow an assessment of the importance of the Project area for these species and the significance of the Project' impacts on them. Quantification of habitat loss will enable a loss/gain analysis to determine the measures required to achieve NNL for PBF.

The feasibility assessment for Saiga antelope rail crossings shall also be carried out.

The CHA and residual impact assessment sections of the ESIA report and BMP will be updated, where necessary, based on the outcomes of the supplementary biodiversity surveys and the Saiga rail crossing feasibility assessment.

6.17 Administrative Setting of the Project Corridor

Kazakhstan's administrative structure comprises regions (oblasts), districts (rayons), cities of regional significance, rural districts and settlements. Districts are further divided into rural districts, each comprising one or more rural settlements. Regional, district and rural authorities (Akimats) exercise local administrative functions within their respective jurisdictions, including responsibilities related to spatial planning, local infrastructure and the provision of public services.

The EBRD- and IBRD-financed sections covered by this ESIA extend for approximately 286 km across Mangystau and Aktobe Regions in western Kazakhstan. The EBRD-financed section comprises approximately 125 km in Beineu District, Mangystau Region, and 35 km in Baiganin District, Aktobe Region. The IBRD-financed section comprises approximately 86 km in Baiganin District and 40 km in Shalkar District, both in Aktobe Region. Accordingly, the sections covered by this ESIA extend across two regions and three districts, with Baiganin District encompassing both EBRD- and IBRD-financed sections of the Project.

Within Beineu District, the Project corridor passes in the vicinity of the rural settlements of Syngyrlau (Syngyrlau Rural District), Nogayti, Sam (Sam Rural District) and Turysh (Turysh Rural District). Within Baiganin and Shalkar Districts, the sections covered by this ESIA traverse sparsely populated areas and do not pass in the vicinity of any settlements. Accordingly, the settlements relevant to the community-level social baseline and assessment are located within Beineu District, while the Baiganin and Shalkar sections are characterised primarily by dispersed land use and infrastructure rather than settlement-based receptors (see [Figure 2](#)).

6.18 Social and Socio-Economic Environment

Mangystau Region is a major industrial region in Western Kazakhstan, with an economy dominated by the oil and gas sector, supported by transport and logistics, port operations, construction and manufacturing. In 2025, the region's Gross Regional Product (GRP) reached approximately **KZT 5.62 trillion (EUR 10.1 billion)**, increasing by **12.3%** in real terms compared to the previous year, significantly above Kazakhstan's overall economic growth. The region has one of the highest income levels in the country, with average monthly wages of **KZT 659,800 (approximately EUR 1,190)** in the first quarter of 2026. At the same time, the cost of living is above the national average due to the region's remote location, reliance on imported consumer goods and relatively high transport and logistics costs.

The region plays a strategic role in Kazakhstan's transport and logistics network. It provides the country's principal access to the Caspian Sea through the ports of Aktau and Kuryk and serves as an important gateway for international freight movements along the Trans-Caspian International Transport Route (Middle Corridor). Mangystau is connected to other regions of Kazakhstan and neighbouring countries by the national railway network, Aktau International Airport and the republican highway system. However, road connectivity with central Kazakhstan remains constrained, resulting in long transport distances and relatively high logistics costs. The planned Beineu-Saksaulsk highway is expected to significantly improve east-west connectivity, reduce transport distances to central Kazakhstan, strengthen the region's logistics role, improve access to domestic markets and support further economic diversification beyond the oil and gas sector.

Beineu District is the largest district in **Mangystau Region** by area and occupies the north-eastern part of the region, bordering Uzbekistan. The district has a relatively small and dispersed population, with economic activity concentrated in the district centre of Beineu and several rural settlements. Owing to its strategic location along major road and railway corridors linking western Kazakhstan with Aktobe Region, Uzbekistan and other Central Asian countries, Beineu serves as an important transport and logistics hub.

The district accounts for approximately 2.3% of Mangystau Region's industrial output, compared with 22.1% in Mangystau District and 17.8% in Tupkaragan District. Industrial activity is mainly associated with oil and gas extraction and the production of shell limestone (coquina) building blocks from locally available mineral resources. Agriculture is another important sector, with Beineu contributing approximately 14.8% of the region's total agricultural output, including 17.1% of regional livestock production, while crop production accounts for only 2.8% of the regional total due to the arid climate and predominance of pastureland. Consequently, livestock farming remains the principal economic activity in rural areas, while transport, logistics, trade and public services provide additional sources of employment. Compared with Mangystau Region as a whole, the district has a less industrialised economic structure and generally lower household incomes, reflecting the absence of major oil and gas production facilities that generate the highest wage levels in the region.

The rural settlements of **Syndyrlau**, **Nogayti Sam**, and **Turysh** in Beineu District, Mangystau Region, are low-density rural communities with economies predominantly based on **extensive pastoral livestock farming**, including sheep, goats, cattle, horses, and camels. Livestock production represents the principal livelihood source, with limited diversification into non-agricultural activities, primarily small-scale trade and basic service provision.

The settlements exhibit varying degrees of spatial accessibility and functional connectivity to the district center. **Syndyrlau** benefits from relatively closer proximity to Beineu and year-round access via an asphalt road, supporting more reliable connectivity to markets and public services. **Sam** and **Turysh** are more remote and are connected to the district center primarily via unpaved road infrastructure, which may be subject to seasonal accessibility constraints. **Sam** Rural District has a total population of approximately 692, including 351 men and 341 women. Sam village itself has about 510 residents. Livestock farming is the dominant livelihood activity: the rural district has 29 farming enterprises, all engaged in livestock production (Livestock includes cattle, sheep and goats, horses and camels.) Local authorities indicated that household livelihoods and income are strongly dependent on livestock production, while opportunities for other forms of employment and business activity remain limited.

Turysh has a population of approximately 697, comprising 355 men and 342 women. The local economy is also predominantly livestock-based, with 30 farming enterprises engaged mainly in meat and dairy production. Reported average household income is around KZT 100,000-150,000, with livestock products, including meat and milk, forming an important source of household income⁶⁹. Employment is concentrated in the school, railway sector, local administration, medical point and other public services, while small-scale commercial activity is limited, including two local

⁶⁹Here and throughout this report, references to the views or information provided by district and rural administrations and local residents are based on stakeholder interviews, focus group discussions and consultations conducted as part of the ESIA process. The corresponding consultation records are provided in Annex 2.

shops. Transport connectivity remains constrained by the condition of local roads: access to the district centre is via a gravel road, while links towards other areas rely largely on unpaved roads. Residents also use private vehicles and rail transport, and a daily bus connection is available.

Aktobe Region is one of Kazakhstan's largest and most economically diversified regions. Its economy is based on mining, metallurgy, oil and gas production, manufacturing, agriculture, transport and trade. In 2025, the region's Gross Regional Product (GRP) exceeded KZT 4 trillion (approximately EUR 7.2 billion), supported by steady growth in industrial production and infrastructure investment. Average income and wage levels are close to the national average, while the cost of living remains relatively moderate compared to western oil-producing regions. Agriculture remains an important component of the regional economy, particularly livestock farming, including cattle, sheep, horses and camels, with crop production concentrated mainly in the northern parts of the region.

Aktobe Region serves as a key transport hub in western Kazakhstan, linking the country's western regions with central and northern Kazakhstan and providing road and rail connections to the Russian Federation. The region has a well-developed transport network comprising major national highways, the national railway network and Aktobe International Airport, providing efficient passenger and freight connections within Kazakhstan and to the Russian Federation. The planned Beineu-Saksausk highway will further strengthen transport connectivity between Aktobe and Mangystau regions by providing a more direct road link to the Caspian ports. Within Aktobe Region, the sections covered by this ESIA extend through Baiganin and Shalkar Districts, where the Project alignment traverses predominantly sparsely populated areas

Baiganin District is a sparsely populated, predominantly rural district with an economy characterised by **oil and gas extraction and livestock farming**. **Mineral extraction accounts for approximately 98% of the district's industrial output**, reflecting the dominant role of the oil and gas sector in the local economy. The district covers approximately 6.10 million ha and had a population of about 22,285 at the beginning of 2026.

The district is traversed by railway corridors and gas transmission pipelines but has relatively limited road connectivity. The local road network extends for approximately 392.8 km and primarily serves rural settlements; according to the district passport, around 91% of local roads are classified as worn. At the settlement level, economic activity is primarily concentrated in agricultural production, complemented by public services, small-scale trade and transport-related activities.

The EBRD- and IBRD-financed sections covered by this ESIA extend through Baiganin District; however, the Project alignment within the district traverses sparsely populated areas and does not pass in the vicinity of any settlements. Land use along the Project corridor is therefore characterised primarily by open, sparsely vegetated land, with limited agricultural use.

Shalkar District has a relatively modest contribution to the economy of Aktobe Region, accounting for approximately 1% of the region's industrial output and 7.1% of its gross agricultural output. Unlike several resource-oriented districts in the region, **Shalkar's industrial sector is relatively balanced, with mineral extraction and manufacturing accounting for approximately 47.1% and 46.5% of total industrial output, respectively**. Agriculture remains an important component of the district economy, with both livestock farming and crop production contributing to local agricultural output. The district economy is further supported by its role as a regional railway

transport hub, with major railway corridors linking western Kazakhstan with other parts of the country and Central Asia.

The IBRD-financed section covered by this ESIA extends for approximately 40 km through Shalkar District. Similar to the Project corridor in Baiganin District, this section traverses a sparsely populated area and does not pass in the vicinity of any settlements. Consequently, settlement-based economic activities and livelihoods within Shalkar District are not directly associated with the ESIA corridor, while the socioeconomic relevance of this section relates primarily to land use, transport and other infrastructure along the alignment.

6.19 Demography

Kazakhstan covers an area of approximately 2.725 million km² and had a permanent population of 20.50 million people as of 1 January 2026, resulting in an average population density of approximately 7.5 persons/km². Mangystau Region occupies 165,600 km² (approximately 6.1% of Kazakhstan's territory) and had a population of approximately 819,500 people, corresponding to a population density of around 5.0 persons/km². Although the region has experienced steady population growth in recent years, it remains relatively sparsely populated, with settlements concentrated mainly in Aktau, Zhanaozen and several district centres.

Aktobe Region covers 300,629 km², representing approximately 11% of Kazakhstan's territory, making it the country's second largest region by area. As of 1 January 2026, the region had a population of approximately 955,300 people, resulting in an average population density of only 3.2 persons/km², one of the lowest among Kazakhstan's regions. Population is concentrated primarily in Aktobe City, while the southern districts, including Shalkar District, are characterised by small, widely dispersed rural settlements separated by large distances. These settlement patterns are reflected in the Project area, where the road corridor passes through sparsely populated territories in both Mangystau and Aktobe regions.

Compared with Mangystau Region as a whole, **Beineu District** has a distinctly rural demographic profile. The district has no urban population, with all 72,009 residents living in rural settlements. Population density is only 1.73 persons/km², approximately one-third of the regional average (4.95 persons/km²), reflecting the district's large territory and dispersed settlement pattern. Unlike Mangystau Region, which recorded annual population growth of 1.82%, Beineu District experienced a 1.14% decline in population during the reporting period. This trend suggests continuing demographic challenges, including population out-migration from rural areas, and highlights the importance of improving transport connectivity and access to services to support the district's long-term socio-economic development. Key demographic indicators for Mangystau Region and Beineu District are presented in **Table 25**.

Table 25 - Key Demographic Indicators for Mangystau Region and Beineu District as of January 2026

Region / District	Population total, persons	Urban, %	Rural %	Population density, persons/km	Population growth rate 2025-2026, %
Mangystau Region	819,824	46.8%	53.2%	4.95	1.82
Beineu District	72,009		100.0%	1.73	-1.14

Compared with Aktobe Region as a whole, **Baiganin and Shalkar Districts** have a predominantly rural demographic profile and significantly lower population density. Aktobe Region had a population of approximately 956 thousand people, with 76.3% of residents living in urban areas and an average population density of 3.18 persons/km². In contrast, Baiganin District has an entirely rural population of approximately 22 thousand people, with a very low population density of only 0.37 persons/km². Shalkar District had a population of approximately 41 thousand people, of which 66.4% resided in urban areas, primarily in the town of Shalkar, the administrative centre of the district. The remaining population is distributed among rural settlements located across the extensive territory of the district, accounting for 33.6% of the district population.

Both Baiganin and Shalkar Districts have experienced population decline in recent years, with annual population growth rates of -1.78% and -2.08%, respectively, compared with positive population growth in Aktobe Region (0.68%). These trends reflect demographic challenges typical for areas with dispersed rural settlements, including population out-migration and concentration of population in larger settlements. The low population density and dispersed settlement pattern reflect the extensive territories and predominantly rural settlement structure of these districts and highlight the importance of reliable transport infrastructure for maintaining access to public services, markets and economic opportunities. Key demographic indicators for Mangystau Region and Beineu District are presented in **Table 26**.

Table 26 - Key Demographic Indicators for Aktobe Region, Baiganin and Shalkar Districts as of January 2026

Region / District	Population total, persons	Urban, %	Rural %	Population density, persons/km	Population growth rate 2025-2026, %
Aktobe Region	955,970	76.3%	23.7%	3.18	0.68
Baiganin District	22,286		100.0%	0.37	-1.78
Shalkar District	41,116	66.4%	33.6%	0.67	-2.08

The key demographic characteristics of settlements located along the proposed road corridor are summarized in **Table 27**.

Table 27 - The key demographic characteristics of Project affected settlements⁷⁰

Settlement	Population	Economically active population (labour force)	Children under 18	Retired persons
Beineu district of Mangystau region				
Syndyrlau	554	217	194	46
Sam rural district (Sam+Nogayti settlements)	706	258	304	59
Turysh	684	296	59	206

The settlements located along the Project corridor are small rural communities, with populations ranging from approximately **550** to **700** residents. Economically active residents account for around

⁷⁰The information was sourced from the administrative profiles of the respective rural districts provided by the local authorities

40% of the total population, while children under 18 years of age represent a substantial proportion of the population, ranging from approximately **30%** to **43%**. Older residents account for less than **10%** of the population in each settlement. Overall, the demographic structure is typical of rural areas in western Kazakhstan, with relatively young populations and a significant share of economically active residents.

6.20 Poverty and Unemployment, Incomes and Expenditures

Mangystau Region has one of the highest income levels in Kazakhstan, primarily reflecting the concentration of the oil and gas industry. In the fourth quarter of 2025, average per capita nominal income reached **KZT 285,674** (approximately **EUR 500**), around **12% above** the national average of **KZT 254,446** (approximately **EUR 445**). Despite relatively high-income levels, the regional unemployment rate stood at **5.0%**, slightly above the national average of **4.8%**. At the same time, **8.0%** of the population had incomes below the subsistence minimum in 2024, compared with the national average of **5.1%**. This suggests that the relatively high average incomes generated by the oil and gas sector are not evenly distributed across the population. In addition, Mangystau experiences one of the highest costs of living in Kazakhstan, which further affects the purchasing power of lower-income households.

As regional statistics do not provide comparable income indicators at the district level, average monthly wages of employees were used as a proxy indicator for assessing relative living standards in Beineu district of Mangystau region as well as Baiganin and Shalkar districts of Aktobe region.

Average monthly wages in **Beineu District** are significantly below the regional average. In 2025, average monthly wages amounted to KZT 306,676 (approximately EUR 557) in Beineu District, compared with KZT 623,059 (approximately EUR 1,133) for Mangystau Region as a whole. The substantially higher regional average reflects the concentration of high-paying jobs in the oil and gas sector and related industries, which are primarily located in other parts of the region. Differences in average wages between male and female employees vary significantly between Mangystau Region and Beineu District. At the regional level, female employees earned approximately 52.5% less than male employees, reflecting the strong influence of male-dominated industries, particularly oil and gas, where wages are among the highest in the economy. In Beineu District, the difference was considerably lower, with female employees earning approximately 13.8% less than male employees, indicating a more balanced wage structure typical of a rural economy with a greater share of employment in transport, services, trade and agriculture.

Table 28 - Average monthly nominal wages of employees (Mangystau region)

Region / District	Nominal monthly wages in 2025, KZT	Male wages, KZT	Female wages, KZT	Wage gender gap, %
Mangystau Region	623,059	817,781	388,504	52.5%
Beineu District	306,676	338,610	291,907	13.8%

Aktobe Region has a diversified economy based on mining, manufacturing, transport and logistics, agriculture, trade and services. In the fourth quarter of 2025, average per capita nominal income reached **KZT 229,459** (approximately **EUR 401**), around **10% below** the national average of **KZT 254,446** (approximately **EUR 445**). The regional unemployment rate stood at **4.7%**, slightly below

the national average of **4.8%**. In 2024, **4.3%** of the population had incomes below the subsistence minimum, compared with the national average of **5.1%**. These indicators suggest relatively stable socio-economic conditions, supported by the region's diversified economic structure. In addition, the cost of living in Aktobe Region is generally lower than in Mangystau Region, contributing to relatively higher purchasing power among lower-income households.

Average monthly wages in both districts are slightly below the regional average. In 2025, average monthly wages amounted to **KZT 382,471** (approximately EUR 695) in **Baiganin District** and **KZT 376,082** (approximately EUR 684) in **Shalkar District**, compared with **KZT 404,557** (approximately EUR 735) in **Aktobe Region** as a whole. The lower wage levels in the districts reflect their predominantly rural economic structure, with employment concentrated mainly in agriculture, transport-related activities, local services and other sectors outside the major industrial centres.

Differences in average wages between male and female employees are observed across the region and both districts. In 2025, female employees earned approximately 32% less than male employees in Aktobe Region and Baiganin District, and around 35% less in Shalkar District. These differences may reflect variations in employment sectors, occupational structure and the distribution of higher-paid positions between male and female workers.

At settlement level, information provided by rural administrations indicates relatively low levels of registered unemployment. In **Syngyrlau**, the rural administration reported an unemployment rate of 2.7%. In **Sam Rural District**, 14 persons were reported as unemployed, while in **Turysh** 5 unemployed persons were reported. These figures, however, should not be interpreted as indicating correspondingly high levels of formal employment. Livestock-based self-employment and household farming are important sources of livelihoods in the rural settlements, while Focus Group Discussion (FGD) with women in Turysh indicated that women with children are commonly either employed in the public sector or engaged in unpaid household and childcare responsibilities. The latter would generally not be captured in registered unemployment statistics⁷¹.

In **Turysh** livestock products, particularly meat and milk, identified among the main sources of income. Employment outside livestock farming is concentrated in public services and the railway sector, while small-scale trade and other private-sector activities remain limited. The **Sam Rural Akim** similarly identified livestock farming as the principal source of household income, reporting that the large majority of residents are engaged in livestock-related activities.

Table 29 - Average monthly nominal wages of employees (Aktobe region)

Region / District	Nominal monthly wages in 2025, KZT	Male wages, KZT	Female wages, KZT	Wage gender gap, %
Aktobe Region	404,557	478,782	327,466	31.6%
Baiganin District	382,471	464,941	316,594	31.9%
Shalkar District	376,082	467,712	304,683	34.9%

⁷¹Persons without employment who are not actively seeking work, including those engaged in unpaid household and childcare responsibilities, are generally classified as being outside the labour force rather than unemployed.

6.21 Ethnic Minorities

Kazakhs are the predominant ethnic group in both Mangystau and Aktobe Regions, accounting for approximately **91%** and **83%** of the population, respectively. The remaining population comprises a number of ethnic groups, including Russians, Uzbeks, Ukrainians, Tatars and others, each representing a relatively small proportion of the regional population. These communities are generally well integrated into the social and economic life of the regions and are not geographically segregated or concentrated in distinct settlements. Based on the available baseline information and stakeholder consultations undertaken to date, no ethnic groups have been identified as being disproportionately vulnerable to the Project or requiring specific mitigation measures on the basis of ethnicity.

6.22 Existing Infrastructure and Facilities along the Project Corridor

In Beineu District of Mangystau Region, the road section starts at the junction of the E40 highway and the KR-BG-2 district road. A roadside café and hostel is located approximately 150 m from the junction. The nearest residential houses of Syngyrlau rural settlement are located approximately 1,400 m from the starting point of the road section (**Figures 32 a)** and **b)**).



Figure 32 - Photos of roadside cafe and hostel as Syngyrlau rural settlement

Within Sam rural settlement, the proposed highway alignment passes approximately 50 m from structures associated with local farms. The nearest residential house is located approximately 350 m from the proposed road alignment.

The nearest residential house in Nogayty rural settlement is located approximately 350 m from the proposed highway alignment. Within the boundaries of Turysh village, the proposed highway alignment is located at a sufficient distance from residential buildings and social infrastructure facilities.

Several burial sites and religious structures have been identified in the vicinity of the proposed road alignment along the Syngyrlau-Turysh section (**Figure 33**).

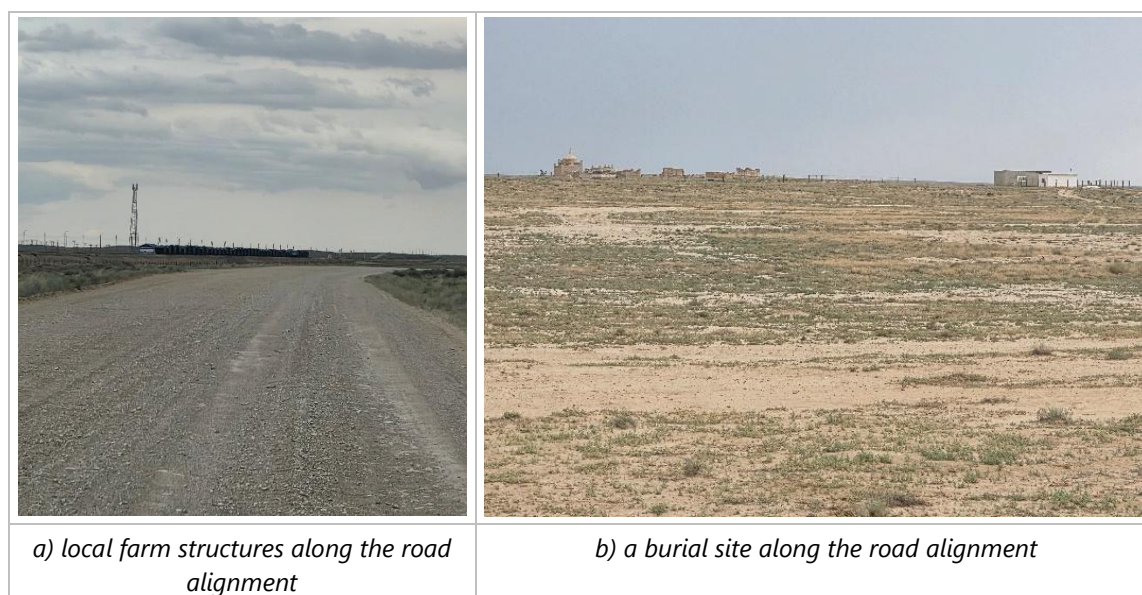


Figure 33 - Photos of local farm structures along the road alignment and a burial site along the road alignment

The road alignment passes in the vicinity of a high-voltage electrical substation and, in several locations, crosses or runs parallel to the Shalkar-Beineu railway line, which forms part of the Zhezkazgan-Saksaulskaya-Shalkar-Beineu railway corridor. The road alignment also intersects with existing power transmission lines and water supply pipelines at several locations.

From Turysh settlement to the administrative boundary between Mangystau and Aktoobe Regions, and further through Baiganin District Shalkar District, the Project alignment follows an unpaved track through sparsely populated and largely undeveloped areas. No settlements are located in the vicinity of the alignment along these sections, and built development is very limited.

6.23 Community Infrastructure and Services

The following section provides an overview of social infrastructure and access to public utilities in the Project-affected settlements, including education and healthcare facilities, water supply, electricity, gas supply and other community services.

Sandyrlau settlement of Beineu district (Mangystau region)

Syndyrlau Village has a secondary school with a capacity of 320 students, with 111 students currently enrolled. The village also has a kindergarten accommodating up to 50 children and a primary healthcare facility. The village has full coverage of potable water supply, electricity and natural gas services.

Consultations with local education staff indicate that the school has 30 teachers. School services were reported to generally meet local needs. However, limited transport connectivity constrains travel to the district centre and other settlements for educational events, examinations and professional development. The local primary healthcare facility is staffed by two healthcare workers

and provides primary healthcare only. The facility was reported to have limited capacity relative to local needs, particularly due to staffing constraints, the absence of an ambulance and limited access to specialised healthcare.

Sam rural district of Beineu district (Mangystau region)

Sam rural district has a secondary school with a capacity of 300 students with more than 120 students currently enrolled and 40 teachers, a kindergarten accommodating up to 25 children, and an outpatient medical clinic designed to accommodate 10 patient visits per shift. Sam and Nogayty rural settlements have full coverage of potable water supply, electricity and natural gas services.

Educational services were generally reported to generally meet local needs. As the school is located within the settlement, students and staff generally access the school by walking, and poor road conditions do not significantly affect daily access. Poor transport connectivity nevertheless affects travel to the district centre and other settlements for examinations, educational events and professional development, with delays or missed attendance reported. The local healthcare facility provides primary healthcare and is staffed by two healthcare workers. Key constraints identified include limited staffing, the absence of an ambulance and restricted access to specialised medical care. Travel and emergency patient transport to district or regional medical facilities are affected by poor road conditions, distance and weather conditions.

Turysh settlement of Beineu district (Mangystau region)

Turysh settlement has a secondary school with a capacity of 150 students with 121 students currently enrolled and 32 teachers, a kindergarten accommodating up to 50 children, and a primary healthcare facility. The settlement has full coverage of potable water supply, electricity and natural gas services.

As the school is located within the settlement and is easily accessible to students and staff, poor road conditions do not significantly affect daily attendance. However, road and weather conditions constrain travel to the district centre and other settlements for educational activities and professional development. The local healthcare facility provides primary healthcare, with two healthcare workers reported. The principal constraints identified were the absence of an ambulance and limited access to specialised medical care. Poor road conditions make travel to district and regional healthcare facilities more difficult and can delay the transport of patients requiring emergency or specialised care.

6.24 Gender Issues

Gender-related differences in employment opportunities and income levels represent an important social consideration in the assessment of rural settlements in Mangystau and Aktobe regions. Employment opportunities in rural areas are generally limited and largely determined by the local economic structure. Women are predominantly employed in education, healthcare, public administration, retail trade and other service sectors, while higher-paid employment in mining, construction and livestock production is largely male-dominated. In addition, many men from rural communities seek seasonal or rotational employment in Kazakhstan's oil and gas producing regions, where wages are generally higher than those available locally.

The focus group discussion (FGD) with women in Turysh confirmed that formal employment opportunities for women in the settlement are limited and concentrated primarily in the public and social sectors, particularly education and healthcare. Women employed in the local school, kindergarten and healthcare facility account for an important share of available formal employment. Women who are not formally employed commonly undertake unpaid household and childcare responsibilities.

Female self-employment and small business activity are limited. Existing self-employment is mainly associated with the small-scale sale of products from household livestock and food production, including dairy and bakery products. Women participating in the FGD identified the limited number of local jobs, the small number of business operators and other employers, and limited access to finance and start-up capital as important constraints to employment and entrepreneurship.

Limited transport connectivity represents an additional constraint on women's economic participation and mobility. Women in both settlements reported relying mainly on taxis or private vehicles to reach district centres and other settlements for healthcare, administrative services, shopping and other purposes. Poor road conditions increase travel time and costs and can significantly restrict mobility during adverse weather and winter conditions. In Bozoy, participants reported that taxi services to Shalkar generally operate no more than once per day and cost approximately KZT 3,500 per person, while winter conditions can substantially restrict or, in some cases, interrupt transport connections. In Turysh, participants similarly reported that poor road conditions and limited transport connections constrain regular travel outside the settlement.

These mobility constraints also affect women's and families' access to healthcare, administrative and other services that are not available locally. Primary healthcare is available in both Turysh and Bozoy, but specialised medical services require travel to larger settlements, and neither settlement was reported to have a locally available ambulance at the time of the FGDs. Participants also reported unreliable mobile communications and very limited internet access, which restrict access to electronic public services and increase dependence on physical travel to other settlements.

Overall, the FGD findings indicate that women's economic participation in Turysh is constrained by limited local employment opportunities, concentration of formal female employment in the social sector, limited opportunities for self-employment and entrepreneurship, unpaid household and childcare responsibilities, and transport-related barriers to accessing employment and services.

6.25 Land Use Issues

The EBRD-financed section of the BBS Project extends for 125 km through Beineu District in Mangystau Region and 35 km through Baiganin District in Aktobe Region. The IBRD-financed section extends for 86 km through Baiganin District and 40 km through Shalkar District, both in Aktobe Region.

Based on the information provided in the local Feasibility Study and observations made during the ESIA surveys, no residential buildings, commercial facilities or other permanent structures have been identified within the proposed land acquisition corridor.

Preliminary land requirement estimates provided in the local Feasibility Study indicate that approximately **535 ha** may be required in **Beineu District**, comprising approximately **491 ha of**

state reserve land and 45 ha of land leased to farming enterprises. These estimates relate entirely to the EBRD-financed section and therefore fall within the scope of this LARF.

In **Baiganin District**, approximately **498 ha** may be required, all of which is identified as **state reserve land**. These estimates cover both the EBRD- and IBRD-financed sections within the district, both of which fall within the scope of this LARF.

In **Shalkar District**, the Feasibility Study estimates a total land requirement of approximately **520 ha**, comprising approximately **420 ha** of state reserve land and **100 ha** of land leased to farming enterprises. However, these estimates cover the Project alignment within Shalkar District as a whole, including both the IBRD-financed section covered by this LARF and the ADB-financed section outside its scope. The available Feasibility Study data do not provide a breakdown of the estimated land requirements between these two sections.

Within the EBRD- and IBRD-financed sections covered by this LARF in **Baiganin and Shalkar Districts (Aktobe Region)**, the Project alignment traverses predominantly saline and sparsely vegetated land with very limited suitability for livestock grazing. This is supported by information and land-use maps provided by the Baiganin and Shalkar District land administration authorities, as well as by observations made by the Consultant during the field survey along the Project alignment. The land along these sections is therefore largely unused for agricultural purposes, including livestock grazing. Accordingly, based on the information currently available, permanent land acquisition within these sections is not expected to result in material impacts on existing agricultural land use or associated livelihoods. **Figure 34** illustrates typical land conditions along the Project alignment in Baiganin District.



Figure 34 - Examples of Typical Land Conditions along the Project Corridor in Baiganin District

Within Beineu District (Mangystau Region), the new road sections passing through the Sam and Turysk Rural Districts will affect land leased to farming enterprises under both long-term and short-term lease arrangements. Land identified in the local Feasibility Study as state reserve land largely corresponds to the existing KR-BG-2 unpaved road corridor. This road was put into operation without the underlying land being formally allocated to JSC NC "KazAvtoZhol".

In Sam Rural District, the total area of pastureland is approximately 21,682 ha, of which about 20,760 ha is leased to farming enterprises and approximately 922 ha is formally classified as state

reserve land. The 922 ha of state reserve land includes the existing unpaved road corridor, which forms part of the Project alignment towards Turysh rural settlement.

In Turysh Rural District, pastureland covers approximately 15,000 ha, all of which has been allocated to farming enterprises under lease arrangements.

Land leased to farming enterprises along the Project alignment is used primarily for grazing horses and camels, and to a lesser extent, cattle. Leaseholders have undertaken various land improvements to support livestock farming activities, including accommodation facilities for farm workers, artesian wells, livestock wintering facilities and other associated infrastructure. The photographs below illustrate typical land improvements observed on leased pastureland along the Project corridor. The **Figure 35** illustrate typical land improvements observed on leased pastureland along the Project corridor.

In summary, based on the currently available information, land along the Project alignment falls primarily into **two categories: state reserve land with little or no current economic use, and pastureland leased to farming enterprises for livestock grazing**. In some areas, leaseholders have undertaken **improvements to support livestock farming activities**, including wells, livestock shelters, fencing and watering facilities. The extent and nature of these improvements vary along the Project corridor and will be further confirmed during detailed design and subsequent land and asset surveys.



Figure 35 - Typical Land Improvements on Leased Pastureland along the Project Corridor (Beineu District)

6.26 Socially Less Protected / Vulnerable Population

In accordance with the Social Code of the Republic of Kazakhstan, socially vulnerable population groups may include persons with disabilities, low-income households, elderly persons requiring social assistance, large and single-parent families, unemployed persons, and other persons or households requiring social support.

In the context of the Project, vulnerability may also arise from a combination of socioeconomic circumstances, such as limited or unstable income, limited employment opportunities, restricted access to transport and specialised healthcare, and additional household or care responsibilities.

Information provided by the rural administrations indicates the presence of several socially vulnerable population groups within the settlements located along the Project corridor in Beineu District. In **Turysh**, 20 persons with disabilities and five unemployed persons were reported. No residents were receiving targeted social assistance at the time the information was provided.

In **Sam Rural District**, which includes **Sam** and **Nogayti** settlements, 12 persons with disabilities, 74 large families, six single-parent families and 14 unemployed persons were reported. The rural administration reported no low-income families or elderly persons living alone and indicated that no socially vulnerable households were receiving state social assistance at the time the information was provided.

In **Syngyrlau**, the available settlement passport indicates a population of 554, including 46 pensioners and 203 persons under 18 years of age. The economically active population comprises 217 persons, and the registered unemployment rate is reported at 2.68%.

Consultations with representatives of vulnerable groups in Syngyrlau, Sam and Turysh provided additional information on the socioeconomic factors affecting these households. Consultations with representatives of vulnerable groups in Syngyrlau, Sam and Turysh provided additional information on their socioeconomic circumstances and the constraints they experience. The consultations included representatives of large families and single-parent households, as well as elderly persons living alone. Participants commonly identified food, transport, utilities, healthcare and education among the main pressures on household expenditure. Limited local employment opportunities and transport connectivity were also identified as important constraints.

The consultations indicate that the socioeconomic circumstances of vulnerable groups are influenced by limited local employment and income-generating opportunities, as well as constraints on access to healthcare, administrative services, markets and other services outside the settlements. These constraints are particularly relevant for households with limited financial resources and elderly persons living alone, for whom the cost and availability of transport may further affect access to essential services.

Overall, vulnerability within the settlements along the Project corridor is associated with factors such as disability, unemployment, low or unstable income, large or single-parent households, elderly persons living alone, and limited access to employment and essential services. The nature and degree of vulnerability vary depending on individual household circumstances.

7 Environmental and Social Impacts, Benefits and Opportunities, Mitigation Measures

7.1 Introduction

This Chapter summarises the E&S impacts and benefits identified for the km 0-km 286 section of the BBS Road (the Project) as part of the ESIA study undertaken by the Consultant in accordance with the applicable national requirements of the Republic of Kazakhstan and the EBRD ESP (2024) and applicable ESRs.

The assessment provides an integrated overview of the Project's potential environmental and social effects, including impacts and benefits of particular relevance to sensitive receptors and Project stakeholders. The identified impacts are assessed together with the proposed mitigation and management measures aimed at avoiding, minimising, or, where necessary, compensating for adverse impacts and enhancing potential benefits.

The methodology applied for the assessment of environmental and social impacts and the development of mitigation measures is presented in detail in **Chapter 4** of this ESIA Report.

7.2 Environmental Impacts and Benefits, Mitigation Measures

7.2.1 Transboundary Impact Assessment

The BBS Road Project is located entirely within the territory of the Republic of Kazakhstan and comprises the construction and operation of a road corridor extending from the vicinity of Beineu in the Mangystau Region to the vicinity of Saksaulsk in the Kyzylorda Region. Based on the assessment undertaken for the Project, **no significant adverse transboundary environmental impacts are anticipated** during either the construction or operational phases.

The Project has been screened against the provisions of the **Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)**. The Project components and activities do not fall within the categories of activities listed in **Appendix I** of the Convention for which a transboundary environmental impact assessment is required.

The BBS Road is located in a sparsely populated area of western Kazakhstan, and the Project's potential environmental effects are expected to be **predominantly localised within and around the Project Area of Influence**. Potential construction-phase impacts, including noise, dust and air emissions, water and soil impacts, waste generation, and disturbance to biodiversity, are expected to decrease with increasing distance from the construction sites and are not expected to extend across international boundaries at a level that could result in significant adverse environmental effects in neighbouring countries.

Similarly, during the operational phase, potential impacts associated with road traffic, including noise and vehicle emissions, are expected to be geographically limited to the vicinity of the road corridor. No Project-related emissions or discharges have been identified that could reasonably be expected to result in significant adverse effects beyond the territory of Kazakhstan.

7.2.2 Climate Change Resilience

Given that transport infrastructure represents a long-term investment, ensuring climate resilience throughout the asset's lifecycle - spanning design, construction, operation, and maintenance - is critical.

In alignment with EBRD ESR1 and the Bank's strict commitment to Paris Agreement Alignment, a comprehensive **Climate Change Vulnerability and Risk Assessment (CVRA)** was conducted in the framework of the Technical Due Diligence. The methodology of CVRA consists of the following phases:

- **Vulnerability Screening (Sensitivity × Exposure):** Identifies relevant climate hazards by crossing the infrastructure's technical sensitivity (independent of location) with the project area's localized current and future climate exposure.
- **Risk Assessment (Likelihood × Consequence):** Evaluates hazards scoring medium/high vulnerability. Likelihood is graded on a 5-step qualitative/quantitative scale (Rare to Almost Certain), and Consequence measures engineering, operational, and health/safety impacts (Insignificant to Catastrophic).
- **Adaptation Planning:** Recommends targeted measures to reduce identified risks to an acceptable level.

For the present project, the screening analysis concludes that the highway infrastructure is highly vulnerable to heat, wildfire, and wind, and moderately vulnerable to cold, flood, and landslide. For these climatic hazards a risk assessment was conducted for both current and future climate conditions. According to the assessment, the following hazards present Medium to High risk levels:

- **Extreme Heat:** Causes asphalt softening (rutting, cracking), thermal expansion/joint damage in bridges, power line failures affecting signaling, and severe heat stress (restricting legal shifts) for maintenance crews.
- **Spring Flooding & Flash Floods:** Condensed torrential downpours can overwhelm culverts/ditches via massive runoff surges, threatening the structural integrity of surface/subgrade materials and causing traffic service disruptions.
- **Wildfires:** Driven by compounding high summer temperatures and severe drought, wildfires can result to asset deterioration, disruption of services and accidents.
- **Drought.** Induces clay soil shrinkage and subgrade settlement, causing pavement cracking.
- **Winds:** High winds across dried-out topsoil can cause physical damage to signs, barriers, and lighting columns, as well as road obstruction and traffic disruption due to debris, fallen vegetation and flying objects.
- **Cold.** Low temperatures can result to pavement deterioration. Abrupt freeze-thaw shifts and winter climate volatility will keep extreme icing events highly frequent, causing an elevated risk of accidents on road surfaces and bridge decks.

Additionally, in the framework of the **Road Safety Audit (RSA)**, climate and weather conditions were examined and assessed regarding their impact on road safety. More specifically, the alignment is exposed to severe temperatures, strong winds, dust storms, heavy snowfall, and intense sun glare. These factors degrade pavement performance, destabilize moving vehicles, and impair driver visibility, creating a high risk for all collision types. Additionally, the road crosses multiple natural

drainage pathways, including erosion channels, depressions, and shallow basins prone to flash floods. Finally, persistent strong winds blow loose sand across the corridor, where it deposits on the traffic lanes. This accumulation narrows the driving surface, reduces tire traction (inducing skids), masks road markings, and blinds visibility, forcing hazardous, sudden adjustments by motorists.

Both CVRA and RSA identified core recommendations for reducing the risks and enhancing climate resilience.

- **Floods:** The RSA proposes utilizing localized, future-projected Intensity–Duration–Frequency (IDF) data to accurately map flood zones. These IDF curves will provide the peak precipitation input volumes for the 2-Dimensional Hydrodynamic Simulation Model recommended by the CVRA. The hydraulic capacity of all drainage structures will be reassessed, with minor culverts upsized or upgraded if required according to the results. Dedicated structural deck drainage systems must also be integrated into all bridge designs to mitigate hydroplaning risks and control over-the-side runoff erosion. Finally, installation of active scour protection (riprap aprons and concrete toe revetments) around intermediate piers and abutment toes is recommended for bridges.
- **Extreme weather events.** The foreseen multi-layered pavement is resilient to extreme, volatile continental climates of the area. It is recommended to reexamine the option of a 35 cm width of Layer 5 (Sub-Base / Frost Protection). Additionally, CVRA recommends recalibrating the bridge design with thermal considerations based on future temperature projections (pessimistic SSP5-8.5 warming pathway).
- **Wind & Sand Encroachment.** It is recommended that the detailed design shall incorporate 100-150 mm HDPE geocells paired with hydroseeding on 1:1.5 slopes. Furthermore, to prevent internal water piping (suffusion) within climate-sensitive silty sands (Km 115-120), non-woven polypropylene geotextile filter mats must be installed underneath the sub-base drainage layer.

Apart from the above, operational measures are proposed:

- **Adoption of asset management practices:** Develop and implement operation and maintenance strategy, implementation of strict maintenance schedule for all highway assets, standardization of record keeping with respect to monitoring and maintenance of assets.
- **Emergency planning.** Develop Emergency Response Plan with procedures for preparing for an imminent emergency event
- **Climate Resilience Action Plan** including procedures to update data regarding climate change, monitor of climate change impacts / risks, incorporate lessons learned from events during operation, select / adopt additional measures.

7.2.3 Visual Impact

This section assesses the potential visual impacts associated with the construction and operation of the Project within the surrounding landscape. The assessment considers the existing landscape character, the sensitivity of visual receptors, and the extent to which Project components may alter views and the visual quality of the area.

Construction Phase

The region is characterised by desert and semi-desert landscapes with inherently low resilience to anthropogenic disturbance. The prevailing climatic conditions are generally unfavourable for the formation and regeneration of soil and vegetation cover.

The visual impacts during the bypass construction stage will be associated with the presence of construction equipment, heavy vehicles, workers, on-site and off-site traffic, construction camps, parking areas, and other temporary facilities, as well as with unfinished engineering structures, such as junctions, livestock passages, bridges, and overhead transmission line (OTL) pylons. As the bypass is a linear infrastructure project, construction activities will not remain concentrated in a single location. Instead, the source of visual disturbance will progressively move along the alignment as construction works advance.

Landscape and visual impacts will also arise from vegetation and topsoil removal, as well as from the establishment of temporary stockpiling and storage areas for topsoil, excavated spoil and construction waste. The locations and dimensions of material stockpiles should be carefully selected and managed to minimise visual intrusion and avoid significant impacts on sensitive receptors. Similarly, areas designated for the storage of topsoil, excavated subsoil, and generated waste, as well as parking areas within the Project site, should be located as far as practicable from sensitive visual receptors.

Four rural settlements are located along the BBS Project road section between km 0 and km 286. Of these, Syngyrlau and Turysh are located approximately 1,400 m and 825 m from the road alignment, respectively, and are therefore unlikely to experience significant visual amenity impacts. However, the Turysh area may be subject to localised visual impacts associated with the construction of the RMU. Nogayti and Sam settlements are located much closer to the road alignment, at approximately 207 m and 138 m, respectively. Consequently, construction activities, including the presence of construction equipment and temporary works, are expected to be visible to residents of these settlements, as well as to farmers using parts of the surrounding semi-desert area as pastureland.

The impact during construction will be unavoidable but short-term, limited to the construction period, localised, and reversible. Provided that the mitigation measures recommended in **Table 28** are implemented, the significance of the residual impact is expected to be low.

Operation Phase

The existing 73 km unpaved earth road between Beineu and Turysh and then earth road to the point km 286 will be upgraded to a modern Category II highway incorporating associated infrastructure, including road lighting (where required), traffic signage, wildlife and agricultural machinery crossings, culverts and other road related facilities. These features will be designed in

accordance with applicable national road standards and integrated into the existing transport and utility corridor, which already includes the Beineu-Bozoy railway, overhead transmission lines, and gas pipelines. Consequently, the upgraded road is not expected to result in a significant adverse change to the overall visual character of the landscape.

The 2.7 ha site selected for the construction of the RMU near Turysh settlement is located on the opposite side of the proposed road alignment, approximately 1,200 m from the nearest residential house in Turysh and around 1,000 m from the BBS Road. As a result, the RMU will not be perceptible to residents of the settlement and will be only barely visible to drivers and travellers on the BBS Road.

According to the Sanitary Rules "Sanitary and Epidemiological Requirements for Sanitary Protection Zones of Facilities that Impact the Environment and Human Health" approved by Order No. KP DSM-2 of the RoK Minister of Health dated 11.01.2022, facilities of category IV and V shall have a maximally landscaped Sanitary Protection Zone (SPZ), with at least 60% of its area allocated to landscaping, including the mandatory establishment of a strip of trees and shrubs along the side facing residential development. This requirement applies to the RMU in Turysh but does not apply to the road construction works.

For the villages of Sam and Nogayti, located approximately 138 m and 207 m from the Project road alignment, respectively, the establishment of tree belts should be considered as a mitigation measure to reduce the visual prominence of the road. Where technically feasible and compatible with local climatic conditions, native and drought-tolerant tree and shrub species should be planted along selected sections of the road corridor to provide visual screening and enhance the integration of the road into the surrounding landscape.

Impact Assessment and Mitigation Measures

Assessment and mitigation of visual impacts during the reservoir construction and operation phases are summarised in **Table 30**.

Table 30 - Summary of visual impacts and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
Population of Sam, Nogayti and Turysh villages, farmers	-	Include the establishment of tree belts, using native and drought-tolerant tree and shrub species where technically feasible and compatible with local climatic conditions, in the Project design documentation for road sections passing in close proximity to the Sam and Nogayti settlements.	-
CONSTRUCTION PHASE			
Population of Sam, Nogayti and Turysh villages, farmers	Moderate	1) Install visual screening (e.g., solid screens, hoarding or fencing) around the perimeter of construction camps, active construction areas and parking areas. The screens/fences should use muted, non-	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		reflective colours that blend with the surrounding landscape, 2) Cover stockpiles of construction materials and topsoil, where practicable, with canvas or other suitable covers in muted colours compatible with the surrounding landscape, 3) Limit the height and dimensions of stockpiles to minimise their visual prominence, particularly from the Sam and Nogayti settlements and other sensitive receptors, 4) Locate stockpiles, temporary facilities and parking areas, where practicable, in visually screened or less prominent locations and away from viewpoints from nearby settlements. 5) Limit construction activities to daytime hours, except where night-time work is technically unavoidable. Where night-time lighting is required, use directional, low-intensity lighting aimed only at the work area and avoid unnecessary light spill towards nearby settlements. 6) Maintain construction sites in an orderly condition, with waste, equipment and materials stored systematically and unnecessary temporary structures removed promptly. 7) Avoid highly reflective materials and surfaces on temporary facilities, fencing and equipment where practicable.	
OPERATION PHASE			
Population of Sam, Nogayti and Turysh villages	Moderate	1) Implement landscaping of the sanitary protection zone around the DEU in Turysh settlement in accordance with the requirements set out in the Project FS document (incorporated in Project design document). 2) Implement tree belts on both sides of the Project Road section passing adjacent to the Sam and Nogayti settlements, in accordance with the Project design document.	Low

7.2.4 Impact on Geology

Construction Phase

The main potential impacts on geology and geological conditions are primarily associated with the predominantly flat terrain and the desert and semi-desert environment along the km 0 - km 286 Project road section, and may arise from construction activities involving earthworks, excavation, sourcing of construction materials, and alteration of the existing ground surface. These potential impacts include:

- **Alteration of the existing terrain and geological profile.** Road construction will require excavation, grading, cutting and filling, particularly for the road formation, embankments, interchanges, culverts and other structures. These activities will locally modify the existing landform and expose or disturb underlying geological materials.
- **Excavation of soil and geological materials.** Excavation for the road formation, drainage structures, RMU, construction camps and other ancillary facilities will disturb near-surface geological formations. These impacts are expected to be localised and largely permanent within the Project footprint.
- **Slope instability and erosion.** Although the BBS corridor is generally characterised by relatively flat terrain, localised cut-and-fill activities and the construction of embankments may increase the potential for surface erosion, localised slope instability and sediment mobilisation, particularly during periods of intense rainfall or snowmelt.
- **Disturbance of geological resources.** Construction will require borrow materials, aggregates and other mineral resources. According to the FS, these materials will be sourced from existing approved commercial suppliers. This approach will reduce potential impacts associated with geological resource extraction, as the development of new borrow pits or quarries specifically for the Project is not currently anticipated.
- **Changes to natural drainage and erosion processes.** The road embankment and associated drainage infrastructure may locally alter existing surface-water flow paths. If not appropriately designed and maintained, these changes could result in concentrated runoff, localised scour and erosion of soil and geological materials.

In summary, construction of the road will result in localised alteration of the existing geological and geomorphological conditions due to excavation, grading, filling and the placement of road embankments. The principal impacts will be associated with the disturbance and removal of near-surface geological materials, local modification of landforms, and potential changes to erosion and drainage patterns. Given the generally flat terrain and the absence of extensive deep excavation, these impacts are expected to be localised and of low significance, provided that appropriate earthworks, erosion control, drainage and material-sourcing measures, as presented in [Table 31](#), are implemented.

Operation Phase

For the operation phase of the Project road, impacts on geology are expected to be considerably lower than during construction. The main potential impacts would be indirect and associated with maintenance, erosion and drainage components, including: These impacts should be temporary and limited to the areas directly affected by the works

- Rainfall, snowmelt and concentrated runoff from the road drainage system may cause erosion of embankment slopes, shoulders and other exposed areas. Over time, uncontrolled erosion could result in localised degradation of the ground surface and instability of embankment slopes.
- The road and its drainage structures will remain a permanent modification of the existing landscape and may alter local surface-water flow paths.
- Inadequately maintained culverts and drainage channels could cause water concentration, scour and localised erosion.

- Periodic road maintenance, drainage repairs, utility works and rehabilitation currently conducted by LLP "QazService"⁷² may result in localised excavation and disturbance of geological materials.

During operation, the Project is not expected to result in any material direct impacts on geological conditions. Potential impacts will primarily be associated with erosion and scour of road embankments and drainage structures, localised changes in surface-water flow and the long-term stability of the road formation. These impacts are expected to be localised and of low significance, provided that road drainage systems, culverts and embankments are regularly inspected and adequately maintained.

Impact Assessment and Mitigation Measures

Assessment and mitigation of impacts on geological conditions during the reservoir construction and operation phases are summarised in **Table 31**.

Table 31 - Summary of geological impacts and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
CONSTRUCTION PHASE			
Water and soil resources, flora and fauna	From low to moderate	1) Limit vegetation clearance, stripping, excavation and other ground-disturbing activities to the approved Project footprint and clearly demarcate construction boundaries before works commence, 2) Carry out excavation, grading, cutting and filling in accordance with the approved design, with particular attention to the stability of road embankments, slopes and other earth structures, 3) Promptly compact and stabilise completed embankments, slopes and other exposed areas to minimise erosion, wind erosion and sediment mobilisation. Where technically feasible, progressively reinstate disturbed areas, 4) Design and construct drainage systems, culverts and erosion-control measures to prevent concentrated runoff, scour and localised erosion of soils and geological materials, 5) Avoid unnecessary obstruction or diversion of existing drainage pathways during construction and ensure that temporary drainage arrangements maintain appropriate surface-water flows, 6) Reuse suitable excavated spoil materials within the Project wherever practicable. Surplus materials should be transported to approved disposal or storage locations and should not be placed in	Low

⁷²Road maintenance company under JSC NC "KazAvtoZhol"

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		natural drainage channels or other environmentally sensitive areas, 7) Source aggregates, borrow materials and other geological resources from existing authorised commercial suppliers, as envisaged by the FS, and avoid development of new borrow pits or quarries specifically for the Project, 8) Locate and manage soil and geological-material stockpiles so that they do not obstruct drainage or become subject to excessive wind or water erosion. Stockpiles should be stabilised or covered where necessary.	
OPERATION (MAINTANENCE) PHASE			
Water and soil resources, flora and fauna	Moderate	1) Regularly inspect and maintain culverts, drainage channels and outlets to prevent blockage, uncontrolled runoff, scour and erosion, 2) Periodically inspect road embankments and other engineered earth structures for erosion, settlement, cracking or localised instability and undertake remedial works as necessary, 3) Ensure that areas disturbed during construction and subsequently reinstated remain stable and are maintained to prevent renewed erosion, 4) Restrict excavation and other ground-disturbing activities associated with road maintenance to the minimum area necessary and apply the same erosion, drainage and material-management measures as during construction.	Low

7.2.5 Impact on Soil

Construction Phase

The potential impacts on soil during the construction phase of the Project will primarily arise from ground-disturbing activities associated with earthworks, excavation, grading and filling as well as the establishment of temporary construction facilities and operation of construction machinery. The principal activities with the potential to affect soil resources include:

- 1) **Vegetation clearance, topsoil stripping and subsoil excavation**, including the improper stripping, handling, storage or reinstatement of topsoil and spoil during road construction, RMUs, construction camps and other ancillary works.

According to the FS, approximately 1.75 mln. m³ of the fertile soil layer⁷³ is expected to be stripped along the road alignment within the Project road section (km 0 - km 286) and subsequently used for site restoration and reinstatement activities. The FS and the local EIA

⁷³It is unclear from the FS whether this refers to topsoil only or to a mixture of topsoil and subsoil. The word-for-word translation from Russian is "fertile soil layer"

report do not specify the proposed locations or management arrangements for the temporary storage and/or disposal of this material. Excavated subsoil (spoil) should be appropriately managed to minimise impacts on the surrounding environment, and designated spoil disposal areas should be identified and agreed with the relevant akimats. Recommendations for the proper storage, handling and reuse of topsoil and management of excavated spoil are provided in [Table 32](#).

- 2) **Earthworks and loading/unloading operations**, which may result in soil compaction, mixing of topsoil and subsoil, loss of fertile topsoil, and localised disturbance of soil structure within the Project footprint.

Heavy construction machinery and vehicles operating on unpaved surfaces may compact the topsoil, reduce its porosity and permeability and potentially affecting its capacity to support vegetation. Improper stripping and handling of topsoil may also result in the mixing of topsoil with underlying subsoil or spoil, reducing the quality and suitability of the topsoil for subsequent site restoration. In addition, repeated vehicle movements, material handling and temporary storage of excavated materials may disturb the natural soil structure and increase the potential for soil erosion and loss of fertile soil.

- 3) **Improper storage, handling and transportation of construction materials and waste**, including excavated materials, hazardous substances, liquid waste and solid waste, which may lead to localised soil contamination.
- 4) **Soil contamination** resulting from accidental spills or leaks of fuel, oils, lubricants, concrete washout, friable construction materials or other hazardous substances during construction could contaminate near-surface soils and, potentially, underlying geological materials.
- 5) **Littering and inadequate waste management** at construction camps, parking areas and work sites, resulting in localised degradation and contamination of soil resources.

Accidental releases of fuels, oils, construction and other hazardous materials could occur at construction sites, equipment and vehicle parking maintenance areas, material and waste storage areas, construction camps and during the transportation of materials. Therefore, the handling of hazardous materials, including their transportation, storage, and use, must be carefully managed.

Contaminants released to the ground may affect near-surface soils and, depending on the nature and quantity of the release and local site conditions, could potentially migrate into deeper soil layers and underlying geological materials. The risk will be increased where materials and wastes are stored or handled without appropriate containment or where spills are not promptly contained and remediated. These impacts can be minimised through appropriate storage and handling arrangements, secondary containment, designated refuelling and parking areas, spill-prevention measures, proper waste management and the prompt clean-up of accidental releases ([Table 32](#)).

Operation Phase

During the operation phase, potential impacts on soil will primarily be associated with road traffic, leakages of oil materials from vehicles, drainage system performance, littering by road users and

road maintenance works. These impacts are expected to be largely localised along the road corridor and its immediate surroundings. The principal potential impacts include:

1. **Soil contamination from traffic-related pollutants.** Vehicle emissions, exhaust particulates, tyre and brake wear and the deposition of other traffic-related pollutants may result in the accumulation of heavy metals and other contaminants in soils adjacent to the road corridor. Over time, such pollutants may affect soil quality and vegetation growth,
2. **Impacts associated with inadequate drainage.** Blockage, deterioration or inadequate maintenance of culverts and roadside drainage structures may result in the accumulation of water, localised flooding and increased erosion of roadside soils and embankments. Concentrated runoff may also cause scour at drainage outlets and other vulnerable locations.
3. **Littering and waste deposition.** Litter discarded by road users, including plastic, packaging and other solid waste, may accumulate along the road corridor and adjacent areas, resulting in deterioration of soil quality and the visual quality of the surrounding environment.
4. **Accidental spills and leaks.** Accidents involving vehicles carrying fuels, oils, chemicals or other hazardous materials could result in soil contamination. Such impacts are potentially more difficult to control during operation because they may originate from road users and other third parties rather than from directly controlled Project activities.
5. **Impacts from the use of de-icing materials.** During the winter season, the application of de-icing materials, such as salts, may result in their deposition and accumulation in roadside soils through runoff, splash and snow storage. De-icing materials may also be transported through the drainage system and accumulate in low-lying areas.

Overall, soil impacts during operation are expected to be localised and generally of low significance under normal operating conditions. However, repeated application of de-icing materials, traffic-related pollutant deposition, littering, inadequate drainage and accidental spills may result in cumulative or localised impacts on soil quality. These impacts will require ongoing management through appropriate road and drainage maintenance, controlled use of de-icing materials, litter control and effective emergency response procedures ([Table 32](#)).

Impact Assessment and Mitigation Measures

Assessment and mitigation of impacts on soil during the reservoir construction and operation phases are summarised in [Table 32](#).

Table 32 - Summary of soil impact and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	-	1) Prepare the following site-specific Environmental Management Plans and obtain approval from the Supervision Engineer: - Topsoil Management Plan,	-

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		- Spoil Management Plan, - Hazardous Materials Management Plan, - Spill Prevention and Management Plan, - Soil Quality Monitoring Plan. 2) Strip, handle, store and use topsoil in accordance with the requirements of the RoK Law on Soil Protection, 3) Identify and designate appropriate locations for the disposal or reuse of excavated spoil and obtain the agreement of the relevant Akimat, where required,	
CONSTRUCTION PHASE			
Water and soil resources, flora and fauna	Moderate	1) Store topsoil separately to prevent mixing with subsoil, maintaining it in a condition that preserves the natural seed bank, until construction works are completed, 2) Avoid placing topsoil stockpiles near planned excavation areas, 3) Limit the height of stockpiles to a maximum of 3 m, and ensure the slope gradient does not exceed 25°, 4) Clearly label all topsoil stockpiles to ensure easy identification, 5) Cover topsoil stockpiles to prevent soil erosion, where natural revegetation has not occurred, 6) Fence off topsoil stockpiles to prevent unauthorized access and compaction by Project vehicles, 7) Reuse the stored topsoil for landscaping the disturbed areas and/or tree planting, 8) Store all hazardous materials in clearly labelled, secure, and ventilated areas, 9) Hazardous materials containers to be clearly labelled according to contents and hazards, 10) Equip sites with spill response kits and train workers on emergency response, 11) Maintain Material Safety Data Sheets (MSDS) for all hazardous materials on-site, 12) Incompatible hazardous materials must not be stored together, 13) Hazardous materials storage areas will be equipped with eye wash kits and fire extinguishers, 14) Use appropriate PPE. 15) Transport friable materials using trucks equipped with waterproof canvas covers, 16) Store construction and other friable materials in separately designated areas that are fenced and covered with waterproof tents,	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		17) Store oil products and chemicals separately, in special drums or tanks placed on secondary containment systems or trays (110% of the volume of the container), 18) Carry out refuelling of oil, fuel, and other chemicals only on specially prepared protective berms, 19) Equip storage facilities for oil and chemicals, as well as heavy trucks transporting these materials, with appropriate spill kits, 20) Immediately stop work in the event of uncontrolled spillage of fuel, engine oil, or chemicals. Remediate contaminated soil by removing the affected layer (to be treated as hazardous waste) and replacing it with clean soil, 21) Train all staff on the safe execution of construction works and on response procedures for environmental incidents such as spills and leaks, 22) Ensure spoil piles do not exceed 3 m in height, and maintain slope gradients not exceeding 25°. Manage spoil piles to prevent erosion and runoff.	
Monitoring: In accordance with Soil Quality Monitoring Plan.			
OPERATION (MAINTANENCE) PHASE			
Water and soil resources, flora and fauna	From low to moderate	1) Regularly inspect and maintain road drainage systems, culverts and drainage outlets to prevent flooding, ponding and soil erosion, 2) Regularly inspect and maintain road embankments, shoulders and roadside areas and promptly repair areas affected by erosion or instability, 3) Apply de-icing materials at the minimum effective rates in accordance with approved winter maintenance procedures and prevent excessive application, 4) Locate temporary snow storage areas away from drainage channels and environmentally sensitive areas, where practicable, 5) Regularly collect and remove litter from the road corridor and associated facilities, 6) Properly manage waste and excavated materials generated during road maintenance activities and prevent their deposition on adjacent land.	Low

7.2.6 Impact on Water Resources

The Project road section (km 0-286) within the Mangistau and Aktobe regions is located outside the water protection zones and water protection belts of surface water bodies. Therefore, any material impacts on surface water resources during the construction and operation phases are not anticipated.

Construction Phase

During the construction phase, potential impacts on surface water could nevertheless arise indirectly from earthworks, excavation, grading and the construction of road embankments and drainage structures. In particular, uncontrolled surface runoff from disturbed areas could transport suspended sediments and construction materials into natural drainage pathways. Accidental spills or leaks of fuels, oils, lubricants, chemicals or other hazardous substances could also result in localised contamination if released in areas connected to surface-water drainage. These risks are expected to be low given the absence of permanent surface water bodies within the Project corridor and the location of the Project outside designated water protection zones and belts. Nevertheless, appropriate erosion, sediment, drainage, waste and spill-prevention measures will be implemented during construction (**Tables 31-32**).

Operation Phase

The operation phase is not expected to result in significant impacts on surface water resources under normal operating conditions. Potential risks are mainly associated with accidental releases from vehicles, particularly in the event of traffic accidents involving vehicles transporting fuels or other hazardous materials, as well as with runoff from the road surface. The potential for such impacts will be further reduced through appropriate road drainage design and maintenance, regular inspection of culverts and drainage structures, and implementation of emergency response procedures for accidental spills (**Table 32**).

Overall, given the absence of permanent surface water bodies within the Project road section, the generally arid climate, and the location of the Project outside water protection zones and belts, impacts on surface water resources are expected to be negligible to low in significance during both construction and operation, provided that the proposed pollution prevention, erosion control and drainage management measures are properly implemented.

7.2.7 Waste Generation and Management

Construction Phase

Construction of the Project road and its associated infrastructure, including the RMU at Turysh, the access road to Turysh, construction camps (with concrete batching and asphalt plants), and other temporary facilities, will generate a range of hazardous and non-hazardous waste streams. These wastes will arise from earthworks, construction activities, the operation and maintenance of construction equipment and vehicles, and the presence of the workforce at construction sites. The principal waste streams expected during the construction phase include:

- 1) Construction waste,
- 2) Used oil and lubricants,
- 3) Oily rags and soil contaminated with oil products,
- 4) Used tires,
- 5) Used lead-acid batteries,
- 6) Ferrous and non-ferrous metal scraps, welding electrode slag,
- 7) Empty containers of fuel, oil products and chemicals,

- 8) Used packaging materials (cardboard and paper),
- 9) Household waste.

According to the Environmental Code of the Republic of Kazakhstan, the Project Road is classified as a Category I or Category II facility and is required to obtain an environmental permit. The environmental permit must be accompanied by a Waste Management Programme, which shall include the following provisions:

- Source segregation of waste,
- Designated temporary waste storage areas,
- Procedures for the storage of hazardous waste,
- Waste transportation procedures,
- Recycling, reuse, recovery, and disposal of waste
- Roles and responsibilities of designated personnel, and the waste monitoring system.

Each type of waste generated during the construction phase shall be collected separately, without mixing different waste streams. Waste storage containers provided on site shall be equipped with all necessary features to prevent potential contamination of the environment. A sufficient number of containers, specifically designated and appropriately designed for different types of waste, shall be provided at designated waste storage areas. Used oils and other liquid wastes shall be stored in drums equipped with secondary containment to prevent leakage and soil contamination. In the event of an accidental spill or leakage, spill response kits shall be used immediately in accordance with the provisions of the Spill Prevention and Response Plan ([Section 7.2.5](#)).

All generated waste may be temporarily stored at specially designated waste storage areas within the construction site for a period of no more than six months from the date of generation. Thereafter, the waste shall be transferred to specialised waste management organisations or transported to appropriate facilities where it will undergo recovery, treatment, or disposal operations, as applicable.

The construction of the Project Road and associated infrastructure will result in the generation of various hazardous and non-hazardous waste streams, including construction and municipal waste, waste oils and lubricants, contaminated materials, used tyres and batteries, metal scrap, and packaging waste. If not properly segregated, stored, transported, and disposed of, these wastes could result in soil and water contamination, pollution of the surrounding environment, and risks to human health and safety.

The impact of the Project's construction phase on waste generation is expected to be direct, adverse, temporary, and localised. The magnitude of the impact is considered low to moderate, depending on the types and quantities of waste generated and the effectiveness of waste management practices. With the implementation of the Waste Management Programme, as required by national legislation, and a comprehensive Waste Management Plan covering waste segregation, storage, transportation, and transfer to specialised waste management facilities, the residual impact is expected to be low ([Table 33](#)).

Operation Phase

During the operation phase, routine maintenance of the Project Road and its associated infrastructure will be undertaken by LLP "QazService". Waste generation during this phase is expected to be significantly lower than during construction and will primarily arise from routine road maintenance, repair and servicing of road infrastructure and vehicles and equipment, and activities associated with winter road maintenance.

Typical waste streams generated during the operation and maintenance phase may include:

- **Road maintenance and repair waste**, including damaged or removed asphalt and concrete, road surfacing materials, excavated materials, and other construction residues,
- **Used oils and lubricants**, including waste engine, hydraulic and transmission oils generated during servicing and maintenance of vehicles and road maintenance equipment,
- **Oil-contaminated materials**, including used filters, oily rags, absorbents, and soil contaminated as a result of accidental spills or leaks,
- **Used tyres and batteries** from maintenance vehicles and equipment,
- **Ferrous and non-ferrous metal scrap** generated during repair and replacement of road furniture, barriers, signs, lighting equipment, and other infrastructure,
- **Spent road maintenance materials**, including contaminated or unused materials associated with winter maintenance activities, where applicable,
- **Municipal waste** generated at RMUs, maintenance facilities, and by personnel.

Waste generated during routine road maintenance shall be segregated at source and temporarily stored at designated waste storage areas at the relevant QazService RMU or other appropriately designated locations. Hazardous waste, including used oils, oil-contaminated materials, batteries and other hazardous maintenance wastes, shall be stored separately in suitable, clearly labelled containers under conditions preventing leakage, spillage, and contamination of soil and water. Liquid hazardous wastes shall be stored in sealed containers with appropriate secondary containment.

Particular attention shall be given to waste generated during major road rehabilitation or resurfacing works, which may involve substantially larger quantities of excavated and removed asphalt, concrete, soil, and other construction materials. Such activities should be subject to appropriate Waste Management Plan and procedures and, where required, a prepared by QazService.

Impact Assessment and Mitigation Measures

Assessment and mitigation of the construction and operation related waste impacts are summarised in **Table 33**.

Table 33 - Summary of waste related impact assessment and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	Moderate	1) Implement waste management requirements incorporated into the Environmental Permit issued for the Project, at a minimum including:	-

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		- Waste Management Programme, - Waste accumulation limits. 2) Prepare and put into effect the Waste Management Plan (WMP) for the Project.	
CONSTRUCTION PHASE			
Workers, nearby population, soil and water resources, flora and fauna	Moderate	General 1) Train the workers engaged in waste management on provisions of the WMP, 2) Apply waste hierarchy approach (prevention, minimization, reuse, recycling, energy recovery, disposal) while implementing the construction activities, 3) Elaborate and implement waste handling procedures for the construction operations, 4) Equip the construction site and construction camps with the waste separate collection / storage containers and locations, 5) Furnish the waste storage / collection facilities with fences, fire extinguishers, secondary containment trays, oil and chemicals spill clean-up kits, etc., 6) Store liquid waste leak-proof, sealed containers, 7) Sign contracts with the licensed waste handling (recycling, treatment, disposal) companies to hand them over the generated wastes. Waste transportation 8) Transport all types of wastes using adequate, sealed and covered trucks to avoid the leakage or dispersal of the waste on roads and surroundings, 9) Ban fly tipping waste on the route and/or their disposal in unauthorized locations, 10) Choose the routes involving the least risk for the transportation of waste from the area of its generation to its storage and recycling / disposal area, 11) Instruct the waste truck drivers on waste transportation safety rules, 12) Include waste transportation streams in the Traffic Management Plan (TMP), Household waste management 13) Equip the construction site with household collection containers / bins, 14) Establish a contract with an authorised regional municipal waste management service for the regular removal of household waste from the construction site and construction camps.	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
Workers of the construction contractor	Moderate	In addition to the measures listed above: enforce the use of PPE and in particular, the protective clothes, shoes, gloves, respirator / masks for the workers dealing with the waste.	Low
Monitoring: In accordance with Waste Management Plan.			
OPERATION (MAINTANENCE) PHASE			
Workers, nearby population, soil and water resources, flora and fauna	From low to moderate	1) Develop and implement a Waste Management Plan for the operation and maintenance of the road, covering the identification, segregation, temporary storage, transportation, recovery, recycling, treatment, and disposal of waste generated during maintenance activities. 2) Apply the waste hierarchy to all waste generated during operation and maintenance activities, prioritising waste prevention and minimisation, followed by reuse, recycling, recovery, and, as a last resort, disposal. 3) Provide designated waste collection and temporary storage areas at the relevant road maintenance facilities, including the RMU, and provide a sufficient number of appropriately labelled and suitable containers for the separate collection of different waste streams. 4) Establish contracts with appropriately authorised waste management companies for the collection, transportation, recycling, recovery, treatment, and disposal of waste generated during road operation and maintenance activities. 5) Establish a contract with an authorised regional municipal waste management service for the regular collection and removal of municipal waste generated at the RMU and other relevant road maintenance facilities.	Low

7.2.8 Impact on Air Quality

Construction Phase

During the construction phase, the following activities and operations are considered potential sources of **stationary and mobile air emissions**, including dust and exhaust emissions:

- **Site clearance and preparation**, including vegetation removal and topsoil stripping;
- **Construction of temporary access roads and facilities**, including the establishment and operation of construction camps and other temporary infrastructure;
- **Earthworks**, including excavation, grading, cutting, filling and handling of excavated materials;

- **Loading, transportation, unloading and storage of friable and potentially dust-generating materials**, including topsoil, spoil, construction materials, etc.;
- **Drilling works**, including drilling associated with the installation of overhead transmission line (OTL) poles, where applicable;
- **Asphalt and batching plants**;
- **Welding, cutting, and painting activities**, which may generate fumes, particulate matter, and volatile organic compounds (VOCs);
- **Movement and manoeuvring of construction machinery**, including excavators, bulldozers, graders, compactors, loaders, trucks, generators, and other diesel-powered equipment.

Earthworks and the construction of the road embankment and pavement are expected to generate fugitive dust emissions, primarily PM_{2.5} and PM₁₀. Exhaust emissions from construction machinery operating within the Project sites and heavy goods vehicles will also contribute to ambient air pollution through the release of NO_x, SO₂, CO, hydrocarbons, CO₂ and other combustion-related pollutants.

According to the data, provided in the local EIA report, the annual air emissions during the construction of the main road, access roads, and the RMUs are estimated at 1,627.9 tonnes/year for the proposed BBS road.

Only two settlements in the Mangystau Region, Sam and Nogayti villages, are located in close proximity to the Project road construction corridor. These settlements are situated approximately 138 m and 207 m, respectively, from the proposed road alignment and therefore have the potential to be affected by construction activities. Farmers using areas adjacent to the road alignment for grazing may also be exposed to exhaust emissions and dust generated by construction machinery and heavy vehicles.

At the time of the ESIA preparation, the exact locations of construction camps, asphalt plants, concrete batching plants, material stockpiles, and other temporary facilities had not yet been determined. Consequently, their potential impacts on nearby residential areas, public buildings, and other sensitive receptors cannot be assessed at this stage. These facilities shall be located during the detailed design and construction planning stage, and their siting shall take into account the proximity of sensitive receptors and prevailing wind conditions in order to minimise air quality impacts.

Overall, the impact on air quality during the construction phase is expected to be direct, adverse, temporary and reversible. With the implementation of appropriate dust suppression measures, emission control measures for construction equipment and temporary facilities, and the mitigation measures specified in the **Table 34**, the residual impact is expected to be of low significance.

Operation Phase

During the operation phase, the proposed BBS Road will generate vehicle exhaust emissions from traffic using the road, resulting in a local increase in ambient concentrations of transport-related air pollutants within the Project corridor. The principal pollutants associated with vehicle traffic are expected to include NO_x, CO, particulate matter (PM_{2.5} and PM₁₀), VOCs, SO₂, greenhouse gases

(GHG, primarily CO₂), and other combustion-related pollutants. The assessment of GHG emissions associated with the Project is presented separately in [Section 7.2.2](#).

The settlements located closest to the operational road corridor, Sam, Nogayti, Turysh and Syngyrlau, represent the primary sensitive receptors that may experience minor increases in traffic-related air pollutant concentrations. The highest concentrations are expected to occur in the immediate vicinity of the carriageway, with pollutant levels decreasing rapidly with distance from the road due to atmospheric dispersion.

Despite these local increases, the Project is expected to deliver an overall regional air quality benefit. As part of the international TRACECA transport corridor, the BBS Road will provide a substantially shorter and more direct transport route across western Kazakhstan compared with the existing road network. The Project will reduce travel distances and journey times, improve traffic flow, and reduce congestion and vehicle idling, thereby improving transport efficiency and reducing fuel consumption and associated atmospheric emissions per vehicle trip (see [Section 2.4.1](#)).

In addition to traffic emissions, minor air emissions are expected from routine road maintenance activities undertaken by QazService. These emissions will be associated with the operation of RMUs, maintenance vehicles and equipment, periodic road repair works, winter maintenance activities, and emergency operations. Such emissions are expected to be infrequent and of limited magnitude.

Overall, the impact on air quality during the operation phase is expected to be direct, adverse, long-term and reversible along the road corridor. With the implementation of the mitigation measures and good international industry practice recommendations presented in [Table 34](#), and taking into account the Project's overall positive regional effect on transport-related air emissions through improved transport efficiency and reduced travel distances, the residual impact on air quality is expected to be low.

Impact Assessment and Mitigation Measures

The assessment of potential impacts on air quality and the proposed mitigation measures for the construction and operation phases are summarised in [Table 34](#).

Table 34 - Summary of impact assessment on air quality and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	-	1) Prepare and put into effect the Air Quality Monitoring Plan for the Project. 2) Conduct pre-construction baseline air quality monitoring for at least 21 days prior to the commencement of construction activities.	-
CONSTRUCTION PHASE			
Nearby settlements, farmers, soil and	Moderate	1) Use construction machinery and heavy vehicles meeting at least Euro IV emission standards, where available,	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
water resources, flora and fauna		2) Conduct regular inspection and maintenance of construction machinery and vehicles, 3) Cover trucks transporting friable materials with securely fastened tarpaulins, 4) Cover or regularly dampen dust-generating stockpiles and topsoil storage areas, 5) Apply regular water-based dust suppression on construction sites and unpaved roads during dry and windy conditions, 6) Limit vehicle speeds to 20-30 km/h on unpaved construction and haul roads, 7) Suspend dust-generating works during strong winds when effective dust control cannot be maintained, 8) Install windbreaks and shelterbelts around the construction site to reduce the dispersion of dust by wind, 9) Locate construction camps, batching/asphalt plants and material stockpiles away from sensitive receptors, taking prevailing wind directions into account, 10) Prohibit open burning of construction waste, packaging or other materials, 11) Monitor visible dust emissions and implement additional controls where excessive dust is observed.	
Monitoring: In accordance with Air Quality Monitoring Plan.			
OPERATION (MAINTANENCE) PHASE			
Nearby settlements, farmers, soil and water resources, flora and fauna	From low to moderate	1) Maintain the road pavement in good condition and promptly repair potholes and other defects to minimise dust generation and inefficient vehicle operation, 2) Ensure regular inspection and maintenance of QazService vehicles and road maintenance equipment to minimise exhaust emissions, 3) Prohibit unnecessary idling of vehicles and equipment at RMUs, maintenance areas and other Project facilities, 4) Apply water-based dust suppression during dry and windy conditions on unpaved access and maintenance roads and during dust-generating maintenance activities.	Low

7.2.9 Impact on Traffic Density

Construction Phase

As per the local FS document, the majority of construction materials and structural components will be delivered from the Aktobe Region. Consequently, the republican roads A27, A26, and E38 are expected to be used for the transportation of construction materials, equipment, and other supplies to the Project area. However, the A33 and E40 routes from Aktau and Atyrau to Beineu may also be used, particularly for the delivery of materials and equipment required for the construction of the BBS road section within the Mangistau Region.

A26 Highway. The A26 is a republican highway of approximately 401 km located in the Aktobe Region. It connects Kandyagash with Embi, Shalkar, and Irgiz, where it joins the E38 international highway. The road provides regional connectivity to the Shalkar and Bozoy areas and is expected to serve as one of the principal access routes for construction traffic, materials supply, and logistics during implementation of the BBS Road Project.

A27 Highway. The A27 forms one of Kazakhstan's principal westbound transport corridors and is part of the international E40 and Asian Highway (AH63/AH70) networks. For the BBS Project, the A27 provides the primary connection between Aktobe and Kandyagash, where the A26 highway begins, thereby linking the Project area with Embi, Shalkar, Bozoy, and the wider national road network.

E38 Highway. The E38 is an international highway forming part of the European E-road network. For the BBS Project, the E38 provides an important connection between the Project area and Kazakhstan's national and international transport network. The highway connects with the A26 at Irgiz, providing access to Shalkar and Bozoy. It is expected to serve as one of the principal routes for the transportation of construction materials, heavy equipment, fuel, and personnel during Project implementation.

According to publicly available sources, existing traffic intensity on the external road network varies considerably along the A27, A26, and E38 highways. The A27 section between Aktobe and Kandyagash is the most heavily trafficked of these routes, with current traffic reported at approximately 10,000-15,000 vehicles per day. Traffic intensity on the more remote sections of the A27 is considerably lower, at approximately 5,000-6,000 vehicles per day. Reliable publicly available traffic data for the A26 and E38 sections relevant to the Project are limited; therefore, site-specific traffic data should be used where available. Taking into account the current and anticipated traffic volumes on the A26, A27, and E38, a significant increase in traffic density as a result of the delivery of construction materials to the Project area is not anticipated.

Another issue to be addressed in this section is the use of temporary access roads to construction sites and camps. Currently, connectivity between rural settlements, including Beineu and Turysh, and Bozoy and Shalkar, is provided by unpaved roads and tracks across semi-desert terrain. These roads can be hazardous, particularly when vehicles travelling in opposite directions meet, due to their limited width, poor road conditions, and lack of adequate passing areas. Therefore, safe and adequately maintained access roads to construction sites and camps should be established before the intensive construction phase begins. The planning, construction, and use of these access roads should be addressed and regulated through a Project-specific Traffic Management Plan ([Table 34](#)).

Operation Phase

Although several local roads, primarily unpaved, provide connections between rural settlements and their respective district centres (e.g. Turysh-Beineu and Bozoy-Shalkar), there is currently no

direct road link between the proposed BBS Road's starting point at Beineu and its terminal point at Saksaulsk.

Upon completion, the BBS Road will form part of the international TRACECA transport corridor, providing a direct connection between Beineu and Saksaulsk. The new route is expected to attract both freight and passenger traffic by significantly reducing travel distances and journey times (see [Section 2.4.1](#)). Nevertheless, no significant adverse impacts associated with increased traffic volumes are anticipated. The highway has been designed to accommodate the forecast traffic demand over the 20-year design horizon while maintaining an acceptable level of service.

The BBS Road will also improve regional accessibility and connectivity by providing a more direct and reliable transport route between settlements and economic centres along the corridor. The improved road infrastructure is expected to reduce travel times, enhance the reliability of freight and passenger transport, and facilitate access to markets, services, and employment opportunities. In addition, replacing existing unpaved and lower-standard routes with a modern paved highway is expected to improve road safety and reduce the risks associated with travel on narrow and poorly maintained local roads. During the operational phase, appropriate road safety measures, including speed management, adequate signage, safe junctions and crossings, and regular road maintenance, will be implemented to minimise potential risks to road users and nearby communities.

Impact Assessment and Mitigation Measures

The assessment of potential traffic impacts and the proposed mitigation measures for the construction and operation phases are summarised in [Table 35](#).

Table 35 - Summary of traffic impact assessment and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	-	Develop a Traffic Management Plan (TMP), that will be approved by the Supervision engineer as well as relevant regional authorities and road police,	-
CONSTRUCTION PHASE			
Materials and service suppliers, Drivers and passengers, Construction contractor, Population of nearby settlements	Moderate	1) Establish procedures for managing abnormal loads and the transportation of oversized or heavy equipment, 2) Include emergency response procedures for road accidents, vehicle breakdowns, adverse weather conditions, and other traffic-related incidents, 3) Establish and maintain safe access roads to construction sites, construction camps, material storage areas, borrow pits, and other ancillary facilities before intensive construction activities commence,	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		4) Provide adequate road width and passing places on narrow access roads, particularly where two-way traffic is expected, 5) Maintain access roads in a safe and serviceable condition throughout construction, including grading, watering, and repair of damaged sections as necessary, 6) Install appropriate traffic signs, warning signs, delineators, and other road-safety measures at construction access points and areas of increased traffic risk, 7) Require all Project drivers and contractors to comply with Kazakhstan's road traffic regulations and Project-specific traffic safety requirements, 8) Provide defensive-driving and road-safety training for drivers of Project vehicles, with particular emphasis on driving on unpaved and narrow roads and in semi-desert conditions, 9) Prohibit driving while fatigued and establish appropriate working-hour and rest requirements for professional drivers, 10) Maintain records of Project-related traffic volumes, traffic incidents, road accidents, complaints, and damage to public roads.	
Monitoring: In accordance with Traffic Management Plan.			
OPERATION (MAINTANENCE) PHASE			
Drivers, visitors and passengers travelling along the BBS road	From low to moderate	1) Maintain appropriate speed limits, road signage, markings, and safety features, particularly near settlements, 2) Maintain safe access to settlements, agricultural areas, and grazing lands, 3) Regularly inspect and maintain the road and associated safety infrastructure, 4) Provide appropriate livestock/wildlife crossing measures and warning signage where required.	Low

7.2.10 Noise and Vibration Impact

Noise impacts during the construction and operation phases will depend on a number of factors, including the intensity and characteristics of traffic (e.g., traffic volume, vehicle type and composition, vehicle speed, and road surface condition), as well as the location, number and sensitivity of noise-sensitive receptors within the Project's Area of Influence. During the construction phase, noise levels will also be influenced by the type, number and operating schedule of construction equipment and machinery, the duration and timing of construction activities, the distance between noise sources and sensitive receptors, and the presence of any physical barriers or other noise attenuation measures.

Construction and operation phases

The main sources of noise and vibration during the construction phase are expected to include:

- Operation of construction equipment and machinery within the Project area;
- Movement of heavy trucks and other construction vehicles along the regional road network in Mangistau and Aktope regions and within the Project construction sites;
- Operation of construction camps and ancillary facilities, including bitumen and asphalt plants and technical and maintenance areas; and
- Noise-generating construction activities and processes, including the loading and unloading of construction materials and other material-handling activities.

For most construction equipment, the main continuous source of noise is the engine and associated exhaust and mechanical systems. In some cases, however, noise generated by specific construction processes or activities may exceed equipment engine noise. Noise and vibration levels during construction will vary depending on the type and intensity of construction activities, the number and combination of equipment operating simultaneously, equipment operating conditions, the construction schedule and working hours, and the distance between the noise or vibration source and sensitive receptors.

As discussed in the **Section 6.12** of this ESIA report, Sam and Nogayti rural settlements are located at 138 m and 207 m from the road alignment respectively and potentially can be affected by the noise emissions as a result of Project construction and operation phases. The WHO "Environmental Noise Guidelines for the European Region"⁷⁴ (2018) provide health-based recommendations for environmental noise exposure. For road traffic noise, WHO strongly recommends:

- **For average noise exposure:** reduce noise levels produced by road traffic below **53 dB Lden**⁷⁵, as road traffic noise above this level is associated with adverse health effects,
- **For night noise exposure:** reduce noise levels produced by road traffic during night time below **45 dB Lnight**⁷⁶, as road traffic noise above this level is associated with adverse effects on sleep.

These recommendations are applicable to both the construction and operational phases of the Project and require the implementation of the noise monitoring and mitigation measures presented in **Table 36**. The measures presented in **Table 36** also apply to the Project's supporting infrastructure, including access road to Turysh, DEU, borrow pits, construction camps, and other Project components as well as transportation of construction materials mainly from Aktope city and surroundings to the project site through A26, A27 and E38 regional roads.

Typical noise levels generated by construction machinery during operation generally exceed the 80 dBA occupational exposure threshold established by the national hygienic standards for workers. Consequently, a range of noise mitigation measures should be implemented during the construction phase, including the provision and mandatory use of appropriate Personal Protective Equipment (PPE), such as hearing protection, for workers exposed to elevated noise levels (**Table 36**).

⁷⁴<https://iris.who.int/server/api/core/bitstreams/f53c45ba-11d3-4502-a424-c1cf49f5a053/content>

⁷⁵Lden - Day-evening-night-weighted sound pressure level

⁷⁶Lnight - Equivalent continuous sound pressure level when the reference time interval is the night

These measures, together with additional engineering and administrative controls, including regular equipment maintenance, installation of effective mufflers, limitation of unnecessary equipment idling, and management of workers' exposure time, will help minimise occupational noise exposure and protect the health and safety of construction personnel.

The BS 5228-2:2009+A1:2014 "Vibration Limits" standard provides specific recommended limits for Peak Particle Velocity (PPV) and the distances at which they should be maintained to protect buildings, structures, and human comfort ([Table 36](#)). Additionally, construction vibrations are not expected to affect the seismic stability of existing buildings and structures.

Table 36 - Vibration Limits (BS 5228-2)

Receptor Type	Vibration Limit (PPV)	Distance (to maintain limit)
Residential Buildings	1.0 mm/s	30-50 m (depending on activity)
Sensitive structures (e.g., churches, monuments)	0.3 mm/s	50-100 m (depending on activity)

Therefore, the vibration exposure on the population of the Sam and Nogayti are not expected during both construction and operation phases.

Impact Assessment and Mitigation Measures

The assessment of potential noise and vibration impacts and the proposed mitigation measures for the construction and operation phases are summarised in [Table 37](#).

Table 37 - Summary of noise and vibration impact assessment and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
Population of the affected settlements (Sam and Nogayti)	-	1) Conduct noise modelling for the areas where the road alignment passes in close proximity to the Sam and Nogayti settlements, 2) If the modelling results indicate that noise levels at sensitive receptors are expected to exceed the applicable 53 dB Lden and/or 45 dB Lnight criteria, incorporate appropriate noise mitigation measures into the Project design, including noise barriers near the Sam and Nogayti settlements, as necessary, 3) Prepare Noise Monitoring Plan to monitor compliance with the applicable national and Project noise criteria at representative noise-sensitive receptors and to verify the effectiveness of mitigation measures.	-
CONSTRUCTION PHASE			
Population of the affected settlements (Sam)	From low to moderate	1) Keep all diesel-powered vehicles and equipment (such as generators and air compressors) at a high level of maintenance. This will particularly include	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
and Nogayti), farmers		the regular inspection and, if necessary, replacement of intake and exhaust silencers, 2) Shut down or throttle back construction machinery and vehicles during periods when they are not in active use, 3) Whenever possible: enclose noisy equipment, restrict non-stop operation of noisy equipment, avoid simultaneous operation of noise generating equipment, 4) Avoid unnecessary idling times, 5) Minimising the need for equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur, 6) Avoid unnecessary horn hooting from the used construction machinery, 7) Limit truck speeds - not to exceed 40 km/h, when driving through local community roads, 8) Prohibit movement of heavy trucks along residential áreas (if any) between 9 PM and 9 AM near residential areas, 9) Implement Noise Monitoring Plan .	
Construction workers	Moderate	In addition to the measures listed above: 1) Enforce the use of PPE and in particular, the protective devices capable to reduce the sound level at the ear to acceptable levels, 2) Provide employees engaged in 'noisy' operations with additional 15 minutes break per 2 hours.	Low
Monitoring: In accordance with the Noise Monitoring Plan.			
OPERATION PHASE			
Population of the affected settlements	Moderate	Implement the mitigation measures specified in the Project design documentation, including the installation of noise barriers near the Sam and Nogayti settlements, where required.	Low

7.2.11 Impacts on Biodiversity

This sub-section presents an assessment of the potential impacts on biodiversity resulting from the Project-related construction and operations activities.

Impacts of the Project will occur within the permanent footprint of the Beineu-Bozoy road section (km 0 - km 326)⁷⁷ and a corridor extending approximately 500 m on either side of the road (Aol). The impact zone will also include the access road to the village of Turysh, with a corridor of the same width.

⁷⁷Although the study area covers the km 0 - km 286 project road section, biodiversity studies were conducted for the wider km 0 - km 326 road section

According to the project data the total area of permanent land take is 1,200 ha. However, the majority of the road alignment traverses previously disturbed areas, with dirt roads within the road footprint area, as shown in satellite imagery and reflected in the habitat mapping (see Baseline chapter). Native or semi-native habitats within the Project footprint occur exclusively along the eastern section of the route. This section has a total length of approximately 47.5 km and a right-of-way width of 42 m, resulting in a potential permanent loss of 199.5 ha of native/semi-native habitats. It should be emphasized that this quantitative assessment is preliminary and must be confirmed during a seasonal field survey.

In addition, at least during the construction phase, temporary structures such as Road Maintenance Units (RMUs), spoil storage and disposal areas, construction camps, asphalt and concrete batching plants⁷⁸ will impact on biodiversity, areas extending 500 m around these structures are considered Aol.

Temporary land requirements are preliminarily estimated at approximately 25%⁷⁹ of the permanent land take (subject to confirmation during detailed design and construction planning), representing an estimated temporary disturbance area of 300 ha.

During the habitat assessment under the baseline biodiversity study, a 10km buffer zone along the road was identified to encompass all habitats representative enough to demonstrate stages of vegetation, soil and ecosystem transformation. Spatial data on rare and protected species obtained during the baseline study revealed the presence of some of these species within the 10 km buffer zone including the road right-of-way. This suggests the potential for actively migratory species (birds, predatory mammals, ungulates) to move from the natural periphery of the zone to the road and back, or crossing the road right-of-way; this zone was considered as an extended study area (see [Section 6.16](#)). Given all this, we define this buffer zone as a "sensitive zone" for species whose presence is confirmed there. However, we do not consider this entire buffer zone to be an Aol for the species.

The impacts are considered and assessed taking into account EBRD's ESR 6, and Guidance Notes to the EBRD ESR 6 (2025), as well as applicable national legislation of the RoK.

7.2.11.1 Impact of the Project

The impacts of the Project on biodiversity will occur during both construction and operation phases. The construction phase includes construction of the road, the operation phase - traffic and road maintenance. The methodology of impact assessment, including identification of impact characteristics and matrix significance are detailed in [Chapter 4](#). Due to the species' varying responses to different impacts, the sensitivity of individual each species or their groups (receptors) was taken into account during the assessment.

Potential impacts on biodiversity derive from activities during:

1. Construction phase, and include:

⁷⁸Such the Project facilities as construction camps, asphalt and batching plants, spoil storage/disposal areas, topsoil storage areas, etc. are not currently defined and will be determined later by the Construction Contractor.

⁷⁹This figure is taken from the World Bank road project in South-Kazakhstan oblast
https://documents1.worldbank.org/curated/en/335961468091497292/pdf/E20900EA0v60P000Box365782B02888799.pdf?utm_source=chatgpt.com

- Destruction (loss) of habitats (vegetation clearance, excavation, top-soil removal, grading, transportation),
- Flora species loss (vegetation clearance, excavation, top-soil removal, grading and transportation),
- Disturbance to fauna species by noise, vibration and light pollution (construction machinery, traffic, lighting of the building area),
- Loss of sedentary animals' habitats and associated risk of mortality (excavation, top-soil removal, grading and transportation),
- Loss of foraging habitats for medium and large mammals (excavation, top-soil removal, grading),
- Loss of foraging and resting habitats for birds (excavation, top-soil removal, grading, transportation),
- Loss of breeding, foraging and wintering habitats of invertebrates and a risk of death of their overwintering stages (vegetation clearance, excavation, top-soil removal, grading and transportation),
- Barrier effect of the road building for migrating mammals (ungulates, predators)

During the field visit in August, 2026, the initial stages of road construction near the settlement of Bozoy⁸⁰ were already recorded (**Figure 33**). Clearing and land planning are underway using graders and other construction machinery.



Figure 36 - The initial stages of the road construction near the settlement of Bozoy (August, 2026)

2. Operational phase, and include:
 - Disturbance to fauna species due to noise, vibration and light pollution associated with road traffic⁸¹,
 - Animal mortality due to vehicle collisions
 - Barrier effect of the road for migrating mammals (ungulates, predators)
 - Increased access to areas along the road.

The assessment was conducted for each predicted impact during the construction and operation phases and for each group of biodiversity receptors, which were grouped based on their ecological

⁸⁰Due to the amendments to the allocation of road sections among the different IFIs, the Bozoy settlement is now outside the scope of this study

⁸¹According to the ESIA, the Projected Traffic Volume for the Design Year 2046, Expressed in Passenger Car Units (PCU/day), adopted for the road (II category), is 13,626

characteristics. Where possible, impacts on individual species were also assessed. The assessment primarily focused on PBFs and CH identified in the framework of the critical habitats assessment..

7.2.11.2 Construction Phase

Destruction (loss) of habitats

Along almost all the Beineu-Bozoy road right-of-way the planned route follows existing dirt roads, while in other sections existing dirt roads run parallel to the route or cross it. Within roughly 2-3 km of the route there is a high concentration of dirt roads, detours, and other disturbances. Therefore, almost all habitats beneath the planned right-of-way have already been partially destroyed. However, in areas adjacent to the road right-of-way, there are natural or semi-natural habitat; furthermore, according to a preliminary assessment, these habitats could potentially occur within the Project footprint area along the eastern section of the route over an of approximately 199.5 ha (see above).

Land clearance, excavation and grading, topsoil removal, and followed embankment construction will completely destruct the habitats within the road footprint (the total area of permanent land take is 1,200 ha).

Priority habitats have not been identified in Kazakhstan; this makes it impossible to identify priority habitats (ecosystems) in the road right-of-way.

Flora species loss

Land clearance, excavation, grading, top-soil removal and followed embankment construction will result in vegetation clearance in the same areas where habitats will be partly destructed (see above), including primarily wormwood and saltwort communities as well as some shrubs, semi-shrubs and tree shrubs, as black saxaul.

According to the baseline desktop analysis, seven rare and protected species (two species of tulips and three saltwort species) classified as PBF can be found in the road right-of-way and to the north of it; some of these are recorded⁸² in the 10 km "sensitive zone", including point of growing of *Tulipa biflora* directly in the road right-of-way or in the immediate vicinity (**Figure 19** in **Section 6.16**).

To obtain reliable data on the growing species and their habitats, it is recommended to conduct the pre-construction field survey during the appropriate season (April-May). If *Tulipa* species are recorded and deemed potentially threatened due to road construction, the plants should be replanted to safe locations. Within the Aol, areas containing well-preserved natural desert ecosystems with communities that include protected saltwort species, if identified, should be designated for protection during the construction works.

Disturbance to fauna species

Existing traffic on dirt roads along the planned route is already having some negative impact on animals. Most have either left the area or visit it only occasionally. However, some sedentary species such (for example, rodents) may still be present, most likely, in areas located near the road right-of-way.

Terrestrial animals can be divided in two groups in relation to their reaction to disturbance - those that run away, and those that hide where they live. Below, the identified mammals, birds and reptiles are analysed in terms of their reaction to disturbance.

Terrestrial mammals, identified in the baseline study, can be classified into three groups based on size and lifestyle. The first group includes permanent residents of the area, such as small - and medium-sized species, mainly rodents, insectivores, and small predators. The second group includes temporary visitors that transit through the area, such as predators, mainly canids and martens, and ungulates, which also graze there. The third group comprises flying mammals – bats.

Small permanent residents (rodents, insectivores) usually hide (in burrows, for example) in response to disturbances, they do not run away from their homes. This behaviour in the context of the Project is dangerous because it results in death of the animals due to the destruction of their homes; potential impacts on this group of animals are considered in the sub-section below.

Second mammal group of temporary visitors usually move away or avoid disturbance areas. Bats will also move away because the noise of the sonic spectrum has a deterrent effect on bats⁸³.

Identified birds are classified in two groups - i) using the area as part of their foraging range, and ii) passing the area during the seasonal migration (given to flooded salt-marshes in spring that could be used for stopover). They all will also move away or avoid disturbance zones. We believe that nesting in this area is unlikely due to existing dirt roads, and other anthropogenic impacts; however, a definitive conclusion can only be made following a targeted field survey during the appropriate season.

Identified reptiles and amphibians are permanent residents; they would choose the same hiding strategy as the small sedentary mammals (see above), so they will be in danger of dying. Potential impacts on this group of animals are considered below.

Noise and soil vibration caused by vegetation clearance, excavation, land grading, traffic, and the commencement of construction works, will be the initial impacts in the Project area. Impact distance (for noise) can vary from about 100 m to 500 m and more, depending on species sensitivity^{84, 85}. As a result, the road right-of-way, and adjoined territories (about 500 m around) will be abandoned by most animals. The construction process will involve road embankment and pavement construction, during which impact factors such as vibration, noise, dust, and lighting will occur. Since most animals will have already left the area by this time, these factors are expected to affect only an insignificant number of animal individuals.

Loss of sedentary animals' habitats and associated risk of mortality

There are two groups of permanent residents which were identified - small mammals (rodents, insectivores), and reptiles and amphibians. Both groups of animals use certain type of shelters (e.g., holes, rocks, hollows, etc.) and hide there in case of danger or disturbance. Such impact as noise

⁸³Domhnall Finch, Henry Schofield, Fiona Mathews, Traffic noise playback reduces the activity and feeding behaviour of free-living bats, Environmental Pollution, Volume 263, Part B, 2020, 114405, ISSN 0269-7491, <https://doi.org/10.1016/j.envpol.2020.114405>

⁸⁴Senzaki, M., Yamaura, Y., Francis, C. et al. Traffic noise reduces foraging efficiency in wild owls. Sci Rep 6, 30602 (2016). <https://doi.org/10.1038/srep30602>

⁸⁵Shilling, F.; Collins, A.; Louderback-Valenzuela, A.; Farman, P.; Guarnieri, M.; Longcore, T., et al. (2018). Wildlife-Crossing Mitigation Effectiveness with Traffic Noise and Light. UC Davis: National Center for Sustainable Transportation. Retrieved from <https://escholarship.org/uc/item/8893d8zw>

will make them hide. Intensive vibration can drive animals out of their shelters, but they will not run far away trying to find temporary shelter and come back when the impact disappears.

Thus, these two groups are mostly likely to be affected during construction works in the road right-of-way and adjoined territories; similar impacts can also be expected at the locations of temporary structures such as access roads, spoil storage and disposal areas, construction camps, asphalt and concrete batching plants.

The risk of mortality arises during excavation and grading within the habitats of these species, as well as from vehicle traffic if animals enter construction sites. Both sedentary species (Central Asian tortoise and Pale pygmy jerboa) classified as PBF species, are in the high-risk group.

Loss of foraging habitats for medium and large mammals

Animals of the mammal group of temporary visitors will move away or avoid disturbance once the land planning and construction works start. The main deterrent impacts are noise and lighting.

Predators pass through the area, and may occasionally hunt birds and rodents there. These species are expected to shift their foraging areas during construction works; no significant impacts on foraging are predicted for these species. The marbled polecat, classified as a PBF, is more territorial, primarily in relation to rodent colonies; therefore, this species will shift its foraging habitats.

Ungulates pass through the area and may graze there. Since these animals have established migration routes and pastures, road construction may force them to change their routes and use alternative grazing areas. Under harsh climatic conditions, such changes could have additional negative impacts on the animals. These impacts could concern such PBF species as urial, goitered gazelle, Asiatic wild ass. However, there is insufficient field data to confirm the presence of these species in the area, as well as insufficient information on the importance of the area for their feeding. A field survey is therefore needed to clarify these issues and develop mitigation measures, if necessary.

Following the construction of the Shalkar-Beineu railway, saiga (CH species) is no longer found in the project area; therefore, these impacts do not affect this species.

Loss of foraging and resting habitats for birds

Vegetation clearance and land planning will lead to the loss of foraging habitats for herbivores bird species such as Pallas's sandgrouse. The destruction of rodent colonies will also lead to the loss of foraging habitats of birds of prey. These losses are not expected to be critical to these species as existing habitats around can compensate the losses.

The construction will lead to the loss of some wet habitats used by waterbirds for stopover and resting during migration seasons, primarily in spring. However, these losses can easily be compensated for by other extensive salt-marches located north and south of the road right-of-way.

In terms of cumulative impacts, the loss of these habitats will add to existing areas of disturbance along the road right-of-way, such as dirt roads, quarries, construction areas, and oil and gas infrastructure (see the Baseline chapter). Despite the considerable distances between them, these areas contribute to the fragmentation of natural habitats, forcing birds (and mammals) to move and seek alternative undisturbed areas.

Loss of breeding, foraging and wintering habitats of invertebrates and a risk of death of their overwintering stages

Land planning and topsoil removal will completely eliminate insect habitats closely related to vegetation and top-soil. Since there is no data on the presence of rare and protected insect species, including four PBF species, in and around the 10 km buffer zone, it is recommended to conduct the pre-construction field survey during the appropriate season (April-May). If protected insect species are discovered and their habitats are at risk of being destroyed by road construction, the loss of these habitats should be compensated for through the protection of suitable natural habitats, which should be combined with the conservation of habitats of protected plant species.

Barrier effect of the road construction for migrating mammals (ungulates, predators)

Given the existing dirt roads along the route and the Shalkar-Beineu railway, that runs in close proximity to the planned route in its western section, a barrier effect already exists. Construction of the road will intensify this effect (only for animals inhabiting to south from the Shalkar-Beineu railway) and further hinder the movement of actively moving animals, including canines, possibly felines, and ungulates, in the central and eastern sections of the route; the animals will avoid the construction areas.

There are no data on the migration routes of canines; the planned route fragments the ranges of two feline species - the Afro-Asiatic Wildcat *Felis lybica* and the Steppe Cat *Felis margarita* (although, there are no field data confirming the presence of these species in the area).

Among ungulates, classified as PBFs, the planned route fragments the range of Goitered gazelle, and crosses the edges of the ranges of Urial and Asiatic Wild Ass. Again, there are no recent field data confirming the presence of these species in the area.

Barrier effect does not affect saiga (classified as CH) as this species no longer found in the project area after the construction of the Shalkar-Beineu railway.

An additional specific impact is exerted on the Central Asian tortoise (PBF species) as the species sometimes migrates short distances (up to 1-2 km per day). If the species inhabits the Project area and its surroundings, road construction could lead to habitat fragmentation and a loss of connectivity between habitat areas. As a result, a barrier effect may emerge during the construction stage and persist during the operation of the road.

7.2.11.3 Operation phase

Disturbance to fauna species due to noise, vibration and light pollution associated with road traffic

Traffic impact distance (for noise) can vary from about 100 m to 500 m and more, depending on species sensitivity^{86, 87}. Consequently, the impact stripe on biodiversity along the road can be as wide as 1 km. Most animals avoid busy roads because of noise and light, except for certain groups of animals and under certain conditions / during certain periods (see below).

⁸⁶Senzaki, M., Yamaura, Y., Francis, C. et al. Traffic noise reduces foraging efficiency in wild owls. Sci Rep 6, 30602 (2016). <https://doi.org/10.1038/srep30602>

⁸⁷Shilling, F.; Collins, A.; Louderback-Valenzuela, A.; Farman, P.; Guarnieri, M.; Longcore, T., et al. (2018). Wildlife-Crossing Mitigation Effectiveness with Traffic Noise and Light. UC Davis: National Center for Sustainable Transportation. Retrieved from <https://escholarship.org/uc/item/8893d8zw>

Animal mortality due to vehicle collisions

Animals may be killed when they enter the road in search of food (e.g., insectivores or birds of prey), or when crossing the road (e.g., ungulates and predators). In addition, Central Asian Tortoises are often hit by vehicles when they enter the road.

To prevent such fatal incidents, a range of mitigation measures is needed, including ecologically appropriate underpasses, overpasses and at-grade crossings, barriers, speed reduction and traffic management.

Barrier effect of the road for migrating mammals

The barrier effect of the road, which became apparent at the construction phase (see above) will persist throughout the entire operational life of the road. In addition to predators and ungulates, this barrier effect could adversely affect the Central Asian tortoise, hindering its migrations and, consequently, contributing to habitat fragmentation and a loss of connectivity.

Regarding the Saiga, the construction of the Shalkar-Beineu railway in 2015 became a critical obstacle to the southward migration of these animals. After 2015, Saiga were no longer observed south of the railway, including within the Project area. Given this, road construction and operation are not expected to have a direct impact on Saiga, as these animals are not currently present in the Project area.

On the other hand, the road right-of-way will further divide the species' range: together, the railway and the road together will divide the range into three fragments. Therefore, the road's operation will have a long-term impact on the Ustyurt population of Saiga tatarica, through a cumulative effect when combined with the Shalkar-Beineu railway.

To reduce this long-term effect, comprehensive mitigation measures should be implemented along both linear infrastructure corridors, including crossings (at-grade passages), underpasses and overpasses adapted for different animal groups. Fourteen road crossings in the Mangistau and Aktope regions have already been identified as part of the national ESIA, and were confirmed during the field study in August, 2026, as a part of this assessment (**Figure 37**). The locations of these crossings were determined by specialists from the state regional forestry and wild animals inspectorates, the state enterprise "Okhotzooptom", and ACBK, based on previously obtained data on Saiga migrations, an ecological assessment of the territories including the terrain, and presence or absence of the other anthropogenic objects nearby.

Increased access to areas along the road

The new paved road will provide easier access to sparsely populated semi-desert areas. Given that these areas are habitats of such ungulates as goitered gazelle, saiga, urial (PBF species), poaching in the areas adjacent to the road is highly likely.

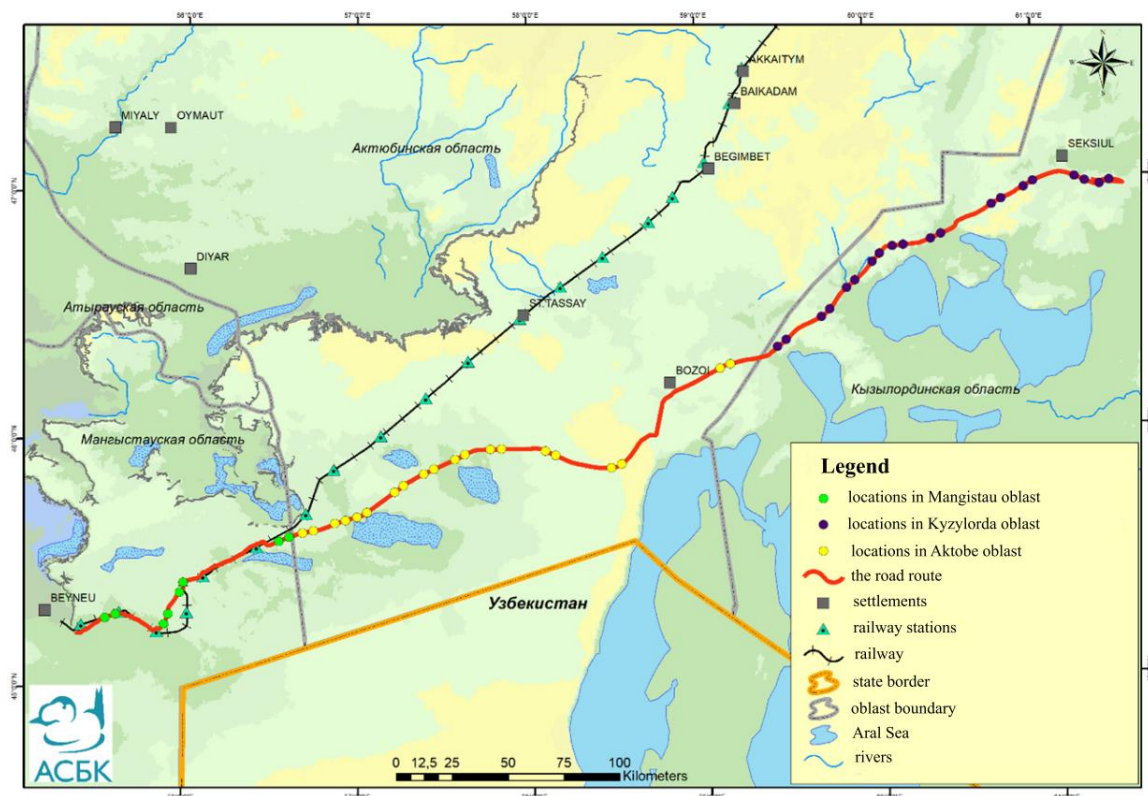


Figure 37 - The road route with proposed locations for the road crossings

7.2.11.4 Impact assessment and mitigation measures

To assess the impacts on biodiversity receptors, the impact significance approach described in Section 4 “The Proposed ESIA Process and Methodology” was applied. Impact significance for each receptor was derived by integrating the assigned receptor sensitivity (environmental value) and the impact magnitude; this integration was performed using the Impact Significance Matrix ([Table 7](#)).

For each receptor, appropriate mitigation measures were developed; the significance of residual impacts was assessed using the same method described above. Residual negative impacts evaluated as being of minor or negligible significance are considered environmentally acceptable. Conversely, residual negative impacts evaluated as being of moderate or major significance are considered environmentally unacceptable and require offsetting. An offsetting framework was developed to provide a basis for subsequent offset projects; this framework is described below and included into the Biodiversity Management Plan (BMP).

The impact significance matrix for biodiversity receptors focusing on PBFs and CH is presented in [Table 38](#).

Table 38 - The impact significance matrix

Receptor	Impact pathways	Receptor sensitivity/ value	Impact magnitude	Impact significance
Plants (PBF) <i>Tulipa biflora</i> Pall. (<i>Tulipa sogdiana</i>)	Destruction of plants and their habitats due to vegetation clearance.	High	High	Significant

Receptor	Impact pathways	Receptor sensitivity/ value	Impact magnitude	Impact significance
<i>Xylosalsola chiwensis</i> (Popov) Akhani & Roalson <i>Tulipa borszczowii</i> Regel <i>Oreosalsola arbusculiformis</i> (Drobow) Sennikov <i>Xylosalsola richteri</i> (Moq.) Akhani & Roalson				
<i>Sedentary animals (PBF)</i> Reptilians: <i>Testudo horsfieldii</i> Mammals: <i>Pale pygmy jerboa</i>	Destruction of habitats, risk of mortality due to vegetation clearance, land grading, excavation works. Tortoise: vehicle collisions (during construction and operation of the road); possible barrier effect of the road construction and operation	High	High	Significant
Mammals – temporary visitors (PBF): <i>Vormela peregusna</i> <i>Ovis vignei</i> <i>Gazella subgutturosa</i> <i>Equus hemionus</i>	Loss of foraging habitats, barrier effect, and risk of mortality during road operation	Medium	Medium	Moderate
Mammals (CH): <i>Saiga tatarica</i>	Long-term barrier effect on the Ustyurt population in terms of cumulative effect in conjunction with the Shalkar-Beineu railway	High	High	Significant
Birds: 89 species	Loss of foraging and resting habitats	Medium	Medium	Moderate
Insects: <i>Saga pedo</i> <i>Hoplitis (Megalosmia) fulva</i> <i>Haplosoma ordinatum</i> <i>Palaeophilotes panope</i>	Destruction of habitats, increased mortality of individuals due to vegetation clearance, land grading excavation works,	High	High	Significant
Fauna in general	Disturbance caused by noise, vibration and light pollution during road construction and associated traffic; Increased human access to areas along the road	Medium	Medium	Moderate

The high sensitivity of receptors such as flora, sedentary animals, and insects is assigned due to their sedentary nature, (i.e. limited ability to avoid impacts). High impact magnitudes on these receptors stem from the unavoidable destruction of their habitats.

During road operation, the high sensitivity of Saiga is attributed to the long-term fragmentation of the Ustyurt population range, as a result of the combined impact together with the Shalkar-Beineu railway. The barrier effect on both species is assessed as high due to the long-term duration of the impact and complete obstruction of migration.

The medium sensitivity of birds as well as medium and large mammals is due to their higher mobility, which allows them to utilize alternative habitats outside the Aol. Because road construction and operation will result in the loss of only a proportion of these species' habitats, the impact magnitude is assessed as medium.

Preliminary quantitative impact assessment

Native or semi-native habitats within the Project footprint occur along the eastern section of the route; a potential permanent loss of these habitats is approximately 199.5 ha. This area covers primarily four types of habitats (Table 22, Section 6.16.4):

- Plain perennial saltworts deserted sparse ecosystems *Anabasis salsa*, *Anabasis salsa*, *A. aphylla*, and *Artemisia terrae - albae*, *Anabasis aphylla*, *Salsola orientalis* communities on zonal gray-brown loamy and rubble soils.
- Plain ecosystems with sparse semi-shrub vegetation on solonetz with *Anabasis salsa* and wormwood (*Artemisia terrae - albae*) communities.
- Sandy massifs with white-earth wormwood-teresken (*Ceratoides papposa*, *Artemisia terrae-albae*, *Agropyron fragile*, *Carex physodes*, *Atraphaxis replicata*) communities in combination with sores without vegetation in the frame *Sarsazanovs* communities.
- Temporary watercourses with a mix of shrubby (*Caragana grandiflora*, *Atraphaxis replicate*, *A. frutescens*, *Convolvulus fruticosus*, *Tamarix laxa*), subshrub (*Salsola orientalis*, *Anabasis salsa*, *Nanophyton erinaceum*) vegetation and areas without vegetation on rubble and loamy soils.

Therefore, a total loss of these habitats could be preliminary estimated approximately 199.5 ha. Potentially, all species classified as PBF, could occur in this area of native and semi-native habitats. Therefore, basing on the precautionary approach, this area (199.5 ha) can be considered as residual impact for the PBF species. The offsetting framework proposes appropriate offsetting measures to compensate for losses (see below); however, a proper loss/gain analysis and offsetting quantification can only be provided after seasonal field surveys specific to each species have been conducted.

Temporary land requirements are preliminarily estimated at approximately 25% of the permanent land take (subject to confirmation during detailed design and construction planning), representing an estimated temporary disturbance area of 300 ha (see above); all described habitats (Table 22, Section 6.16.4) could be located within this area. All PBF species, could occur in this area and be affected by temporary disturbances; therefore, based on the precautionary approach, this area (300 ha) can be considered as a temporary impact zone on PBF species. Appropriate mitigation

measures, including the establishment of “no-go” areas and restoration, are proposed in Table 38 (below); the expected residual impact on PBF species is expected as low.

Because habitats were identified based on satellite imagery, the area of lost habitats and areas of disturbed habitats for each habitat type could only be estimated after habitat structure was verified during a seasonal field survey. Furthermore, habitat loss and partial destruction affecting the PBF species could only be assessed after conducting the corresponding seasonal field surveys for the species.

Regarding the saiga (classified as CH), the construction of the Shalkar-Beineu railway in 2015 divided the species’ range into two fragments – northern and southern. The road’s construction will further divide the southern fragment into two smaller fragments. We estimate that the most southernmost fragment, located south of the road and inaccessible to the species, will cover approximately 600 ha. The area is considered to be lost, at least temporarily, to the species.

To mitigate this barrier effect, construction of crossings over the road is proposed. Adequate mitigation (restoration of saiga migrations) will only be achieved if railway crossings are also constructed. Since the timing and effectiveness of the proposed crossings over the two linear structures remain unclear, the residual impact is assessed as moderate.

Summary of impacts and mitigation measures

The biodiversity assessment and mitigation measures for the construction and operation phases are summarized in **Table 39**. According to the mitigation hierarchy, four types of measures are applied: avoidance, minimization, restoration and offset. Avoidance applies only to the areas adjacent to the road right-of-way, since the road route has already been determined by the Government.

Table 39 - Summary of impacts on biodiversity and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
Overarching action: Develop a Biodiversity Management Plan (BMP) ⁸⁸ during the pre-construction phase to cover mitigation activities of the pre-construction, construction, and operation phases. The mitigation and/or management measures listed below shall be incorporated into the BMP.			
PRE-CONSTRUCTION AND CONSTRUCTION PHASE			
1. Flora	Significant	Pre-construction phase 1) Conduct a field study in the Aol in April-May to identify and map priority plant species (seven PBF species tulip and saltwort species), 2) If any of the identified species could be threatened by pre-construction or construction	Low

⁸⁸BMP is developed and approved prior to the tendering process for the Construction Contractor.

Other management plans, if needed (for example, a Biodiversity Offset Management Plan) are developed by the Construction Contractor prior to the commencement of construction. Some specified mitigation measures are implemented during the pre-construction phase, while others - throughout the construction phase.

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		works, ensure the replanting of individual plants in safe locations using species-specific methods, If the habitats of these species are located within the project footprint area and will be destroyed, quantify the affected habitats and survey the surrounding areas to develop an offset for the anticipated losses, 3) If the habitats of these species are located within areas designated for temporary construction works, including areas where temporary construction structures are planned, mark these habitats on the ground and include them in the construction master-plan as "no-go" zones. Construction phase 4) Monitor relocated plants and/or habitats within "no-go" zones, 5) Implement the offset project, if one has been developed.	
OPERATION PHASE			
Flora		1) Monitor the relocated plants and/or habitats in "no-go" zones, 2) Implement the offset project, if one has been developed.	Low
Monitoring: in accordance with the monitoring section of the BMP			
PRE-CONSTRUCTION AND CONSTRUCTION PHASE			
2. Fauna (other than those listed below)	Moderate	Pre-construction phase 1) Develop a Worker Code of Conduct for employees of the construction company to prevent poaching, 2) Develop Rules for the Protection of Animals during Construction Works, including a Chance Find Procedure, and incorporate "no-go" areas into the construction master plan to avoid or minimize impacts of construction works on fauna and animal habitats identified during field surveys. Construction phase 3) Plan and commence construction works starting from one edge of the road construction sections; this approach will allow animals to move away from the area, 4) Schedule the commencement of construction works outside the main breeding season - before April or after August - to reduce the risk of harm to animals, including their offspring,	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		5) Monitor compliance by construction company workers with the Worker Code of Conduct to prevent poaching, 6) Monitor compliance by the construction company with the Rules for the Protection of Animals during Construction Works, 7) Develop a Worker Code of Conduct for road operator personnel to prevent poaching. 8) Develop Rules for the Protection of Animals during Road Operation for the road operator to minimize animal mortality.	
OPERATION PHASE			
Fauna	Moderate	1) Monitor the road operator's compliance with the Worker Code of Conduct to prevent poaching during operations, 2) Monitor the road operator's compliance with the Rules for the Protection of Animals during Road operation.	Low
Monitoring: according to the Biodiversity Management Plan (monitoring chapter)			
PRE-CONSTRUCTION AND CONSTRUCTION PHASE			
3. Sedentary animals	Significant	Pre-construction phase 1) Conduct a field survey in the AoI to identify residential animal shelters (residential burrows, dens, etc.), rodent colonies, and other animal congregation areas. If identified, mark these locations on the ground and include them in the construction master-plan as "no-go" zones, 2) Survey the project footprint areas and areas designated for temporary construction structures to identify the Central Asian Tortoises (<i>Testudo horsfieldii</i>). If tortoises are found, experienced zoologist will have to capture and relocate them to safe locations using specific methods. 3) Design the road infrastructure to protect small animals from road accidents (animal-vehicle collisions). Construction phase 4) Monitor the construction company's compliance with the Rules for the Protection of Animals, including the Chance Find Procedure. If animals are found, ensure their safe capture and relocation to suitable locations using appropriate species-specific methods, 5) Create infrastructure to protect small animals (reptiles, rodents and small predators) from road accidents, including underpasses, barriers and	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		warning signs in areas where animals are most likely to cross the road, as determined based on the survey results.	
OPERATION PHASE			
Sedentary animals	Moderate, significant on Central Asian tortoise	1) Maintain the constructed underpasses in proper condition, 2) Monitor the road operator's compliance with the Rules for the Protection of Animals during Road Operation, including assessment of road accidents and implement adaptive road management measures (e.g., additional underpasses, barriers, traffic management measures) as necessary.	Low
Monitoring: according to the Biodiversity Management Plan (monitoring chapter)			
PRE-CONSTRUCTION AND CONSTRUCTION PHASE			
4. Medium and large mammals	Moderate; No impact on saiga because there are no animals	Pre-construction phase 1) Conduct a field survey in the AoI to identify mammals and signs of their presence (including dens, traces, dropping, etc.) and animal congregation areas. If dens, migration routes or congregation areas are identified, mark them on the ground and include them in the construction master-plan as "no-go" zones, 2) Design wildlife crossings (at-grade passages) for ungulates (primarily Saiga) at the identified locations (Figure 37), including four crossings in Mangistau oblast and ten crossings in Aktobe oblast. Design barriers between the road crossings, as well as locations for road signs and traffic cameras, 3) In cooperation with the operator of the Shalkar-Beineu railway, conduct a survey of the railway area to determine suitable locations for wildlife crossings over the railway, taking into account the proposed locations of the road crossings, 4) Design wildlife crossings (underpasses) for predators, ungulates and other animals. Cattle drives planned under the Project may be adapted for use by wild animals. Construction phase 5) Construct the designed road infrastructure and equip the crossings with camera traps, 6) Cooperate with the operator of the Shalkar-Beineu railway (it is proposed to launch the Management Coordination Unit) for construction of the railway crossings.	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
OPERATION PHASE			
4. Medium and large mammals	Moderate, Significant for saiga - long-term impact on population as a result of the combined impact together with the Shalkar-Beineu railway	1) Maintain the constructed crossings in proper condition, 2) Monitor animal-vehicle collisions and the operation of the crossings, and implement adaptive management measures as necessary, 3) Cooperate with the operator of the Shalkar-Beineu railway during the construction of the railway crossings.	Low, Moderate on Saiga - when the railway crossings are also established (because the effectiveness of the proposed crossings is unclear)
Monitoring: according to the Biodiversity Management Plan (monitoring chapter)			
PRE-CONSTRUCTION AND CONSTRUCTION PHASE			
5. Birds	Moderate/ Minor	Pre-construction phase 1) Conduct field surveys in the Aol in April-June and September-October to identify bird areas used for stopover, foraging, breeding, as well as bird congregation areas and areas supporting resident species. If such areas are identified, mark them on the ground and include them in the construction master-plan as "no-go" zones, 2) If priority bird habitats are located within the footprint area and will be destroyed, quantify the affected habitats and survey the surrounding areas to develop an offset for the anticipated losses. Construction phase 3) Monitor the identified bird areas, 4) Monitor the construction company's compliance with the Rules for the Protection of Animals, with regard to bird areas during construction works, 5) Implement the offset project, if one has been developed.	Low
OPERATION PHASE			
5. Birds	Minor	1) Monitor the identified bird areas, 2) Implement the offset project, if one has been developed.	Negligible
Monitoring: according to the Biodiversity Management Plan.			
PRE-CONSTRUCTION AND CONSTRUCTION PHASES			

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
6. Invertebrates	Significant/ Moderate	<i>As the priority insect species are associated with plants, it is reasonable to combine activities to mitigate impacts on plants and insects</i> Pre-construction phase 1) Conduct a field study in the Aol in April-June to identify and map the habitats of the priority insect species (four PBF species), in coordination with the field study of priority plant species – see p.1 in this table), 2) If habitats of these species are identified, mark them on the ground and include them in the construction master plan as "no-go" zones, in coordination with the inclusion of habitats of priority plants species, 3) If the habitats of these species are located within the project footprint area and will be destroyed, quantify the affected habitats and survey the surrounding areas to develop an offset for the anticipated losses. Construction phase 4) Monitor the habitats in "no-go" zones, 5) Implement the offset project, if one has been developed.	Low
OPERATION PHASE			
Invertebrates	Minor	1) Monitor the habitats in "no-go" zones, 2) Implement the offset project, if one has been developed.	Negligible
Monitoring: according to the Biodiversity Management Plan.			

Proposed offsetting strategy

The offsetting strategy aims to achieve No Net Loss (NNL) or Net Gain (NG) for biodiversity values – PBF and CH.

PBF species: plants, insects, Central Asian tortoise, Pale pygmy jerboa, birds breeding in the area. The Project will result in the complete loss of the species habitats, located within the road right-of-way. However, similar habitats exist in surrounding areas. The proposed offset approach aims to identify and protect such habitats to prevent their degradation or destruction in the future due to potential threats such as overgrazing, off-road driving, etc. If restoration and enhancement of suitable habitats is necessary, this will be done to ensure the sustainable habitats for the species, including potentially translocated plants (tulips) and animals (tortoises).

The feasibility of this approach is based on satellite imagery and limited field data confirming the presence of similar habitats in surrounding areas, many of which are in native or semi-native state and potentially suitable for the species inhabiting. It is assumed that these habitats will be free from any economic activities in the future. However, there are constraints, as large areas around

the Project area are used by local populations for grazing. Therefore, implementation requirements must include negotiations with local authorities and communities, as well as consultations with the regional Departments on Environment Protection regarding the legal status of the proposed protected habitats.

PBF and CH species: ungulates and other migratory animals. To mitigate barrier effect of the road, construction of crossings over the road is proposed (including underpasses for small animals and overpasses/at-grade passes for ungulates). But effectiveness of the proposed crossings remains unclear; this effectiveness will be visible only after construction of the passes. If the constructed crossings do not provide adequate opportunities for migration and connectivity, they will be improved or new crossings will be constructed.

The feasibility of this approach is based on best international practice in using linear infrastructure crossings to facilitate wildlife migration and connectivity. It is assumed that appropriate crossing types will be selected, funded and constructed, as well as improved if necessary. Constraints are obvious: a lack of funding, leading to the absence of necessary crossings or their technical simplification. Regarding the saiga, there is a constraint related to the need to construct adequate crossings over the Shalkar-Beineu railway; without these, the road crossings will be useless. Implementation requirements must include making project funding contingent on crossing construction and close coordination with the railway operator.

7.3 Social Impacts and Benefits, Mitigation Measures

7.3.1 Regional Socio-Economic Benefits of the Project

Consultations undertaken during the ESIA with the Mangystau Regional Akimat and the Beineu, Baiganin and Shalkar District Akimats indicated that the Project is considered important for improving regional and inter-district transport connectivity and supporting economic development. The consulted authorities highlighted the expected benefits of a more direct and reliable road connection between Mangystau and Aktobe Regions and improved links between western and central Kazakhstan. At the district level, the Project was also viewed as providing opportunities to improve access to markets, facilitate the movement of goods and people, support livestock farming and other local economic activities, and create conditions for the development of trade and roadside services.

Construction Phase

During construction, the Project is expected to generate a temporary increase in economic activity in Mangystau and Aktobe Regions by creating additional demand for construction materials, equipment, transport, fuel and supporting services, thereby providing business opportunities for regional contractors, subcontractors, suppliers, transport and logistics companies and other service providers.

The Project may also strengthen the capacity of the regional road construction sector by providing regional contractors, engineers, quality control and E&S specialists, and testing laboratories with practical experience in applying international technical, quality and E&S requirements. This experience may strengthen regional expertise and build practical knowledge and skills in implementing infrastructure projects in accordance with IFI requirements.

Operation Phase

The principal socio-economic benefits of the Project are expected to occur during operation and to be associated with improved regional and inter-district connectivity, reduced travel times and transport costs, and improved reliability of road transport. The new road will provide a more direct connection between Mangystau and Aktobe Regions and strengthen road links between western and central Kazakhstan, improving the movement of people, goods and agricultural products and access to regional and national markets.

For **Mangystau Region**, improved east–west road connectivity is expected to complement the region’s existing transport and logistics infrastructure, including the ports of Aktau and Kuryk and connections to the Trans-Caspian International Transport Route (Middle Corridor). Reduced transport distances and improved road connectivity with central Kazakhstan are expected to increase logistics efficiency and may reduce the cost of transporting consumer goods, construction materials and other supplies to the region. The Project may therefore contribute to strengthening Mangystau’s logistics role and supporting economic activity beyond the oil and gas sector.

The substantially shorter road connection is expected to reduce road freight transport costs between central and southern Kazakhstan and Mangystau Region, with indicative estimates suggesting potential savings in the order of 20–30%. This is particularly relevant for Mangystau Region, which is highly dependent on supplies from other parts of Kazakhstan, with approximately 84% of food products sourced from outside the region. International evidence indicates that transport costs can represent a significant component of the delivered cost of goods; recent World Bank research estimates ad-valorem transport costs for domestically produced goods in the countries studied at approximately 7–17% of their value⁸⁹. The reduction in freight costs resulting from the Project could therefore contribute to lower delivered and, potentially, retail prices for some essential goods in Mangystau Region, particularly relatively low-value and transport-intensive products. The actual effect on consumer prices will depend on the transport cost component of individual products and the extent to which logistics savings are passed on to consumers.

For **Aktobe Region**, the Project will strengthen transport connections with Mangystau Region and provide a more direct road link towards western Kazakhstan and the Caspian transport network. Improved connectivity is expected to facilitate freight and passenger movements and support economic linkages between the two regions.

The benefits are particularly relevant for **Baiganin and Shalkar Districts**, where road connectivity is currently more limited. Improved road access is expected to reduce the relative isolation of these areas from the wider road network, facilitate movement between districts and regions, and improve access to markets and economic centres. In the longer term, improved accessibility may support livestock farming, trade, transport services and other local economic activities.

Overall, the Project is expected to have a **long-term positive socio-economic impact at the regional and district levels**, primarily through improved connectivity, reduced transport

⁸⁹<https://documents1.worldbank.org/curated/en/099053024123058965/pdf/P50057713d247d0ea18e1d19f0dca13c1b7.pdf?utm>

constraints and better access to markets. These expected benefits are consistent with the views expressed by regional and district authorities during the ESIA consultations, who generally considered the Project important for the economic development and improved connectivity of their respective regions and districts.

7.3.2 Local Economy and Employment Impacts

The Project is expected to generate predominantly positive impacts on the local economy through temporary employment and business opportunities during construction and, in the longer term, through improved access to markets, reduced transport constraints and opportunities for the development of agriculture, small businesses and roadside services. These expectations were consistently expressed during consultations with rural Akimats, farmers, local residents and existing businesses along the Project corridor.

Construction Phase

According to the Project Feasibility Study, construction of the entire 559 km Beineu-Bozoy-Saksaulsk Road is estimated to generate approximately 7,211 direct jobs in construction and related activities, as well as 6,522 additional indirect jobs in supporting industries, representing a total of approximately 13,733 jobs. These estimates cover the entire road corridor, including the Project section (km 0 - km 286) and the remaining sections (km 286 - km 559), and do not represent the number of workers expected to be present simultaneously at construction sites.

For preliminary workforce planning purposes, it is assumed that at least 50% of the direct construction workforce will comprise Kazakhstan nationals, consistent with local labour participation targets applied to certain internationally financed infrastructure projects. However, given the limited availability of labour in settlements along much of the road corridor, a significant proportion of workers is expected to be recruited from other regions of Kazakhstan, while some specialised positions may be filled by foreign workers.

The anticipated mobilisation of non-local workers may result in temporary labour influx along the Project corridor. Although the majority of construction activities will take place in sparsely populated areas, potential impacts may arise around construction camps, settlements and facilities used by the workforce.

During consultations, the **rural Akims** indicated that construction could provide temporary employment and additional income opportunities for residents of settlements along the Project corridor. They identified potential employment opportunities for local residents during construction, as well as opportunities to provide goods and services to Contractors and their workforce. Local businesses and households could potentially provide food, temporary accommodation, transport, fuel and water, equipment repair and maintenance, cleaning and other supporting services.

The farmers interviewed in Syngyrlau, Sam and Turysh also identified opportunities associated with Project construction. Several farmers indicated that their farms could supply meat, milk and other livestock products to Contractors and construction workers, while some also identified the possibility of providing temporary accommodation. These opportunities could provide an additional source of income alongside their existing livestock activities.

Local residents interviewed during the ESIA similarly expressed interest in Project-related employment and small-scale business opportunities. Potential activities identified by participants included catering, sale of agricultural products and provision of other services to the construction workforce. Some respondents indicated that they would consider establishing small food outlets or points for the sale of locally produced agricultural products if sufficient demand arises during construction.

The consultation with the owner of the **existing roadside accommodation and catering facility** in Syngyrlau provides a practical example of the capacity of existing local businesses to benefit from construction-related demand. The business currently provides accommodation, hostel and catering services and confirmed its ability to provide these services to Contractors and construction workers during the construction period.

Overall, construction is therefore expected to create a temporary increase in demand for labour, locally produced food, accommodation, transport and other services. The extent to which these opportunities translate into local economic benefits will depend on Contractors' recruitment and procurement practices and the capacity of local residents, farmers and businesses to respond to Project-related demand.

To enhance local economic benefits, the Contractor should develop and implement a **Local Employment Programme** and adopt procurement practices that, where practicable, prioritise local businesses, farmers and service providers.

The employment of a large construction workforce, including non-local and migrant workers, may also give rise to labour and working conditions risks, particularly where Contractors and subcontractors do not apply consistent labour management practices. Potential risks include inadequate employment contracts, excessive working hours, delayed payment of wages, discrimination, poor working and accommodation conditions, and limited access to effective worker grievance mechanisms. Migrant workers may be particularly vulnerable to unfair recruitment practices, recruitment fees, retention of identity documents and restrictions on freedom of movement.

To mitigate these risks, Contractors will be required to develop and implement a Labour Management Plan (LMP) in accordance with national labour legislation and EBRD ESR2 requirements ([Table 40](#)). The LMP will apply to Contractors and subcontractors and address the following key aspects:

- **Employment conditions and workers' rights:** Written employment contracts in a language understood by workers, timely payment of wages, compliance with working hours and rest periods, equal treatment and non-discrimination, and prohibition of child labour and forced labour,
- **Protection and welfare of migrant workers:** Fair recruitment practices, prohibition of recruitment fees and retention of identity documents, freedom of movement, and provision of adequate accommodation, sanitation, healthcare and safe transportation.
- **Worker grievance management and compliance monitoring:** Accessible and confidential grievance mechanisms without retaliation, induction training on workers' rights and Codes of Conduct, and regular monitoring of labour practices and working conditions, including subcontractor compliance.

Operation Phase

The **rural Akims** generally considered improved transport connectivity to be an important opportunity for longer-term local economic development. The expected benefits identified during consultations included reduced travel time and transport costs, improved access to markets, increased opportunities for the sale of locally produced agricultural products, and development of small businesses and roadside services. The Akimats also identified potential opportunities for new commercial activities associated with increased traffic, including trade, catering, vehicle services and other roadside businesses.

These expectations were particularly evident among **the farmers** interviewed along the Project corridor. Farmers repeatedly identified the absence of a good road and poor condition of existing access routes as factors increasing transport costs and travel time and limiting access to buyers and markets. Interviewed farmers associated the new road with opportunities to increase livestock numbers, production and sales, expand their farming activities and increase farm income. Some also identified opportunities to diversify into non-agricultural activities, including catering, camping and fuel or other roadside services.

Local residents interviewed during the ESIA also associated the improved road connection with opportunities to increase household income and develop small businesses. Frequently mentioned opportunities included catering, trade, sale of agricultural products and roadside services. The consultations therefore indicate that improved connectivity is perceived not only as a transport benefit but also as an opportunity to expand the range of income-generating activities available within the settlements along the Project corridor.

The **existing roadside business in Syngyrlau** provides further evidence of the potential for development of roadside services following completion of the Project. The business currently receives approximately 40–50 customers per day and identified poor road conditions and difficult access as constraints on customer numbers. Following improvement of the road, the owner plans to expand the existing accommodation and catering business through additional services, including a vehicle service station, car wash, fuel station, shop and welding workshop.

Overall, the consultations indicate that the principal long-term local economic benefit of the Project is expected to arise from **improved access to markets and increased economic activity associated with the new road**. The strongest potential benefits are expected for livestock producers and small businesses, through reduced transport constraints, improved access to customers and markets, and opportunities for the development of trade, catering, vehicle services, accommodation and other roadside activities.

To enhance long-term local economic benefits, QAJ should cooperate with the relevant Akimats to **identify suitable locations along the road for roadside businesses and services, including designated areas for the sale of local agricultural products, catering, retail and vehicle services**. The detailed design should, where feasible, provide safe access to such locations. Local farmers and businesses should be informed of the available opportunities and applicable requirements.

Table 40 - Summary of Employment and Labour-Related Impacts and Mitigation Measures

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
CONSTRUCTION PHASE			
Construction workers, including non-local and migrant workers	Moderate	Require Contractors to develop and implement a Labour Management Plan (LMP) addressing employment conditions, workers' rights, migrant worker welfare, grievance mechanisms and subcontractor compliance.	Low

7.3.3 Impacts on Community Services and Infrastructure

The Project may affect the accessibility and delivery of community services in settlements along the Project corridor, particularly education and healthcare services. Consultations with representatives of schools and primary healthcare facilities in Syngyrlau, Sam and Turysh indicate that the principal construction-related concerns are associated with construction traffic, dust, noise and potential temporary access restrictions, while the operation of the new road is expected to result in significant improvements in access to educational opportunities and specialised healthcare outside the settlements.

Construction Phase

Representatives of **educational institutions in Syngyrlau, Sam and Turysh** considered that construction activities could temporarily affect the environment around schools, primarily through increased movement of construction vehicles, noise and dust. As students and staff generally walk to schools located within their settlements, particular attention was placed on preventing construction traffic from using local residential streets and maintaining safe pedestrian access. School representatives recommended appropriate traffic management and road safety measures, including signs, road markings, barriers and pedestrian crossings.

Representatives of **local healthcare facilities** generally did not expect construction to significantly disrupt the provision of primary healthcare services. However, the presence of construction workers and potential construction-related incidents may temporarily increase demand for primary healthcare services in Syngyrlau, placing additional pressure on the facility's already limited staff and capacity. Healthcare representatives also emphasized the importance of maintaining uninterrupted access during construction and limiting construction-related dust, noise and heavy vehicle movements through residential areas.

Overall, construction-related impacts on education and healthcare services are expected to be temporary and manageable, provided that access to schools and healthcare facilities is maintained and construction traffic, dust and noise are appropriately controlled.

Mitigation measures: The Contractor's Traffic Management Plan should include specific measures to ensure the safety of schoolchildren and maintain safe and uninterrupted access to schools and healthcare facilities during construction (see **Section 7.2.9**).

Operation Phase

Representatives of **educational institutions in Syngyrlau, Sam and Turysh settlements** expected improved road connectivity to expand access to educational opportunities outside their

settlements. While the existing poor road conditions do not significantly affect daily attendance, they constrain travel to district centres and other settlements for examinations, competitions, educational events and professional development. School representatives expect the new road to facilitate such travel and improve access to colleges, vocational education, additional training and other educational opportunities outside the settlements.

The expected benefits are particularly important for **healthcare services**. The healthcare facilities in Syngyrlau, Sam and Turysh provide primary healthcare only, while specialised treatment requires travel to district or regional medical facilities. Healthcare representatives reported that poor road conditions currently constrain access to district and regional healthcare facilities and may delay the transport of patients requiring emergency or specialised care. All three healthcare representatives expected the improved road to facilitate access to specialised healthcare and reduce patient transport times to district and regional medical facilities.

The Project is therefore expected to have a **long-term positive impact on access to education and healthcare services**. For education, the principal benefit will be improved access to educational opportunities and professional development. For healthcare, the benefit is potentially more significant, as improved road conditions are expected to reduce an existing transport constraint on access to specialised and emergency medical care.

7.3.4 Gender Impacts

The assessment of gender-related impacts is informed by the women-only focus group discussion conducted in Turysh and interviews with vulnerable women in Syngyrlau, Sam and Turysh. The consultations indicate that women generally perceive the Project positively, particularly in relation to employment and income-generating opportunities, improved mobility and better access to services. At the same time, women may face specific barriers to benefiting from Project-related employment and business opportunities due to their existing employment patterns, household and childcare responsibilities, and limited experience in small business and self-employment.

Construction Phase

The construction phase is expected to create temporary employment and income-generating opportunities for women in the Project-affected settlements. All participants in the **Turysh FGD** expressed interest in employment during construction, while potential activities identified by women included catering and the sale of locally produced agricultural and dairy products to the construction workforce. Women also expressed interest in longer-term opportunities to establish small shops, roadside cafés and other small businesses associated with the new road. Similar expectations were expressed by **vulnerable women** interviewed in **Syngyrlau, Sam and Turysh**, who identified employment, catering, sale of agricultural products and provision of other services as potential opportunities associated with Project construction.

However, women may not benefit equally from these opportunities. Female employment in Turysh is currently concentrated mainly in education, healthcare and other social services, while female self-employment and small business activity are limited. Household and childcare responsibilities may further constrain women's ability to take up construction-related employment. FGD participants specifically identified childcare availability as a factor that could affect women's ability to access new employment and business opportunities.

Enhancement measures: The Contractor/s should develop and implement a **Gender Action Plan (GAP)** setting out specific measures and procedures to promote women's participation in Project-related employment and business opportunities, including targeted communication of available opportunities, equal and transparent recruitment procedures, measures to facilitate participation by women with childcare responsibilities, and monitoring of women's participation in Project employment and business opportunities. The GAP should also address non-discrimination and equal treatment of female workers, including non-local and migrant workers, and provide for gender-sensitive workplace facilities and access to confidential grievance mechanisms.

GBVH and Community Safety

Women participating in the Turysh FGD did not express significant safety concerns associated with the arrival of workers from other areas. Nevertheless, the presence of a predominantly male construction workforce may introduce potential GBVH risks, which should be addressed through appropriate preventive measures, including safe management of construction sites and worker accommodation.

Nevertheless, given the anticipated mobilisation of non-local workers and the establishment of construction camps, potential GBVH risks may arise both within the construction workforce and through interactions between workers and nearby communities. These risks may include:

- Sexual harassment, unwanted attention and inappropriate behaviour towards women and girls in nearby settlements, particularly in areas frequently visited by construction workers;
- Sexual harassment, discrimination and other forms of inappropriate behaviour towards female construction workers, including risks associated with unequal power relations between workers and supervisors;
- Sexual exploitation and abuse, including situations where women seeking employment, business opportunities or access to Project-related services may be exposed to inappropriate requests or pressure;
- Increased risks of harassment and intimidation in and around construction camps, worker transport facilities and other locations where construction workers interact with local communities.

Contractors will be required to implement the Project GBVH Prevention and Response Plan, including:

- Mandatory Codes of Conduct for all workers, including subcontractor personnel, prohibiting sexual exploitation, abuse, harassment and inappropriate behavior towards local community members;
- GBVH prevention training for workers and supervisors, including prevention of harassment and abuse of authority in recruitment, employment and interactions with local communities;
- Establishment of safe and confidential reporting mechanisms accessible to both workers and local communities, with procedures for addressing GBVH-related complaints while protecting affected persons and their privacy;

- Regular monitoring of compliance with GBVH prevention measures at construction sites, worker accommodation facilities and locations where workers interact with local communities.

Operation Phase

The operation of the new road is expected to have a positive gender impact by reducing transport-related constraints that currently disproportionately affect women's mobility and access to economic opportunities and services. Women participating in the Turysh FGD reported that poor road conditions increase travel time and costs and restrict travel outside the settlement, particularly during adverse weather conditions. Participants expected improved road connectivity to facilitate access to employment, healthcare, education, administrative services and markets.

Improved connectivity may also expand opportunities for women's self-employment and small business development. FGD participants expected the new road to create opportunities for the sale of locally produced agricultural and dairy products, catering and other roadside services. This is particularly relevant given the currently limited level of female entrepreneurship in Turysh. Improved access to markets and customers may therefore provide women with opportunities to diversify household income beyond public-sector employment, social benefits and small-scale household production.

Overall, the Project is expected to have a **positive long-term gender impact**, principally through improved mobility, access to services and increased employment and income-generating opportunities. However, achieving these benefits will depend on women having effective access to Project-related employment and business opportunities and on appropriate measures being maintained to manage community safety and GBVH risks during construction.

The assessment of potential noise GBVH impacts and the proposed mitigation measures for the construction and operation phases are summarised in **Table 41**.

Table 41 - Summary of GBVH impact assessment and mitigation measures for the Project construction phase

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
CONSTRUCTION PHASE			
Women in Project-affected communities	Moderate	Implement the GBVH Prevention and Response Plan, including mandatory Codes of Conduct for workers and subcontractors, GBVH prevention training addressing harassment and abuse of authority, confidential reporting and response procedures accessible to workers and local communities, and regular monitoring of compliance at construction sites and worker accommodation facilities.	Low

7.3.5 Impacts on Vulnerable Groups

Construction Phase

Temporary construction-related disruptions may have a greater impact on vulnerable persons and households, particularly those with limited income, reduced mobility or limited access to alternative transport. Temporary access or transport disruptions may further constrain their ability to reach healthcare, administrative and other essential services outside their settlements, particularly for elderly persons living alone and households with limited financial resources.

At the same time, construction may provide temporary employment and income-generating opportunities for vulnerable households. Interviewed participants expressed interest in Project-related employment and service provision, including catering, sale of agricultural products and other small-scale services. However, the ability of vulnerable persons to benefit from these opportunities may vary depending on their individual circumstances, including age, disability, household responsibilities, skills and access to information on available opportunities.

Enhancement measure: The Contractor should facilitate vulnerable households' access to Project-related employment and small-scale business opportunities through targeted communication of available opportunities and inclusive local recruitment and procurement practices.

Operation phase

The operation of the new road is expected to have a positive impact on vulnerable groups, primarily through improved mobility and access to healthcare, administrative services, markets and other services outside the settlements. Interviewed participants in Syngyrlau, Sam and Turysh consistently identified poor transport connectivity as an existing constraint and generally expected the new road to improve access to district centres, healthcare, education and other services.

Improved road connectivity is expected to be particularly beneficial for vulnerable households by reducing transport-related barriers to accessing healthcare and other essential services and by creating additional opportunities for household income and small business development, although the extent of these benefits will depend on the availability and affordability of transport and the ability of vulnerable persons to access employment, markets and business opportunities.

Overall, the Project is expected to have a **positive long-term impact on vulnerable groups** through improved accessibility and economic opportunities, while temporary adverse impacts during construction can be managed through targeted access, communication and community safety measures.

7.3.6 Land Tenure/Land Use Impacts

Permanent land acquisition will be required for the construction of the Project. Preliminary land requirement estimates provided in the local Feasibility Study indicate that approximately **535 ha** may be required in **Beineu District**, comprising approximately **491 ha of state reserve land and 45 ha of land leased to farming enterprises**. In **Baiganin District**, approximately **498 ha** may be required, all of which is identified as **state reserve land**. These estimates cover the EBRD- and IBRD-financed sections within these districts.

In **Shalkar District**, the Feasibility Study estimates a total land requirement of approximately **520 ha**, comprising approximately **420 ha of state reserve land and 100 ha of land leased to farming enterprises**. However, these estimates cover both the IBRD-financed section included in the ESIA and the ADB-financed section outside its scope, and the available data do not provide a breakdown

of the estimated land requirements between these sections. The final Project land requirements and affected land plots will therefore be confirmed during detailed design and LARP preparation.

Impacts associated with the acquisition of state reserve land are expected to be limited, as the affected areas have little or no current economic use and are largely unsuitable for livestock grazing. **Acquisition of leased pastureland, however, may result in loss of grazing land and fragmentation of existing landholdings.** Based on preliminary land plot information, permanent acquisition is expected to affect approximately 0.15% to 1.5% of the total area of individual leased plots. Given the relatively small proportion of land expected to be acquired, the direct loss of grazing land is generally expected to result in a minor adverse impact, subject to appropriate compensation.

The effects of land fragmentation and severance may be more significant where the road divides an existing pasture holding, restricts livestock movement, or affects access to land improvements and infrastructure required for livestock farming. Particular consideration will be required where the alignment affects access to artesian wells, livestock wintering facilities, worker accommodation or other facilities essential to farming activities. The significance of these impacts will be assessed on a plot-by-plot basis during LARP preparation, taking into account the configuration, accessibility and continued usability of the remaining land.

A Land Acquisition and Resettlement Plan (LARP) will be prepared following completion of the detailed design and confirmation of the final land requirements. The LARP will identify affected persons, land plots, land use rights, assets and livelihood impacts and establish applicable compensation, mitigation and, where required, livelihood restoration measures in accordance with Kazakhstan legislation, the Project LARF and EBRD ESR 5. Measures to address land severance may include cattle passes and other arrangements to maintain livestock movement and access to grazing areas, water sources and livestock infrastructure.

Further details on the anticipated scale and nature of land acquisition, potential land fragmentation impacts, eligibility and entitlement principles, and requirements for LARP preparation are provided in the Project Land Acquisition and Resettlement Framework (LARF).

Table 42 - Summary of land tenure/land use impact assessment and mitigation measures for the Project construction phase

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
CONSTRUCTION PHASE			
Farming enterprises and other affected land users	Moderate	Prepare and implement a Land Acquisition and Resettlement Plan (LARP) in accordance with the Project LARF and EBRD ESR 5. Ensure that all Project-related land acquisition and restrictions on land use, including impacts on pastureland, other land uses, assets and improvements, are identified and appropriately compensated or mitigated.	Low

7.4 Occupational Health and Safety Impacts

Construction Phase

All project-related construction activities may have impacts on health and safety of construction workers, contractors, and subcontractors. The area of influence for OHS impacts includes the road construction corridor, construction camps, asphalt and batching plants, temporary access roads, equipment maintenance areas, storage areas, and other temporary Project facilities.

The construction stage envisions site preparation and clearing, earthworks and excavation, operation of heavy machinery, loading, transportation and unloading of construction materials, pavement works, construction of culverts, welding, as well as activities at construction camps and other temporary ancillary facilities, including asphalt and batching plants, storage and maintenance areas.

Key OHS hazards/aspects may include vehicle and equipment movement, interaction between workers and moving machinery, exposure to dust, noise, vibration, waste and hazardous substances, hot bitumen and asphalt, extreme outdoor temperature (hot or cold) and adverse weather conditions, as well as workers' fatigue and stress.

Another relevant OHS aspect is that the section of proposed road, located within the Baiganin and Shalkar districts of Aktobe Region⁹⁰, passes through an area classified as a natural focus of plague⁹¹. Under the applicable sanitary and epidemiological requirements of the Republic of Kazakhstan, organisations and individuals undertaking economic activities within plague-endemic areas are required to inform personnel and other persons working in the area about the epidemiological situation, relevant personal protection measures and actions to be taken in the event of suspected infection.

Therefore, potential OHS impacts - injuries of varying severity and occupational illnesses associated with the road construction may result from the risk of:

- Onsite accidents involving mobile machinery - workers can be hit by the moving equipment and machinery operating at the construction site,
- Traffic accidents involving project-related vehicles transporting project workers, including contractors' and subcontractors' workers,
- Exposure to hazardous conditions in the work zone - exposure to dust from earthworks, exhaust emissions from vehicles and machinery, bitumen fumes, and other chemicals,
- Dangerous levels of noise and vibration - prolonged exposure to exceeding noise and vibration levels from construction machinery, vehicles and operations,
- Slips, trips, and falls caused by uneven terrain, excavations, mud, vegetation, and poor housekeeping at construction sites,
- Fire caused by improper storage, handling and use of flammable materials, such as fuels, lubricants, solvents and bitumen-related products, as well as during performance of hot works (welding, cutting),
- Ergonomic risks caused by physically demanding tasks (e.g. lifting, loading/unloading, carrying etc.),

⁹⁰Feasibility Study for the Construction of the Beineu-Saksausk Road to Category II Technical Standards in the Mangystau, Aktobe and Kyzylorda Regions, Almaty, 2026

⁹¹A natural focus of plague is an area of the Earth's surface within which the causative agent of the disease circulates naturally, without external introduction, for an indefinite period of time. Natural plague foci cover approximately 40% of Kazakhstan's territory, equivalent to about 1.1 million km² (U.S. Centers for Disease Control and prevention, 2024).

- Increased risk of communicable disease transmission related to temporary concentration of workers at construction sites and camps, further exacerbated by the presence of natural focus of plague in certain areas along the planned road alignment,
- Other risks - considering outdoor character of works, extreme temperatures can cause heat or cold stress. Psychosocial risks causing mental health stress are related to long shifts, separation from families, and life in temporary accommodation facilities.

Receptor sensitivity

Overall receptor sensitivity is considered high due to the inherent risk of human injury, illness, or fatality.

Impact assessment

The potential impact magnitude is high, as the identified risks could result in disabling injuries, fatalities, or long-term adverse health effects. Impact significance would be significant as a function of the high receptor sensitivity and same levels of impact magnitude. However, the impact magnitude could be reduced through application of mitigation measures proposed in [Table 43](#).

Management and mitigation

The construction works must be performed in accordance with a Construction Health and Safety Management Plan ("CHSMP"). This plan should be developed by the Construction contractor to prevent accidents, personal injuries, and to promote health and well-being of all persons in the workplace to achieve the goal of "zero injuries and accidents".

The CHSMP must include the requirements of the relevant national legislation, EBRD's ESR4 and good international practice and should be in line with the provisions of approved construction and working design documents.

The Project's CHSMP for the road construction works should at least cover the following issues:

- Allocation of OHS roles and responsibilities,
- Identification of OHS risks relevant to the Projects,
- Workers' regular OHS briefings / training,
- Provision of workers (including sub-contractors) with certified, work-appropriate personal protective equipment (PPE),
- Medical examination of workers, including the staff of sub-contractors,
- Recording and investigation of OHS incidents, implementation of proper correction measures,
- Safe performance of high-hazardous tasks, inter alia: hot works, earthworks, works at height, electric works,
- OHS monitoring and audit of construction sites.

Additionally, the Contractor must define proper management over the following activities:

- Storage of and handling with the hazardous materials and chemicals,
- Fire prevention and protection,
- Emergency response and first aid,

- Drugs and alcohols,
- Site safety signs, posters and registers,
- Monitoring of construction noise, vibration and air emissions.

Residual impact

With the effective implementation of the proposed mitigation measures, the residual impact significance is considered from moderate to low.

Operation Stage

Road operation will require regular maintenance and repair activities, which may cause OHS risks for maintenance personnel. The Project envisions construction Road Maintenance Unit (RMU). Therefore, the area of influence for OHS impacts during the operation stage will include the full road's right-of-way, where the maintenance activities will be undertaken, as well as the RMU and any required supporting facilities (storage areas, temporary staff facilities).

Receptor sensitivity is considered medium, reflecting potential severity of injuries for workers. The potential impact magnitude is medium, as road maintenance and repair activities will generally be more limited in scale, duration and frequency than construction activities and will involve a smaller workforce. The resulting impact significance is assessed as moderate. Effective application of mitigation measures can further reduce the impact magnitude.

Therefore, it is recommended to develop Operation Health and Safety Management Plan based on the CHSMP and incorporating lessons learned from OHS performance during the construction stage.

With the effective implementation of the proposed mitigation measures (**Table 43**), the impact magnitude is expected to be reduced to low and the residual OHS impact significance will be low as well.

The assessment and mitigation of the OHS impacts during the construction and operation phases of the reservoir are summarised in **Table 43**.

Table 43 - Summary of occupational health and safety impact assessment and mitigation measures

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	-	1) Develop Construction Health and Safety Management Plan ("CHSMP") to include the relevant national requirements and principles of good international practice, 2) The OHSMP should cover at least the following: - Identification of key OHS risks and hazards, - Allocation of OHS roles and responsibilities among the managers, engineers and technicians,	-

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		- Briefing, training and knowledge examination, - Medical examination, - Emergency response, - Management of hazardous chemicals, - Fire safety, - Performance of high-hazardous works, - Personal protective equipment, - Supervision of sub-contractors, - Accident investigation, etc. 3) Develop a Worker Accommodation Management Plan (if required) that shall at least include: - Assessment of workers' accommodation needs through estimates of local workforce availability within the Project area, - Availability of existing housing, - Assessing impacts of workers' accommodation on communities, drafting of the relevant mitigation measures, - Applicable standards and guidance for workers' accommodation, - Management of workers' accommodation, including consultations and grievance mechanisms.	
CONSTRUCTION PHASE			
Construction workers, including contractors and subcontractors	Significant	1) Implement the CHSMP, 2) Implement Worker Accommodation Management Plan as per the IFC and EBRD guidance note on workers' accommodation (2009)⁹².	Low to moderate
Monitoring: OHS daily, weekly and monthly inspections and monitoring as per the CHSMP (to be performed by the Construction contractor, the Supervision engineer, the Client and invited consultants).			
OPERATION PHASE			
Workers of maintenance operator, including contractors and subcontractors	Moderate	1) Develop Operation Health and Safety Management Plan (OHSMP) for the maintenance and repair works based on the CHSMP and incorporate lessons learned from OHS performance during the construction stage, 2) Follow the requirements of the relevant national OHS legislation.	Low

⁹²IFC (International Finance Corporation) and EBRD (European Bank for Reconstruction and Development). 2009. Guidance note: Workers' accommodation: processes and standards, https://www.ebrd.com/downloads/about/sustainability/Workers_accommodation.pdf

7.5 Impacts on Community Health and Safety

Construction Phase

The main receptors potentially affected by the Project's community health and safety impacts during the Project construction include residents of the affected settlements, users of roads simultaneously used by the Project vehicles, and local herders along the planned road alignment.

The core area of influence for community health and safety impacts includes settlements located along the planned road alignment, namely Sam (138 m), Nogayti (207 m), Turysh (825 m) and Syngyrlau (1400 m). A study area of 250 m on either side of the road alignment is considered for air quality impacts, and 100 m for noise and vibration impacts. Locations of temporary Project facilities, such as construction camps, asphalt and batching plants, spoil storage/disposal areas, topsoil storage areas, etc. are not currently defined, but their location should as well as be considered in the context of potential public health and safety impacts.

With regards to the Project delivery routes, it is not yet decided whether the construction materials (from Aktobe and Almaty) will be transported by rail. However, at least a portion of the materials is expected to be delivered to the Project area via the existing road network, which will result in increased traffic volumes on these roads during the construction stage.

Given the length of the road corridor, the limited availability of accommodation in nearby settlements and the anticipated mobilisation of non-local workers, temporary construction camps are expected to be required. Based on experience from comparable road construction projects in Kazakhstan and interviews with the QAJ representatives, it is preliminarily estimated that seven construction workers' accommodation camps (one camp per section), with a combined accommodation capacity of up to 2,500 workers, may be required along the 286 km Project section.

In accordance with the IFC/EBRD Workers' Accommodation Guidance (2009), camp locations should be selected taking into account access to construction sites, safe worker transportation, availability of essential services and potential impacts on nearby communities. The final number, locations and capacities of construction workers' accommodation camps will be determined during detailed construction planning, based on Contractors' workforce mobilisation and accommodation requirements.

The location and operation of construction workers' accommodation camps may pose community health and safety risks, particularly where camps are located near settlements. Potential impacts include:

- Increased pressure on local infrastructure and services, including water supply, sanitation, waste management and healthcare;
- Increased traffic and road safety risks associated with worker transportation;
- Increased risk of transmission of communicable diseases between construction workers and local communities;
- Potential conflicts and inappropriate interactions between construction workers and local residents, including risks of gender-based violence and harassment (GBVH).

Prior to the establishment of camps, Contractors will be required to prepare and implement a Construction Workers Accommodation Camp Management Plan, taking into account the IFC/EBRD

Workers' Accommodation Guidance Note (2009). The Plan will address the following community health and safety aspects:

- **Camp siting and community interface:** Selection of camp locations to minimise disturbance to nearby settlements, consultation with affected communities, appropriate access control and security arrangements.
- **Environmental and public health management:** Adequate water supply, sanitation, wastewater and solid waste management, healthcare arrangements and measures to prevent the transmission of communicable diseases.
- **Worker transport and community safety:** Organised transportation between camps and construction sites, minimisation of unnecessary traffic through settlements, mandatory worker Codes of Conduct, GBVH prevention measures and accessible community grievance mechanisms.

Contractors will regularly monitor the operation of construction camps and address any community health and safety concerns identified during construction.

Based on the above, the following construction-related community health and safety aspects are considered relevant to the Project:

- Increased traffic movement along Project delivery routes associated with the transportation of materials, equipment, and personnel,
- The presence of active construction sites, open excavations, construction machinery, and stored materials accessible to the public if not secured,
- Air emissions, noise and vibration from machinery, vehicles, and construction works (relevant to Sam and Nogayti settlements), and
- The presence of non-local workforce interacting with nearby communities.

During the consultations, representatives of local education and healthcare institutions and other participants identified construction traffic as a potential concern for community safety and living conditions. Particular attention was given to the movement of construction vehicles and other heavy vehicles through residential areas and the associated risks to pedestrians, including schoolchildren, as well as disturbance to local residents. Participants emphasised the need to restrict such traffic through the settlements during construction and to ensure safe pedestrian movement and access within the settlements.

Therefore, the potential community health and safety impacts associated with the road construction include:

- Increased risk of road traffic accident involving Project-related vehicles and other road users or pedestrians along the Project delivery routes,
- Safety risks to members of public, including slip, trip, and fall incidents associated with open excavations within construction areas,
- Temporary deterioration of air quality and increased noise and vibration levels within the Project's area of influence for these parameters, especially affecting vulnerable groups,
- Potential conflicts between the residents or herders and the construction contractor, including those related to access restrictions, bypass requirements, functioning of the construction camps, and other construction-related disturbances,

- Potential transmission of communicable diseases from construction workers to local population, especially affecting vulnerable groups.

Impact significance

Given the potential to affect human health, the sensitivity is seen as high. Magnitude of impacts will be low, resulting in moderate significance of impacts on community health and safety. Effective application of the mitigation measures presented in **Table 44** can further reduce the impact magnitude.

Management and mitigation

The Construction contractor will be obliged to implement measures to minimise air emissions, dust and noise from construction activities. The Construction contractor will be obliged to inform local communities about the construction schedule and planned activities in a timely and accessible manner. Advance communication will allow affected residents and local farmers to plan their movements and activities accordingly and reduce the potential for misunderstandings or conflicts.

The Project will establish and maintain an accessible grievance mechanism through which community members can raise concerns and complaints related to construction activities. Community members will be informed about the availability of the grievance mechanism and how it can be accessed.

Furthermore, as part of the Project's ESMS and in accordance with the EBRD ESR 4, the following site-specific management plans should be developed:

- Community Health, Safety and Security Plan,
- Construction Camp Management Plan,
- Noise and Air Quality Monitoring Plans for affected settlements, and
- Traffic Management Plan.

Residual impact

With the effective implementation of the proposed mitigation measures, the impact magnitude is expected to be reduced to negligible, and the residual impact significance will be from low to moderate.

Operation Phase

Most of the impacts associated with the Project construction stage will not be applicable once the road is commissioned. The operations risks will be related to the traffic flow increase and technical conditions of the Project infrastructure, which if not satisfactory, can lead to traffic accidents and increase emissions of pollutants.

The significance of the community health and safety impact during the operation stage will be moderate, deriving from high receptors sensitivity and low magnitude of impacts. Implementation of the proposed mitigation measures will reduce impact magnitude to negligible and the overall impact significance will be low.

The assessment and mitigation of the community health and safety impacts during the construction and operation phases of the reservoir are summarised in **Table 44**.

Table 44 - Summary of community health and safety impact assessment and mitigation measures

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
CONSTRUCTION PHASE			
Residents of the settlements located along the planned road alignment and the Project delivery routes, local farmers	Moderate	1) Restrict access to the construction site, install where relevant physical barriers and warning signs, 2) Set up and maintain proper functioning of the Project Grievance Mechanism, 3) Communicate planned construction schedule to the affected communities in a timely and accessible manner, 4) Develop site-specific management plans in accordance with the EBRD ESR 4, including: - Community Health, Safety and Security Plan, - Construction Camp Management Plan, - Noise and Air Quality Monitoring Plan for affected settlements, - Traffic Management Plan (TMP). <i>The TMP shall include specific measures to restrict, where practicable, the movement of construction and other heavy vehicles through residential areas, ensure pedestrian safety, particularly for schoolchildren, and maintain safe access within the affected settlements.</i>	Low to moderate
Local communities near construction camps and/or worker accommodation facilities	Moderate	Require contractors to prepare and implement Construction Workers' Accommodation Camp Management Plan addressing camp siting, sanitation, waste management, worker transport, community interaction, GBVH prevention and grievance mechanisms.	Low
OPERATION PHASE			
Users of the Project road section and residents of the settlements along the Project road section	Moderate	1) Monitor the technical conditions of the road during its operational phase, provide timely maintenance, if necessary, 2) Apply appropriate traffic and work-zone safety measures during maintenance and repair activities to protect road users and nearby communities.	Low

7.6 Impact on Cultural Heritage

Construction Phase

Of the four identified historical and cultural heritage units located within the Project road section, one site, Remains of Desert Kites (Early Iron Age), Unit No. 3, is situated within the proposed road centreline and is therefore expected to be directly affected by the Project (**Figure 38**). Accordingly, this heritage asset has been classified as to be disturbed as a result of Project implementation.

The Project will therefore require the development and implementation of appropriate mitigation and management measures to protect the directly affected Unit No. 3, as well as precautionary measures to safeguard the remaining three heritage units. Although these three units are not expected to be directly impacted, they may be vulnerable to accidental damage during construction activities, including the movement and operation of construction machinery. The proposed measures shall be developed in accordance with the requirements of the legislation of the RoK and international good practice and, where appropriate, incorporated into the Cultural Heritage Management Plan (CHMP).

In addition, opportunities to avoid or further minimise impacts on cultural heritage should be explored during the detailed design stage. This may include reviewing the proposed road alignment and introducing minor alignment adjustments, where technically feasible, to avoid or reduce direct impacts on identified cultural heritage assets.

Operation Phase

During the operational phase of the Project, no adverse impacts on cultural heritage are anticipated. On the contrary, positive impacts are expected through improved access to cultural heritage assets and sites of spiritual significance located not only in the vicinity of the four identified heritage units, but also within and around the settlements of Sam, Nogayti and Turysh.

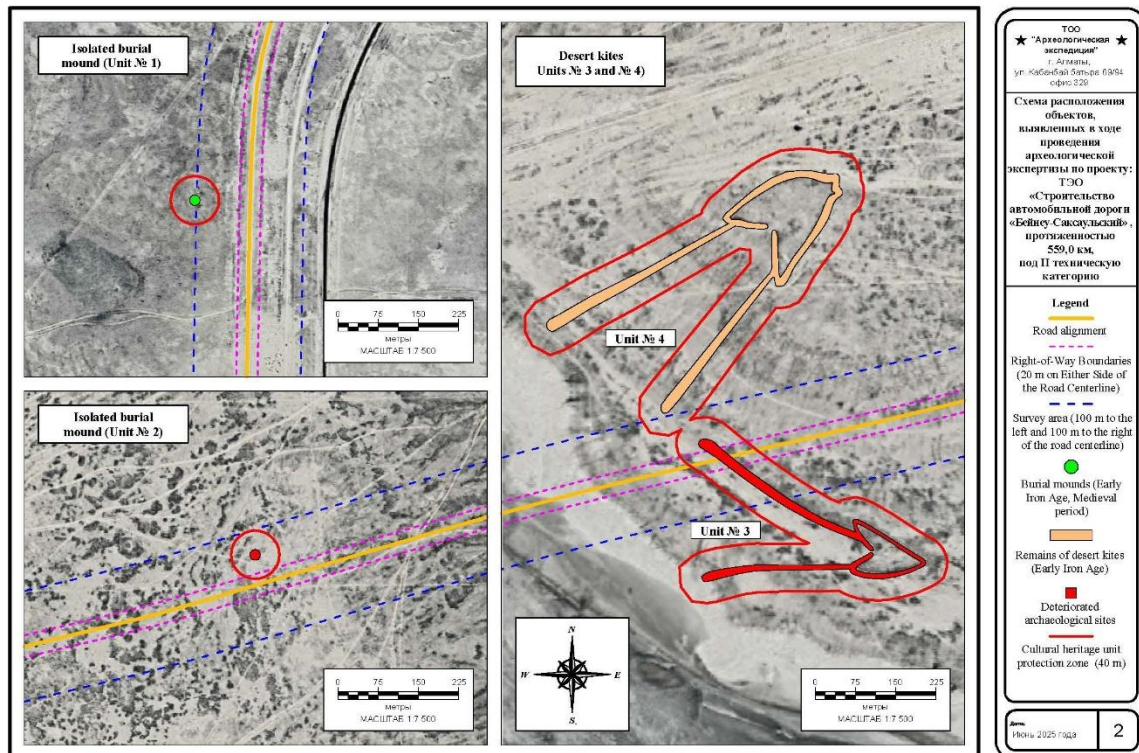


Figure 38 - Locations of the four cultural heritage units identified within the Project road section (km 0.0 - km 286.0)

Impact Assessment and Mitigation Measures

The assessment of Project impact on cultural heritage and the proposed mitigation measures for the construction and operation phases are summarised in **Table 45**.

Table 45 - Summary of cultural heritage impact assessment and mitigation measures for the Project construction and operation phases

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
-	-	3) Develop a Cultural Heritage Management Plan (CHMP) for the Project, to be agreed upon by the supervision engineer, the Client, the Bank and the authorized state body, 4) Carry out a detailed archaeological survey before the start of construction works, including: - Conduct test excavations (trial trenching), - Delineate the impacted areas, identify the surface area and volume requiring safeguard excavations, and carry out such excavations to preserve the affected units, if relevant, - Assess the possibility of relocating monuments to areas outside the reservoir impoundment, - Assess the structural resistance to vibration-generating activities, - Propose specific protection measures to prevent damage during construction activities, including construction of protection walls, restriction of vibration-generating activities, etc., - Recommend appropriate preservation measures for each of the identified cultural heritage sites. 5) Hire a qualified cultural heritage expert from an authorized institution to be present during the construction works and implement archaeological surveillance for all construction sites, as well as to help implement all heritage focused mitigations and reporting to Client/Bank, 6) Prior to construction works, develop a Chance Finds Procedure (CFP)⁹³ for the Project and train the relevant workers in applying it (so that they can identify the chance finds, stop the works and notify the management); keep the training log up to date and include reporting on it in monitoring reports.	-
CONSTRUCTION PHASE			

⁹³A template of this procedure can be found in Guidance note - ESR 8: Cultural heritage (November 2025), https://www.ebrd.com/content/dam/ebd_dxp/assets/pdfs/environment---sustainability/implementation-performance-requirements/esrs-2025/EBRD%20Environmental%20and%20Social%20Requirement%208%20Guidance%20note%20Cultural%20heritage.pdf

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
Nearby settlements, site visitors, custodians	Low to moderate	1) Implement the CHMP, 2) Implement the CHP, 3) Deliver regular briefing to all workers involved in implementing heritage focused mitigations.	Low
Monitoring: In accordance with the Cultural Heritage Management Plan.			

7.7 Emergency Preparedness and Response

The Project Road corridor passes through remote and sparsely populated areas where access to emergency medical services, fire and rescue services, and other emergency response resources may be limited. The considerable distances from settlements and emergency service facilities, potentially long response times, limited mobile network coverage, and exposure to extreme weather conditions may complicate emergency notification, access to incident locations, and the provision of timely assistance.

These conditions may increase the consequences of road traffic accidents, occupational injuries, fires, hazardous-material spills, and other emergencies during construction and operation of the Project. Severe weather events, including snowstorms, strong winds, extreme temperatures and reduced visibility, may further restrict access to affected locations and delay emergency response.

To address these risks, the Construction contractor shall ensure that appropriate emergency preparedness and response arrangements are established for the Project Road section. These arrangements shall be proportionate to the risks associated with the Project and shall take account of the limitations of existing emergency services and communications infrastructure.

Before the start of construction activities, the Construction contractor shall prepare and implement a site-specific Emergency Preparedness and Response Plan (EPRP), coordinated with the QAJ emergency arrangements and the relevant local and regional emergency services. The plan shall establish clear procedures for emergency notification, incident location identification, initial response, medical assistance and evacuation, coordination with external emergency services, and communication with affected workers and other relevant parties.

The EPRP shall be regularly updated as construction progresses and work locations, access conditions, emergency service availability, or identified risks change. Emergency response drills shall be conducted periodically to test communication, incident reporting, medical evacuation, coordination with external services, and the effectiveness of the established arrangements.

A medical emergency and evacuation strategy shall be developed based on the anticipated types and severity of injuries, the availability and capabilities of nearby medical facilities, the accessibility of the road corridor, and the likely response times of ambulance and other emergency services. The strategy shall define arrangements for first aid, stabilisation of injured persons, ground ambulance transport, and escalation to specialised evacuation arrangements where necessary and feasible.

The Construction contractor shall establish reliable means of communication for personnel working or travelling in remote areas, including satellite communication devices or equivalent systems where conventional mobile or radio communications cannot provide adequate coverage.

Emergency contact lists, reporting protocols, location-sharing procedures, and backup communication arrangements shall be maintained and tested.

During operation, the QAJ shall maintain appropriate arrangements for reporting and responding to road traffic accidents, hazardous-material incidents, fires, severe weather events, and other emergencies. These arrangements shall include coordination with the competent emergency services, effective communication with road users, and procedures for managing incidents and temporary road closures where necessary.

Emergency preparedness and response measures proposed for the Project's construction and operational phases are summarised in **Table 46**.

Table 46 - Summary of Proposed Measures for Effective E&S Management of Project Suppliers

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
Affected population, flora and fauna, workers	Moderate	1) Develop and implement site specific Emergency Preparedness and Response Plan (EPRP) identifying credible emergency scenarios, response responsibilities, notification procedures, escalation arrangements and coordination with external emergency services. Include construction camps, work fronts, mobile work crews and material transport activities. The EPRP shall include, at a minimum: - Georeferenced emergency response maps identifying road chainages, construction work areas, emergency access points, available medical facilities and emergency service providers, and sections with limited communications coverage, - An assessment of the availability, capabilities and expected response times of external emergency services, including the identification of sections where delays may require additional on-site response resources, - A medical emergency and evacuation strategy covering first aid, stabilisation, ground ambulance arrangements, receiving medical facilities and the feasibility of air medical evacuation where warranted, - Reliable communication arrangements for remote work teams, including satellite communication devices or equivalent systems where conventional communications are insufficient, together with backup power and equipment testing requirements, - Defined coordination and notification procedures agreed, as practicable, with the relevant	Low

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
		emergency services, including arrangements for incident location identification, responder access and handover of casualties, - Emergency procedures addressing severe weather, loss of communications, road traffic accidents, serious occupational injuries, fire, hazardous-material spills and other credible emergency scenarios, - A programme of emergency training and periodic drills, with documented findings and corrective actions.	
OPERATION PHASE			
Population of nearby settlements, travellers, drivers	Moderate	1) Establish operational-phase procedures for accident reporting, emergency access, incident scene management, traffic control, road closures, hazardous-material incidents and coordination with emergency services. 2) Transfer relevant emergency mapping, contact lists and procedures to the QAJ before opening the road to traffic.	Low

7.8 Supply Chain Environmental, Social, Health and Safety Risk Assessment and Management

The construction of the Project Road will require the supply and transportation of aggregates, sand, gravel, crushed stone, asphalt, cement, and other construction materials (see [Section 2.3](#)). The sourcing of these materials may give rise to E&S risks and impacts beyond the immediate project construction footprint, particularly where materials are obtained from third-party quarries, borrow areas, or other extraction sites.

Potential risks associated with the supply chain include inadequate working conditions and labour practices, occupational health and safety risks at extraction and processing facilities, adverse impacts on biodiversity and natural habitats, non-compliance with applicable environmental permits and other regulatory requirements, and road safety risks associated with the transportation of construction materials along public roads and project haul routes.

The ESIA has identified likely sources of aggregates and other construction materials. However, the E&S performance of individual suppliers, including quarry operations and associated transportation activities, will need to be verified before the respective sources are approved for project use.

The Construction Contractors shall establish and implement a risk-based E&S assessment and management plan for the selection, approval and monitoring of construction material suppliers, including suppliers engaged through subcontractors. The assessment shall be proportionate to the nature, scale, and significance of the potential E&S risks associated with each source and shall include, as a minimum:

- **Regulatory compliance and environmental management:** Verification of the relevant permits and authorisations for extraction and processing activities, as well as compliance with applicable environmental requirements and the implementation of appropriate environmental management measures.
- **Labour and working conditions:** Assessment of suppliers' labour management practices, including compliance with applicable labour legislation, working hours, remuneration, employment contracts, non-discrimination, prohibition of forced and child labour, and access to grievance mechanisms.
- **Occupational health and safety:** Review of the supplier's OHS management arrangements, including risk assessments, worker training, machinery and equipment safety, use of personal protective equipment, emergency preparedness, and incident reporting.
- **Biodiversity and ecosystem protection:** Screening of source quarries and extraction sites for potential impacts on protected areas, critical habitats, threatened species, and other areas of biodiversity importance. Particular attention shall be given to preventing the procurement of materials from sources associated with unauthorised extraction or significant adverse biodiversity impacts.
- **Transportation and road safety:** Assessment of material haul routes, transportation volumes, vehicle and driver safety, load securing, speed management, driver working hours, and potential risks to road users and local communities. The assessment shall consider the cumulative contribution of material deliveries to traffic on public roads and the project road.
- **Supplier monitoring and corrective action:** Establishment of requirements for suppliers to provide relevant E&S documentation, cooperate with inspections where warranted, address identified non-compliances, and report significant incidents associated with their operations.

Suppliers shall be approved only after the required level of assessment has been completed and any significant risks have been addressed. Where material E&S deficiencies are identified, corrective action shall be required within defined timeframes. Suppliers associated with unacceptable or unmitigated risks shall not be used for the Project.

The supply chain assessment shall be undertaken before the relevant supplier or material source is approved and updated if the source changes, significant new risks are identified, or material incidents occur. The results shall be documented and retained as part of the Project's E&S management records.

Measures to be implemented by the Construction Contractor and its subcontractors to ensure the effective management of the E&S performance of suppliers engaged in the Project's supply chain are summarised in **Table 47**.

In addition to the management of material suppliers, the Project will involve subcontractors providing construction works and related services. The engagement of subcontractors may give rise to E&S risks associated with inadequate labour and working conditions, occupational health and safety, environmental management, community health and safety, and non-compliance with Project E&S requirements.

The Construction contractors will be responsible for ensuring that their subcontractors comply with applicable national legislation and Project E&S requirements, including the relevant provisions of the Construction ESMP and associated management plans. This will include:

- Subcontractor selection and contractual requirements: Risk-based E&S screening of subcontractors before engagement and inclusion of applicable E&S requirements in subcontract agreements, including requirements for further subcontracting;
- Implementation of Project E&S requirements: Ensuring subcontractor compliance with labour management, occupational health and safety, environmental protection, community health and safety, and GBVH prevention measures;
- Monitoring and corrective action: Regular monitoring of subcontractor E&S performance, reporting of significant incidents and non-compliances, and implementation of corrective measures where necessary.

The Construction contractors will retain responsibility for monitoring the E&S performance of their subcontractors throughout construction.

Table 47 - Summary of Proposed Measures for Effective E&S Management of Project Suppliers

Receptor	Assessed Impact	Mitigation / management measures	Residual impact
PRE-CONSTRUCTION PHASE			
Affected population, environment, workers, natural resources	Moderate	1) Develop and implement a risk-based Supply Chain E&S Assessment and Management Plan covering all significant suppliers of construction materials, including quarries, aggregate extraction sites, asphalt plants and other relevant facilities, including: - Supply chain E&S management procedure for screening approving and monitoring suppliers, - Supplier and quarry E&S due diligence, - Labour and working conditions, - Biodiversity screening of material sources, - Supplier OHS performance, - Material haulage and road safety, - Monitoring, reporting and corrective action. Verification: <i>Approved plan, procedure, register of material sources, completed supplier screening and due diligence records, haulage management arrangements and records of monitoring and corrective actions.</i> 2) Require Construction Contractors to conduct E&S screening of subcontractors, incorporate Project E&S requirements into subcontract agreements, ensure implementation of relevant management plans, and regularly monitor compliance and corrective actions.	Low

8 Stakeholder Engagement and Consultations

Stakeholder engagement has been undertaken throughout the ESIA process to inform the identification and assessment of potential environmental and social impacts and the development of appropriate mitigation and enhancement measures in accordance with the principles of *EBRD Environmental and Social Requirement (ESR) 10: Information Disclosure and Stakeholder Engagement*. Engagement activities included consultations conducted during the ESIA scoping stage, followed by targeted consultations, interviews and focus group discussions undertaken as part of the main ESIA stage.

The engagement process involved regional, district and rural public authorities, representatives of Project affected communities, land users, farmers, vulnerable groups, women, educational and healthcare institutions, and local businesses and service providers. Different engagement methods were applied depending on the stakeholder group and the purpose of the consultation, including meetings, semi-structured interviews, focus group discussions and consultations with potentially affected land users.

Stakeholder engagement will continue during the ESIA disclosure stage, including meetings with relevant regional and district public authorities to present and discuss the ESIA findings, as well as public consultation meetings with Project-affected communities and other stakeholders. The disclosure consultations are currently planned for the second decade of November 2026. The results of all stakeholder engagement activities undertaken as part of the environmental and social studies for the Project Feasibility Study, including the ESIA scoping, main ESIA and disclosure stages, will be consolidated and presented in the Public Consultation Report (PCR).

The Project **Stakeholder Engagement Plan (SEP)** provides the framework for stakeholder engagement, information disclosure and grievance management throughout the Project lifecycle, including the design, construction and operation stages.

8.1 Scoping Stage Consultations

During the ESIA scoping stage, preliminary consultations were undertaken with relevant district and rural public authorities, representatives of Project-affected communities and other stakeholders. The consultations were intended to introduce the Project, obtain information on existing environmental and socioeconomic conditions, identify stakeholder concerns and expectations, and inform the identification of key environmental and social issues requiring further consideration during the ESIA.

The principal stakeholder consultations undertaken during the scoping stage and the key issues discussed are summarised in **Table 48** Further details of the scoping consultations are provided in the ESIA Scoping Report.

Table 48 - Summary of of ESIA Scoping stage consultations

Date / location	Stakeholders consulted	Key issues discussed
22 June 2026, Beineu District, Mangystau Region	Beineu District Akimat; Mangystau Branch of QAJ	- Stakeholder perceptions and expectations regarding the Project - Settlements and existing land use along the Project corridor; - Livestock farming and other local economic activities, including potential impacts associated with the acquisition of leased pastureland; - Cultural heritage and wildlife movements within the Project area; - Potential environmental and social impacts of the Project and cooperation with local stakeholders during Project development and implementation.
22 June 2026, Turysh, Beineu District	Turysh Rural Akimat; local residents	- Expected socioeconomic benefits of improved connectivity; - local employment and entrepreneurship opportunities; - potential development of roadside services; - pastureland and land acquisition; - timing of Project implementation; expectations of local residents.
24 June 2026, Shalkar District, Aktobe Region	Shalkar District Akimat; Aktobe Branch of QAJ	- perspectives of improved regional connectivity; - livestock farming and access to markets; - existing transport constraints; - road access and junction requirements; - key economic and infrastructure features of the district.

Overall, stakeholders consulted during the scoping stage generally expressed positive views regarding the Project and considered improved road connectivity important for the socioeconomic development of the affected districts. Expected benefits identified during the consultations included improved regional and inter-district connectivity, better access to markets, support for livestock farming, local employment and business opportunities, and the potential development of roadside services.

The consultations also identified a number of issues requiring further consideration during the ESIA, including land acquisition and potential impacts on leased pastureland, access arrangements for settlements and land users, livestock movement, community expectations regarding Project implementation, and the need to ensure that local communities and businesses can benefit from Project-related economic opportunities. These issues were considered within stakeholder consultations and impact assessment undertaken during the main ESIA stage.

8.2 Stakeholder Engagement during the Main ESIA Stage

Following completion of the scoping stage, a more detailed programme of stakeholder engagement was undertaken during the main ESIA stage to support the collection and verification of baseline information, further identify stakeholder concerns and expectations, and obtain stakeholder views on potential Project impacts and proposed mitigation and enhancement measures.

The stakeholder engagement activities undertaken during the main ESIA stage, the key issues and expectations raised by stakeholders, and their consideration in the ESIA are summarised in [Table 49](#). Detailed records of the consultations, interviews and focus group discussions are provided in [Annex 2](#).

Table 49 - Summary of stakeholder engagement activities undertaken within main ESIA stage

Date / location	Stakeholders consulted	Key issues and expectations raised	Consideration in the ESIA
14 August 2026, Aktau, Mangystau Region	Deputy Akim of Mangystau Region; heads and representatives of relevant regional departments; Beineu District Akimat; QAJ; relevant environmental and road-sector authorities; ESIA Consultant	• Presentation of the Project and ESIA process; • Project implementation schedule; • land-related matters; • livestock movement and requirements for cattle passes; • coordination of subsequent ESIA activities.	Land-related issues considered in the land use and land tenure assessment and LARF; livestock movement considered in Project design and mitigation measures; further coordination incorporated into the stakeholder engagement process
10 August 2026, Baiganin District, Aktope Region	Baiganin District Akimat; ESIA Consultant	• The Project features and benefits • existing land use and land tenure along the Project corridor; • availability of local construction materials; agricultural activities in the wider Project area.	Information incorporated into the land use and socioeconomic baseline and assessment of land acquisition impacts
12-13 August 2026, Syngyrlau, Sam and Turysh, Beineu district, Mangystau region	Relevant rural Akimats	• Local demographic and socioeconomic conditions; • employment and livelihoods; • livestock farming and land use; • community infrastructure and services; • existing transport constraints; • anticipated Project impacts and benefits; local employment and business opportunities.	Information incorporated into the socioeconomic baseline and assessments of local economy and employment, community services and regional/local socioeconomic benefits
12-13 August 2026, Syngyrlau, Sam and Turysh,	Farmers and land users	• Livestock farming and pasture use; • access to grazing areas,	Considered in the assessment of local economy and employment impacts and development of

Date / location	Stakeholders consulted	Key issues and expectations raised	Consideration in the ESIA
Beineu district, Mangystau region		- existing transport constraints and access to markets; - livestock movement; - Project-related employment, supply and business opportunities.	enhancement measures for local procurement and business opportunities
12-13 August 2026, Syngyrlau, Sam and Turysh, Beineu district, Mangystau region	Local residents, including representatives of vulnerable households	- Household socioeconomic conditions; - current employment and sources of income; - transport and mobility constraints; - access to healthcare, administrative and other services; - temporary construction-related concerns; - expected benefits of improved connectivity; - employment and small business opportunities.	Considered in the assessments of vulnerable groups, community services, community health and safety, and local economy and employment
12 August 2026, Turysh, Beineu district, Mangystau region	Women-only focus group discussion	- Women's employment and economic participation; - self-employment and entrepreneurship; - household and childcare responsibilities; - mobility and access to services; - potential Project-related employment and business opportunities; - construction-related concerns; - community safety and measures to facilitate women's participation in Project benefits.	Considered in the gender impact assessment and development of measures to promote women's participation in Project-related opportunities and manage gender based risks
12-13 August 2026, Syngyrlau, Sam and Turysh, Beineu district, Mangystau region	Representatives of educational institutions	- Existing educational services; - access to education and educational opportunities outside the settlements; - existing transport constraints; - construction traffic and safety of schoolchildren;	Considered in the assessment of impacts on community services and community health and safety and in requirements for construction traffic management

Date / location	Stakeholders consulted	Key issues and expectations raised	Consideration in the ESIA
		expected benefits of improved road connectivity.	
12-13 August 2026, Syngyrlau, Sam and Turysh, Beineu district, Mangystau region	Representatives of primary healthcare facilities	- Existing healthcare services; - access to specialized and emergency healthcare; - existing transport constraints; - potential construction-related impacts; - expected benefits of improved road connectivity.	Considered in the assessment of impacts on community services, including improved access to specialised and emergency healthcare
13 August 2026, Syngyrlau, Beineu district, Mangystau region	Local roadside businesses	- Existing business activities and transport constraints; - capacity to provide goods and services during construction; - potential construction-related demand; - opportunities for expansion of roadside business.	Considered in the assessment of local economy and employment impacts and enhancement measures for local procurement and longer-term economic development
12-13 August 2026, relevant Project areas within Beineu district, Mangystau region	Potentially affected farmers and land users	- Project land requirements; - existing land use and land tenure; - potential acquisition of leased pastureland; - land fragmentation and severance; - livestock movement and access to water sources and farm infrastructure; - compensation principles and measures to maintain access and continued use of remaining land.	Addressed through the land use and land tenure impact assessment, the Project LARF and requirements for subsequent LARP preparation, including measures to maintain access to pastureland and farming infrastructure.

8.3 Planned Stakeholder Engagement during ESIA Disclosure

Stakeholder engagement will continue during the ESIA disclosure stage, currently planned for mid-November 2026. The disclosure consultations will provide relevant public authorities, Project-affected communities and other interested stakeholders with an opportunity to review and discuss the key findings of the ESIA, including the identified environmental and social impacts and the proposed mitigation and enhancement measures, and to provide comments and recommendations before finalisation of the Project E&S documentation.

At the regional level, concluding consultation meetings are planned with the Mangystau and Aktope Regional Akimats, with participation of relevant regional departments, representatives of the Beineu, Baiganin and Shalkar District Akimats, QAJ and the ESIA Consultant. The meetings will present and discuss the principal ESIA findings relevant to each region, including key environmental and social impacts, proposed mitigation and enhancement measures, land acquisition and land-use issues, community and infrastructure considerations, and arrangements for subsequent Project implementation.

At the community level, public consultation meetings are planned in Syngyrlau, Sam and Turysh, which are the settlements located in the vicinity of the Project alignment. The consultations will present the Project and the key findings of the ESIA and provide local residents, land users, businesses and other interested stakeholders with an opportunity to raise questions, provide comments and discuss the proposed mitigation and enhancement measures. Particular attention will be given to issues identified during the earlier consultations, including land use and livestock access, construction traffic and community safety, local employment and business opportunities, and access to community services.

No separate community-level disclosure meetings are currently planned in Baiganin and Shalkar Districts, as the Project alignment within these districts traverses sparsely populated areas and does not pass in the vicinity of settlements. Representatives of the Baiganin and Shalkar District Akimats will, however, be involved in the respective regional-level disclosure consultations.

The comments and recommendations received during the disclosure consultations will be documented and considered in the finalisation of the Project E&S documentation, as appropriate. The results of the disclosure consultations, together with the stakeholder engagement undertaken during the scoping and main ESIA stages, will be consolidated and presented in the Project Public Consultation Report (PCR).

Annex 1. Cumulative Impact Assessment Study

A1.1 Introduction

This section presents the findings of the Cumulative Impact Assessment (CIA), which considers the E&S impacts of the Project, as well as those of other projects or activities that are currently being implemented or planned in the Project area soon. The CIA covers existing and reasonably foreseeable economic developments for which sufficient publicly available information exists to identify potential interactions with the Project over time and/or space and to assess the resulting cumulative effects.

The expected cumulative impacts will be considered as either additive (e.g., equal to the sum of individual effects) or interactive: synergistic or antagonistic effects when individual effects augment or 'neutralize' each other.

The CIA follows a stepped process outlined in the IFC's *Cumulative Impact Assessment and Management - Guidelines for the Private Sector in Emerging Markets* (2013)⁹⁴, and aligned with the requirements of the EU's EIA Directive⁹⁵. In accordance with the IFC's Guidelines, the CIA has been carried out in six steps:

- Step 1 - Identification of Valued Environmental and Social Components (VECs)⁹⁶, establishment of spatial and temporal assessment boundaries,
- Step 2 - Identification of other projects / activities affecting VECs to be included into the assessment,
- Step 3 - Establishment of baseline conditions of the identified VECs,
- Step 4 - Assessment of the cumulative impacts on the identified VECs,
- Step 5 - Assessment of significance (evaluation) for the predicted cumulative impacts, and
- Step 6 - Management of the cumulative impacts.

A1.2 Determining VECs and Spatial and Temporal Boundaries

VECs are valuable or sensitive processes and components whose viability or sustainability might be affected by the Project; the focus of CIA is on 'ultimate recipients of impacts' (IFC, 2013). For this CIA, the VECs are defined as E&S receptors of the Project's impacts described in **Chapter 7**. Only VECs associated with adverse residual impacts of low to moderate significance and positive residual impacts are assumed to be subject to cumulative effects and included into the CIA.

The following VECs have been identified for this CIA:

⁹⁴https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment.

⁹⁵Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment as amended by 2014/52/EU.

⁹⁶VECs may include: a) physical features, habitats, wildlife populations, b) ecosystem services, natural processes (e.g., water flow, microclimate), c) social conditions (e.g., health, income), or d) cultural aspects (e.g., recreation habits, local traditions).

- **Soil resources** due to a) soil cover disturbance as a result of vegetation clearance and topsoil removal, excavation and grading, b) risk of soil contamination with surface runoff from the construction sites and from the operational road surface, and c) emissions (dust, ICE emissions) from construction sites and the operational road;
- **Water resources:**
 - Surface water bodies/water channels flowing along and/or crossing the project road alignment or located in its vicinity that may be affected by contaminated surface runoff from Project sites;
 - Shallow groundwater within the road alignment and adjacent areas to be affected by changes in natural drainage as a result of construction of road embankments; alteration / interception of the existing surface water flow paths may lead to runoff concentration and localised flooding.
- **Biodiversity:**
 - Flora species within the Project alignment affected by a) disturbance and loss of vegetation at the Project sites due to construction works (vegetation clearance, excavation, topsoil removal, grading) and b) emissions (dust, ICE emissions) from construction sites and the operational road. The sensitive receptors are seven protected rare plant species that may occur in and around the Project sites (five Tulipa species and two Salsola species (see [Section 6.16.2](#) for details).
 - Fauna species / wildlife within and around the Project alignment:
 - Invertebrates - permanent inhabitants of the Project sites that will be affected by destruction and permanent loss of wintering, breeding, and foraging habitats;
 - Sedentary mammals (insectivores and rodents), amphibians and reptiles - permanent inhabitants of the Project sites and their vicinities that are a) at risk of mortality associated with onsite land planning and top-soil removal and Project-related transportation and b) would lose part of habitats within the Project area;
 - Birds and bats – permanent inhabitants of the Project sites and their vicinities that would be forced to migrate off the Project sites and their vicinities disturbed by noise and artificial lightning and lose some portion of foraging habitats within the Project area;
 - Migratory species:
 - Migratory birds whose ranges overlap with the Project alignment that will be affected by loss of resting habitats;
 - Migratory mammals whose ranges overlap with the Project alignment: ungulates, including Saiga Antelope, Goitered gazelle, Urial, and Asiatic wild ass and predators are affected by noise and artificial lighting-related disturbance, which triggers shift in habitats and changes in migration pathways. For Ustyurt Saiga population the proposed road may also exacerbate current fragmentation of Ustyurt Saiga population

triggered by the Shalkar-Beineu Railway construction and operation. Further the Project effects may include poaching intensification due to improved access to the Project area (both during the construction and operation phases).

- **Local population:**

- Residents of affected settlements - closest to the road alignment and exposed to adverse impacts associated with construction works:
 - Sam, Nogayti and Turysh residents to be potentially affected by emissions, noise and visual effects associated with construction of the road sections (Sam and Nogayti) and construction of the access road to the Project Road (Turysh); and safety risks related to unauthorised access to construction sites (all abovementioned settlements);
 - Residents of settlements that would host / be close to construction camps exposed to the risk of communicable disease transmission associated with the migrant worker influx, security risks including GBHV risks for female population;

Note: The location of construction camps where migrant workers will concentrate is not defined at this stage;

- Economically active residents of settlements near the Project Road that would benefit from additional employment opportunities and opportunities for development of small businesses providing services to construction workforce (catering, worker accommodation, agricultural products supply, retail, vehicle maintenance services);

Note: The typical Aol of the development Projects on local employment is in rural areas is typically 20-25 km which are seen as reasonable for daily commuting if paved roads are available and especially worker transportation is expected to be provided. The indicative 50 km employment catchment for the Project includes Sam, Nogayti, Turysh, Bozoy, Syngyrlau, Beineu, Sarga and Akzhigit settlements;

- Residents of the settlements along the Project delivery routes:
 - Residents of houses along such routes to be affected by the emissions (mainly dust emissions), noise and vibration from heavy vehicle movements;
 - Children and the elderly exposed to increased risk of road traffic accidents due to increased traffic of heavy vehicles within the settlements and expected traffic diversions;
 - All residents potentially affected by potential temporary restrictions of access to public infrastructure including education and healthcare facilities due to traffic diversions.

Note: The routes for delivery of construction materials, equipment and personnel to the Project sites have not been determined at this stage. It is assumed the majority of construction materials and equipment to be

transported via A-25 motor road (Aktobe-Shalkar section) and Bozoy-Shalkar road by heavy trucks. The highest construction traffic load would be on Birshogyr-Shalkar and Shalkar-Bozoy road sections.

- **Drivers and passengers**
 - Using Project delivery routes and exposed to a) the increased risk of road traffic accidents/vehicle collisions due to increased traffic of heavy vehicles, traffic diversions, poor visibility due to road dust emissions, construction equipment entering and leaving the roadways, b) delays and increased travel times;
 - Using the Project Road sections at the operation stage who will benefit from reduced travel time and reduced risk of traffic accidents but may also be exposed to increased risk of vehicle collisions due to high travel speeds (if conditions of the road infrastructure are not satisfactory);
 - Cumulative impact evaluation - Negative Low.
- **Farming enterprises and individual herders** that would be:
 - affected a) permanent acquisition of leased pasturelands and fragmentation of landholdings, b) loss of grazing lands, c) disruption of livestock movement pathways and reduced access to infrastructure required for livestock farming (e.g. wells, summer houses for herders, livestock wintering facilities, etc.); d) increased risk of livestock-vehicle collisions associated with construction vehicles, e) increased disturbance of livestock caused by noise from construction activities and road operation, e) safety risks for herders related to unauthorised access to construction sites;
 - potentially benefitting from opportunities for supply meat, milk and other livestock products to construction workforce / catering businesses servicing the Project during the construction phase;
 - potentially benefitting from improved regional and inter-district connectivity and improved access to food markets in large cities where livestock products can be sold.
- **Residents of settlements** along the Project Road who would:
 - benefit from significant improvements in access to educational opportunities and specialised healthcare and other public services outside the settlements, regional markets and other infrastructure, as well as overall improved economic development for Beineu, Baiganin and Shalkar Districts;
 - be potentially affected increased risk of road traffic accident due to traffic flow increase and, if conditions of the road infrastructure are not satisfactory.
- **Materials and service suppliers** mainly from Mangistau and Aktobe regions who would benefit from additional demand for construction materials and equipment as well as transport, fuel and supporting services during the construction phase.
- **Construction workers, including contractors and subcontractors' workers and maintenance workers** exposed to:
 - occupational health and safety risks associated with a) on-site works (e.g. outdoor works at extreme weather conditions (both hot and cold), vehicle and

equipment movement, interaction between workers and moving machinery, exposure to dust and vehicle emissions, noise and vibration, waste and hazardous substances including hot bitumen and asphalt, presence in the area classified as a natural focus of plague) and b) potential road accidents during commuting between the construction camps and the Project sites.

- **Linear infrastructure facilities** crossed by the road: gas pipelines, water supply pipelines, telecommunication cables, OHTLs to be re-arranged due to the Project.
- **Local healthcare facilities** to be exposed to temporarily increased demand for primary healthcare services from construction workers due to potential construction-related incidents. The local healthcare facilities are highly sensitive to the additional load as the nearest primary healthcare facilities located in Sam and Syngyrlau and Bozoy villages have very limited capacity due to staffing constraints, and the nearest specialised hospitals and ambulance stations are located in Beineu (in 280 km from eastern end of the road) and Shalkar (in 230km from eastern end of the road).
- **Historical and cultural heritage units:** archaeological sites within the road alignment (one site) and in its vicinity (three sites); Site 1 is to be disturbed by the road construction; the other three sites are at risk of damage/disturbance during the construction phase.
- **Visitors and custodians** of historical and cultural heritage sites and sites of spiritual importance: to be affected by temporary restrictions on access to cultural heritage assets and cultural heritage units of spiritual significance in and around Sam, Nogayti and Turysh during construction and benefitting from improved access to them during the road operation.
- **Local and regional economies**
 - **Economies of Beineu, Baiganin and Shalkar districts** that would benefit from providing opportunities to improve access to markets outside the districts, facilitate the movement of goods and people, support livestock farming and other local economic activities, and create conditions for the development of trade and roadside services;
 - **Economies of Mangistau and Aktope Regions** that would benefit from a) business opportunities for regional contractors, subcontractors, suppliers, transport and logistics companies and other service providers; b) opportunities to increase capacity of the road construction sector, firstly in Aktope Region, c) reliable road connection and improved inter-regional connectivity that promotes economic development

Ambient air quality, noise and vibration levels, landscape and land assets (pastureland) are not viewed as individual VECs per se and considered as media for impacts on ultimate receptors: population of nearby settlements, Project workers, and farmers/herders.

Baseline natural and physical environmental concerns identified via stakeholder engagement and screened for inclusion in the scope of the current CIA include:

- Cumulative impact of the proposed road and the existing Shalkar-Beineu railway commissioned in 2015 on a Ustyurt population of Saiga Antelope (*Saiga tatarica*); The Project Road route crosses the railway at two locations and runs close to it within Subsections 1-3 (see [Figure 2](#));
Saiga Antelope is a 'Near Threatened' species per IUCN Red List currently classified as a 'valuable animal species that is object of hunting' per national legislation. As per a specialised survey, the construction and subsequent operation of the Shalkar-Beineu railway have significantly altered migration conditions of the population: following the commission of the railway, saigas of the northern subpopulation are proved to have very limited access to their wintering habitats located to the south of the railway including those in a natural protected area in Uzbekistan. Further there is a shift of divided subpopulations off the railway that augments the barrier effect ([Section 2.4](#) and [Section 6.16.3](#) for details).

The **spatial boundaries** of the CIA are assumed to coincide with the boundaries of Mangistau and Aktoobe Regions.

The **temporal boundaries** of the CIA are assumed to include Project construction and operation phases.

Road construction phase is expected to start in early 2028 and will last for 34 months (early 2028 - late 2030).

The operational life of the road earthworks and major structures is 50 years or more, while the design life of asphalt pavement is 15-20 years before major rehabilitation, assuming periodic maintenance. Bridges and major culverts' design life is 50+ years. For the purposes of the current CIA, the duration of the operation phase is assumed to be 50 years.

A1.3 Identification of Other Activities/Projects for the Inclusion in the CIA

The current CIA will consider interaction of the Project with the ongoing and planned activities, which overlap with the Project temporarily and spatially or by activity type, or affect the same selected VECs as the Project does. The following other projects/activities have been identified and reviewed:

1. **Associated facilities** for the Project (see [Section 2.6](#) for details):
 - The 273 km section of the BBS Road (km 286 to km 559), to be financed by the ADB and DBK, together with its associated supporting infrastructure, including RMUs, access roads, and other auxiliary facilities;
 - The 206-km Bozoy-Shalkar road to be financed by the IBRD crossing the settlements of Bozoy, Kanbakty, Baykadam, Begimbet, Astsushiy, Akkaytym, and Shalkar.

The proposed road should be connected to the power grid to ensure power supply to the road lighting system. At the moment, neither connection point(s) to the grid nor routes for the proposed new power supply lines (if required) are not determined.

2. **Concurrent projects in Mangistau and Aktoobe Regions**

The long list of concurrent projects is assumed to include:

- development projects in Beineu District of Mangistau Region and Baiganin and Shalkar districts of Aktobe Region that involve settlements within 50 km from the Project Road alignment;
- linear infrastructure projects in Mangistau and Aktobe Regions that temporarily overlap with the Project construction and operation phases.

The sources of information on such activities were as follows:

- Open-source publications including press-releases at the websites of Akimats of Aktobe and Mangistau Regions;
- National Database on the State of the Environment and Natural Resources of the Republic of Kazakhstan, a national platform for collection, accumulation, processing and publishing environmental information, which contains *inter alia* Project/EIA documentation for EIA public hearings (<https://hearings.ndbecology.gov.kz/Discussion/DisPublic>);
- Plan for Socio-Economic Development of Aktobe Region for 2026-2030⁹⁷;
- Description of the Investment Portfolio of Mangistau Region for 2026-2032⁹⁸.

3. Operational Shalkar-Beineu railway

The projects mentioned above have been screened for the scale of potential impacts on Project VECs and spatial and/or temporal overlaps with the Project; the findings of the analysis are presented in **Table 50**. As a result, several projects / activities having potential to affect one or more Project VECs have been identified and scoped into the current CIA.

Table 50 - Analysis of the projects that can contribute to the cumulative impacts on the Project VECs

Project Name	Implementation Timeline	Interaction with the Project	Relevance to CIA
ASSOCIATED PROJECTS			
Construction of the 273 km section of the BBS Road (km 286 to km 559) with associated supporting infrastructure	Construction phase: early 2028 - late 2030 (TBC)	Construction of a Category II Road comprising substantial new-build sections on a new alignment, together with reconstruction/use of existing road or earthwork sections where technically feasible. An associated activity which may have not been initiated without the Project Road; both roads are part of the BBS road project from the perspective of the national authorities, which is in turn a unit of the Transport Corridor Europe-Caucasus-Asia (TRACECA) Temporal and spatial overlap with the Project (in terms of adverse impacts on local communities along the Bozoy-Shalkar road)	Included

⁹⁷<https://www.gov.kz/memleket/entities/aktobe-ekonomika/documents/details/1037661>

⁹⁸<https://www.gov.kz/memleket/entities/mangystau/press/news/details/1215968?lang=ru>

Project Name	Implementation Timeline	Interaction with the Project	Relevance to CIA
		and Aktobe-Shalkar roads and traffic density in the Project area) Activity type overlap - joint contribution to inter-regional connectivity and reliable road transportation	
Reconstruction of the 206-km Bozoy-Shalkar road	Construction phase: early 2028 - late 2030 (TBC)	Reconstruction and rehabilitation of the existing road corridor, with possible newly build/re-aligned sections and associated structures (where required). An associated activity which may not have been initiated without the Project Road; one of the expected Project delivery routes. Both roads are part of the BBS road project from the perspective of the national authorities. Temporal and spatial overlap with the Project (in terms of adverse impacts on local communities along the Bozoy-Shalkar road, and Aktobe-Shalkar road and traffic density in the Project area); Activity type overlap - joint contribution to inter-regional connectivity and reliable road transportation	Included
CONCURRENT PROJECTS IN BEINEU, BAIGANIN AND SHALKAR DISTRICTS			
Sarga Village Centralized Water-Supply Project, Beineu District	Construction phase: 2025-2026 (TBC) Operation Phase: 2026 onwards	Construction/completion of a water-treatment facility and approximately 22 km of intra-village potable-water distribution network, including approximately 500 m ³ storage/supply capacity. No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included
Modernisation of Beineu Railway Station, Beineu District	Construction phase: 2025-2026	The modernisation/reconstruction of Beineu Railway Station (passenger terminal): the existing railway building will be replaced with a larger facility with will the upgraded engineering utilities, safety/security systems and accessibility infrastructure. No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included
Reconstruction of drinking water supply networks in Kauylzhyr, Shalkar District	Construction phase: 2025-2026	The village is crossed by the expected Project delivery route (A-25 road, Birshogyr-Shalkar section). No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included

Project Name	Implementation Timeline	Interaction with the Project	Relevance to CIA
Modernisation of Shalkar District Hospital, Shalkar, Shalkar District	Construction phase: 2024-2026	The village is crossed by the expected Project delivery route (Shalkar-Bozoy road, i.e. part of Aol of the associated project, i.e. part of Aol of the associated project. No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included
Reconstruction of a sports facility in Bozoy, Shalkar District	Construction phase: 2025-2026	The village is crossed by the expected Project delivery route (Shalkar-Bozoy road / i.e. part of Aol of the associated project, part of Project's road Aol (on local employment). No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included
Construction of a new school in Bozoy, Shalkar District	Construction phase: 2026-2027 (TBC)	Construction of a new educational facility for 320 students. The village is crossed by the expected Project delivery route (Shalkar-Bozoy road / i.e. part of Aol of the associated project, part of Project's road Aol (on local employment) No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase.	Not included
Construction of Astana-Arkalyk-Torgai-Irgiz-Shalkar road corridor, Irgiz-Shalkar section, Shalkar District	Pre-construction / design and permitting in 2026; Construction date to be confirmed	The village is crossed by the expected Project delivery route (Shalkar-Bozoy road, i.e. part of Aol of the associated project). Implementation timeline is not determined	Not included
Expansion of Kul-Bas Oil Field Project, Baiganin District	Construction phase - 2026-2027 Operation Phase 2028 onwards	Planned expansion of the field development programme involving expansion of oil processing and storage facilities, increased associated gas utilisation, planned gas-processing infrastructure and pipeline, additional well drilling and substantial planned increase in production capacity. There would be spatial overlap with the Project (in terms of adverse impacts on local communities along the Bozoy-Shalkar road and Aktobe-Shalkar roads and traffic density in the Project area) No temporal overlap with the Project as this activity is expected to be completed before the start of the Project construction phase. Activity-type overlap - joint contribution to inter-regional connectivity and reliable road delivery	Not included

Project Name	Implementation Timeline	Interaction with the Project	Relevance to CIA
CONCURRENT LINEAR INFRASTRUCTURE PROJECTS IN MANGISTAU AND AKTOBE REGIONS			
Aktobe - Ulgaysyn Road Reconstruction Project, Aktobe Region	Construction phase: 2026-late 2028	A major upgrade (expansion from two to four lanes) of a 243km highway section in Aktobe Region, forming part of Kazakhstan's strategic west-south and international transit network. No spatial overlap - distance from the Project area to road corridor is 170 km minimum. Temporal and activity-type overlap - joint contribution to inter-regional connectivity and reliable road transportation.	Included
Ulgaysyn - Saksaulsk Road Reconstruction Project, Aktobe and Kyzylorda Region	Construction phase: 2027-2029	A major upgrade (expansion from two to four lanes) of a 312km highway section in Aktobe and Kyzylorda Regions, forming part of Kazakhstan's strategic west-south and international transit network. No spatial overlap – distance from the Project area to the road corridor is 120 km minimum). Temporal and activity-type overlap - joint contribution to inter-regional connectivity and reliable road transportation.	Included
Second string of Beineu-Bozoy-Shymkent Gas Pipeline (BBS-2), section from GMS-Beineu to KS-Aral, Mangistau, Aktobe and Kyzylorda Regions	Construction phase: 2025-2029	Construction of a new 1,450km trunk gas pipeline and the associated infrastructure. Linear part is planned to be completed by end-2026; 2027–2029 second stage adds compressor stations (KS), including inter alia Gas Metering Station (GMS) Beineu, KS Baiganin and KS Bozoy and raises capacity from 10 to 15 bcm/year Spatial and temporal overlap with the Project	Included
KS-14 - Kostanay Gas Pipeline, Aktobe and Kostanay Regions	Construction phase: late 2025-2030	Construction of a new 630 km trunk gas pipeline KS-14-Kostanay trunk gas pipeline and new KS-14 near the existing facility connected to the Bukhara-Ural trunk gas pipeline system. Approximately 300 km section is within the Aktobe Region. Phase 1 includes a pipeline construction (late 2025-2027), and a separate compressor-capacity expansion in roughly 2029-2030. Only temporal overlap with the Project; no spatial overlap as the distance of the pipeline from the Project area is 485 km and distance to the associated project area is 284 m	Not included

Project Name	Implementation Timeline	Interaction with the Project	Relevance to CIA
Kenkiyak-Atyrau / Kenkiyak-Kumkol oil pipeline expansion, Mangistau Region	Construction phase: 2026-2030	Expansion of two oil pipelines starting at Kenkiyak deposit. Only temporal overlap with the Project; no spatial overlap as the distance of the pipeline from the Project area is approximately 300-km and distance to the associated project area is approximately 200 km.	Not included
OPERATIONAL SHALKAR-BEINEU RAILWAY			
Shalkar-Beineu Railway	Construction completed in 2015 Operation phase - 2016 onwards	The proposed road route includes two railway crossings (within Subsection 1 and Subsection 3). Some sections of the proposed road are to run parallel to the railway at approximately 100m. There is a spatial overlap with the Project Road. Temporal overlap is expected at the Project operation stage. Potential for cumulative impact of the operational Project Road and operational railway on migratory mammals, especially ungulates, and shallow groundwater due to change of natural drainage.	Included

Therefore, the list of scoped-in projects include:

- Construction /reconstruction of the 273 km section of the BBS Road (km 286 to km 559) (early 2028 - late 2030);
- Construction /reconstruction of 206-km Shalkar-Bozoy road (early 2028 - late 2030)
- Aktobe-Ulgaysyn Road Reconstruction Project (2026-2029);
- Ulgaysyn-Saksaulsk Road Reconstruction Project (2027-2029);
- Second string of Beineu-Bozoy-Shymkent Gas Pipeline with proposed associated infrastructures: GIS-Beineu, KS-Baiganin, KS-Bozoy to KS-Aral (2025-2029)
- Operational Shalkar-Beineu Railway (2016 onwards).

A1.4 Establishment of Baseline Conditions for the Identified VECs

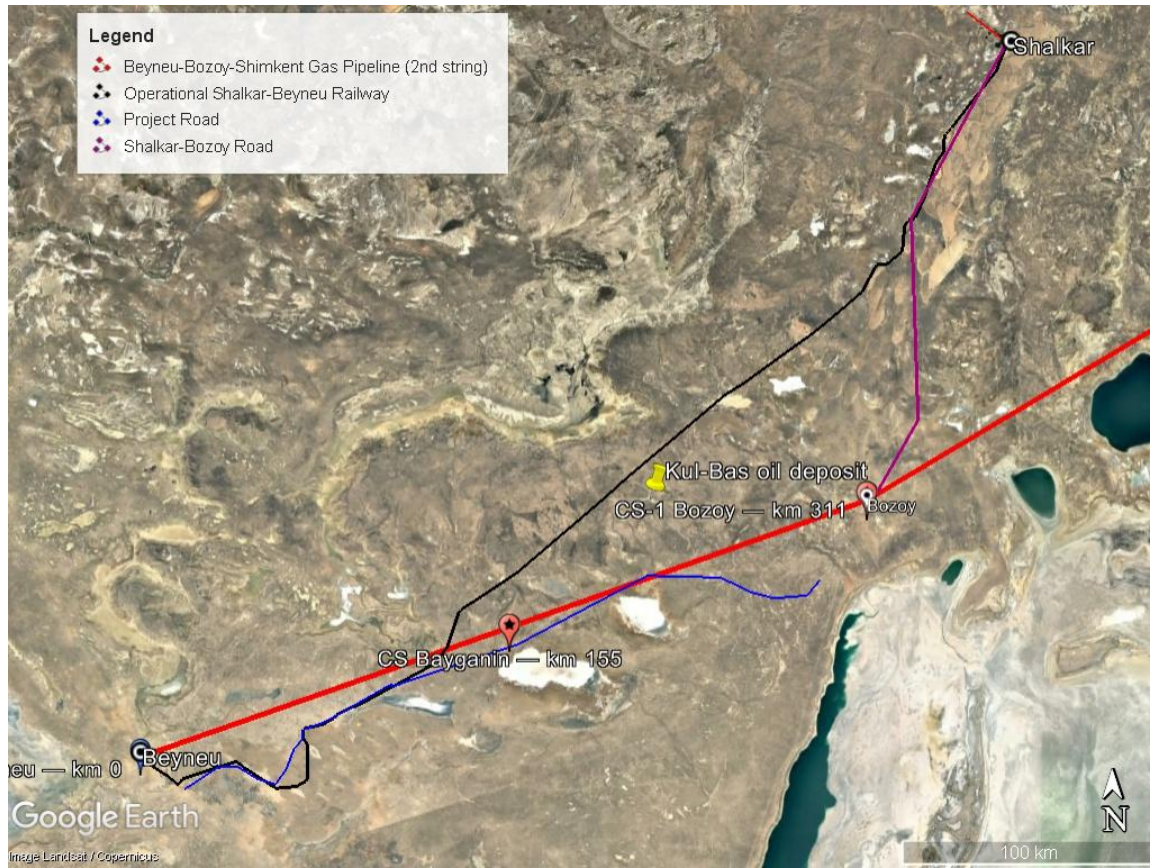
Baseline conditions for all identified VECs are described in **Chapter 6** and is not repeated in the current section.

A1.5 Assessment and Evaluation of Cumulative Impacts on the VECs

Construction phase

Table 51 in **Annex 1.1** identifies cumulative impacts of the Project and other relevant activities during construction phase and evaluates their significance.

The largest number of overlaps have been identified for Second String of Beineu-Bozoy-Shymkent Gas Pipeline Project due to spatial proximity to the Project Road alignment (see **Figure 39**) and the temporal overlap construction phases.



Note: The route for the proposed Second String of Beineu-Bozoy-Shymkent Gas Pipeline is indicative

Figure 39 - Other relevant projects having spatial overlaps with the Project

During the construction phase, cumulative impacts may result from the overlap between Project construction activities and construction/reconstruction of the other infrastructure facilities and delivery of construction materials and equipment.

The current CIA indicates that some of the Project's construction impacts are not significantly amplified by those of the other relevant projects. As a result, the cumulative impacts are expected to be of a similar level of significance as the Project's residual impacts. Such impacts include:

- Negative cumulative impact on surface water bodies flowing along and/or crossing the Project Road alignment due to the risk of contamination with surface runoff from the Project sites.
- Negative cumulative impact on construction workers: safety risk (risk of road traffic accidents) related to transportation to the Project construction sites, due to potential overlap of personnel delivery routes with those used by the other construction / reconstruction projects.

- Positive cumulative impact on economically active residents of settlements within 50 km from the Project Road alignment: additional temporary employment opportunities, including direct, indirect and induced jobs, and additional income for small businesses providing services to the construction workforce (e.g. catering, worker accommodation, retail, and transport maintenance services).

Further, there are cumulative impacts resulting from the amplification of Project-related construction impacts by those of the other activities or projects. The CIA also identified the following **negative impacts of this type**:

- Cumulative impact on shallow groundwater within the Project Road alignment and adjacent areas due to alternation of surface water flow paths, potential for runoff concentration and localised flooding. This impact may occur within the Subsection 5 of the Project Road and is associated with the Second String of Beineu-Bozoy-Shymkent Gas Pipeline. The cumulative impact is assessed as Negative Low to Moderate.
- Cumulative impacts on fauna species from construction of the Project Road and Second String of Beineu-Bozoy-Shymkent Gas Pipeline and operational Shalkar-Beineu Railway:
 - Impact on birds and bats being permanent inhabitants of the Project Road alignment due to loss of foraging habitats and the increased aggregated area of exposure to artificial noise and lighting / disturbance, potentially resulting in migration off the Project area. The cumulative impact is assessed as Negative Low to Moderate.
 - Impact on migratory birds due to loss of resting habitats, an increased aggregated area of exposure to artificial noise and lighting / disturbance, and the potential for changes in migration pathways. The cumulative impact is assessed as Negative Low to Moderate.
 - Cumulative impacts on ungulates (including Saiga) and predators due to noise- and artificial lighting-related disturbance that is likely to keep animals off the area where the project road, the railway and proposed gas pipeline are located, change their migration pathways and may impede access to part of their current foraging habitats. For Ustyurt Saiga population construction of the Project Road and the second string of the gas pipeline may also exacerbate current population fragmentation triggered by the Shalkar-Beineu Railway construction. In addition, Project construction shift workers placed in the construction camps may practice poaching. The aggregated cumulative impact of the three linear infrastructure facilities is assessed as Negative Moderate.
- Cumulative impact on residents of settlements along the Project delivery routes due to emissions, mainly dust emissions, noise and vibration from heavy vehicle movements, increased risk of road traffic accidents for children and the elderly, and temporary restrictions of access to public infrastructure due to traffic diversions. The cumulative impact is assessed as Negative Moderate.

- Cumulative impact on drivers and passengers travelling along the Project delivery routes due to increased risk of road traffic accidents / vehicle collisions, poor visibility caused by road dust emissions, and increased risk of delays. The cumulative impact is assessed as Negative Low to Moderate.
- Cumulative impact on farming enterprises and individual herders using pasture lands within the Project Road alignment. The impact results from permanent and temporary acquisition of leased pasturelands, temporary fragmentation of landholdings, loss of grazing lands, temporary disruption of livestock movement pathways, temporary reduced access to infrastructure required for livestock farming, increased risk of livestock-vehicle collisions associated with construction vehicles, increased disturbance of livestock caused by noise from construction activities and road operation, and safety risks for herders related to unauthorised access to construction sites. The aggregated cumulative impact on this VEC is assessed as Negative Low to Moderate.
- Potential cumulative impact on linear infrastructure facilities crossed by the Project Road alignment, including water pipelines, gas pipelines, overhead transmission lines and telecommunication cables (if Second String of Beineu-Bozoy-Shymkent Gas Pipeline also overlaps with the linear infrastructure facilities affected by the Project Road; this interaction remains to be confirmed).
- Cumulative adverse impact on local healthcare facilities due to additional pressure on local primary and secondary healthcare facilities associated with increased demand for primary healthcare and emergency services related to construction incidents and several concurrent construction Projects in the area with small number and limited capacity of required facilities. The cumulative impact is assessed as Negative Moderate.
- Cumulative impact on visitors and custodians of historical and cultural heritage sites and sites of spiritual importance in and around Sam, Nogayti and Turysh villages due to temporary access restrictions associated with traffic diversions and/or restrictions. The cumulative impact is assessed as Negative Low to Moderate.

Positive cumulative impacts resulting amplified by the other relevant projects include:

- Created opportunities to supply livestock products to the construction workforce and catering businesses servicing the Project. The cumulative impact is assessed as Positive Low to Moderate.
- Expected additional income and business development opportunities for Project's materials and service suppliers, due to increased demand for construction materials and equipment, as well as transport, fuel and supporting services. The cumulative impact is assessed as Positive Low to Moderate.

No cumulative effects were identified for several VECs affected by the Project, including:

- soil resources, and flora species, and selected fauna groups (invertebrates, sedentary mammals, reptiles and amphibians) within the Project Road alignment.

- residents of Sam, Nogayti and Turysh in terms of impact from emissions, noise and visual effects of the construction activities
- historical and cultural heritage sites in and around the Project Road alignment.

Operation phase

Table 52 in **Annex 1.1** below identifies cumulative impacts of the Project and other relevant activities during the operation phase and evaluates their significance.

During the operation phase, cumulative impacts may result from interaction between operation of the Project Road and the other road infrastructure projects and the operational Shalkar-Beineu Railway. The CIA identifies both negative and positive cumulative impacts on the Project VECs.

The current CIA indicates that some of the Project's operation impacts are not significantly amplified by the other relevant projects. As a result, the cumulative impacts are expected to be of a similar level of significance as the Project's residual impacts. Such impacts include:

- Cumulative negative impacts on birds and bats – permanent inhabitants of the Project Road vicinity and migratory birds due to increased aggregated area of noise and artificial lighting-related disturbance. This additional disturbance area promotes migration of birds and bats off the Project Road area. This impact is associated with the overlap with the operational Shalkar-Beineu Railway and is assessed as Negative Low.

Further, there are cumulative impacts resulting from the amplification of Project-related operation impacts by the other activities or projects. The CIA identified the following **negative impacts** of this type:

- Cumulative impact on shallow groundwater within the Project Road alignment and adjacent areas due to interception of the surface water flow paths, potential runoff concentration and localised flooding. This impact applies only to Subsections 1–3 of the Project Road and is associated with the operational Shalkar-Beineu Railway. The cumulative impact is assessed as Negative Low to Moderate.
- Cumulative impact on migratory mammals - ungulates and predators:
 - The newly construction road becomes one more area of disturbance for wildlife between Beineu and Shalkar in addition to the existing dirt roads, quarries, an oil development field, a railroad, etc. Such areas are sources of noise and artificial lighting that disturb migratory mammals and maintain their shift south off the Project Road alignment that occurred at the construction phase;
 - Newly constructed road (more specifically, road embankment) becomes as an additional barrier for migration of the mammals within their natural ranges, which may impede access to part of foraging habitats and change migration pathways. The Project Road may exacerbate fragmentation of the Ustyurt Saiga population that occurred after the construction of the Shalkar-Beineu railway intersecting the migration pathways without crossings suitable for Saiga herds;

- operational railway may make poaching in the Project area more intensive due to improved access to the Project area from other districts and regions.

The cumulative impact is assessed as Negative Moderate.

- Cumulative impact on drivers and passengers travelling along the Project Road due to a potential increase in the risk of vehicle collisions associated with high travel speeds on the Project Road and the four other road projects. The cumulative impact is assessed as Negative Low.

The **positive cumulative impacts** resulting from amplification of the Project and other relevant projects include:

- Impact on drivers and passengers travelling along the Project Road due to reduced travel time and reduced risk of traffic accidents resulting from operation of the Project Road and the four other road projects. The cumulative impact is assessed as Positive Moderate;
- Impact on population of settlements along the Project Road due to improved access to educational opportunities and specialised healthcare and other public services outside the settlements, regional markets and other infrastructure. The cumulative impact is assessed as Positive Moderate;
- Impact on farming enterprises and individual herders - users of pasture lands within the Project Road alignment through improved access to food markets in large cities where livestock products can be sold and resulting promotion of livestock farming development. This impact is associated with the Construction of 273km section of the BBS Road and Reconstruction of 206km Shalkar-Bozoy road and is assessed as Positive Moderate;
- Impact on visitors and custodians of historical and cultural heritage sites and sites of spiritual importance in and around Sam, Nogayti and Turysh villages through improved access to assets from other regions. The cumulative impact is assessed as Positive Low to Moderate;
- Impact on the economy of Project districts through improved access to markets outside the districts, reliable transportation of goods and people, and created conditions for the development of trade and roadside services. The cumulative impact is assessed as Positive Moderate;
- Impact on the economy of Project regions through opportunities to increase capacity of the road construction sector, firstly in Aktobe Region, reliable road connection and improved inter-regional connectivity that promotes economic development, and promotion of conditions for the development of trade and roadside services. The cumulative impact is assessed as Positive Moderate.

No cumulative effects were identified for several VECs affected by the Project at its operation phase, including:

- Soil resources, surface water bodies flowing along and/or crossing the Project Road alignment, flora within the Project alignment, and selected fauna groups (invertebrates, sedentary mammals, reptiles and amphibians);
- Residents of Sam, Nogayti and Turysh affected by emissions and noise from the operational road;
- farming enterprises and individual herders - users of pasture lands within the Project Road alignment;
- Maintenance workers in relation to OHS risks at the Project construction sites and risk of road accidents related to transportation to the Project maintenance sites;
- Linear infrastructure facilities crossed by the Project Road alignment, including water pipelines, gas pipelines, overhead transmission lines and telecommunication cables;
- Local healthcare facilities; and
- Historical and cultural heritage units in and around the Project Road alignment.

A1.6 Cumulative Impact Management

The CIA did not identify any Moderate to High or High negative cumulative impacts and detected several positive cumulative benefits. This section proposes measures for every cumulative impact identified for the construction and operation phases. For negative impacts, such measures follow the mitigation hierarchy and combine the Project measures set out in the ESIA and Biodiversity Management Plan (BMP) with coordination actions needed to manage interaction with other projects. For positive impacts, enhancement measures are proposed to improve the likelihood and equitable distribution of benefits.

The overarching measures for cumulative impact management are as follows:

- Establish a coordination group involving representatives of the Client, Construction Contractor, proponents of the relevant concurrent road construction projects and Second String for Beineu-Bozoy-Shimkent Gas Pipeline Project, Shalkar-Beineu Railway operator (Kazakhstan Railways), district Akimats, road police, emergency services and operators of infrastructure facilities affected by the Project;
- Maintain information register covering schedules, work fronts, haul routes, traffic peaks, drainage crossings, proposed wildlife corridors, utility crossings, community access constraints, incidents and complaints; the register should be shared with representatives of the coordination group and reviewed at least monthly during the construction phase and quarterly during operation;
- Agree with proponents of the concurrent Projects on using common spatial data and compatible monitoring methods where the projects affect the same VEC/receptor;
- Coordinate stakeholder communications to ensure local communities receive consistent information, distinguish responsible projects, and can submit grievances to the appropriate contact person via clearly established channel.

The recommended impact prevention, mitigation and/or enhancement measures that targets specific cumulative impacts are proposed in **Table 51** and **Table 52**.

The implementation of these measures is assumed reduce the significance of negative cumulative impacts to Low grade and maximise Project benefits.

Table 51 - Cumulative Impact Management Measures - Construction Phase

Neg. – negative cumulative impact, Pos. – positive cumulative impact

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
Surface water		
<u>Surface water bodies along or crossing the Project Road alignment:</u> risk of contamination by surface runoff from construction sites	Neg.	Implement the Spill Prevention and Management Plan and erosion and sediment controls at all Project sites (road sections, construction camps, Turysh RMU, spoil and refuelling areas).
Groundwater		
<u>Shallow groundwater within the Subsection 5 of the Project Road:</u> altered surface water flow paths, runoff concentration and localised flooding in combination with the Second String of the Beineu-Bozoy-Shymkent Gas Pipeline	Neg.	Undertake an integrated drainage and shallow groundwater review for the overlapping corridor during the final design development. Align culverts and drainage outlets with natural flow paths; size them for combined obstruction and runoff conditions and provide scour protection. Sequence earthworks so that the road and pipeline do not simultaneously block drainage; maintain temporary bypass drainage and jointly inspect after major rainfall or snowmelt
Biodiversity		
<u>Permanent birds and bats:</u> loss of foraging habitat and enlarged noise and artificial-light disturbance area from the road, gas pipeline and railway	Neg.	Plan and complete seasonal surveys to identify and map foraging, breeding and congregation areas for permanent inhabitants and stopover areas for migratory birds as specified in BMP. Identify "no-go" zones around sensitive areas.
<u>Migratory birds:</u> enlarged noise and artificial-light disturbance area from the road, gas pipeline and railway	Neg.	Schedule site clearance and other high-noise activities with the gas pipeline proponent outside sensitive periods for key species where practicable.
<u>Ungulates and predators, including Ustyurt Saiga:</u> combined disturbance, changed migration pathways, reduced access to foraging habitats and increased Ustyurt Saiga population fragmentation	Neg.	Complete a survey to study current presence of mammals, migration routes and congregation areas at the final design development. Establish "no-go" zones around sensitive areas. Design "at-grade" passages for Saigas at identified locations and underpasses for predators and other ungulates (see BMP for design of the passages). Establish a Biodiversity Coordination Unit with the railway operator to plan, design and construct/update the railway crossings. Coordinate with the gas pipeline proponent to keep a continuous migration corridor.
Local population		

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
<u>Residents of settlements along the Project delivery routes:</u> cumulative dust, emissions, noise and vibration; road traffic accident risks to children and the elderly; temporary access restrictions	Neg.	Develop and implement the construction-phase Traffic Management Plan (see Table 34) including approved routes, journey planning, speed limits, defensive-driving training, fatigue controls and vehicle inspections. Prepare a route-specific logistics schedule with the other projects; avoid residential streets where practicable and cap simultaneous heavy-vehicle movements. Use covered loads, water-based dust suppression, low speeds on unpaved roads, maintained Euro IV or better vehicles where available, and suspend uncontrolled dust-generating activity during strong winds. Restrict noisy deliveries to daytime; provide pedestrian protection near schools and clinics and maintain safe, uninterrupted access or clearly signed detours. Give advance notice and operate an accessible, shared-routing grievance and rapid response process
<u>Economically active residents of nearby settlements:</u> due to additional temporary direct, indirect and induced jobs and income for small businesses	Pos.	Develop and implement a transparent Local Employment Programme (see Section 7.3.2) with advance disclosure of vacancies, skills requirements and recruitment procedures in affected settlements. Apply inclusive local procurement for catering, accommodation, retail, transport and maintenance services, with fair supplier prequalification and prompt payment. Coordinate with other projects and Akimats to avoid unrealistic recruitment expectations and provide short, demand-led training; track participation by women and vulnerable households.
Drivers and passengers on delivery routes: collision risk, dust-related poor visibility and delays	Neg.	Coordinate abnormal-load movements and delivery windows among the concurrent projects and notify road users in advance. Install signs, delineators and traffic control at access points; maintain road width, passing places and road surface, and suppress dust. Use real-time incident/weather communication, recovery capability and alternate-route or convoy arrangements where necessary.
Farming enterprises and individual herders: land take and fragmentation, reduced grazing access, disrupted livestock movement, collision and disturbance risks, and unauthorised site access risks.	Neg.	Confirm cumulative land and access impacts on land users through the LARP (see Table 39), considering adjacent projects; compensate eligible losses and restore livelihoods where required. Maintain access to grazing land, wells, wintering facilities and livestock infrastructure; provide cattle passes at routes agreed with herders and keep temporary routes open or provide alternatives. Fence or clearly mark Project sites, control speeds, post livestock warnings, schedule movements with herders and repair Project-caused damage.

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
		Use ongoing farmer liaison and the grievance mechanism to resolve access, collision and disturbance issues promptly
Farming enterprises and individual herders: opportunities for farmers to supply livestock products to the construction workforce and catering businesses	Pos.	Publish forecast demand, food-safety requirements and procurement opportunities early and in accessible formats. Package contracts so local farmers can participate; use transparent qualification and payment terms and avoid exclusive arrangements that displace existing community supply. Coordinate demand forecasts among projects to help farmers scale safely without overinvestment based on temporary demand.
Construction workers: risk of road traffic accidents during personnel transportation to construction sites where delivery routes overlap with the other projects' routes	Neg.	Develop and implement the and Construction Health and Safety Management Plan (CHSMP) for the Project, which is to include <i>inter alia</i> driver controls procedures. Develop and implement the construction-phase Traffic Management Plan (see Table 34) which should cover <i>inter alia</i> personnel transportation. Coordinate shift-change and workforce-bus timetables with other projects to avoid simultaneous peaks. Maintain emergency communication and road-accident response arrangements covering remote sections
Linear infrastructure facilities: possible cumulative interference with water and gas pipelines, OHTLs and telecommunication cables	Neg.	Verify all crossings and parallel sections through surveys, owner records and joint site walkovers, including the proposed gas pipeline alignment once its design is confirmed. Prepare utility-specific crossing designs, protection requirements, permit-to-work and method statements; agree exclusion zones, supervision and emergency isolation contacts. Coordinate construction sequences and maintain service continuity; promptly notify owners of damage or changed conditions and reinstate affected assets.
Local healthcare facilities: cumulative pressure from construction incidents and concurrent projects in an area with limited capacity	Neg.	Provide contractor-funded on-site occupational health capability, trained first aiders, first-aid rooms and dedicated emergency transport so routine cases do not burden village facilities. Agree referral, ambulance, communications and mass-casualty protocols with district health authorities Develop and implement the CHSMP including driver controls, medical examinations and preventive health measures to reduce incidents at source/ Maintain uninterrupted access to local healthcare facilities.
Visitors and custodians of cultural and spiritual sites near Sam, Nogayti and Turysh: temporary access restrictions caused by traffic diversions or closures	Neg.	Map access routes and key religious/cultural dates with custodians before works. Maintain access whenever safe; Where closure is unavoidable, agree a short-duration, accessible, clearly signed alternative route and communicate it in advance.

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
		Integrate access protection into the construction phase Traffic Management Plan
Regional materials and service suppliers: potential for increased income and business development opportunities due to increased demand	Pos..	Implement transparent local and regional supplier outreach, prequalification and tendering; publish pipelines of expected packages. Provide briefings on technical, quality and E&S requirements and encourage joint ventures or subcontracting where capacity gaps exist. Coordinate major orders and delivery schedules with other projects to reduce supply bottlenecks, price spikes and unsafe transport peaks

Table 52 - Cumulative Impact Management Measures - Operation Phase

Neg. – negative cumulative impact, Pos. – positive cumulative impact

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
Groundwater		
<u>Shallow groundwater within the Subsections 1-3 of the Project Road:</u> interception of surface-water flow paths, runoff concentration and localised flooding in combination with Shalkar-Beineu Railway	Neg.	Maintain an integrated road-rail drainage inventory and jointly inspect culverts, channels and outlets before and after high-runoff periods. Remove blockages, repair scour and erosion, and maintain cross-drainage continuity; do not discharge road runoff in a manner that overloads railway drainage. Monitor ponding and groundwater-related saturation at known low points and implement additional culverts, relief drainage or outlet protection where recurring effects occur
Biodiversity		
<u>Permanent birds and bats and migratory birds:</u> enlarged noise and artificial-light disturbance area from the road and the railway	Neg.	Retain only safety-critical lighting; use shielded, downward-directed, low-intensity lighting and avoid illumination of confirmed bird/bat areas. Maintain "no-go" zones around sensitive areas and implement any BMP offset commitments.
<u>Ungulates and predators, including Ustyurt Saiga:</u> combined disturbance and barrier effects of the Project Road and railway (changed migration pathways, reduced access to foraging habitats and increased Ustyurt Saiga population fragmentation); risk of increased poaching due to improved access	Neg.	Maintain road wildlife passages, protective fencing and warning signs. Keep approaches unobstructed and manage speeds at crossing zones. Use camera traps and collision patrol data to measure crossing effectiveness and adapt locations, geometry, fencing or traffic controls. Through the BCU established at the construction phase align and progressively establish railway crossings with the road crossings to restore corridor permeability for migrating animals.
Drivers and passengers using the Project Road and the other road projects: cumulative collision risk associated with higher speeds	Neg.	Apply unified speed management, consistent signs and markings, safe junction and crossing design, delineation and barriers at high-risk locations.

VEC and cumulative effect	Code	Proposed mitigation / enhancement measures
		Coordinate road safety audits, crash-data analysis and blackspot treatment across the connected road projects. Provide accessible traveller information on routes, services, weather and emergency contacts.
Drivers and passengers using the Project Road and the other road projects: reduced travel time and accident risk for road users	Pos.	Protect the benefit through preventive maintenance, consistent route guidance and speed management across the roads of concern. Monitor journey times, reliability and crashes; address bottlenecks and inconsistent standards at interfaces between the roads. Provide accessible traveller information on routes, services, weather and emergency contacts.
Farming enterprises and individual herders: improved access to urban food markets and resulting promotion of livestock farming	Pos.	Maintain safe access from grazing areas and settlements to the new corridor, including cattle passes and agricultural access points.
Visitors and custodians of cultural and spiritual sites near Sam, Nogayti and Turysh: improved inter-regional access	Pos.	Support the benefit by providing safe, agreed access, directional signs and parking/turning arrangements that do not damage heritage assets or disturb custodians and nearby residents. Monitor traffic, litter, unauthorised access and physical condition of sites and introduce controls where increased visitation creates harm.
Economy of Beineu, Baiganin and Shalkar Districts: improved external market access, reliable movement of goods and people, and promotion of roadside services	Pos.	Coordinate with Akimats to designate safe roadside service areas for local products, catering, retail and vehicle services, and incorporate them into design and operation.
Economy of Mangistau and Aktope Regions: reliable inter-regional connectivity and development of trade, development of roadside services, improved capacity of the road sector	Pos.	Include qualified regional firms and specialists in maintenance procurement. Coordinate corridor maintenance standards, emergency response and freight information across regions to preserve reliability. Use periodic regional indicators to verify that connectivity benefits are realised and to identify bottlenecks or unequal access.

Annex 1.1. Cumulative impact assessment matrices

Table 53 - Cumulative Impact Assessment - construction phase

Legend:

–	No cumulative effect on the Project VEC identified
+	There is a cumulative effect on a Project VEC
>	The other project / activity amplifies the Project's impact on VEC and results in increased impact significance
0	The other project / activity does not amplify the Project's impact on VEC and does not change the impact significance

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
Soil resources within the Project Road alignment	–	–	–	–	–
Water resources					
Surface water bodies flowing along and/or crossing the Project Road alignment	–	–	–	+ Risk of contamination with surface runoff from the Project sites 0 Cumulative impact evaluation - Negative Low	+ Risk of contamination with surface runoff from the Project sites 0 Cumulative impact evaluation - Negative Low

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
Shallow groundwater within the road alignment and adjacent areas	–	–	–	+ Interception of the surface-water flow paths, potential concentrated runoff and localised flooding (applies only to Subsection 1-3 of the Project Road) > Cumulative impact evaluation - Negative Low to Moderate	+ Interception of the surface-water flow paths, potential concentrated runoff and localised flooding (applies only to Subsection 1-3 of the Project Road) > Cumulative impact evaluation - Negative Low to Moderate
Biodiversity					
Flora within the Project alignment	–	–	–	–	–
Fauna within and around the Project alignment:					
Invertebrates	–	–	–	–	–
Sedentary mammals, reptiles and amphibians	–	–	–	– Note: It is assumed the proposed gas pipeline corridor will not cross the road alignment	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
Birds and bats - permanent inhabitants	–	–	–	+ Loss of foraging habitats around the Project Road alignment, Increased aggregated area of exposure to artificial noise and lighting / disturbance Migration off the Project area > Cumulative impact evaluation - Negative Low to Moderate	– Note: artificial noise and lighting disturbance from the railway forms the baseline conditions
Migratory birds	–	–	–	+ Loss of resting habitats, Increased aggregated area of exposure to artificial noise and lighting / disturbance, potential for change in the migration pathways > Cumulative impact evaluation - Negative Low to Moderate	– Note: artificial noise and lighting disturbance from the railway forms the baseline conditions
Migratory mammals:					
Saiga	–	–	–	– Note: Saigas have not been detected within the Project Road alignment after 2016 (Shalkar-	– Note: Fragmentation of Ustyurt Saiga population has led to absence of Saigas

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
				Bozoy railway construction), no receptors within the Aol	within the road alignment after 2016
Other ungulates and predators	–	–	–	+ Noise and artificial lighting-related disturbance that force animals to change migration pathways, impeded access to part of foraging habitats; risk of poaching practices by Project shift workers based in construction camps > Cumulative impact evaluation - Negative Low to Moderate	– Note: artificial noise and lighting disturbance from the railway forms the baseline conditions
Local population					
Residents of affected settlements (Sam, Nogayti and Turysh)	–	–	–	–	–
Economically active residents of settlements within 50km from the road alignment	–	+ Additional temporary employment opportunities (direct, indirect and induced jobs)	–	+ Additional temporary employment opportunities (direct, indirect and induced jobs) Additional income of small businesses providing services to construction workforce	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
		Additional income of small businesses providing services to construction workforce 0 Cumulative impact evaluation - Negative Low to Moderate		0 Cumulative impact evaluation - Negative Low to Moderate	
Residents of settlements along the Project delivery routes	+ Emissions (mainly dust emissions), noise and vibration from heavy vehicle movements Increased risk of road traffic accidents for children and the elderly Temporary restrictions of access to public inf due to traffic diversions > Cumulative impact evaluation - Negative Moderate	+ Emissions (mainly dust emissions), noise and vibration from heavy vehicle movements Increased risk of road traffic accidents for children and the elderly Temporary restrictions of access to public inf due to traffic diversions >	–	+ Emissions (mainly dust emissions), noise and vibration from heavy vehicle movements Increased risk of road traffic accidents for children and the elderly Temporary restrictions of access to public inf due to traffic diversions > Cumulative impact evaluation - Negative Moderate	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
		Cumulative impact evaluation - Negative Moderate			
Drivers and passengers travelling along the Project delivery routes	+ Increased risk of road traffic accidents/vehicle collisions, poor visibility due to road dust emissions, increased risk of delays > Cumulative impact evaluation - Negative Low to Moderate	+ Increased risk of road traffic accidents/vehicle collisions, poor visibility due to road dust emissions, increased risk of delays > Cumulative impact evaluation - Negative Low to Moderate	–	+ Increased risk of road traffic accidents/vehicle collisions, poor visibility due to road dust emissions, increased risk of delays > Cumulative impact evaluation - Negative Low to Moderate	–
Farming enterprises and individual herders -users of pasture lands within the Project Road alignment	–	–	–	+ Permanent and temporary of acquisition of leased pasturelands, temporary fragmentation of landholdings; Loss of grazing lands; Temporary disruption of livestock movement pathways	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
				Temporary reduced access to infrastructure required for livestock farming Increased risk of livestock-vehicle collisions associated with construction vehicles, Increased disturbance of livestock caused by noise from construction activities and road operation, Safety risks for herders related to unauthorised access to construction sites > Cumulative impact evaluation - Negative Low to Moderate	
				+ Opportunities to supply livestock products to construction workforce / catering businesses servicing the Project > Cumulative impact evaluation - Positive Low to Moderate	
Construction workers					
OHS risks at the Project construction sites	–	–	–	–	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
				(assuming construction sites of both projects will be not in close to each other - TBC)	
Risk of road accidents related to transportation to the Project construction sites	+ Increased road accidents risk due to potential overlap of personnel delivery routes to the construction sites 0 Cumulative impact evaluation - Negative Low	+ Increased road accidents risk due to potential overlap of personnel delivery routes to the construction sites 0 Cumulative impact evaluation - Negative Low	–	+ Increased road accidents risk due to potential overlap of personnel delivery routes to the construction sites 0 Cumulative impact evaluation - Negative Low	–
Linear infrastructure facilities crossed by the Project Road alignment (water pipelines, gas pipelines, OHTLs, and telecommunication cables)	–	–	–	+ (if the proposed gas pipeline route overlaps with linear infrastructure facilities affected by the Project Road) (TBC)	–
Local healthcare facilities	+ Additional pressure on local primary and secondary healthcare faculties due to increased demand for	+ Additional pressure on local primary and secondary healthcare faculties due to increased demand	–	+ Additional pressure on local primary and secondary healthcare faculties due to increased demand for primary healthcare related to construction incidents	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
	primary healthcare related to construction incidents > Cumulative impact evaluation - Negative Moderate	for primary healthcare related to construction incidents > Cumulative impact evaluation - Negative Moderate		> Cumulative impact evaluation - Negative Moderate	
Cultural heritage:					
Historical and cultural heritage units in and around the Project Road alignment	–	–	–	– (distance from the Project-affected areological sites to the gas pipeline route is more than 8 km)	–
Visitors and custodians of historical and cultural heritage sites and sites of spiritual importance in and around Sam, Nogayti and Turysh villages	–	–	–	+ temporary access restrictions due to traffic diversions and/or restrictions > Cumulative impact evaluation - Negative Low to Moderate	–
Materials and service suppliers mainly from Mangistau and Aktobe regions	+ Additional income from increased demand for construction materials and equipment as well as transport, fuel and supporting services Cumulative impact evaluation - Positive Low to Moderate				

Table 54 - Cumulative Impact Assessment - operation phase

Legend:

–	No cumulative effect on the Project VEC identified
+	There is a cumulative effect on a Project VEC
>	The other project / activity amplifies the Project's impact on VEC and results in increased impact significance
0	The other project / activity does not amplify the Project's impact on VEC and does not change the impact significance

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgaysyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
Soil resources within the Project Road alignment	–	–	–	–	–
Water resources					
Surface water bodies flowing along and/or crossing the Project Road alignment	–	–	–	–	–
Shallow groundwater within the road alignment and adjacent areas	–	–	–	–	+ Interception of the surface-water flow paths, potential concentrated runoff and localised flooding (applies only to Subsection 1-3 of the Project Road)

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
					> Cumulative impact evaluation - Negative Low to Moderate
Biodiversity					
Flora within the Project alignment	–	–	–	–	–
Fauna within and around the Project alignment:					
Invertebrates	–	–	–	–	–
Sedentary mammals, reptiles and amphibians	–	–	–	–	–
Birds and bats - permanent inhabitants of the road vicinity	–	–	–	–	+ Increased aggregated area of exposure to operational noise and road lighting disturbance, and migration off the Project area 0 Cumulative impact evaluation - Negative Low
Migratory birds	–	–	–	–	+

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
					Increased aggregated area of exposure to operational noise and road lighting disturbance; Migration off the Project area 0 Cumulative impact evaluation - Negative Low
Migratory mammals:					
Ungulates and predators	–	–	–	–	+ Increased noise and artificial lighting-related disturbance maintaining the shift of migratory animals off the railway; Long-term barrier effect of the road embankment: a) impeded access to part of foraging habitats; b) exacerbation of the current fragmentation

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
					of Ustyurt Saiga population caused by the operational railway. c) potential intensification of poaching due to improved access to the Project area > Cumulative impact evaluation - Negative Moderate
Local population					
Residents of affected settlements (Sam, Nogayti and Turysh) affected by emissions and noise from the operational road	–	–	–	–	–
Drivers and passengers travelling along the Project road	+ Reduced travel time and reduced risk of traffic accidents > Cumulative impact evaluation – Positive Moderate			–	–
	+				

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
	Potential increase in the risk of road traffic accidents/vehicle collisions due to high travel speeds (if conditions of the road infrastructure are not satisfactory) > Cumulative impact evaluation - Negative Low				
Population of settlements along the Project Road	Improved access to educational opportunities and specialised healthcare and other public services outside the settlements, regional markets and other infrastructure > Cumulative impact evaluation - Positive Moderate			–	–
Farming enterprises and individual herders -users of pasture lands within the Project Road alignment	–	–	–	–	–
	+ Improved access to food markets in large cities where livestock products can be sold, support to livestock farming development > Cumulative impact evaluation - Positive Moderate		–	–	–
Maintenance workers					
OHS risks at the Project construction sites	–	–	–	–	–
Risk of road accidents related to transportation to	–	–	–	–	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
the Project maintenance sites					
Linear infrastructure facilities crossed by the Project Road alignment (water pipelines, gas pipelines, OHTLs, and telecommunication cables)	–	–	–	–	–
Local healthcare facilities	–	–	–	–	–
Cultural heritage:					
Historical and cultural heritage units in and around the Project Road alignment	– No impact is expected			–	–
Visitors and custodians of historical and cultural heritage sites and sites of spiritual importance in and around Sam, Nogayti and Turysh villages	– improved access to assets from other regions > Cumulative impact evaluation - Positive Low to Moderate			–	–
Materials and service suppliers mainly from Mangistau and Aktobe regions	–				
Economy of Project districts	+		–	–	–

VECs	Other projects/activities included into CIA				
	Construction of 273km section of the BBS Road	Reconstruction of 206-km Shalkar-Bozoy road	Aktobe – Ulgaysyn and Ulgasyn – Saksaulsk Road Reconstruction Projects	Second string of Beineu–Bozoy–Shymkent Gas Pipeline	Operational Shalkar-Beineu Railway
	Improved access to markets outside the districts, reliable transportation of goods and people, created conditions for the development of trade and roadside services > Cumulative impact evaluation - Positive Moderate				
Economy of Project regions	+ opportunities to increase capacity of the road construction sector, firstly in Aktobe Region, reliable road connection and improved inter-regional connectivity that promotes economic development, promotion of conditions for the development of trade and roadside services > Cumulative impact evaluation - Positive Moderate			–	–

Record of Focus Group Discussion with Women

Beineu-Saksaulsk Road Project | ESIA Socio-Economic Studies

Settlement	Turysh, Beineu District, Mangystau Region
Date	12 August 2026
Venue	Turysh settlement
Moderator	Arai Smagul, Local Consultant
Number of participants	9 women

Purpose. This record documents the findings of a focus group discussion with women undertaken as part of the ESIA socio-economic studies for the Beineu-Saksaulsk Road Project.

1. Socio-Economic Situation of Women and Sources of Income

- What are the main employment opportunities and sources of income available to women in the settlement?
- How common are permanent employment, self-employment and small business among women?
- What are the main constraints preventing women from finding employment, earning higher incomes or starting/expanding a business?

Key findings / views expressed:

The main sources of income available to women are salaries, social benefits and pensions. Formal female employment is concentrated mainly in the social sector. The local school, with capacity for 150 students, employs around 32 teachers; the kindergarten, with capacity for 50 children, employs seven staff; and the outpatient clinic employs two healthcare workers.

Female self-employment is limited and mainly involves the sale of products from household livestock and food production, including dairy and bakery products. Women-owned small businesses are very limited. Key constraints identified by participants include the limited number of local jobs and employers, limited opportunities for small business and self-employment, distance from larger settlements and employment centres, and poor transport infrastructure and road conditions, which make regular travel outside the settlement difficult.

2. Transport and Women's Mobility

- How do women usually travel to Beineu, the district centre and other settlements?
- What are the main reasons for travel, such as healthcare, education, shopping, employment or administrative services?
- What difficulties are associated with these trips, including cost, travel time, transport availability, road conditions, seasonality or safety?
- To what extent does the existing transport situation restrict women's mobility?

Key findings / views expressed:

All participants stated that the poor condition of the existing road restricts accessibility to and from Turysh. Residents generally travel to Beineu by taxi or private vehicle, where available. The main

reasons for travel are healthcare and administrative services, shopping and onward travel to other settlements.

Participants reported that poor road conditions increase travel time and cost and make travel particularly difficult during adverse weather. Travel within and outside the settlement is largely along unpaved roads and tracks through desert terrain. During winter, transport connections between settlements may be substantially restricted or temporarily interrupted.

Participants expressed strong interest in improved road connectivity and expected the Project to improve accessibility and mobility.

3. Access to Social Services

- Does the existing transport situation affect women's and families' access to healthcare, education, public and other services?
- Which groups experience the greatest difficulties, such as women with children, elderly persons or socially vulnerable households?

Key findings / views expressed:

Limited transport connectivity adversely affects access to services. Turysh has one outpatient clinic staffed by a doctor and a nurse and providing primary healthcare only. Specialised healthcare requires travel to Beineu by private taxi or private vehicle, and there is no ambulance based in the settlement.

The settlement has one school and one kindergarten. Mobile communications are unstable and internet access is very limited. As a result, access to electronic public services is constrained, while services that require in-person attendance generally require travel to another settlement, increasing dependence on available transport.

4. Project-Related Employment and Business Opportunities

- Would women be interested in employment or service provision during road construction? What types of work or services could be suitable?
- What opportunities for women-owned small businesses could arise from the Project?
- What could help women benefit from these opportunities?

Key findings / views expressed:

All participants expressed interest in employment during road construction. Potential opportunities identified included selling dairy products from household livestock, supplying agricultural products to the construction workforce and providing catering services.

Participants also expressed interest in longer-term small business opportunities along the road, including small shops and roadside cafés serving road users.

5. Expected Changes after Road Construction

- How could the improved road affect the daily lives of women and families?
- Could improved transport expand women's access to employment, markets, healthcare and education?
- Could the road create additional opportunities for selling local agricultural products, small business development or roadside services?

Key findings / views expressed:

Participants expected improved road connectivity to increase women's access to employment, healthcare and education and to create additional income-generating opportunities. They also expected better access to markets for locally produced agricultural and dairy products and opportunities to develop catering and other roadside services.

6. Potential Construction-Phase Impacts

- What temporary inconveniences or problems could arise for women and families during construction?
- Are there concerns related to construction traffic, dust, noise, temporary access restrictions or other construction activities?
- What measures could reduce these impacts?

Key findings / views expressed:

Participants identified movement of construction vehicles through the settlement as a key concern, particularly because of risks to children playing in streets and around residential properties. Noise and dust from construction activities were also raised.

Participants recommended restricting construction vehicle movements through the settlement, preventing unnecessary entry of construction machinery into residential areas and strengthening control over construction vehicle operations.

7. Women's Safety and GBVH Risks

- Do women have concerns about community safety associated with the arrival of workers from other areas?
- Are there locations or situations requiring particular attention to the safety of women and girls?
- What measures could the Contractor or Project implement to support a safe environment?

Key findings / views expressed:

Women did not express significant public safety concerns associated with the possible arrival of workers from other areas. Nevertheless, participants emphasised the need to maintain safe conditions for women and girls during construction.

Recommendations included strict compliance with traffic and occupational safety requirements, where practicable provision of a separate worker camp, restriction of construction machinery movements through the settlement, fencing of construction areas, safe operation of construction vehicles and equipment, and designated areas for storage of construction and inert materials.

8. Distribution of Benefits and Recommendations

- Which groups of women are likely to benefit most from the Project, and are any groups likely to benefit less or face additional difficulties?
- What should be provided to enable women to access new jobs, business opportunities and improved transport?
- What are the participants' main recommendations to the Project?

Key findings / views expressed:

Participants considered that homemakers and other working-age women could benefit from Project-related employment and business opportunities. They did not identify major additional difficulties for particular groups of women.

Participants recommended increasing access to childcare to enable women with childcare responsibilities to take up employment and business opportunities during construction and operation of the road.

Additional Issues Raised by Participants

Participants additionally recommended maintaining safe access to the settlement, providing sufficient livestock crossings, implementing dust suppression, installing appropriate temporary and permanent road signs and markings, supporting local employment, and fencing road or construction areas where required for safety.

Summary of FGD Findings

Main issues / constraints	Construction vehicle movements through the settlement; insufficient livestock crossings; existing transport constraints.
Main expected benefits	Employment and income opportunities; improved access to healthcare and public services; improved mobility; opportunities for local agricultural sales and roadside businesses.
Main construction-phase risks	Construction traffic through the settlement, noise and dust, and insufficient temporary arrangements for livestock movement.
Priority recommendations / issues for further consideration in the ESIA	Local employment opportunities; sufficient livestock crossings; safe access to the settlement; road and construction-site fencing where required; traffic safety measures; warning signs and road markings; dust suppression.

Minutes of Meeting with the Deputy Akim of Mangystau Region

Beineu-Saksaulsk Road Project | ESIA Stakeholder Consultation

Date	14 August 2026
Location	Aktau, Mangystau Region
Chair	Tilek Zhetkizgenuly, Deputy Akim of Mangystau Region

Purpose of the meeting. To present the Beineu-Saksaulsk Road Project and the preliminary findings of the ESIA, discuss key environmental and social matters relevant to the Mangystau section of the Project, and establish arrangements for continued coordination with the Regional Akimat during completion of the ESIA.

Participants

- Tilek Zhetkizgenuly - Deputy Akim of Mangystau Region (Chair; responsible for entrepreneurship and trade, economy, budget and finance, and agriculture);
- Tanat Nurgambetov - Deputy Akim of Beineu District, Mangystau Region (online);
- Beyneubek Abilov - Head of the Department of Passenger Transport and Roads of Mangystau Region;
- Sabit Duisekenov - Head of the Department of Agriculture and Land Relations of Mangystau Region;
- Pikir Sansyzybayev - Head of the Department of Entrepreneurship and Trade of Mangystau Region;
- Tilegen Yediyev - Head of the Department of Economy and Budget Planning of Mangystau Region;
- Khaidar Tuleushov - Acting Head of the Department of Natural Resources and Environmental Management of Mangystau Region;
- Altyn Oshambayeva - First Category Engineer, Technical Policy and Quality Control Department, JSC NC KazAvtoJol;
- Gaukhar Akhmetova - Acting Head of the Department of Ecology of the Committee for Environmental Regulation and Control, Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, Mangystau Region;
- Abai Turalikhanov - Head of the Quality Expertise and State Registration Unit, Mangystau Branch of the National Center for Quality of Road Assets;
- Yerbolat Shaimurat - Head of Laboratory, Mangystau Branch of the National Center for Quality of Road Assets;
- Arai Smagul - EBRD ESIA Consultant;
- Suren Gyurjinyan - EBRD ESIA Consultant.

Presentations and Discussion

Project overview. *Altyn Oshambayeva*, representing KazAvtoJol, presented the overall Project concept and key technical characteristics. It was noted that the Kazakhstan feasibility study had been prepared and had undergone the relevant construction and economic review. Of the approximately 125 km section in Mangystau Region, around 73 km is planned for reconstruction and 52 km for new construction. The proposed works also include four bridges and grade-separated structures.

Preliminary ESIA findings. *Suren Gyurjinyan* presented the preliminary findings of the ESIA, with particular emphasis on the expected socio-economic benefits of improved regional connectivity, Project-related land requirements, potential effects on pasture access and livestock movement, and the need to maintain access to grazing areas and farming infrastructure following construction of the road.

Land use and land availability. *Sabit Duisekenov* noted that no significant land acquisition issues had been identified for the Project section in Beineu District and confirmed that the land required for the road had already been withdrawn from the forest fund category. The Department of Agriculture and Land Relations confirmed its readiness to support further clarification of land-use and land-allocation matters as the Project design and land requirements are refined.

Livestock movement and cattle passes. *Beyneubek Abilov* emphasised that livestock crossings should accommodate not only sheep and other small livestock but also camels, reflecting local livestock farming practices. It was clarified that the locations, dimensions and technical parameters of livestock crossings would be further defined and agreed during the detailed design stage, taking account of actual livestock movement and access requirements.

Project schedule. The participants discussed the anticipated implementation schedule. The ESIA Consultant advised that completion of the feasibility study was planned by the end of 2026, followed by detailed design. Contractor procurement was expected to commence in early 2027, with road construction tentatively anticipated to begin around mid-2027, subject to completion of the required financing, design, approval and procurement procedures.

Agreed Follow-up and Coordination

- Continued coordination of the ESIA will be maintained with the relevant departments of the Mangystau Regional Akimat at department-head level, with the Regional Akimat facilitating access to information and participation of the responsible authorities as required.
- Land-use and land-allocation matters will be further coordinated with the Department of Agriculture and Land Relations as the Project design and final land requirements are confirmed.
- The detailed design will consider the location and dimensions of livestock crossings, including requirements for camel movement and continued access to pastureland and farming infrastructure.
- The Regional Akimat and relevant departments will be engaged further during the ESIA disclosure stage to review and discuss the ESIA findings and proposed mitigation and enhancement measures.

Minutes of Meeting with Baiganin District Akimat

Beineu-Saksaulsk Road Project | ESIA Stakeholder Consultation

Date	10 August 2026
Location	Baiganin District Akimat, Aktobe Region
Chair / Key Representative	Aibek Kuppenov, Akim of Baiganin District
Participants	Representatives of Baiganin District Akimat; representatives of the Aktobe Regional Branch of QAJ; ESIA Consultant team

Purpose of the meeting

The meeting was held as part of stakeholder engagement for the ESIA of the Beineu-Saksaulsk Road Project. The discussion focused on land use and land tenure conditions along the Project alignment in Baiganin District, the availability of local construction materials, and agricultural activities in the wider Project area.

Key Discussion Points

Land use and land tenure: The District Akimat advised that no significant land allocation issues had been identified within the Project corridor in Baiganin District. Land plots within the proposed road corridor had not been allocated to farming enterprises. During preparation of the local Feasibility Study, measures had been taken to prevent new land allocations within the planned road corridor.

Existing land conditions: The Project alignment is located at a considerable distance from settlements. Based on available mapping and information provided by the District Akimat, land adjoining the alignment is predominantly desert terrain and is classified as state reserve land. No farming enterprises are located directly along the proposed road corridor.

Agricultural activities in the wider area: One farming enterprise is located south of the proposed alignment. Its principal activity is hay harvesting and sale, including supply of hay to Mangystau Region.

Potential source of construction materials: The District Akimat confirmed that one operating sand and gravel deposit is located within the district and may potentially serve as a local source of construction materials for the road works, subject to the applicable technical, environmental and permitting requirements.

Overall Outcome

The consultation confirmed that the Project corridor in Baiganin District predominantly crosses state reserve land in sparsely populated desert areas, with no farming enterprises located directly along the alignment. The information provided by the District Akimat was used to inform the ESIA land use and socio-economic baseline and the assessment of potential land-related impacts. The meeting also identified a potential local source of sand and gravel that may be relevant during the construction stage, subject to further assessment and applicable approvals.

Summary of Consultations with Project-Affected Land Users

Beineu-Saksaulsk Road Project | ESIA / Land Acquisition and Resettlement Studies

Purpose. This document summarises consultations undertaken with land users potentially affected by Project-related land acquisition in Beineu District, Mangystau Region. The consultations were undertaken to understand existing land use and livestock farming activities, identify land acquisition and access concerns, and record the preferences and recommendations expressed by the affected land users. The findings of these consultations have been taken into account in the preparation of the Project Land Acquisition and Resettlement Framework (LARF) and will be further considered during detailed land and asset surveys and the subsequent preparation of the Land Acquisition and Resettlement Plan (LARP).

1. Consultation with Kenzhe Farming Enterprise

Date and time	12 August 2026
Location	Sam settlement, Beineu District, Mangystau Region
Land user	Kenzhe Farming Enterprise
Representative	Rysbek Kanzharovich Nysanbayev, Head of the Farming Enterprise
Main activity	Camel and small ruminant farming

Existing land use and farming activities

The farming enterprise keeps approximately 50 camels, 100 sheep and 18 horses. According to the representative, Kenzhe leases approximately 1,000 ha of pastureland from the state under a 49-year lease covering the period 2010–2059. Day-to-day livestock grazing activities are mainly undertaken by the farmer's son and daughter-in-law.

Potential Project impact and land-user preference

Part of Kenzhe's leased land is expected to fall within the Project land acquisition area. The representative stated that monetary compensation is not the preferred option and requested provision of an equivalent replacement land plot for the affected area. The representative also requested a livestock crossing in the direction of Sam settlement to maintain safe livestock movement across the future road.

2. Consultation with Farming Enterprise Representatives

Date and time	14 August 2026, 10:00
Location	Aktau, Mangystau Region
Land user	Farming enterprise administratively located in Sam settlement, Beineu District
Representatives	Salamat Nurzhanova, Head of the Farming Enterprise, and Salamat Boken
Land plot	Cadastral No. 13-196-008-1108; approximately 1,000 ha leased from the state

Existing land use and farming activities

Approximately 300 ha of the leased plot is currently used for grazing around 500 head of ruminant livestock. According to the representatives, construction of the existing railway severed part of the

land plot, and no livestock crossing was provided. They stated that this has already reduced the practical value and usability of part of the holding.

Potential Project impact and land-user preference

The representatives stated that provision of replacement land would not be an acceptable option because comparable nearby land does not have suitable water sources. They indicated that they would be prepared to relinquish the lease subject to monetary compensation. In their view, provision of a livestock crossing alone would not resolve the existing land-use constraint because part of the holding has already lost economic value as a result of railway severance.

3. Summary of Key Consultation Findings

Key issue	Consultation finding / implication
Land use and livelihoods	Both consulted land users rely on leased pastureland for livestock farming. The practical value of the land depends on access to grazing areas, water sources, farm infrastructure and safe livestock movement.
Land acquisition preferences	Preferences differ between affected land users. Kenzhe expressed a preference for equivalent replacement land rather than cash compensation, while the second farming enterprise considered replacement land unsuitable because of the absence of comparable water sources and expressed a preference for cash compensation for land development costs.
Land severance and access	Land severance is a key concern. Kenzhe requested a livestock crossing towards Sam, while the second farming enterprise reported that existing railway severance has already reduced the usability of its holding and considered that a livestock crossing alone would not address the issue.
Implications for LARP preparation	Final impacts and appropriate mitigation should be determined on a plot-by-plot basis following confirmation of the detailed design and land requirements. The LARP should consider affected land rights, continued usability of remaining land, access to water and infrastructure, livestock movement, existing improvements and the preferences of affected land users, in accordance with the Project LARF and applicable requirements.

Annex 3. High-Level Environmental and Social Assessment of the Project's Associated Facility

According to the EBRD ESP (2024), the 273 km section of the Beineu-Bozoy-Saskaulsk Road (km 286 - km 559), to be financed by the ADB and DBK, together with its associated supporting infrastructure, including RMUs, access roads, and other auxiliary facilities, is considered an **Associated Facility** of the Project Road (km 0 - km 286).

The high-level E&S assessment of the Associated Facility has been carried out taking into account the following:

1. The Project Road section (km 0 - km 286) and the Associated Facility (km 286 - km 559) constitute two sections of the 559 km Beineu-Bozoy-Saksaulsk Road.
2. A local feasibility study has been prepared for the entire Beineu-Bozoy-Saksaulsk Road and reviewed by the Consultant.
3. A local EIA report has been prepared for the entire Beineu-Bozoy-Saksaulsk Road⁹⁹ and reviewed by the Consultant.
4. During the ESIA process, the Consultant reviewed the technical characteristics, components, and E&S baseline conditions of the Associated Facility section (km 286 - km 559).
5. There are significant similarities between the Project Road section and the Associated Facility in terms of their technical characteristics, environmental and social context, and potential E&S impacts.

The high-level E&S assessment has been conducted using the following impact magnitude matrix.

Magnitude	Suggested interpretation
Significant	Large-scale, long-term or irreversible impacts, impacts on highly sensitive receptors, or impacts that may require specific mitigation/management measures.
Moderate	Noticeable impacts affecting a wider area or more sensitive receptors, but generally manageable through standard mitigation.
Low	Limited spatial extent, short duration, low sensitivity of receptors and readily reversible/manageable effects.
NA / No material impact identified	No meaningful pathway for impact based on available information.

During the high-level assessment, the **confidence in** and **adequacy of the available information** are also taken into consideration.

Available data	Confidence
Detailed baseline and design information available	High
Reasonable information available, but some gaps remain	Medium
Limited information; assessment based largely on secondary data/professional judgement	Low

⁹⁹The local EIA has not yet undergone the state environmental examination

Table 55 - High-Level Impact Assessment of Associated Facility

No	E&S aspect / potential impact	Project phase	Available information / basis for assessment	Assessment of impact / magnitude	Rationale for magnitude rating	Additional measures / follow-up
1	Air quality - dust and gaseous emissions from construction activities, machinery and vehicle movement.	Construction	- Local FS document and EIA report, - Proposed BBS road alignment, - Location of sensitive receptors, - Overview of construction activities and environmental baseline data. <i>Adequacy of the available information: Medium.</i>	Moderate (due to its extent)	The assessment considers the scale and duration of construction (34 months, the same as for the Project Road section), the proximity of settlements and sensitive receptors, expected traffic volumes, and the potential similarity of impacts with those associated with the EBRD-financed section. There are no settlements within the 500-m buffer zone on either side of the road alignment between km 286 and km 559. The nearest settlement is Akеспе Village,	Typical construction phase air quality mitigation and dust suppression measures. Availability of the air emissions permits. Air Quality Monitoring Plan.
2	Noise and vibration - construction machinery, operations and increased traffic.	Construction / Operation	- Local FS document and EIA report, - Proposed BBS road alignment, - Location of sensitive receptors, - Traffic density forecasts, - Overview of construction activities and environmental baseline data. <i>Adequacy of the available information: Medium.</i>	From Moderate to Low	located approximately 735 m from the road alignment and 680 km from the DEU to be constructed (section km 450 - km 490).	Noise management measures during the construction to minimise impact on workers and fauna. Noise Monitoring Plan.
3	Surface water / water resources - pollution from	Construction / Operation	Local FS document and EIA report,	From Moderate to Low	There are no surface water resources within the footprint of the BBS Road section km 286 - km 559. However, this	Water protection and spill-prevention measures.

No	E&S aspect / potential impact	Project phase	Available information / basis for assessment	Assessment of impact / magnitude	Rationale for magnitude rating	Additional measures / follow-up
	construction and road operation.		- Proposed BBS road alignment, - Regional maps showing available water sources. - Overview of construction activities and environmental baseline data. <i>Adequacy of the available information: Medium.</i>		section of the road runs in the vicinity of the Small Aral Sea and the Aral Sea. The minimum distances from the road alignment to the following water bodies are: - Small Aral Sea / Butakov Bay: 6,290 m, - Small Aral Sea / Shevchenko Bay: 7,900 m, - Aral Sea / Tushchybas Lake: 9,120 m.	Water Quality Monitoring Plan. Maintenance of wastewater culverts and drainage systems during the operation phase.
4	Soil and contamination - soil disturbance, erosion and accidental contamination.	Construction	- Local FS document and EIA report, - Proposed BBS road alignment, - Overview of construction activities and environmental baseline data. <i>Adequacy of the available information: Medium.</i>	Moderate	Similarities with the Project Road section (km 0 - km 286) impacts on soil and geology. Soil contamination within the road footprint resulting from atmospheric deposition, as well as spills and leaks associated with construction activities and equipment. Volumes, storage/disposal of topsoil to be removed and spoil to be excavated from the road construction corridor. Erosion processes resulting from weather conditions and construction activities. Delivery routes, storage and use of construction and hazardous materials.	Set of measures required to avoid and minimize the impact on soil and geology. Spill Prevention and Response Plan. Hazardous Materials Management Plan. Topsoil and Spoil Management Plans. Soil Quality Monitoring Plan.
5	Waste and hazardous materials	Construction / Operation	- Local FS document and EIA report. - Volumes of earthworks and excavation works.	Moderate (due to its extent)	Similarities with the Project Road section (km 0 - km 286) in terms of waste generation, management activities, and practices.	Waste Management Plans for the construction and operation phases.

No	E&S aspect / potential impact	Project phase	Available information / basis for assessment	Assessment of impact / magnitude	Rationale for magnitude rating	Additional measures / follow-up
			- Overview of construction activities. - Specifications of construction and hazardous materials. <i>Adequacy of the available information: Medium.</i>			Availability of the relevant permits. Availability of contracts with specialized waste management companies.
6	Landscape / visual impacts	Construction / Operation	- Local FS document and EIA report. - Findings from site visits to the BBS Road area (km 286 - km 326). - Available photographs of the relevant road section. - Other linear infrastructure around the relevant road section. <i>Adequacy of the available information: Medium.</i>	Moderate, taking into account the absence of settlements along the road alignment	Similarities with the Project Road section (km 0 - km 286) in terms of potential irreversible changes to visual amenity. No settlements are located along the BBS Road section from km 286 to km 559.	Site Reinstatement and Rehabilitation Plan. Establishment and maintenance of green belts near sensitive receptors.
7	Traffic and access	Construction / Operation	- Local FS document and EIA report, - Traffic density forecasts, - Construction materials delivery routes to the relevant road section, - Correct connection between Beineu and Saksaulsk via the 1,460 km	Moderate	Similarities with the Project Road section (km 0 - km 286) in terms of expected traffic along the Project Road section. Traffic impacts from other road construction projects in Kazakhstan.	Traffic Management Plan. Relevant approvals from the regional and local authorities and Road Police.

No	E&S aspect / potential impact	Project phase	Available information / basis for assessment	Assessment of impact / magnitude	Rationale for magnitude rating	Additional measures / follow-up
			'Saksaulsk-Irgiz-Karabutak-Khromtau-Aktobe-Kandyagash-Dossor-Kulsary-Beineu' road. <i>Adequacy of the available information: Medium.</i>			
8	Biodiversity - habitat loss, fragmentation and disturbance.	Construction / Operation	- Local FS document and EIA report, - Proposed BBS road alignment, - Regional context of the biodiversity surveys conducted for the Project Road section, - Letter No 03-08/646I dated 10 July 2025 from the Kyzylorda Regional Territorial Inspectorate of Forestry and Wildlife of the Forestry and Wildlife Committee of the Ministry of Ecology and Natural Resources, - Available biodiversity studies, especially for Ustyurt saiga population. <i>Adequacy of the available information: Low.</i>	From Significant to Moderate	As per the Letter No. 03-08/646I from Inspectorate 'The area of the proposed road construction is a habitat and migration route for saiga antelopes. In addition, the Red Data Book-listed Great Bustard may occur in the area. The coordinates provided in the application do not include any forest fund lands or specially protected natural areas'. Vegetation to be cleared together with top-soil to be removed during the construction. Proposed wildlife passages over the road for Ustyurt saiga, including: - three passages in the Aktobe Region; and - ten passages in the Kyzylorda Region.	Biodiversity Action or Management Plan. Spring season biodiversity surveys. Critical Habitat Assessment. Revision of the proposed Ustyurt saiga passages over the relevant road section. Landscaping plan.

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9	Specially protected natural areas	Construction / Operation	- Local FS document and EIA report, - Proposed BBS Road alignment, - Available maps showing specially protected natural areas in Kazakhstan. <i>Adequacy of the available information: Medium.</i>	No meaningful pathway for impact based on available information	According to the local EIA study, there are no specially protected natural areas in the vicinity of the relevant road section (km 286 - km 559).	-
10	Cultural heritage	Construction	- Local FS document and EIA report, - Alignment of the road alignment, - Archaeological Assessment Report No AES-521 dated 30.06.2025, - Photos and gps locations of the identified cultural heritage units. <i>Adequacy of the available information: High.</i>	Moderate	Four cultural heritage units were identified within the 100 m buffer zone on either side of the road alignment, from which one site, single burial mound (Medieval period) is located within the 6 m from the road alignment and therefore will be directly affected.	Cultural Heritage Management Plan for the single burial mound located within the direct impact area. Rescue excavations for other archaeological sites and implementation of a Chance Finds Procedure during construction activities.
11	Community health, safety and security	Construction / Operation	- Local FS document and EIA report, - Letter No 3T-2025-02134259 dated 26 June 2025 from the Department of Sanitary and Epidemiological Control of	From Moderate to Low	Similarities with the Project Road section (km 0 - km 286) in terms of impacts on community health and safety. The Associated Facility road section passes through areas of the Aktobe Region that are considered natural plague-endemic areas.	Community Health and Safety Management Plan. Measures as per the 'Sanitary and Epidemiological Requirements for the Organization and Implementation of Sanitary

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			the Aktobe Region of the Committee for Sanitary and Epidemiological Control of the RoK Ministry of Healthcare. <i>Adequacy of the available information: Medium.</i>			and Anti-Epidemic Measures to Prevent Infectious Diseases (Plague and Cholera)' approved by Order No ҚР ДСМ-116 of the RoK Minister of Healthcare.
12	Occupational health and safety	Construction / Operation	- Local FS document and EIA report, - Overview of construction activities, - Equipment and machinery to be used during the construction, - Specifications of construction and hazardous materials.	Moderate	Similarities with the Project Road section (km 0 - km 286) in terms of impacts on occupational health and safety. OHS performance outcomes from similar completed and ongoing road projects in Kazakhstan.	Health and Safety Management Plans for the construction and operation phases. Worker Accommodation Management Plan and Code of Conduct.
13	Climate change / GHG emissions	Construction / Operation	- Local FS document and EIA report, - Traffic density forecasts, - Climate Country Risk Profile: Kazakhstan, ADB/World Bank, 2021, - The 8th National Communication and the 5th Biennial Report of the Republic of Kazakhstan to the UN Framework	Moderate	Similarities with the Project Road section (km 0 - km 286) GHG emissions. GHG emissions and exposure/vulnerability of the road to climate-related hazards. Shared Socioeconomic Pathway (SSP2-4.5 and SSP5-8.5) scenarios.	Climate resilience and appropriate design measures. Green Economy Transition report.

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			Convention on Climate Change, 2023. <i>Adequacy of the available information: Medium.</i>			
14	Land acquisition / economic displacement	Construction	- Local FS document and EIA report, - Proposed BBS road alignment, - Preliminary land allocation and land-use information, - Land acquisition and livelihood impact assessment undertaken for the Road section km 0 - km 286, including the Project LARF. <i>Adequacy of the available information: Medium.</i>	Moderate	Permanent land acquisition will be required for the road and associated infrastructure. Based on the available information, the affected land is expected to comprise primarily state reserve land with limited current economic use and pastureland leased to farming enterprises. Impacts on state reserve land are expected to be limited where the land has little or no productive use. Acquisition of leased pastureland may result in direct loss of grazing area and, potentially, land severance and restrictions on access to remaining pasture, water sources and livestock infrastructure. Experience from the Project Road section (km 0 - km 286) indicates that fragmentation and access restrictions may be more important than the absolute area of land acquired. No physical displacement is anticipated based on the information currently available.	Prepare a Land Acquisition and Resettlement Framework (LARF) in accordance with the applicable financier requirements. Following completion of the detailed design and confirmation of the final land acquisition footprint, prepare a Land Acquisition and Resettlement Plan (LARP). Implement the LARP prior to taking possession of affected land or restricting access, including payment of compensation for affected land use rights, assets and economic losses and implementation of livelihood restoration and access restoration measures, where required. Monitor and document LARP implementation, including verification of compensation

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						payments, implementation of livelihood restoration measures, restoration of access and resolution of land acquisition-related grievances.
15	Socio-economic impacts / local economy	Construction / Operation	- Local FS document and EIA report - Project description and regional transport context, - Findings of the ESIA socio-economic assessment and stakeholder consultations for the Project Road section (km 0–km 286), - Expected similarities in construction activities and operational benefits across the BBS Road. <i>Adequacy of the available information: Medium.</i>	Moderate (positive overall)	Construction is expected to create temporary employment and business opportunities, while construction traffic and access restrictions may cause temporary disturbance to land users. During operation, the road is expected to provide long-term socio-economic benefits through improved regional connectivity, reduced travel time and transport constraints, and better access to markets, supporting livestock farming, trade and roadside services.	Local Employment Programme and transparent local recruitment procedures. Local procurement measures, where practicable, to facilitate participation of local businesses, farmers and service providers. Maintain access to land and existing economic activities during construction, where practicable. Coordinate with relevant regional and district Akimats regarding opportunities for roadside services and other local economic development associated with the new road.
16	Gender impacts - access to employment and economic opportunities,	Construction / Operation	- Local FS and EIA report; - Socio-economic characteristics of the Associated Facility area;	Moderate to Low	Construction may create temporary employment and business opportunities for women, although their participation may be constrained by existing employment patterns, household and childcare responsibilities and limited	Undertake a gender assessment as part of the detailed E&S assessment of develop appropriate gender-related measures, including measures to promote

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	mobility and community safety		- Gender assessment undertaken for the Project Road section (km 0–286); - Similarity of potential socio-economic impacts between the Project Road and Associated Facility. <i>Adequacy of available information: Low to Medium.</i>		access to business opportunities. Potential gender-related risks may also arise from the presence of the construction workforce and associated GBVH and community safety risks. During operation, improved road connectivity may have positive gender impacts through improved mobility and access to employment, markets and services, and increased opportunities for women's small businesses and income-generating activities.	women's access to employment and business opportunities. Develop and implement a Gender Action Plan (GAP) and a Gender-Based Violence and Harassment Prevention and Response Plan for the construction phase.