BALASAUSQANDIQ VANADIUM MINING AND PROCESSING PLANT PROJECT

Environmental and Social Impact Assessment

SCOPING REPORT

69.07.E

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LIST OF ABBREVIATIONS

AMD	Acid Mine Drainage
AMV	Ammonium Metavanadate
ARDML	Acid Rock Drainage and Metals Leaching
BAT	Best Available Technology
CCHF	Crimean-Congo Haemorrhagic Fever
CMP	Construction Management Plan
CR	Critically Endangered
EBRD	European Bank for Reconstruction and Development
EP	Equator Principles
E&S	Environmental and Social
ESAP	Environmental and Social Action Plan
EIA	Environmental Impact Assessment
EME	Extreme Meteorological Events
EMP	Environmental Monitoring Programme
ESIA	Environmental and Social Impact Assessment
ES	Ecosystem Services
ESMS	Environmental and Social Management System
EU	European Union
FAR	Ferro-Alloy Resources
FS	Feasibility Study
GRP	Gross Regional Product
HCH	Historical and Cultural Heritage
HMP	Hydrometallurgical Plant
IBA	Important Bird Areas
ICMM	International Council on Mining and Metals
ICP	Informed Consultation and Participation
IEC	Industrial Environmental Control
IFI	International Financial Organization
ILO	International Labor Organization
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
LC	Least Concern
LLP	Limited Liability Partnership
MPP	Mining and Processing Plant
MRE	Mineral Resource Estimate
MSW	Municipal Solid Waste
NAG	Non-Acid Generating

NT	Near Threatened
NTS	Non-Technical Summary
NW	Northwest
MPC	Maximum Permissible Concentration
MS	Meteorological Station
OB	Ore Body
PA	Protected Areas
PAG	Potentially Acid Generating
PIS	Pilot Industrial Site
PIU	Pilot Industrial Unit
PS	Performance Standards
RK	Republic of Kazakhstan
ROM	Run-of-mine
SEP	Stakeholder Engagement Plan
SER	State Environmental Review
SPZ	Sanitary Protection Zone
SRMRW	Sanitary Rules for the Management of Radioactive Waste
tpa	tonnes per annum
TSF	Tailings Storage Facility
VAT	Value Added Tax
VOCs	Volatile Organic Compounds
VU	Vulnerable Species
WA	Wetland Area

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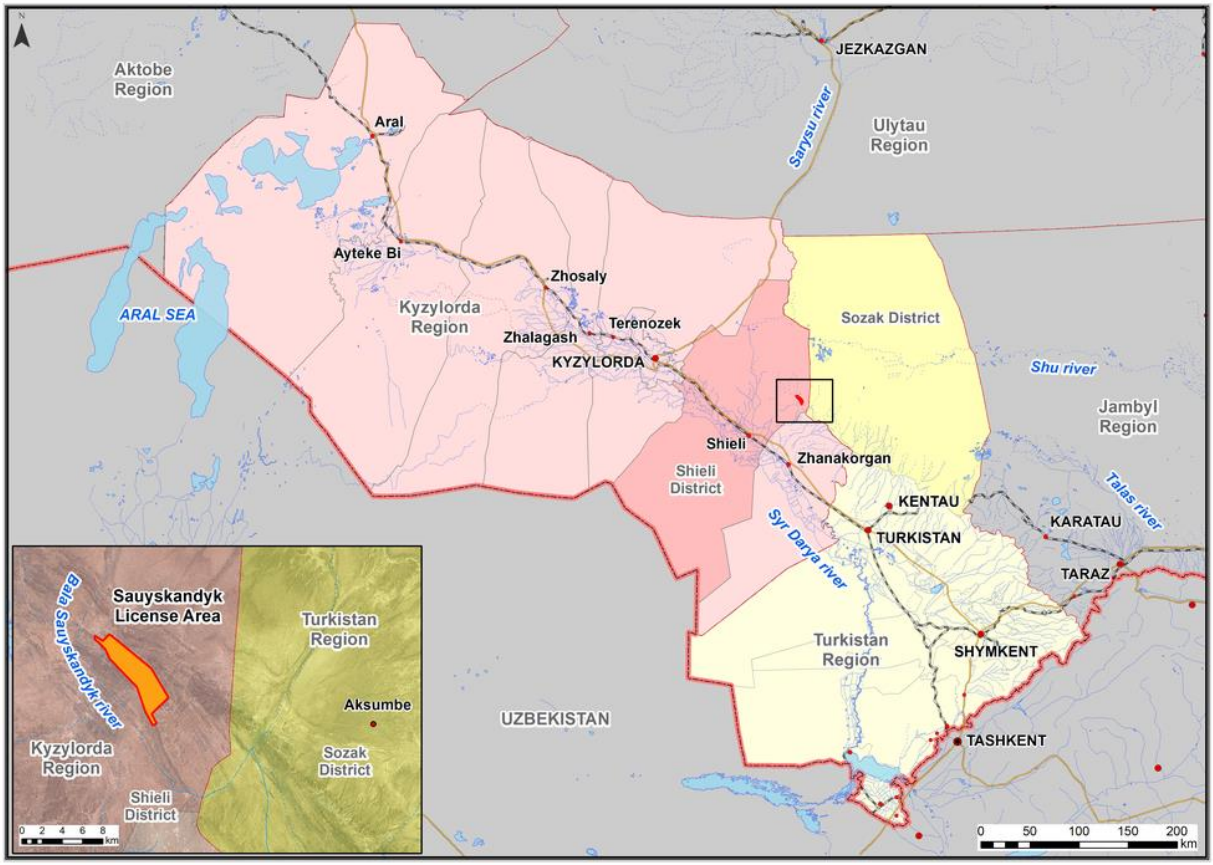
1 INTRODUCTION

The Balasausqandiq deposit is a very large black shale deposit containing vanadium and valuable by-products: uranium, molybdenum, aluminium, rare earth metals and carbon. The deposit is in the Shieli District of the Kyzylorda Region, 70 km northeast of the district centre – Shieli village, in the spurs of Karatau (**Figure 1**). The nearest settlement is Aksumbe village (9 km from the Project site) located in the Sozak District of the Turkestan Region.



Source: developed by the Consultant

Figure 1. Project Location

The license for the right to use subsoil resources was issued to Firma Balausa LLP (hereinafter referred to as the "enterprise"), which is part of the Ferro-Alloy Resources group of companies (hereinafter referred to as "FAR").

1.1 Existing operations

Firma Balausa LLP operates based on a certificate of state re-registration of a legal entity No. 134-1933-08-TOO (IU) dated April 1, 2009, issued by the Department of Justice of the Kyzylorda region and license No. 0003232 dated September 29, 2009 for the right to use the subsoil of the Balasausqandiq vanadium deposit.

Currently, Firma Balausa LLP produces ammonium metavanadate (AMV) and nickel concentrate:

- The ore mineral – vanadium-containing quartzites of the Balasausqandiq deposit – is mined in the experimental quarry of Firma Balausa LLP by open-pit mining. Vanadium-containing raw materials are processed by hydrometallurgical methods with vanadium extracted by autoclave leaching.

- In recent years, other types of raw materials containing vanadium have been processed such as iron-containing concentrate and spent vanadium catalyst., The raw materials are roasted to increase the efficiency of the technological process.

The operation has four facilities (**Figure 3**).

- A pilot industrial site[1];
- An open pit;
- A shift worker camp;
- An office.

Figure 2. A small shallow pit developed in the northwestern part of the OB1 deposit. View to the northwest (SRK, 2024)

Currently FAR is not actively mining but a small, shallow open pit has been historically mined on the NW part of ore body 1 (OB1) since 2009 to provide feed for the pilot processing plant (**Figure 2**). This small-scale operation produced ca. 15,000 tonnes per annum over a period of several years. Much of the mined material has been stockpiled at site. A much older pit was mined in the centre of OB1 in 1971 during the Soviet era with a total of 12,000 tonnes of mineralised material. A small stockpile remains on site from that mining activity.

1.2 Development Project

FAR is developing a Feasibility Study (FS) for the construction of a mining and processing plant (MPP) based on the Balasausqandiq vanadium deposit (the “Project”). The company plans to install equipment that will increase production and process AMV into more widely sold vanadium pentoxide (V_2O_5). A phased increase in production is planned to achieve output of 25.8 thousand tonnes of vanadium pentoxide per year.

A two-stage increase in production is planned:

- Phase 1 - up to 1.65 million tonnes per year;

[1] According to the reporting and permitting documentation, the processing of ore and raw materials is carried out at the pilot industrial site (PIS). However, in the documentation of Firma Balausa LLP, other names are also used: hydrometallurgical plant (HMP); pilot industrial unit (PIU). In this paper, we use these terms as equivalent.

- Phase 2 - up to 5 million tonnes per year.

The Phase 1 Feasibility Study was completed in accordance with national Kazakh standards and is currently being updated in accordance with international standards.

The Project will be implemented in accordance with the Equator Principles, version 4 (hereinafter referred to as “EP 4”) and the International Finance Corporation’s Environmental and Social Sustainability Performance Standards, version 2012 (hereinafter referred to as “IFC PS”). The IFC PS and EP 4, Category A projects (the Project is Category A) require a full-scale Environmental and Social Impact Assessment (ESIA). A consortium of organisations Ecoline International (Bulgaria) and Green Bridge (Kazakhstan), (hereinafter referred to as “the Consultant”) has been appointed to conduct the ESIA.

2 PROJECT DESCRIPTION

Unless indicated otherwise, the information in this section is based on SRK's Project Description Update (29 March 2024), which is extracted from the ongoing Feasibility Study (FS).

2.1 The Proponent

FAR[2] was founded in 2000 as a holding company and is registered in Guernsey, the Channel Islands, UK. FAR owns four subsidiaries based in the UK and Kazakhstan, including Firma Balausa LLP, which is implementing the Project under the leadership of FAR.

As part of the Project, it is planned to build an additional processing plant near the existing production facility. The new plant will operate independently of the existing production facility plant, increase production and process AMV into the more widely sold vanadium pentoxide (V_2O_5).

2.2 The Project

The Project will comprise an open pit mining operation and the construction and operation of a new processing plant and associated tailings storage facility ("TSF"). The depth and extent of the mine workings will be determined through the mining study. The Project's mining licence defines a mining rate of up to roughly 1.65 Mtpa, but the final mine plan will be produced during the mining study as part of the FS.

FAR intends to develop in stages, following the natural growth of the vanadium market, enabling later development stages to be substantially financed by earlier stage earnings. This relatively slow development plan can be revised if there is a significant increase in demand, for example, for vanadium flow batteries for energy storage.

A two-stage development is currently projected, starting at 1.65 Mtpa (Phase 1) producing about 8,600 tonnes of vanadium pentoxide (V_2O_5) per annum and increasing to 5 Mtpa (Phase 2) with an additional 17,200 tonnes of vanadium pentoxide. The ESIA's scope is only for the Phase 1 development. FAR has appointed SRK to develop a mine plan and preliminary layout of project infrastructure with alternative locations for the processing plant, mine waste disposal and other facilities.

The ore processing is also being developed as part of the Project Phase 1 Feasibility Study in accordance with national and international standards (the FS includes full exploration of Ore Body 1 containing 23 million tonnes of vanadium (and by-product) reserves).

2.3 Project Location

The Balasausqandiq Project is in the Shieli District of Kyzylorda Region, Kazakhstan. Shieli village is about 70 km west of the site (**Figure 1**). The nearest city is Kyzylorda, 200 km west of the mine with Astana (the capital city) approximately 1200 km north.

[2] FAR was founded in 2000 as a holding company and owns a number of subsidiaries based in the UK and Kazakhstan. https://ferro-alloy.com/ru/, including Firma Balausa LLP, which implements the Project under the leadership of FAR.

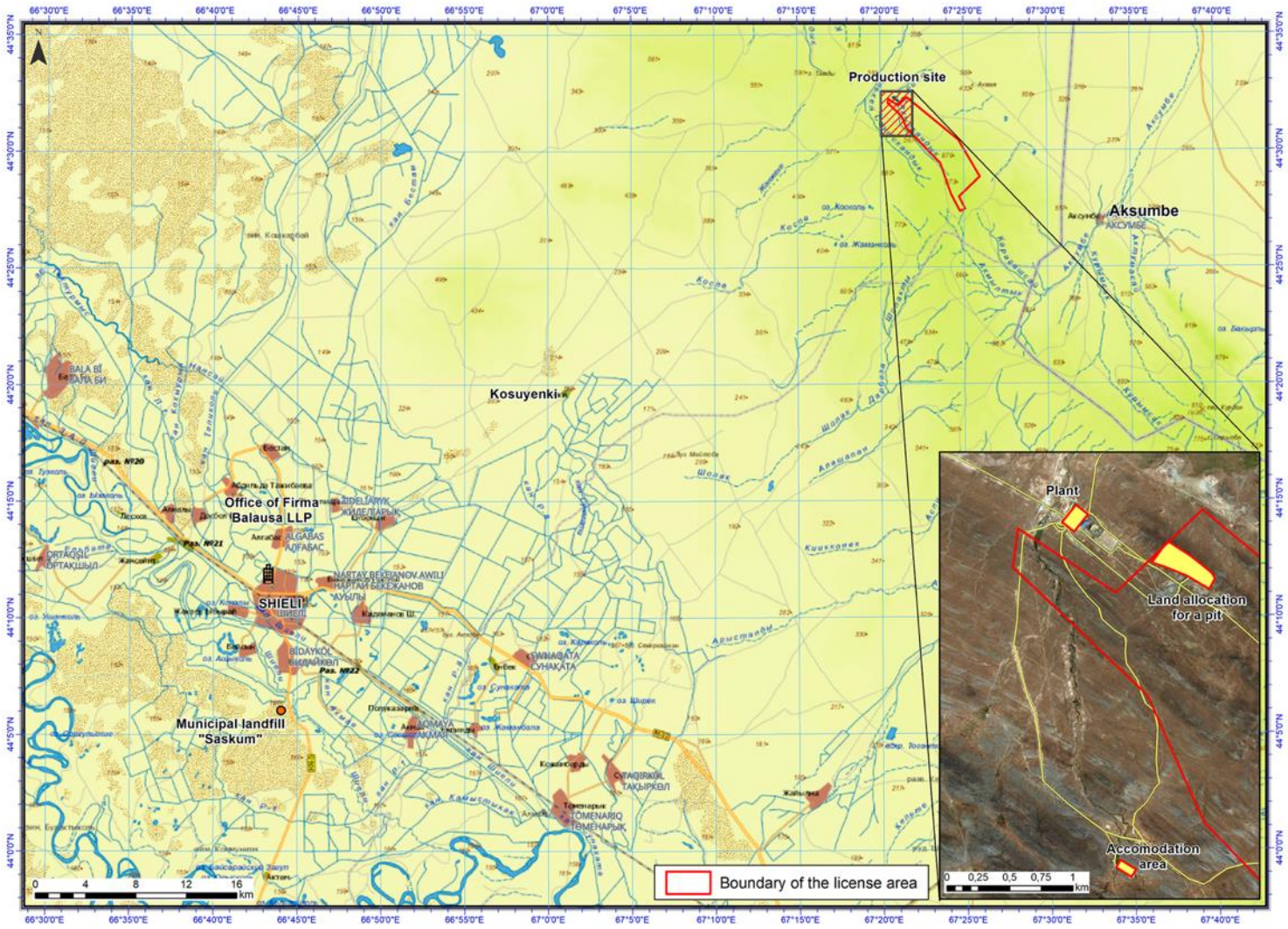


Figure 3. Currently operating facilities of Firma Balausa LLP. The Overview map.

2.4 Resources and Reserves

The Balausa vanadium deposit (Ore bodies OB1, OB2, OB3 and OB4) was discovered in the late 1940s. Ongoing exploration drilling has occurred at various intervals over the subsequent 70 years. The deposit has been subject to several Soviet era resource estimates by State Reserve Committee and a more recent JORC[3] Mineral Resource Estimate ("MRE") completed by GBM in 2018.

Ore body OB1 is a stratiform vanadium pentoxide deposit preserved in a synformal keel (v-shaped – see **Figure 5**) of highly folded carbonaceous shales with a strike length[4] of almost 4 km. It is one of several such ore bodies in the licence area. Although not needed for the FS for Phase 1 of the Project, the adjacent ore bodies OB2, OB3 and OB4 are currently undergoing an infill and verification drill programme similar in scope to that of OB1.

The JORC Mineral Resource Estimate (GBM, 2018) was based on drill and trench sections 500 m apart. Upon review, SRK considered 250 m was required for defining the deposit geometry and grade to an indicated level of confidence. SRK recommended an infill drill and trench programme to provide a greater confidence which was completed in late 2022. A pit optimisation study has also been conducted to provide reasonable prospects for eventual economic extraction.

An MRE conducted in accordance with JORC (dated 30 April 2023) based on both the historic and latest infill and verification drill and trench programme for V_2O_5, U (uranium), Mo (molybdenum) and C (carbon) defined an Indicated Mineral Resource of **32.89 million tonnes** (Mt) at a mean grade of 0.62% V_2O_5 (with a 0.4% V_2O_5 cut-off grade) (**Table 1**). Neither measured nor estimated resources are reported.

Table 1. Summary MRE Report for OB1 Resource (30 April 2023) (with a cut-off grade of 0.4% V_2O_5) (SRK, 2024)

CLASSIFICATION	WEATHERING	Mass	Average Value				Material Content			
			V_2O_5	Mo	U	C	V_2O_5	Mo	U	C
		Million tonnes	%	%	%	%	tonnes	tonnes	tonnes	tonnes
INDICATED RESOURCE	Oxide	1.56	0.67	0.0139	0.0047	7.16	10,560	216	73	112,151
	Transitional	1.25	0.66	0.0138	0.0045	7.17	8,260	172	56	89,869
	Pure - sulphide	30.08	0.61	0.0150	0.0052	8.82	184,814	4,523	1,554	2,655,454
	Total	**32.89**	**0.62**	**0.0149**	**0.0051**	**8.68**	**203,634**	**4,911**	**1,683**	2,857,473

2.5 Project Phases

Four phases of the life of mine will be assessed in the ESIA, namely:

1. Construction: an approximate period of 2 years during which mine facilities are constructed, and overburden stripped from the pit area in preparation for mining. Construction is expected to commence in late 2025.
2. Operations: an approximate 20 year period of open pit mining, ore processing, production and export and tailings deposition.

[3] The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves ('the JORC Code') is a professional code of practice that sets minimum standards for Public Reporting of minerals Exploration Results, Mineral Resources and Ore Reserves.

[4] The longest horizontal dimension of a body or zone of (potentially exploitable) material in bedrock.

3. Closure: 18-month period during which mining infrastructure is decommissioned and removed (where possible) and affected land is rehabilitated and revegetated.
4. For the ESIA, the term 'post-closure'[5] is used to describe the period after closure of the mine. Post-closure has been considered where effects of the project extend beyond the closure period (e.g. management of discharges and formation of pit lakes post closure). The ESIA assesses effects and impacts in the post closure period up until closure objectives have been met and environmental monitoring indicates that active management of the site is no longer required. In general, the post closure period is some 5–10 years depending on the residual risks.

Scheduling of construction and operations will occur in later stages of the FS development.

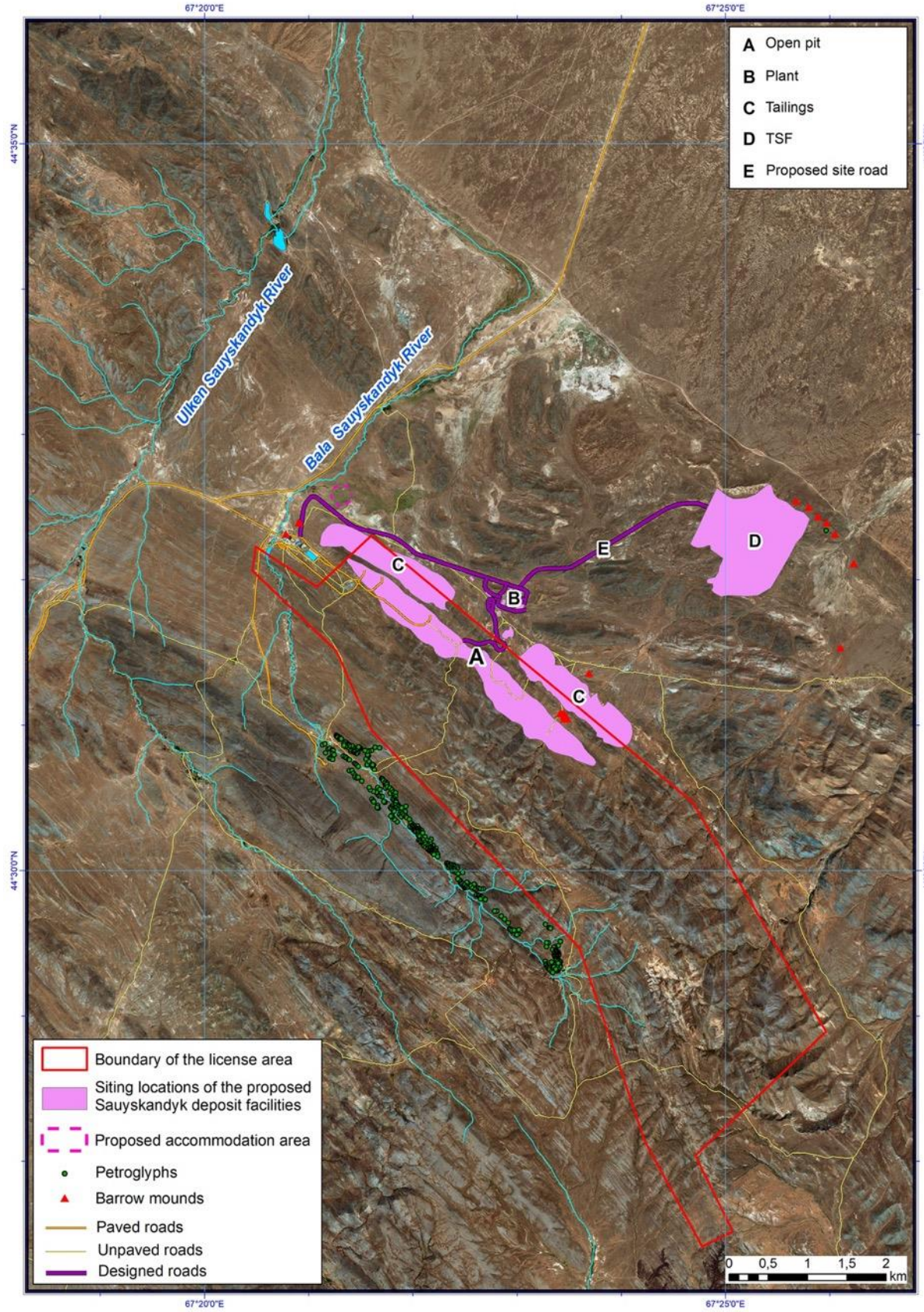
2.6 Project Facilities and site plan

The site plan in its current state is provided on **Figure 3**. The layout is still being developed and so does not yet contain all elements. Those already shown might also change. The mining licence area and contours of Ore Body 1 (OB 1) are shown below (**Figure 4**).

2.6.1 Open Pit

The mining FS is ongoing and the ultimate pit and waste rock dumps configurations are still to be defined, with only a preliminary site outline being available.

[5] For the purposes of the ESIA, the term "post-closure" is used to describe the period after the mine has closed.



Source: developed by the Consultant

Figure 4. The mining licence area within which project facilities are shown

A conceptual plan of the open pit (plan and section views) based on the MRE report is presented below (**Figure 5**). As more technical studies are completed, the design of the open pit is subject to change. The annual mill feed production target is set at 1.65 Mtpa of Run-of Mine (RoM) (i.e. diluted ore tonnes). It is currently expected to convert the entirety of the Indicated classified material as part of the Resource to Ore Reserves.

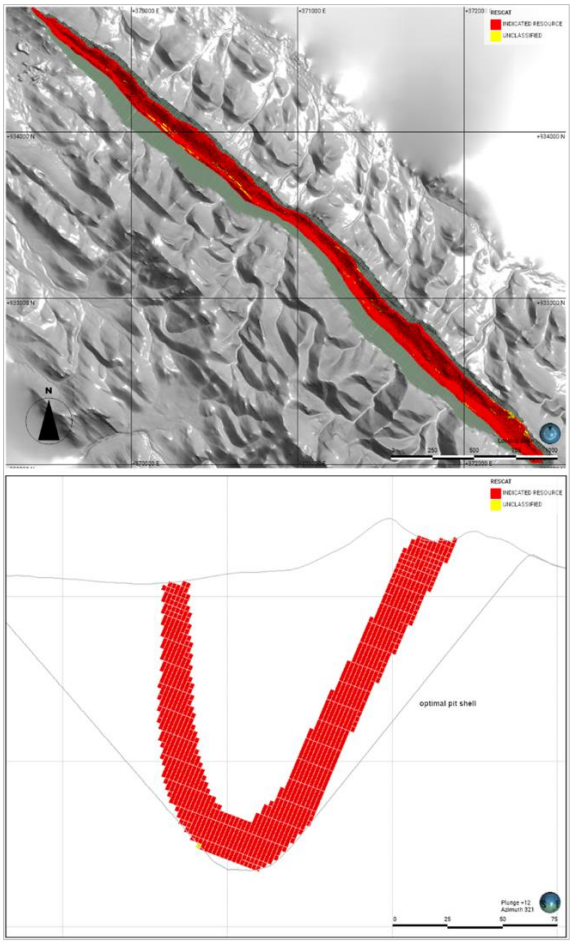


Figure 5. Plan (above) and section view (below) showing Indicated Resource within an optimal pit shell. The sections within the defined optimal pit shell that is not Indicated Resource will manifest as waste rock.

2.6.2 Waste Rock Dumps

Preliminary locations for the waste dumps are planned north of the mine site, near the western and southern boundaries of the processing plant. However, the final design will be developed later in the FS once the detailed pit design is finalized and the required waste rock capacity defined.

The acid generating potential of the waste rock is currently being assessed to define the construction methodology of the waste rock dumps to prevent acid rock drainage and metals leaching (ARDML) risk.

2.6.3 The Ore processing plant and process

The ore processing plant is expected to use the following preliminarily determined minerals recovery process.

2.6.3.1 Ore-processing

Tetra Tech Limited (“Tetra Tech”) was contracted to assist in confirming a technological process developed by FAR, including design and costing of process and selected non-process

infrastructure. This work is ongoing, so information presented below is tentative. The process is presented schematically below (**Figure 6**).

2.6.3.2 Crushing and grinding

Run-of-mine (ROM) which is the material excavated from the pit, is crushed then sent to a grinding area equipped with grinding mill and ball milling. Water is introduced into the milling which is conducted in a closed-loop with a hydrocyclone. The hydrocyclone separates the required particle size for further processing while sending the coarser particles back for further milling. Hydrocyclone overflow is directed to a mill thickener, where over two thirds of the water is removed and recycled back to milling.

2.6.3.3 De-carbonisation

The discharge containing the desired minerals is then de-carbonised where inorganic carbon is converted to gas and minor leaching occurs, under ambient pressure and temperature. Leaching is the treatment of ore with chemicals converting the valuable metals within the ore, into soluble salts while the remainder of the ore remains insoluble.

2.6.3.4 Autoclave leaching circuit

From atmospheric leaching, the product is filtered, made into a pulp, and sent to the Autoclave Leaching Circuit. The autoclave will use elevated heat and pressure to accelerate the leaching process, which leads to release of all valuable components such as vanadium, uranium and molybdenum into the solution. Residual acid that is not utilised in PAL is recirculated back to Atmospheric leach.

2.6.3.5 Carbon concentrate recovery

Flotation will then be used to recover a carbon concentrate which will be transported elsewhere for further product recovery. Flotation is a mineral processing method for separating and concentrating ores by altering their surfaces to a hydrophobic (repelled by water) or hydrophilic (attracted to water) conditions. Air is passed through the solution where the hydrophobic particles attach to the air bubbles that float to the surface creating a froth which then contains the desired particles.

2.6.3.6 Vanadium recovery

The solution containing vanadium is further neutralised, filtered, oxidised using hydrogen peroxide and then sent for adsorption in a similar fashion to uranium and molybdenum (described above). Once the resin is at full capacity however, it undergoes desorption, resulting in a concentrated vanadium solution that is then turned into an ammonium metavanadate slurry by adding ammonium-based reagent. This slurry is then filtered, dried and decomposed using a calciner to produce vanadium pentoxide (V_2O_5). The calciner is used to heat and dry the metavanadate slurry with restricted oxygen supply. The vanadium pentoxide is then flaked and packaged for sale.

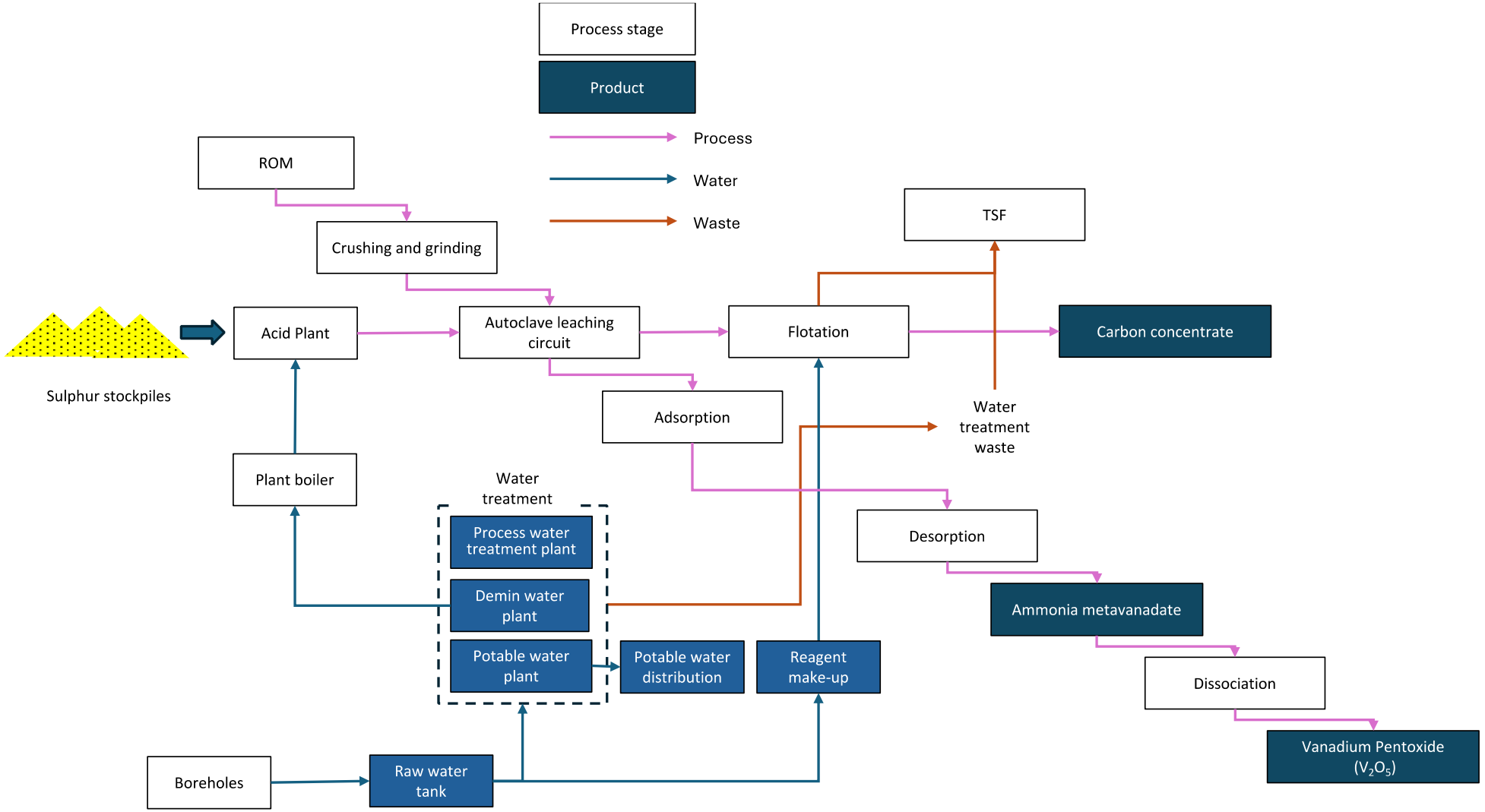


Figure 6. Preliminary Description of Technological Process (Tetra Tech, 2023)

2.6.4 Tailings and tailing storage facility (TSF)

Tailings are the resultant, typically valueless material that is a waste from the processing. In this case though, solid residue from the PAL circuit is mainly the carbon rich cake that can be sold.

The TSF is required for the safe, permanent disposal of tailings from the minerals recovery process. Tailings are the generally valueless component of the ore once it has been through minerals processing for recovery of the minerals. Tailings are typically extremely fine because the ore needs to be crushed and ground to a consistency small enough to be able to extract the minerals. Tailings are also typically wet because the crushed ore has been mixed with water to create a slurry that can be processed. A tailings storage TSF site investigation programme is ongoing for Balasausqandiq with the goal to find an optimal location for the facility. The currently preferred location is provided in **Section 3. Alternatives**.

2.6.5 Water Supply

Water supply options are being explored. A site for the extraction of groundwater exists and extraction rights are secured. Although historic records show adequate supplies, a test programme has been started to ensure that aquifer characteristics remain fit for purpose. The drilling of a test-borehole and pump testing has been completed (FAR, 2024).

2.6.6 Power Supply and Energy Use

In 2021, the Company connected to a nearby 110kV powerline and is currently able to take up to three MW. Although subject to more exact estimation as the design work progresses, the current expectation is for a requirement of up to 15 MW for the planned mine and plant. The current line and connection can, with little modification, supply up to this level and negotiations are ongoing with the line's owners to confirm this availability (FAR, 2024). There are several powerlines in the area and other options will be considered in the FS.

2.6.7 Transport infrastructure

The internal mine road, which will connect the mining and processing plant facilities, and the main access road is depicted in **Figure 4**. This access road will be designed during the FS. Currently, the Company uses existing local roads for transportation, as well as an access road to the existing facilities.

2.6.8 Employment and labour accommodation

The Project will require both construction and operations workforces, creating employment for both men and women. The estimates of the required workforce are not yet available. However, given the scale of planned development, it is assumed that several hundred direct construction jobs will be created; and around the same number of jobs will be provided over the 20 years or more of mine operations.

All project stages will be rotational, and a new rotational village will be built for workers (**Figure 4**).

2.6.9 Associated facilities

This Project has no associated facilities. Main and auxiliary facilities and internal and external infrastructure (such as the access and haul roads and the power transmission line(s) to the plant) will be implemented by the Company, are thus part of the Project and included in the scope of the ESIA.

2.7 Environmental and Social Aspects for the Project

For each identified activity it is necessary to identify associated environmental and social (E&S) aspects. E&S aspects are defined as 'an element of an organisation's activities, products or services that can *interact* with the environment', and it is the identification and quantification of the aspects that provides the key to assessing impacts. The E&S aspects of

the proposed Balasausqandiq Project are presented in **Table 2**. As the design progresses, this table will be populated with specific data that will be used as the basis of the ESIA. All information will be included in the ESIA report and disclosed during the consultation process.

Table 2. Listing of E&S aspects associated with the activities that would be conducted on the proposed Balasausqandiq Project

Category	Aspect			Quantity	Units
Use of resources	Water	Industrial			m^3/annum
		Potable			m^3/annum
		Reuse/Recirculation			m^3/annum
	Energy	Mining			MWh/annum
		Concentrator			MWh/annum
		Other Infrastructure			MWh/annum
		Tailings storage facility			MWh/annum
		Liquid fuels			m^3/annum
		Gas			m^3/annum
	Land	Mine pits			Ha
		Stockpile areas			Ha
		Waste rock dump areas			Ha
		Overall mine area including concentrator			Ha
		TSF			Ha
	Raw materials	Explosives			tonnes /annum
		Antiscalant			tonnes/annum
		Lubricants			tonnes/annum
		Other hazardous materials			tonnes/annum
		Other non-hazardous materials			tonnes/annum
Emitted substances	Products	RoM, Carbon Concentrate, Ammonium metavanadate, V_2O_5			tpa
	Atmospheric emissions	Blasting	PM		tpa
			NOx		tpa
		Loading trucks	PM		tpa
		Stockpiling / reclaiming	PM		tpa
		Dumping of waste rock	PM		tpa
		Crushing and grinding	PM		tpa
		Mine haul roads	PM		tpa
		TSF	PM		tpa
		Tail-pipe emissions	PM		tpa
			NOx		tpa
			SOx		tpa
			VOCs		tpa
		Other fuel burning appliances	PM		tpa
			NOx		tpa
			SOx		tpa
			VOCs		tpa
		Greenhouse gasses			tpa CO_2 eq
	Effluent	Mine water			Mm^3/annum
		Impacted stormwater			m^3/annum
		Sewage			m^3/annum

Category	Aspect			Quantity	Units
		AMD			n/a
		Positive water balance discharge			m^3/annum
	Waste	Waste rock	PAG		tpa
			NAG		tpa
		Industrial waste			tpa
		Tailings			tpa
		MSW			tpa
		Hazardous waste	TBC		tpa
		Medical waste			kg/annum
		Waste oil			L/annum
	Energy emitted	Noise			dBA
		Vibration			dB
Social and economic	Jobs (construction)				personnel
	Jobs (operations)				personnel
	Spending	Total Operating Costs			USDm
		Total Capital Expenditure			USDm
		Tax revenues (regional)			USDm
		Tax revenues (national)			USDm
		Wages (per skill level)	1		USD
			2		USD
			3		USD
			4		USD
			5		USD

3 ALTERNATIVES

The following alternatives have been considered at the ESIA scoping stage:

- 'Zero' alternative,
- Alternative locations of the Project facilities (TSF, plant, waste dump sites).

3.1 'Zero' Alternative

The 'zero' alternative involves the rejection of the planned activity. In this case, the development of the districts and oblasts (regions) will continue as currently without the economic inputs from the mine. The 'zero' alternative and alternative options will be assessed in detail within the framework of the full-scale ESIA.

3.2 Alternative locations of Project facilities

Alternative locations are only considered for the TSF: seven siting options were initially identified of which locations 1,4,5,6 and 7 were selected for further investigation based on technical and economic assessment parameters. Key parameters for each potential location are summarised below (**Table 3**). Possible locations of the TSF relative to potential locations of the processing plant and open pit are shown in **Figure 7.**

Table 3. Key Geometric Parameters of TSF Volumetric Models

Key Parameter	Potential TSF Location				
	1	4	5	6	7
Tailings Storage Capacity (Mm^3)	15.9	16.0	15.8	16.0	16.0
Maximum Embankment Height (m)	31.0	29.0	25.5	28.0	25.0
Construction Material Volume Required (Mm^3)	2.4	2.2	4.5	5.0	4.9
Pipeline Distance from Production Area (km)	4.4	5.0	6.4	6.3	8.6
Total Surface Area (Mm^2)	1.6	1.7	1.7	1.6	1.7

The subsequent site selection study for the TSF is based on design criteria detailed in **Table 4**.

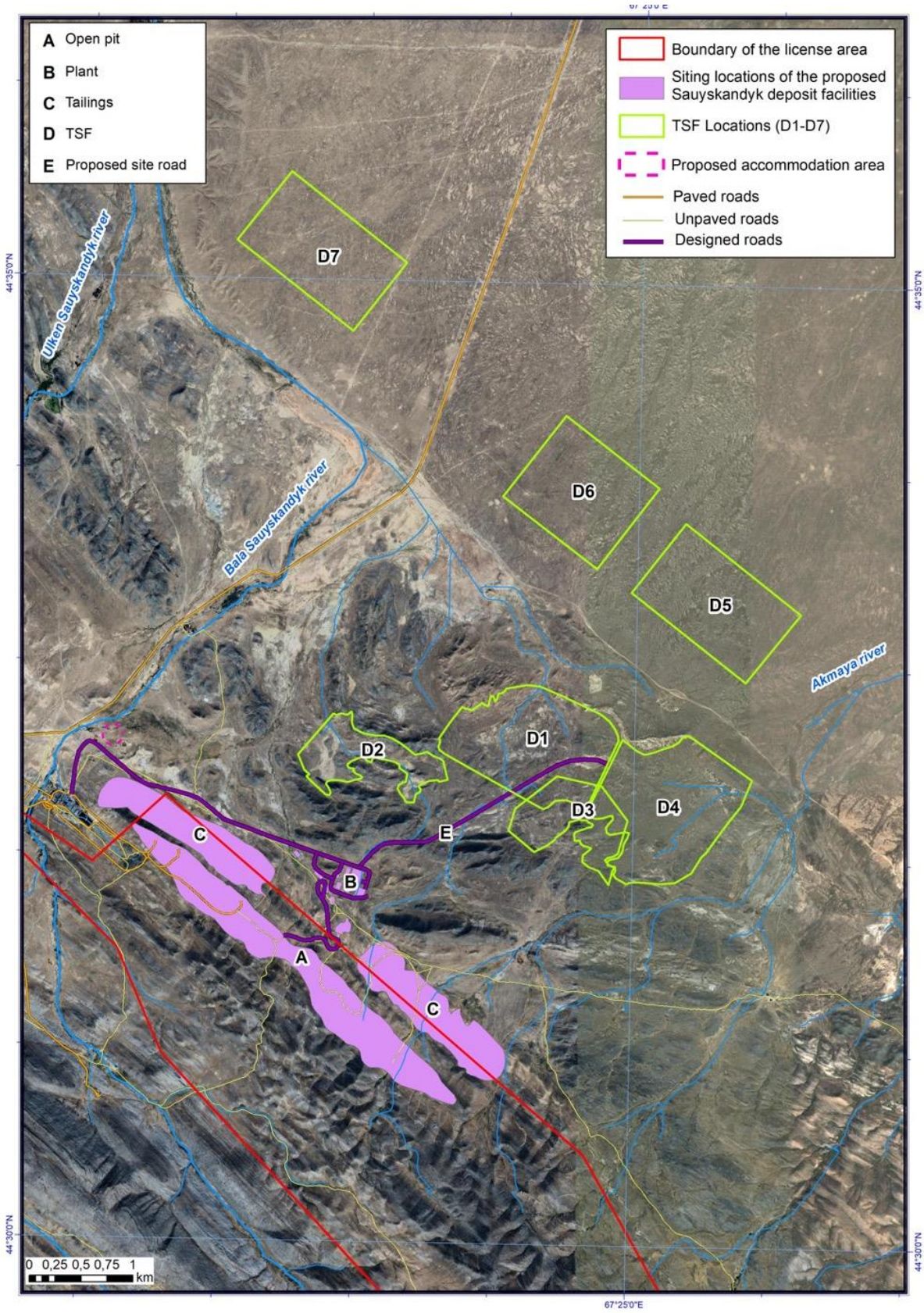
Table 4. TSF Design Criteria.

Design Criteria	Parameter Value
Life of Mine	20 Years
Tailings Type	Conventional Slurry Tailings
Tailings Production Rate	1.65 Mtpa
Assumed Tailings Dry Density	1.4 t/m^3*
Tailings Storage Capacity Requirement	15.7 Mm^3
Minimum Freeboard on TSF	2 m
Tailings Beach Angle	0°
Construction Method	Downstream Raising**
Upstream Tailings Dam Slope Ratio	3H:1V[6]
Downstream Tailings Dam Slope Ratio	3H:1V
Tailings Dam Crest Width	10 m
Engineered Basal Liner System	Required

**Tailings dry density is a conservative estimate based on SRK's past project experience with conventional unthickened slurry tailings in the CIS region*

***SRK has conservatively assumed the downstream construction method of dam raising, considering the proximity of a geological fault to the project site and the lack of information on fault activity.*

[6] Geometric slope is 3 units horizontally to the right and 1 unit vertically upward.



Source: developed by the Consultant

Figure 7. Possible TSF locations. As described in the text, these will be finalised once the exact tailings volumes have been finalised (SRK, 2024)

Based on currently available site investigation data, the following has been concluded:

- Five potential TSF sites (Locations 1, 4, 5, 6, and 7) offer adequate tailings storage capacity for the tailings volumes that will be produced over the life of mine:
  - Location 1 and Location 4 are within the area required for mine infrastructure;
  - Locations 5, 6 and 7 are outside the area required for mine infrastructure.
- Site 4 has the following advantage over all other locations:
  - Minimal volumes of construction material.
- Site 4 has the following advantages over Sites 5, 6 and 7:
  - Relative proximity to the future production site and requires comparatively shorter lengths of tailings feed and return water pipelines, as well as lower energy costs for pumping during operation;
  - Several topographic features that are conducive to the construction of tailings dams reducing the amount of construction material required;
  - Detailed topographic information is available providing comparatively more accurate volumetric modelling;
  - Within an area designated for mining infrastructure, meaning that the mine is likely to already have land use permission for the area.
- Site 4 has the following advantages over Site 1:
  - No obvious signs of major stormwater drainage or surface runoff.
  - Is located further from mining infrastructure, reducing the risk of damage to or destruction of mining infrastructure in the event of a catastrophic failure of the TSF.
- Neither site has direct access to sufficient quantities and quality of sources of construction materials to construct the TSF.

Based on the preliminary multi-criterial analysis of alternative TSF locations, Site 4 is considered as the most suitable option

3.3 Technological alternatives

Two strategies are currently being considered:

- Scenario 1 – obtaining carbon concentrate (flotation concentrate) that is then ground and prepared for sale. It can potentially be used in the rubber industry.
- Scenario 2 – obtaining ferrosilicon by briquetting, which is widely used in ferrous metallurgy. In the second scenario, there will be minimal to no tailings, only warehouses for ferrosilicon.

3.4 Waste Site

A landfill site must still be identified for ‘household’ waste from the mine that cannot be re-used or recycled. Recyclable fractions of municipal solid waste (MSW) and industrial waste must be used either on the mining property and processing plant or transferred to specialized waste disposal organizations.

4 REGULATORY FRAMEWORK

4.1 National legal requirements

The RK has a developed legislation in the field of environmental protection, labour relations, protection of labour and health.

The Constitution of the RK [A1] establishes that the land and its subsoil, water, flora and fauna, and other natural resources belong to the people. The state exercises property rights on behalf of the people and aims to protect the environment favourable to human life and health. Citizens of the RK are obliged to preserve nature and take care of natural resources.

The 2021 Environmental Code [A2] replaced the 2007 Environmental Code and was enacted on 1 July 2021, with some articles coming into force in stages until 2024. The Code sets out the framework for the development and/or revision of legal acts in environmental protection, environmental audits, and so forth. The new Code introduces the concepts of best available technology (BAT), strategic environmental assessment, ecosystem services, integrated environmental permitting and others. The new Code is aimed at harmonizing with European Union (EU) legislation and covers much of EU environmental legislation, as well as some additional issues (forest protection, soil protection, environmental education and awareness, research and development, radioactive waste management, special environmental requirements for certain types of activities) and country-specific issues.

Environmental assessment of economic activities/projects of the RK includes two complementary subsystems of environmental impact assessment conducted by the client (EIA) and state environmental review (SER). The system is described in detail in the Environmental Code [A2] and *Instructions for Organizing and Conducting Environmental Assessment* [A3] are conducted by the project initiator using a licensed organization as part of the pre-planning, pre-project or project documentation. EIA findings are submitted to the SER conducted by the authorized body. Implementing economic activities without a positive conclusion from the SER is prohibited.

Public involvement takes the form of public hearings on EIA documents and *Rules for Conducting Public Hearings* have been developed [A4]. Emissions permits, including emissions and discharges, must be renewed every 5 years on the basis of a positive conclusion from the SER and, accordingly, requires the development of an EIA (including public hearings) and draft emission standards.

The Law on Permits and Notifications [A5] controls activities or actions that may pose a danger to human life and health, the environment, property, national security and law and order.

The Water Code [A6] is aimed at achieving and maintaining an environmentally safe and economically optimal level of water use, protection of water resources, and water supply and sanitation to preserve and improve the living conditions of the population and the environment. The state-owned water fund includes all water bodies in the RK.

The Land Code [A7] regulates land relations to ensure the rational use and protection of land, reproduction of soil fertility, conservation and improvement of the natural environment, and so forth. Land in the RK is categorised: agricultural; populated areas; industry, transport, communications, for the needs of space activities, defence, national security and other non-agricultural purposes, specially protected natural areas, health, recreational and historical and cultural purposes, forest fund, water fund and reserve lands.

The Code of the RK on Subsoil and Subsoil Use [A8] regulates subsoil use to protect the interests of the RK, through rational and comprehensive study and use of subsoil. The subsoil user is obliged to choose the most effective methods and technologies for conducting work, based on international standards and complying with technological schemes and projects that ensure the rational use of subsoil, the safety of workers, the population and the environment.

The Law of the RK on the Protection and Use of Objects of Historical and Cultural Heritage [A9] aims to protect and regulate the use of objects of historical and cultural heritage, and ensure their revival, preservation, and popularization.

Labor legislation is well developed in the RK. The Constitution states that everyone has the right to: freedom of work, free choice of activity and profession, working conditions that meet safety and hygiene requirements, remuneration for work without any discrimination, as well as social protection from unemployment and rest. Those working under an employment contract are guaranteed statutory working hours, weekends and holidays, and paid annual leave.

The Labor Code [A10] creates the legal conditions to achieve a balance of interests of the parties to labour relations, social stability and public harmony. The Code establishes provisions on guarantees of employment, working hours, labour protection conditions, and so forth. Occupational safety requirements provide for the certification of production facilities for working conditions, periodic medical examinations and examinations of workers engaged in heavy work, work with harmful and (or) dangerous working conditions, investigations in case of harm to the health of workers associated with their work activities, and so forth.

The Law on State Guarantees of Equal Rights and Equal Opportunities for Men and Women [A11] establishes the basic principles and norms regarding the creation of conditions for gender equality in all spheres of state and public life.

All production facilities of organizations operating in the RK are subject to certification for working conditions in accordance with the *Rules for Mandatory Periodic Certification of Production Facilities for Working Conditions* [A12].

The Social Code [A13] is aimed at improving the well-being of citizens, as well as reorienting the system towards preventive measures and the prevention of social risks. All types of social support are provided, such as assistance to individuals (families) with children, measures to promote employment, targeted social support for families below the poverty line, provision of special social services, protection of the rights and interests of persons with disabilities, provision of pension payments, as well as social support for various civilian categories, including those who have lost their breadwinner.

The Code on People's Health and the Health Care System [A14] is aimed at ensuring citizen right to health care, including affordable and high-quality medical care to preserve and strengthen the health of the population of the RK. The Code provides for government regulation and management; issuing health permits and notifications; structure of the health care system; accreditation, accreditation and certification in the field of healthcare and many other aspects.

The Law of the RK "On Housing Relations" [A30] defines the categories of citizens who belong to socially vulnerable groups of the population: 1) veterans of the Great Patriotic War; 2) persons with disabilities of the first and second groups; 3) families with or raising children with disabilities; 4) persons suffering from severe forms of certain chronic diseases listed in the list of diseases approved by the authorized body in the field of health; 5) pensioners by age; 6) orphans and children left without parental care, under twenty-nine years of age, who lost their parents before reaching adulthood. When conscripting such persons for military service, the age is extended by the duration of compulsory military service; 7) Kandasy[7]; 8) persons who have lost their homes as a result of environmental disasters, natural and man-made emergencies; 9) mothers with many children, awarded with the pendants "Altyn Alka", "Kumis Alka" or previously received the title "Mother Heroine", as well as awarded with the orders "Maternal Glory" of the 1st and 2nd degrees, large families; 10) families of persons who died

[7] "Kandasy" is a Kazakh word, means the Kazakh immigrants returning from Mongolia

(perished) in the performance of state or public duties, military service, during preparation for or implementation of a flight into outer space, while saving human life, while maintaining law and order; 11) single-parent families.

The RK has been a member of the International Labor Organization (ILO) since 1993. As of November 2023, Kazakhstan has ratified 25 ILO conventions, including eight fundamental ones.

4.2 IFC requirements

The International Finance Corporation (IFC) is a private institution within the World Bank Group that established the environmental and social assessment and management framework followed by most international lenders. IFC has its own framework documents that set out its commitment to sustainable development and are an integral part of risk management namely:

- Policy on Environmental and Social Sustainability [A33];
- Performance Standards, which define the responsibilities of clients for managing environmental and social risks; [A34] and
- Policy on Access to Information, which sets out IFC's commitment to transparency [A35].

4.2.1 Policy on Environmental and Social Sustainability

The Policy defines IFC's principles and approaches to investment. In addition, the Policy defines the functions and responsibilities of IFC:

- IFC conducts Environmental and Social Due Diligence;
- IFC uses a process of environmental and social categorization according to the following categories:
    - Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented;
    - Category B: Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures;
    - Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts;
    - Category FI: Business activities involving investments in FIs or through delivery mechanisms involving financial intermediation.

As part of its supervision program, IFC monitors investment and advisory activities.

4.2.2 Performance Standards on Environmental and Social Sustainability

IFC's clients are required to comply with IFC's PS within projects financed by IFC. Each of the 8 Standards is supported by a Guidance Note, which discusses and explains in detail various aspects of the use of PS.

4.2.2.1 PS1: Assessment and Management of Environmental and Social Risks and Impacts

The client, in coordination with other responsible government agencies and third parties as appropriate, will conduct a process of environmental and social assessment, and establish and maintain an ESMS appropriate to the nature and scale of the project and commensurate with the level of its environmental and social risks and impacts. The ESMS will incorporate the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management

programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review.

To systematically identify risks and impacts, the client must establish and maintain a process for identifying the project's environmental and social risks and impacts using appropriate assessment methods and tools, such as:

- a full-scale ESIA,
- a limited or focused environmental and social assessment, or
- straightforward application of environmental siting, pollution standards, design criteria, or construction standards.

For the development of new projects likely to have significant environmental or social impacts, the client will undertake a comprehensive ESIA, including the exploration of alternatives.

The client establishes a dialogue with stakeholders and maintains it throughout the entire project life cycle, including:

- analysis of stakeholders and planning of engagement with them;
- information disclosure;
- consultations;
- informed consultation and participation are carried out for projects with potentially significant environmental impacts and involve deeper consultations;
- grievance mechanism.
- regular reporting to the local community.

4.2.2.2 PS2: Labor and Working Conditions

The client will base the employment relationship on the principle of equal opportunity and fair treatment and will not discriminate with respect to any aspects of the employment relationship for both company staff and temporary workers. IFC does not support the use of forced or child labour. Requirements for safety and working conditions apply to employees of (sub)contractors and along the supply chain (main suppliers).

4.2.2.3 PS3: Resource Efficiency and Pollution Prevention

Pollution prevention and rational use of natural resources are the basic principles on which the client's activities should be based. The standard is supported by Environment, Health and Safety Guidelines, including the General Environment, Health and Safety Guidelines [A36] and sectoral guidelines. In addition to the General Guidelines, the Environmental, Health and Safety Guidelines for Mining [A37] are applicable to the site and proposed Project. The Guidelines also contain requirements for managing hazardous materials.

It should be taken into account that the technical details associated with environmental regulation (including calculation models, as well as methods for determining concentrations adopted in the IFC) are based on the methods of the US Environmental Protection Agency) and differ significantly from the methods adopted in Kazakhstan, which in a number of parameters can lead to significant differences in results.

4.2.2.4 PS4: Community Health, Safety, and Security

The standard contains requirements for protecting community health, including the risks of water-related diseases and vector-borne diseases. It also discusses the requirements for ensuring industrial safety and the requirements for the protection of facilities.

PS4 introduces for the first time the concept of ecosystem services and proposes to consider risks to public health, including through the prism of this concept.

PS4 also defines the requirements for security personnel.

4.2.2.5 PS5: Land Acquisition and Involuntary Resettlement

The standard formulates detailed requirements for involuntary resettlement. PS5 addresses both physical displacement and economic displacement. No land allocations are expected within the existing enterprise; therefore, the standard does not apply in this ESIA.

4.2.2.6 PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

The requirements of PS6 are consistent with the requirements of the Convention on Biological Diversity [C2]. The objectives of this Standard are:

- to protect and conserve biodiversity;
- to maintain the benefits from ecosystem services;
- to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

4.2.2.7 PS7: Indigenous Peoples

The standard concerns indigenous people leading a traditional way of life.

Only very limited groups of people are recognized by IFC as Indigenous Peoples, and these do not include people living in and around the mine site. This Standard is not applicable to this ESIA and the Project.

4.2.2.8 PS8: Cultural Heritage

The standard is intended to ensure the preservation of cultural heritage, both tangible and intangible. When developing a project, it is necessary to conduct research to identify cultural heritage sites in the project impact area.

According to PS8 cultural heritage refers to (i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles. In other words, the requirements of IFC PS8 apply to both tangible and intangible cultural heritage.

PS8 identifies the need for broad stakeholder consultation on the conservation and use of cultural heritage sites, introduces the concept of “critical cultural heritage”, and establishes the need for an Informed Consultation and Participation (ICP) process with Affected Communities.

4.3 Equator Principles

The EPs were developed at the initiative of the IFC and have now been adopted by 140 financial institutions from 39 countries [A38]. EPs aim to provide a common approach and minimum requirements for identifying, assessing and managing environmental and social risks in project financing. The principles are periodically updated based on analysis of current practice. In July 2020, the fourth official version of the Equator Principles IV was approved. They apply to all new projects costing more than US$10 million that are likely to have significant environmental or social impacts.

The Principles involve the categorization and environmental assessment of projects (Principles 1 and 2). Category A projects require a full impact assessment, development and implementation of an Environmental and Social Action Plan (ESAP) (Principle 4) and a Stakeholder Engagement Plan (Principle 5). In addition, funded Category A projects require the establishment and maintenance of an environmental and social management system (ESMS), as well as a grievance mechanism (Principle 6).

EPs require projects to comply with applicable IFC policies, performance standards, and guidelines (Principle 3).

5 ESIA METHODOLOGY

5.1 General information

Environmental and Social Impact Assessment (ESIA) of a Project is the process of identifying potential environmental and social impacts of a proposed activity, assessing the magnitude and significance of those impacts, and developing measures to avoid and/or mitigate negative impacts and enhance positive effects. A key element of the ESIA is consultation with stakeholders.

The main approach of this ESIA is based on the relationship “activities - aspects - impacts”.

> The approach is described in the ISO 14001 standard “Environmental management systems” and is a powerful conceptual tool for assessing and managing the Project’s impacts at all stages of its implementation. Following the definitions given in ISO 14001, environmental and social aspects are defined as “elements of activities that can interact with the receiving environment”. Accordingly, impacts are defined as “changes in the receiving environment”.

5.2 ESIA Process

The key elements of the ESIA are:

- Preliminary assessment and identification of key issues for consideration in the ESIA,
- Conducting a full-scale assessment, including collection and analysis of information on environmental and social baseline conditions; analysis of alternatives; and detailed assessment of impacts and risks,
- Planning activities to mitigate negative impacts and enhance positive effects, as well as management and monitoring activities,
- Consultations with stakeholders.

For organizational purposes, the ESIA is divided into two stages:

- **Stage 1**. Preliminary assessment (culminating in this Scoping report),
- **Stage 2**. Full-scale assessment of risks and impacts and preparation of Management Plans.

The scheme for conducting the ESIA is presented below (**Figure 8**).

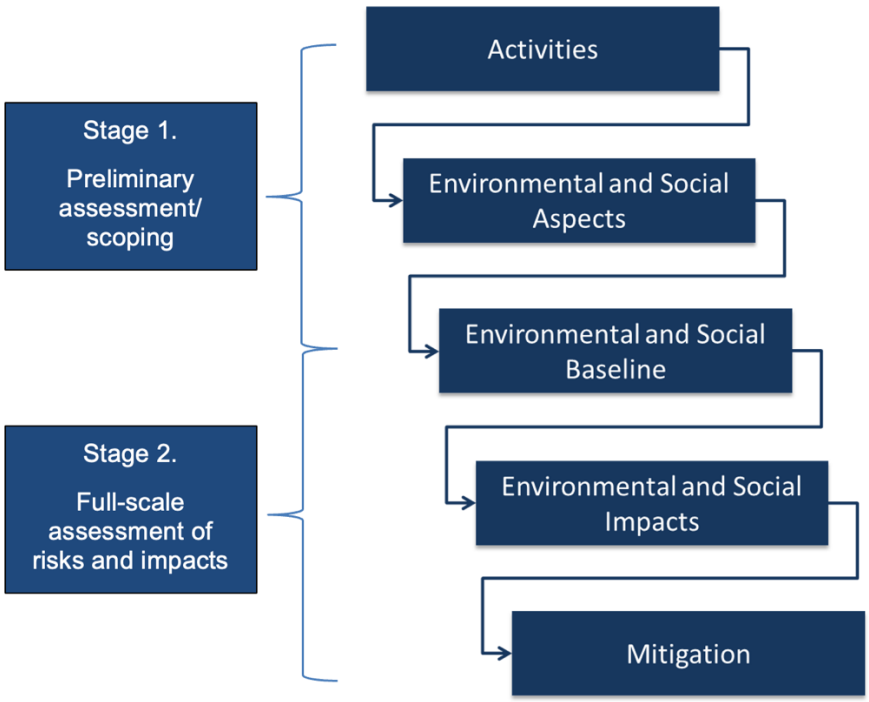


Figure 8. ESIA concept based on the activity-aspect-impact relationship

5.2.1 Preliminary assessment (scoping) and identification of key issues for consideration in the ESIA

Scoping (which is the focus of this document) is the foundation of the ESIA process.

The environmental and social aspects of the project and associated potential impacts are identified. As a function of the environmental and social aspects, components of the natural and social environment that may be changed by the aspects are identified as **environmental and social receptors**[8]. Potentially significant impacts are identified in this manner and the scope of the required assessment determined. The assessment itself is carried forward into the next phase of the ESIA.

The following types of Project impacts are considered:

- **Direct impacts**: Project impacts arising directly from Project activities and associated environmental and social aspects. These impacts are typically realized at the same place and time as where and when the Project is implemented. They are also referred to as primary impacts because they have direct consequences for the natural or social environment; for example, waste water discharge from the operation into an adjacent river.
- **Indirect impacts**: may be caused by activities not included in the Project but related to it and/or caused by its implementation. Such impacts often occur over time, affect a

[8] An example of ecological receptors are habitats disturbed as a result of excavation/construction works; an example of social receptors are residents of the district centre who may be employed as construction workers or workers at the planned mining and processing plant.

wider area, but are reasonably predictable; For example, off-site power generation, that provides electricity to the project.

- **Cumulative impacts**: may result from the combination of the various impacts of the project itself and/or several projects/activities in the same area. Cumulative impacts may also result from the gradual build-up of the impacts of one activity when they add up to the impacts of other past, present and reasonably foreseeable future activities.

Both negative and positive impacts from the planned activity are considered.

The identified impacts are preliminarily ranked by significance (high, moderate or medium) by the subject matter specialists.

Within the preliminary assessment is the identification of such negative impacts that cannot be prevented, mitigated or compensated for (fatal flaws) and which, therefore, will be the basis for disqualifying the Project.

During the project development process, designs will be updated and the baseline environmental and social conditions investigated and analysed. All this information will be analysed by specialists and included in the assessment.

5.2.2 Full-scale impact and risk assessment

As part of a full-scale assessment, it is necessary to assess the significance of impacts, which is a function of receptor sensitivity and exposure intensity. This section outlines an approach to determining the significance of impacts, consisting of the following steps:

- Assessment of receptor sensitivity (its ecological or social value);
- Assessment of impact intensity;
- Assessment of impact significance;
- Assessment of residual impacts;
- Assessment of cumulative impacts.

5.2.2.1 Assessment of receptor sensitivity

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

Table 5. Criteria for assessing receptor sensitivity

Sensitivity	Main 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

5.2.2.2 Assessment of impact magnitude

Table 6. Criteria for determining the magnitude of impacts *

Magnitude category	Main criteria
High	Loss of the resource and/or its quality and functional condition; severe damage to its key characteristics, permanent / irreversible change of its properties or components (Adverse impact)
	Large-scale or substantial improvement in the quality of the resource; major restoration or improvement, permanent change in the form of significant improvement in quality characteristics (Positive Impact)
Medium	Loss of a resource that does not lead to a deterioration in its functional condition, partial loss or deterioration of key characteristics, properties or constituent elements (Negative impact)

Magnitude category	Main criteria
	Improvement or addition of key characteristics, properties or constituent elements; qualitative improvement (Positive impact)
Low	Some measurable change in parameters, quality or vulnerability, minor loss or alteration to one (or more) key characteristics, properties or constituent elements (Adverse Impact)
	Minor improvement or addition to one (or more) key characteristics, properties or elements, some positive effect on resource parameters, or a reduced risk of a negative impact (Positive Impact)
Negligible	Very minor loss or deterioration of one or more characteristics, properties or constituent elements (Adverse Impact)
	Very minor improvement or addition of one or more characteristics, properties or constituent elements (Beneficial Impact)
No change	No loss or alteration of characteristics, properties or constituent elements, no noticeable impact in either direction.

5.2.2.3 Assessment of impact significance

The significance of impacts is based on reasoning and professional judgment and considers the views and recommendations of stakeholders. In some cases, the significance of predicted impacts may be determined using quantitative thresholds and scoring criteria. By assigning impacts to one of the four significance categories, different impacts can be assessed using the same scale, allowing direct comparison of the significance of different impacts. The four impact significance categories are summarized in **Table 7**.

Table 7. Criteria for determining the significance of impacts *

Significance category	Main 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 violation of statutory environmental regulations.
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 and approval 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.

Impact significance is determined for both positive and negative impacts/risks. To determine the significance of the effects, a matrix is used to combine the sensitivity of the receptor and the magnitude of the impact (**Table 8**).

Table 8. Impact Significance Matrix

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

5.2.2.4 Assessment of Residual Impacts

Residual impacts are those likely to occur after mitigation and enhancement of positive impacts and other management measures. Stated differently the residual impacts are what must be 'lived with' if the project goes ahead. Residual impacts must be environmentally and socially acceptable.

5.2.2.5 Assessment of Cumulative Impacts

Cumulative impacts from the project and in combination with other existing or reasonably anticipated future projects will be assessed recognising:

- Summative impacts are a change in the state of a receptor that can be summed up with a similar change in the state of the same receptor (e.g., a combination of several similar impacts to a single receptor).
- Interacting impacts - impacts where a change in the state of a receptor can be added to some other change in the state of the same receptor (e.g., a combination of several different impacts on the same receptor).

The assessment of cumulative impacts will follow IFC Good Practice Guidance. Additional measures to mitigate and/or manage cumulative impacts will be included in the ESAP.

5.2.3 E&S Management and Monitoring

Based on the assessment, mitigation will be identified to avoid, reduce or manage potential negative impacts and enhance positive impacts. Mitigation measures will be clear, feasible and applicable to local conditions and based on GIIP.

Mitigation, monitoring and management requirements identified through the impact assessment process will be detailed in an Environmental and Social Management Plan (ESMP). The ESMP will be split into the construction and operational stages. The ESMP will also contain a management framework, that will serve to ensure E&S risks are included in decision-making and day-to-day operations. It will contain a framework for tracking, evaluating, and communicating E&S performance as well as mechanisms for identifying, minimizing and managing E&S risks and liabilities. The ESMP will include guidance for the Construction Contractor to develop further specific management plans, such as Waste Management Plan, Soil Management Plan, Worker Camp Management Plan, Health and Safety Management Plan and other necessary plans to be determined during the ESIA process.

5.2.4 Stakeholder Engagement and Public Consultation

A Stakeholder Engagement Plan (SEP) has been developed for this ESIA, including stakeholder identification and analysis, action plan, and grievance mechanism. The SEP defines a structured and systematic approach to stakeholder engagement during project development and implementation and provides for the resolution of grievances.

5.2.5 Data Availability, Assumptions and Limitations

The ESIA currently faces the following limitations:

- There is limited environmental and social information on the project area. Open sources have very limited local data[9] on environmental components (in particular, on the availability and quality of surface and groundwater, air and soil quality, and the state of biodiversity). Studies to characterise the state of the environment are required, and which must be conducted in the design and ESIA.
- There is insufficient information on the minerals processing approach that will ultimately be used at the mine. Such technology will have to be decided prior to the next ESIA phase.

[9] Local data refers to the characteristics of environmental components at the site and in the zone of influence of the designed mining and processing plant

6 ENVIRONMENTAL BASELINE

6.1 Climate

The climate of the Kyzylorda Region is sharply continental with hot, dry and long summers and cold winters with little snow. Continentality is manifested in large daily, monthly and yearly meteorological variability.

Frequent and strong north-eastern winds are typical. Strong winter winds at low temperatures blow away the snow in higher areas, causing deep frost penetration and cracks on the soil surface. Dust storms occur in summer.

Annual average air temperature has risen persistently across all regions of Kazakhstan from 1976 - 2021. The Kyzylorda Region is among the five regions with largest warming rates (0.44°C/10 years) and has the highest spring warming rate (0.87°C/10 years) [C1]. High summer temperatures have been increasingly recurrent, particularly in the Shieli District, with fewer cold days.

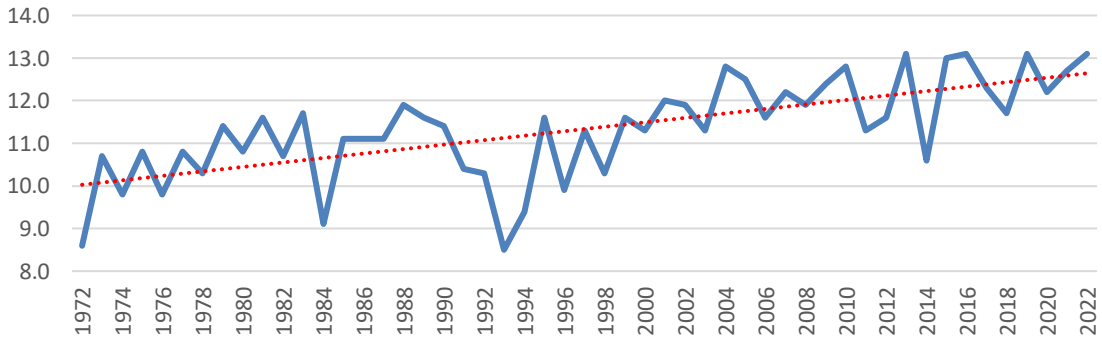
While alternating short periods of positive or negative abnormal precipitation is typical for the whole country, precipitation in the Kyzylorda Region was decreasing from 1976 through 2021 at a rate of 4–7% of the norm per 10 years, particularly in autumn [C1].

The climate of the Project area is characterised below based on the records maintained at the nearest meteorological station (MS) in Shieli located at an elevation of 153 m above sea level[10].

6.1.1 Air Temperature

Air temperature in the Project area is shaped by radiation balance, circulation processes and a complex underlying surface.

Annual average air temperature records from the Shieli MS from 1972 to 2022 (**Figure 9**) gradually rose with regional climate becoming warmer. The average annual temperature graph for that period shows that air temperature increased by 2.5ºC (from 10 to 12.5ºC).



Source: Weather and Climate Information Portal [C4].

Figure 9. Average Annual Air Temperatures (ºC) as Recorded at the Shieli MS (1972-2022)

Summers are hot and long with July being the hottest month. The average monthly air temperature in July varied from 24.0 to 29.8°C with diurnal temperature variation of 4.5°C. The highest air temperature recorded in summer over the past 50 years is 48°C.

[10] The Shieli MS coordinates are 44.17 latitude and 66.75 longitude, the synoptic index is 38069. Weather records at this MS are available for the period from 1972 onwards.

January is the coldest month with average monthly air temperature ranging from –14.7°C to +1.2°C. The lowest air temperature recorded in winter over the past 50 years was - 41°C. The period when the average daily air temperature stands above 0°C lasts from 17-25 March to 6-12 November, i.e. 226-239 days per year.

6.1.2 Precipitation

The study area has an arid climate and very little precipitation distributed very unevenly among the seasons with 60% of the total precipitation falling in winter and spring. Summer rainfall plays a relatively minor role in supporting soil moisture and development of wild and cultivated plants.

Total annual precipitation has varied widely over the past 50 years, though the overall trend is downward from 175 to 120 mm [according to C5 data].

Average annual precipitation from 1972 to 2022 was 150 mm. The modest precipitation is attributed to the fact that the region lies almost in the centre of Eurasia, i.e. virtually out of reach of humid air masses from the Atlantic that bring moisture and rain. The months with the highest daily average precipitation were February, April and May; the lowest daily rainfall in that period was recorded in September; the highest daily precipitation (75 mm) was recorded in February 1977 [C5].

Snow cover is little and unstable occurring; from the middle of December with an average thickness of 3.5 cm. Stable snow cover lasts 2.5 months and melts in the middle of March.

Fogs form during the cold season and generally occur 18-27 days per year. The aridity is not favourable for air quality.

6.1.3 Wind Pattern

Monthly average and maximum wind velocities and recurrence of wind speeds for different classes recorded at the Shieli MS over the past 50 years is shown in **Table 9**.

The average annual wind speed was 2.1 m/s. Both average and maximum wind speeds tend to increase in spring. A wind rose indicates the prevalence of northerly winds prevail throughout a year. The foothill terrain of the Project area along with the lack of natural vegetation barriers reducing wind speed are key factors is conducive to higher wind speeds and periodic blizzards, both snow and dust.

Table 9. Wind Speeds as Recorded at the Shieli MS from 1972 to 2022

Source: KazHydroMet [C6]

Average Monthly Wind Speed, m/s												
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
1.8	2.2	2.5	2.7	2.4	1.9	1.9	2.1	2	1.7	1.7	1.7	2.1
Maximum Monthly Wind Speed (m/s)												
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
11.9	14.1	14.7	16	16.1	13.5	12.7	12.6	14	12.7	12.7	12.5	13.6
Recurrence of Wind Speeds for Different Grades, %												
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-20	21-24	>40
Year	46	31	14	5	2	1	0	0.1	0.0	0.0	0.0	0.0

6.1.4 Air Humidity

Monthly and annual average data on air humidity for the past 50 years is presented in **Table 10**. The highest humidity levels typically occur in winter. The lowest warm-season humidity levels are observed in July. The large moisture deficit at elevated air temperatures accelerates evaporation [B3,B4].

Table 10. Average Relative Monthly Air Humidity (%) as Recorded at the Shieli MS from 1972 to 2022

Source: KazHydroMet [C6]

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
78	73	64	50	44	39	40	40	43	54	70	77	56

6.1.5 Future Climate Change

Surface air temperature in Kazakhstan is expected to continue increasing throughout all seasons. The range of change is expected to be from 2.3–2.6°C to 3.0–3.5°C by mid-century and increase even further toward the end of century (from 3.3–3.9°C to 6.2–7.3°C [C1]. Warming is likely to be more significant in the northern regions of the country [C1].

The southern regions including the Kyzylorda Region, are expected to experience significantly higher likelihood of periods of extreme heat in the 21st century. For example, the number of days with temperatures exceeding a threshold level of 35°C in the Kyzylorda Region is likely to increase by 20-30 per year and possibly even more [C1].

Most climate models indicate a certain increase in the annual precipitation across Kazakhstan. The smallest increase in seasonal precipitation is expected to occur in the western and southern regions where the amount of summer rainfall is likely to decrease most significantly, i.e. by more than 20%.

The intensity of extreme precipitation events would apparently increase with temperature. The periods of extreme drought are expected to become much more likely toward the end of this century; with the southern regions more acutely affected.

6.2 Ambient Air Quality

Air quality is monitored in the Shieli District at the Meteorological Station No. 442 668, located at 18, Yesenova Street in Shieli. There is one stationary automatic monitoring station and is part of the KazHydroMet monitoring network. The station monitors the concentrations of 6 air pollutants (particulate matter PM_{10} and $PM_{2.5}$; sulphur dioxide; carbon monoxide; nitrogen dioxide; and ozone). Monitoring results are published regularly [C7]. Air quality in the Project area, is summarised in **Table 11**.

Air quality is relatively poor. Maximum one-time concentrations of pollutants remain within the Maximum Permissible Concentration (MPC) guidelines, but the average monthly nitrogen dioxide concentration is 3.52 times higher than the MPC daily guideline concentration (MPC av.d.); for ozone the exceedance is 1.7 times the MPC av.d. The planned mining and processing plant is about 70 km (**Figure 1**) from the village of Shieli. The altitude difference between the village of Shieli and the mine site is 284 m, which can also cause significant differences in air quality.

Air quality in the immediate vicinity of the mine site was measured by Firma Balausa LLP within the framework of industrial environmental control (IEC). Pollutant concentrations at the sanitary protection zone boundaries of the operating quarry and the PIU are shown in **Table 11**, providing some indication of air quality in the area.

Table 11. Concentrations of pollutants in the atmospheric air in the village of Shieli and at the boundaries of the sanitary protection zone of the OPU and the pit

Source: KazHydromet data and PEC Reports for 2021-2023 [B1,B2].

Pollutant	Maximum single, µg/m³ (T average = 20 min)				IFC, µg/m³	Average daily concentrations, µg/m³			Average annual concentrations, µg/m³	
	Shieli (HM)	SPZ pit	SPZ PIU	MPC m.r	T average. 1 hour	Shieli (HM)	MPC cc	IFC 24 hours	Shieli (HM)	IFC, year

1. Suspended particles $PM_{2.5}$	151			160		30	35	25		10
2. Suspended particles PM_{10}	264			300		42	60	50		20
3. Nitrogen dioxide	200	20	31	200	200	150	40		150	40
4. Sulfur dioxide	100	21	25	500	500 (10 min)	2	50	20	1	
5. Carbon monoxide	4020	81	3	5000		80	3000		50	

Air quality near Firma Balausa LLP is generally better than at the village of Shieli, probably due to additional emissions sources in the village of Shieli.

The entire Shieli district is characterized by strong winds, mainly from the north-east, which blow snow off the elevated parts of the terrain in winter, and in the warm months (from April to October) raise dust storms. There were two dust storm days per annum between 1971-2000.

6.3 Geology

The Balasausqandiq deposit is in the hills of the Karatau Range, adjoining the Ak-Sumbe River in the south-east and the Kos-Shoko Upland in the north-west. The north-eastern foothills of the Karatau Range form the northern boundary of the deposit. The terrain of the Project area comprises three types of landscape, namely mountainous landscape, steppe valley and hummocky submontane plain. The mountainous landscape and hummocky submontane plain are formed by the mountain ridge gently dipping from the southeast to the northwest. The highest and lowest elevations within the ore field are 775 m and 420 m, respectively. The northwestern part of the ore field has typical hummocky terrain becoming mountainous landscape in the central part.

The geology is mainly Cambrian and Quaternary deposits. The Balasausqandiq ore body lies within the Cambrian black carbonaceous shale forming the Kurumsak suite. The Balasausqandiq ore body is exposed at the surface and forms narrow elongated synclinal structures with a core of silico-clayey-carbonaceous shale of the Lower Kulantau sub-suite and wings formed by vanadium-containing materials. The underlying layer includes tillite and clayey-carbonaceous shale of the Baykonur suite. The dip of the ore body wings varies from 750 to 900 m. Siliceous interlayers form clearly visible and continuously traceable ridges where the ore body crops out. Intervals between these ridges are composed of softer silico-clayey and vanadium-bearing shale.

The deposit contains two types of ore:

1. Quartz-roscoelite oxide ores that mainly occur in the upper section of the deposit at depths from 0 to 15 m. These oxide ores form a thin layer at a depth of up to 10 m. Oxide mineralisation may penetrate deeper via faults and fractures. Generally, oxide ores account for about 4% of the total number of productive layers.

2. Black silico-carbonaceous reticular ore formations (primary) lying under the oxide ore layer. It is virtually impossible to establish where there is the precise boundary dividing these two types of ore. It is only visible in the deeper sections of the pit.

Quaternary deposits present in the Project area include loamy clay, sandy loam, fine sand, pebble and gravel genetically associated with the river valleys and gorges. Diluvial deposits forming the slopes and weathering crusts are also widespread in the area, having a thickness of several metres.

As per SP RK 2.03-30-2017 [A17], the seismicity of the Project area is 6 degrees.

There is no evidence of any current hazardous geological processes occurring in the Project area.

6.4 Geochemistry

The deposit contains vanadium as a primary mineral and molybdenum with uranium and rare-earth minerals as by-products. The majority of vanadium (60-70%) is contained in patronite and sulvanite, and the remaining 30-35%, in silicates including vanadium-bearing muscovite. Patronite is thinly scattered in the carbonaceous substance, sulvanite occurs in a web of quartz veins in lyddite and dolomite interlayers, and roscoelite minerals are present in the form of nests in quartz veins running through carbonaceous-clayey shale. Primary ores contain V_2O_5 (0.66%), P_2O_5 (0.53%), and SiO_2 (65.2%).

6.5 Radiation characteristics of the deposit

RK Radiation Safety of the Population [A18] laws in Kazakhstan require a radiation safety assessment. Compliance with the current Radiation Safety Standards (RSS-99), Sanitary Rules for the Management of Radioactive Waste (SRMRW) and other republican and industry regulations is required.

Within Kyzylorda region is the Syrdarya uranium ore province, within which uranium is mined at the Northern Kharasan, Irkol and Southern Karamuryn deposits. The Irkol deposit is in the Shieli region [C3].

The presence of uranium mines requires gamma radiation and radioactive contamination monitoring at ground layer in the Kyzylorda region. Some 3 meteorological stations (Aral Sea, Shieli, Kyzylorda) and at 3 automatic posts for air pollution in the city of Kyzylorda), Akay village and Toretam village conduct such monitoring. The average values of the radiation gamma background in populated areas were recorded in 2023 within the range of 0.02-0.34 μSv/h. On average, the gamma background radiation in the region was 0.13 μSv/h, i.e. compliant with permissible limits.

The average daily density of radioactive fallout in Kyzylorda[11] fluctuated between 1.3-2.4 Bq/m^2, the average density of fallout was 1.7 Bq/m^2, which also does not exceed maximum permissible level [C8].

The proximity of Syrdarya to the Balasausqandiq deposit necessitates radioecological studies at the mine site to assess potential human impacts. Such studies were conducted at the reconnaissance level with more detailed studies including the content of natural radionuclides in soils, natural surface and natural waters, air and the working environment of ore mining and processing.

The specific effective radioactivity of vanadium-bearing quartzites from the Balasausqandiq deposit is 208 Bq/kg, which does not exceed permissible levels. The effective radioactivity of overburden and ore-bearing rocks means they are in Class 1, with no restrictions on their use in economic activities and construction. The planned mining is safe to continue provided radiation safety standards are observed, detailed in the Conclusion of the sanitary-epidemiological examination of the Kyzylorda region on product safety No. 41-03/18-236 dated 31.05.2007

After additional radiation-ecological studies, further bespoke management measures will be developed to ensure that there is no radioactivity exposure risk in exploiting the Balasausqandiq deposit.

6.6 Groundwater

Two types of groundwater are present in the Project area:

- Water contained in loose sediments in river valleys and intermountain areas;

[11] Based on the results of air sampling with horizontal tablets for five days.

- Water confined to fissured and fractured rocks disturbed by tectonic forces.

Loose sediments date back to the Quaternary and Neogene period. They contain slightly brackish or rarely fresh water, which is confined to the local Pliocene aquifer (N2). These sediments are concentrated in the northern and north-eastern parts of the Project area, covering the piedmont plain and being overlain by Quaternary sediments almost everywhere.

Water-bearing rocks include sand interlayers and lenses of varying size and thickness, sandstone and rarely gravelite occurring amid light-brown clay. Sand is mainly fine particles. The groundwater table occurs at depths of up to 20 m. The aquifer is unconfined and porous, has an uneven distribution and often crops out.

This groundwater aquifer is mainly fed by precipitation and surface water including temporary streams. The groundwater flow direction is generally aligned along the terrain from the southeast to the northwest. The aquifer has a regional confining bed composed of the Late Eocene/Early Oligocene clay (P_{23} - P_{31}).

The fractured and fissured aquifer is mainly unconfined and occurs in the tectonically disturbed zones. Water is contained in Cambrian rocks in the faults and fractures of about 90-100 m. The aquifer holds an abundant groundwater reserve, which is evidenced by the presence of springs where discharge, water temperature and chemistry vary significantly from season to season. The highest discharges (up to 1.5-5.0 l/s) occur in spring, decreasing to 0.01-0.03 l/s during the low-flow season and some springs completely drying out. These springs contain fresh, hydrocarbonate and hydrocarbonate/sulphate water. The filtration rate does not exceed 0.047-0.262 m/day. The general groundwater flow direction is assumed to be south-west.

The groundwater table is at 14.0-15.0 m and the aquifer is mainly recharged by winter/spring precipitation.

The degree to which groundwater is protected against migration of pollutants from the surface can be qualitatively assessed using V.M. Goldberg's technique. This technique considers the following four characteristics of the aeration zone: 1) the depth of the aquifer; 2) rock structure and lithology; 3) cross-sectional thickness of impermeable sediments; 4) filtration capacity of rocks including impermeable sediments in points. The time over which pollutants reach the aquifer serves as the justification for the points assigned. A sum of points is used to classify groundwater by the degree of protection. Category I means the least degree and Category VI is the highest degree of protection. Groundwater associated with loose sediments and fractured zones was assessed as Category II, i.e. weakly protected water.

6.7 Surface Water

6.7.1 Hydrographic Network

The hydrographic network in the Balasausqandiq license area is unfortunately not well described in open literature. Major watercourses with a seasonal flow pattern are the Aksumbe, Bala-Sauskandyk, Ulken-Sauskandyk, Akmaya, Taldyk and Kurumsak Rivers. Other smaller streams completely dry out by mid-summer. These streams include the Karagashsai, Akmultyk, Terekti and Koklekti streams [C9]. The catchment basin of the Aksumbe River, a larger river with permanent flow, borders the Project's area of influence in the south east shows major watercourses in the Project area are shown in **Figure 3.**

The ***Aksumbe River*** is the largest river in the Project area, rising in the smoother eastern part of the Kurlybai Mountains at an elevation of 575-600 m. The mountain section of the river is 12.5 km and the river catchment is 232 km^2. The river valley has four inset accumulative terraces and cuts through the Early Palaeozoic bedrock.

Balasausqandiq River is the major watercourse in the license area, rising in the Balasausqandiq Mountains at an elevation of 750-780 m. The river is 12 km long with 7 km running through the mountains and the remaining section flowing through the plains. The river has a catchment area of about 34 km^2 and is non-perennial with some streamflow in summer.

The main channel of the Balasausqandiq River is further south of the eastern part of the license area. The river valley is 50 to 250 m wide with a meandering channel split into several streams in some sections; it is 0.2 to 10 m wide with depths ranging from 0.05 to 0.15 m. The flow velocity is 0.12 m/s with a high-water mark of 0.1-0.3 m above the water edge level. The river has a two-side floodplain of about 20 m. The river banks are 0.2-2 m high and partially sodded. Water erosion has affected small river bank sections of about 0.2-0.3 m in some places.

The Balasausqandiq River water was used to fill a surface water pond established in the river valley 200 m away from the Company's process facilities. As of July 2022, the total area of the pond was 0.57 ha with a perimeter of 0.412 km. The pond is used to supply water required for the Company's processes.

Water samples from the Balasausqandiq River are collected and analysed from time to time.

The ***Ulken-Sausqandiq River*** rises in the Ulken-Sausqandiq Mountains at an altitude of 760 m. It has a length of 28 km,14 km of which flows through the mountains. The river drains a catchment area of 95 km^2 and has a typical erosion valley. Slopes in the middle reach are composed of the Cambrian lime-clayey chloritized metamorphic shale. Late Proterozoic acid effusive rocks and tuffs are widespread further downstream, while red clay with gravel lenses brought ashore by the river occur on the first slope in the mouth section. The river is also non-perennial. Sections containing flowing water alternate with dry sections in the mountains, while the flatland part of the river channel does not contain water [C10].

The ***Akmaya River*** is approximately 25 km long. The river's drainage basin includes small streams from the eastern and southeastern parts of the development area (**Figure 1**). The river is also non-perennial (there was no runoff in July 2024) and flows into an endorheic zone (a drying lake) to the northeast of the development area. The Akmaya Riverbed is rectilinear, well expressed in relief, and composed of gravel. The banks of the river are turfed.

6.7.2 River Flow Regime and Discharges

Local watercourses in the Project area mainly receive their flow from precipitation and snow/ice melt and sometimes by a mix of sources including springs. The average river discharge during spring snowmelt can be as high as 25-35 l/s, sharply decreasing in summer to only 5-10 l/s. As rivers leave the mountains and flow through the flatland, they dry out in summer and only few reaches with flowing water remain.

The Balasausqandiq River valley, surrounding the license area to the south west, west and north west, has a large number of springs that feed the river. Several springs in the river valley 2.9 km away from the Company's facilities are used to provide drinking and cooking water for the mine camp.

The process water pond is filled during high-flow periods in spring and autumn. The Balasausqandiq River has no permanent flow with only some reaches containing water during the low-flow period. There is no monitoring of water levels in the river and neither water quantity, nor quality from the process water pond are recorded. There are no hydrometric (hydrological) stations on the Balasausqandiq River. Occasional river discharge measurements conducted in the 1940s were sporadic and short-lived [C10].

It is recommended that a permanent hydrometric station to monitor flow discharges in the Balasausqandiq River be established. Monitoring data can then be used to predict the river flow needed to meet the Company's technical water demand.

6.8 Soil Cover

Soil and vegetation cover in the Kyzylorda Region are typical desert. Of the total area of usable land, 10% lies in the Syr Darya Basin, 25% in the semi-desert zone and 65% in the desert zone. A major part of the Kyzylorda Region area is covered by the Quaternary alluvial sediments that are widespread in the Syr Darya River delta.

In general, alluvial sediments in the areas adjoining the river channels mainly have a light texture, while those lying in the interfluvial lowland areas are darker because they contain more clay.

Soils occurring throughout the region are typical of the northern desert zone. Soil cover is quite diverse and comprises the following two distinct soil groups: wetter soils used for crop farming and dry soils in the desert zone that have traces of ancient irrigation structures in some places [C11].

The license area is mainly covered with light grey mountain soil that is typical of dry climate and little precipitation areas. These conditions promote intensive weathering rocks with easily soluble compounds including carbonates and sulphates being generated. These compounds are washed out from the soil which becomes depleted of nutrients.

The soil of the study area is of limited value as it has low fertility and a soil bonitation[12] score of up to 10 [C14]. The area has a typical mountainous landscape with rocky surface and thin soil cover of 10-20 cm. Elevated salinity levels and shallow groundwater table make this soil unsuitable for trees and shrubs.

No specialised soil surveys have been conducted in the Project area to date. However, soil tests performed by the Company as part of the Environmental Monitoring Programme (EMP) indicate that regulated parameters meet the hygienic and environmental safety guidelines [A15, A16], while those that are not covered by these guidelines are within the national background levels. Campaign soil testing should be performed as part of the ESIA process at the Project site.

6.9 Landscape and Biological Diversity

6.9.1 Landscapes

The Project site represents a transition from the desert (the northern part of the Project site) to the mountains (the central and southern parts).

The landscape of the mountainous zone is low hilly ridges composed of sedimentary and volcanogenic rocks covered with mountainous fescue and feather grass/fescue vegetation, shrubs and motley grass meadows growing on mountainous chestnut soils. The desert zone is a piedmont[13] landscape with low hilly ridges composed of loamy clay, clay and sand covered with silky wormwood, ephemeral grass/silky wormwood, Russian thistle/silky wormwood, and Eastern thistle/silky wormwood vegetation growing on northern grey soils [C73].

Mountain massifs with exposed hard rocks are dissected by narrow ravines with small streams, springs and intermittent watercourses, in some places covered with shrubs and lone willow trees. A significant part of the area has no vegetation cover, only rocks, upper sections of hills and cliff debris.

Low mountains are surrounded by desert-like plains covered with Russian thistle, wormwood, cereal grasses, ephemeral plants and thistle varieties. Small rivers and streams have been dammed to create water reservoirs, surrounded by tamarisk thickets, salt trees with other tree species in some places. Some water reservoirs dry out in summer. The entire area has been significantly overgrazed.

6.9.2 Vegetation Cover

The Project area is classified as part of the Irano-Turanian Subregion of the Sahara-Gobi Desert Region.

[12] A comparative assessment of the quality and productivity of land for agricultural use.
[13] A gently sloping plain that forms at the base of a mountain range or hills literally ‘mountain foot’.

The northern part of the site is in the Central/Northern Turanian Sub-province of the Northern Turanian Province, representing a piedmont desert area that belongs to the Trans-Karatau District. It is dominated by hemipetrophyte/ephemeral/wormwood (wormwood *Artemisia vallida, A. sublessingiana, A. semiarida,* bulbous meadow-grass *Poa bulbosa*) and pterophyte/ephemeral/black thistle (thistle *Salsola arbusculiformis,* bulbous meadow-grass *Poa bulbosa*) desert plant associations [C12]. The southern and central parts of the Project area extend into the Zhetysu/Alatau/Northern Tyan-Shan province and its Northern Tyan-Shan piedmont sub-province [C13].

The vegetation cover is rather homogenous dominated by xerophyte, mesophyte and halophyte species. The area has a mountainous landscape with rocky surface and thin soil cover of 10-20 cm.

Vegetation cover is very poor and limited to typical steppe and semi-desert species. Low thistle shrubs and wormwood are typical species for the mountainous part of the study area. Lone-standing trees or small groups of tamarisk and salt tree shrubs occur on the stream banks and near springs. Fourwing saltbush *(Atriplex canescens)*, tasbiyurgun (*Nanophyton erinaceum*) and biyurgun (*Anabasis salsa)* grow in small depressions.

The larger part of the study area is mainly thistle and wormwood/thistle (*Salsola arbusculiformis, Artemisia terrae-albae, A. turanica*) plant associations (**Figure 10**) covering the bottom parts of the hills and sometimes comprising keireuk (*Salsola orientalis*) and teresken (*Kraschenninnikovia ceratoides*) species and patches of biyurgun (*Anabasis salsa*) and tasbiyurgun (*Nanophytum arenacium*). The fourwing saltbush (*Atriplex cana*) associations occur in the areas having rubble-rich soil. Upper parts of the hills are occupied by the wormwood/ephemeral plant associations (*Artemisia karatavica, A. sublessingiana*).

Figure 10. Thistle and wormwood/ephemeral plant associations

6.9.2.1 Existing Anthropogenic Impact on Vegetation

Vegetation in the study area is mainly affected by factors not relating to industrial activity but having implications for soil and plant life. The most significant impact relates to agriculture overgrazing.

Intensive overgrazing has resulted in a dramatic decline of such indigenous species as Karatau wormwood (*Artemisia karatavica Krasch*.), white wormwood (*Artemisia terrae alba C.A. Mey*), fourwing saltbush (*Atriplex cana C.A.Mey*.), and Russian thistle (*Salsola arbusculiformis Drobow*).

6.9.3 Fauna

6.9.3.1 Mammals

Mammal fauna in the Project area is typical of the Turanian District of the Irano-Turanian Province in the Mediterranean Subregion and includes elements of the Western Tyan-Shan District of the Upland Asian Province in the Central Asian Subregion in its low mountain areas. The Project area is part of the Kyzylkum Zoogeographical Unit, lying close to the boundaries of the Karatau and Moyinkum Zoogeographical Units, reflected in the mammal species composition (e.g. the mammal fauna of the Kyzylkum Unit includes typical desert species).

The mammal fauna of the study area is clearly dominated by the desert species. Literature indicates 36 species representing 6 orders. Areas with the richest species diversity are those around water bodies and shallow water lagoons overgrown with tamarisk thickets and banks of small rivers and streams covered with shrubs.

Rodents (*Rodentia*) are common species with the great gerbil being key to trophic relationships and also the major plague carrier in the region.

Lagomorphs *(Lagomorpha*) and hares and rabbits (*Leparidae*) are represented by the tolai hare species *(Lepus tola*i). The tolai hare inhabits piedmont plains occupied by shrub vegetation, floodplain areas and slightly rugged plateaus.

Predators *(Carnivora*) and the canines family (*Canidae*) are represented by 4 species. Wolf (*Canis lupu*s) occurs along the rivers in the floodplain forests and reed thickets and in the low mountain areas occupied by shrubs. The average wolf population density is 1 individual per 10 000 ha. Jackal *(Canis aureus)* is abundant in the plain and low mountain areas covered with shrubs. Corsac fox (*Vulpes corsac*) occurs throughout the entire study area. Fox (*Vulpes vulpes*) inhabits the semi-desert areas with an average population density of 1 individual per 1000 ha. Felines (*Felidae*) include the African wild cat (*Felis libyca)* occurring in areas overgrown with shrub vegetation.

Mustelid (*Mustelidae*) species mainly occur in riparian areas. The steppe polecat (*Mustela eversmanni*) lives close to water bodies and rodent colonies. The average population density is 1 individual per 100 ha. Marbled polecat (*Vormela peregusna*), a species listed in the RK Red Data Book, may also occur close to rodent colonies. European badger (*Meles meles*) and the least weasel *(Mustela nivalis*) occur on the slightly rugged plateaus.

Even-toed ungulates order (*Artiodadactyla*) is probably represented by 3 species. Gazelle (*Gazella subguturosa*) is listed in the RK Red Data Book as a Category 3 species (i.e. rare species[14]).

Saiga antelope (*Saiga tatarica*) used to be abundant but the population declined dramatically in the 1990s when males were killed by poachers. According to IUCN, saiga antelope (*Saiga tatarica*) was classified as critically endangered (CR). Recent conservation efforts have resulted in the recovery of the saiga population so that it has become abundant in some areas (e.g. the Volga-Ural interfluve). There is some debate on whether the saiga population should be regulated through harvesting for scientific research purposes. IUCN reclassified the saiga antelope species as near threatened (NT) after reassessment in 2023. The Kyzylkum and Moyinkum zoogeographical units are crossed by migration routes used by saiga antelopes forming the Betbak-Dala/Arys population.

[14] Category 3 Rare species of the Red data Book of the Republic of Kazakhstan roughly corresponds to the IUCN Red List of Threatened Species category Near Threatened (NT)

The Karatau Mountains are home to Karatau argali (*Ovis ammon nigrimontana*), endemic species listed in the RK Red Data Book in Category 1. Argali visited the Balasausqandiq Project area and were observed on the cliffs during 2017 and 2018.

The following four protected species may occur in the Project area:

1. Marbled polecat (*Vormela peregusna*), the species is listed in the RK Red Data Book in Category 3 and is classified as a vulnerable species (VU) by IUCN. The marbled polecat is found in desert, semi-desert and steppe areas and may occur near rodent colonies.
2. Gazelle (*Gazella subguturosa*), the species is listed in the RK Red Data Book in Category 3. The only representative of the Gazelle genus and Antelopes sub-family in Kazakhstan occurs in the hilly sand dunes, gravel and clay deserts covered with saxaul thickets and open gravel-covered spaces. Key limiting factors are poaching and displacement because of human activities.
3. Karatau mountain argali (*Ovis ammon nigrimontana*), the subspecies is listed in the RK Red Data Book in Category 1. The *Ovis ammon* species is classified by IUCN as near threatened (NT). The argali occurs in the Karatau Mountains and was observed on the rock cliffs in the Balasausqandiq Project area in 2017-2018 and may visit the area under abnormal weather conditions.
4. Desert dormouse (*Selevinia betpakdalensis*), the species is listed in the RK Red Data Book in Category 3. The desert dormouse is a very rare relict species that is endemic to the south-eastern part of Kazakhstan. The species lives in the gravel and clay deserts and occurs in the Darialyk desert near the border with the Aryskum desert. The largest number of encounters was recorded in Betpakdali near the Chu River floodplain lagoons.

6.9.3.2 Birds

Literature indicates that the birds (avi-fauna) of the study area during seasonal migrations can comprise about 122 bird species representing 13 orders, or some 25% of Kazakhstan's bird species diversity, including transient, nesting, sedentary and wintering birds. Over 50 species occur in the area in summer, including 20 nesting species. About 14 bird species stay there in winter. Over 100 species are migratory birds.

The RK Red Data Book includes 15 bird species, most of which occur during seasonal migrations and about 8 species stay in the area in summer. In spring, birds migrate most actively in March-April, while in autumn migration mostly takes place in September-October.

Two important bird areas (IBA) (see **Section 6.9.4.3**) are located 50-70 km away from the Balasausqandiq Project area. The proximity of the IBAs along major bird migration routes and home to about 30 rare species listed in the RK Red Data Book and some globally threatened species, influences the species composition of the study area.

Migratory waterfowl and shorebirds occur in the floodplains and riparian areas of reservoirs, streams and artesian wells. The list of rare and endangered species occurring in the Project area is presented in **Table 12.**

Table 12. Rare and Endangered Bird Species in the Project Area

Species	Duration of Stay, Months												Remarks
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1. Short-toed Eagle - *Circaetus ferox*- Змееяд													Migration. Might be nesting
2. Egyptian vulture – Neophron percnopterus – Стервятник - EN													Migration
3. Steppe Eagle - *Aquila nipalensis*-													Migration

Степной орел EN													
4. Imperial Eagle - *Aquila heliaca* - Могильник - VU													Migration. Might be nesting
5. Golden Eagle - Беркут - *Aquila chrisaeetos* -													Migration. Might be nesting
6. Saker Falcon - *Falco cherrug* - Балобан - EN													Migration
7. Crane - *Grus* - Серый журавль –LC													Migration
8. Demoisele Crane –*Anthropoides virgo* - Журавль-красавка - LC													Migration
9. - Great Bustard - *Otis tarda* – Дрофа - EN													Migration
10. Macqueeen's Bustard *Chlamydotis undulata* - Джек - VU													Migration. Might be nesting
11. Little Bustard – *Otis tetrax* - Стрепет													Migration
12. Pin-tailed Sandgrouse - *Pterocles alchata*- Белобрюхий рябок LC													Migration. Might be nesting
13. Black-bellied Sandgrouse - *Pterocles orientalis* - Чернобрюхий рябок LC													Migration. Might be nesting
14. Pallas's Sandgrouse - *Syrrhaptes paradoxus* - Саджа LC													Migration. Might be nesting
15. Yellow-eyed Pigeon – *Columba Eversmanni* – Бурый голубь VU													Migration. Might be nesting

Note: IUCN categories: CR – critically endangered, EN – endangered, VU – vulnerable, LC – least concern

6.9.3.3 Amphibians and Reptiles

Literature indicates, 2 amphibian and 11 reptile species may occur in the study area. The *Amphibia* class is represented by two species: European green toad (*Bufotes viridis*) that occurs close to the rivers and water reservoirs and lake frog (*Pelophylax ridibundus*) (*Rana ridibunda*) that lives in the floodplains of small rivers, streams, reservoirs and artesian wells.

The Central Asian tortoise (*Agrionemys horsfieldi*) from the typical tortoise family occurs in the plains. The population of typical geckos (*Gekkonidae*) is small. The grey thin-toed gecko (*Tenuidactylus russowi*) is an endemic Central Asian species and occurs in the floodplains, piedmont and low mountain areas. There are 3 species representing the agama (*Agamidae*) family.

The steppe agama (*Agama sangunolenta*) is numerous and widespread and a desert dweller. The sunwatcher toad-headed agama (*Phrynocephales helioscopus*), an endemic Central Asian species occurs in large numbers. The reticulated toad-headed agama (*Phrynocephales retculatus*) lives in the plains. The rapid racerunner (*Eremias velox*), representing the lizards (*Lacertidae*) family is a small population and occurs in the plains and amid the sands.

Three snake species from 2 families are likely to occur in the Project area. The steppe rat snake (*Elaphe dione*), representing the colubrid (*Colubridae*) family, lives in the arid plains and low mountain areas. The steppe ribbon racer (*Psammphis lineolatum*) occurs in the plain areas overgrown with Russian thistle.

The Siberian pit viper (*Gloydius halys*), a small-numbered representative of the Asian lance-head snakes (*Crotalidae*) family also occur in the area, their bites are dangerous for humans.

6.9.4 Valuable Biodiversity Areas

6.9.4.1 Protected Areas

The Kyzylorda Region has three protected areas (PA) that lie fully within its boundaries [C67] (**Figure 11**):

- Barsa-Kelmes State Nature Reserve (two clusters),
- Torangylsai State Wildlife Sanctuary (zoological);
- Kargaly State Wildlife Sanctuary (zoological).

The Southern Kazakhstan State Nature Reserve Zone extends into the southern part of the region (**Figure 12**). The eastern cluster of that zone, within the Turkestan Region, is located 8 km from the Project's license area (**Figure 12**).

6.9.4.2 Wetlands of International Importance

The Lesser Aral Sea and Delta of Syr Darya River is a wetland area (WA) of international importance (Ramsar sites, WII No. 2083, 330,000 ha) [C68] covering the eastern section of the Lesser Aral Sea including Saryshyganak Bay and Syr Darya River mouth, with a number of lakes in the north eastern section of the Aral Depression (**Figure 11**).

6.9.4.3 Important Bird Areas

The Kyzylorda Region has five Important Bird Areas (IBA) of international significance [C69] (**Figure 11**).

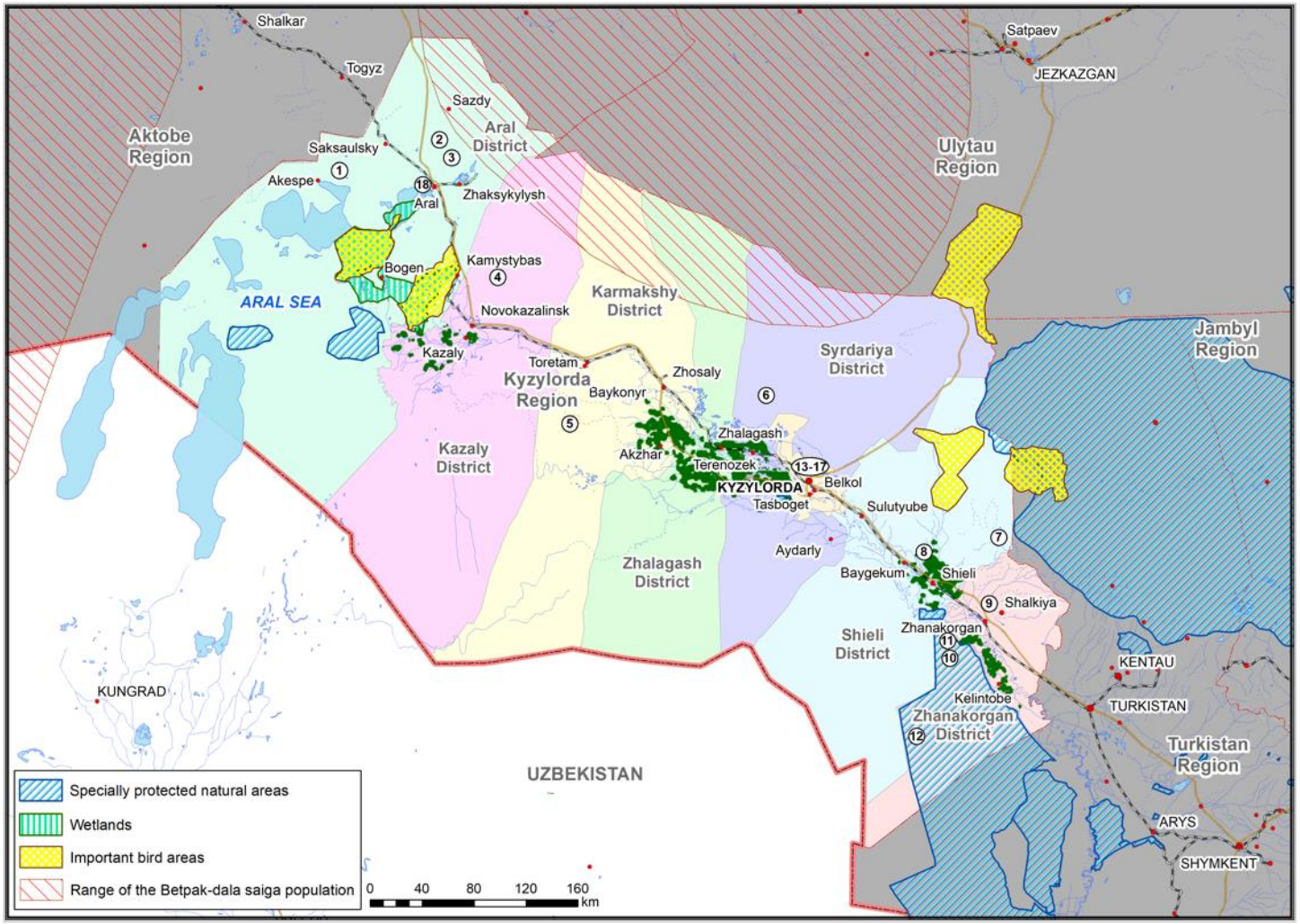
The two sites nearest to the Project are the Telikol Lakes (IBA KZ068) having an area of 159,320 ha [C69] and located 41 km from the boundary of the license area, and Lakes in the Lower Reaches of the Chu River (IBA KZ069) occupying 147,950 ha [C69] and located 32.8 km from the license area (**Figure 12**).

These IBAs, similar to the Project area itself, lie within two broad Asian passageways, the Central Asian Flyway and Western Asian/Eastern African Flyway [C69]. As such, it can be expected that migratory birds would fly over the Project area.

6.9.4.4 Key Biodiversity Areas

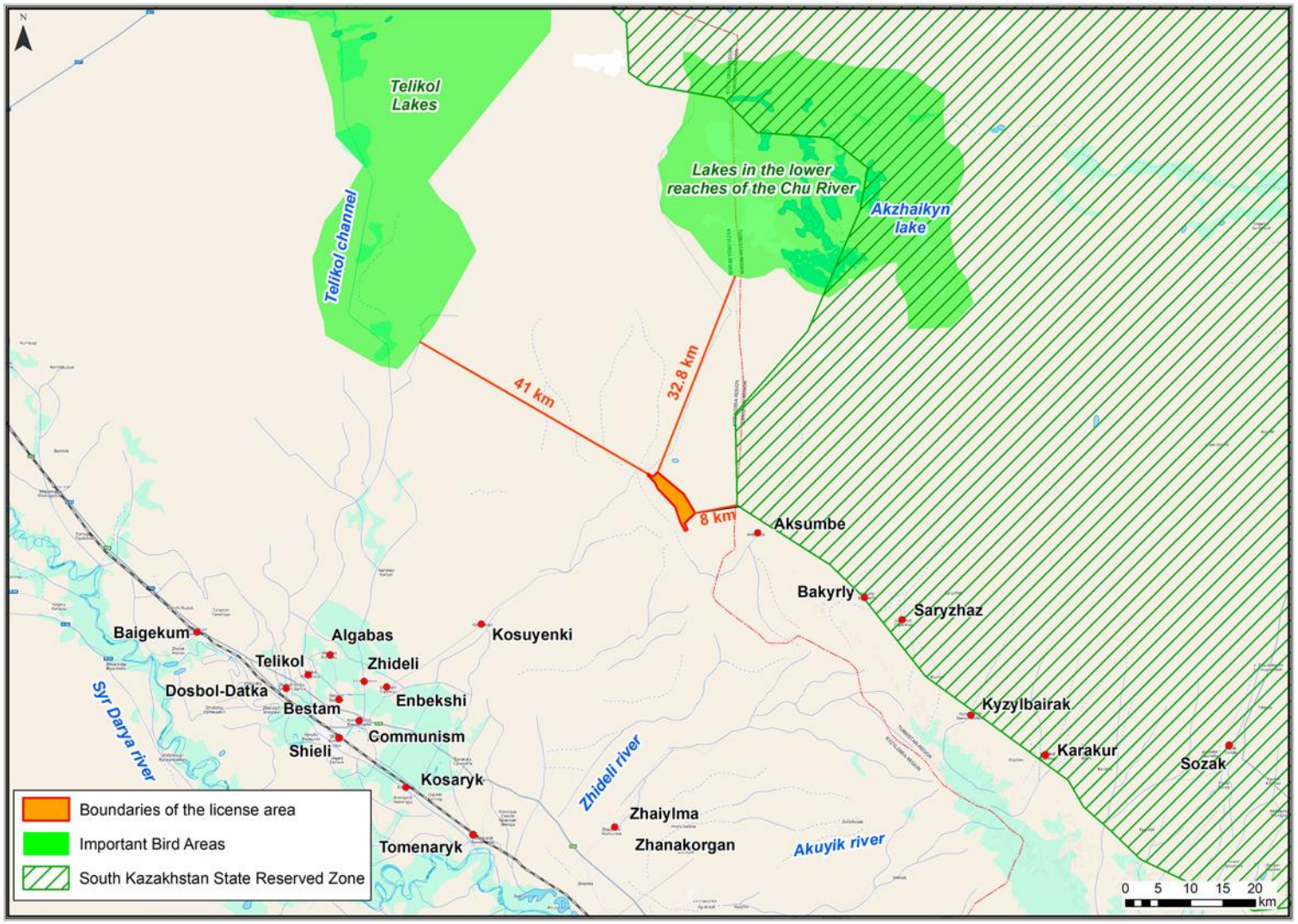
The above mentioned IBAs are also classified as Key Biodiversity Areas (KBA):

- Telikol Lakes – KBA No. 22080 [C70];
- Lakes in the Lower Reaches of the Chu River – KBA No. 21938 [C71].



Source: the map developed by Ecoline Int. based on open data [C67, C68, C69]

Figure 11. Valuable Biodiversity Areas in Kyzylorda Region



Source: the map developed by Ecoline Int. based on open data [C67, C69].

Figure 12. Valuable Biodiversity Areas Nearest to the Project Site

6.10 Noise and Vibration

The monitoring of noise and vibration in the Project area is not conducted because the license area is far from residential areas. Aksumbe Village, the nearest residential area, is located 9 km away. The nearest asphalted public motor road runs 0.5 km south of the outermost point of the license area. No anthropogenic sources of noise and vibration are currently present in the area with wind being the main natural source of noise.

6.11 Seismicity

As per the seismic zoning map and construction standard SN RK 2.03-30-2017 "Construction in Seismic Areas" [A17] populated areas in the Kyzylorda Region including Shieli lie within the 6-degree seismic zone and require that the seismic resistance requirements be met in the design and construction of new projects. No seismic events have been recorded in the Project area.

6.12 Dangerous Geological and Hydrogeological Events

Dangerous events include extreme temperatures, sandstorms, hurricanes, mud flows, landslides, earthquakes and other natural processes.

Extreme meteorological events (EME) in Kazakhstan during cold weather are heavy snowfalls and blizzards accompanied by strong winds and even hurricanes, long periods of severe frost, icing and freezing drizzle, and spring frost occurring in late spring. Warm-season extreme events include heavy showers accompanied by thunderstorms, hail and gusty wind. High fire danger, extreme heat and drought often occur in summer.

The most recurring extreme events are strong wind, heavy rain, severe snowstorm, heavy snowfall, thick fog and hail. The total recurrence of these events in 1990–2021 was 96.8% [C1].

The Kyzylorda Region is among five regions in Kazakhstan that experience fewest extreme weather events, though each region sees 1-3 extreme weather events per year on the average. The number of uncontrollable hydrometeorological events recorded in the Kyzylorda Region accounts for 2.2% of all such events in Kazakhstan.

The most frequent extreme weather events in the Kyzylorda Region and entire Southern Kazakhstan in 2017-2021 were heat waves and droughts [C1].

Mud flows and landslides are not expected to occur in the Project area.

7 SOCIO-ECONOMIC BASELINE

The socio-economic situation is presented here for national, regional, district and settlement levels. Settlements nearest the Project site are selected, which may be environmentally or socio-economically impacted.

The Project is in the Shieli district of the Kyzylorda region. The nearest settlements are the village of Aksumbe, Sozak district, Turkestan region (9 km from the site) and the village of Kosuyenki, Shieli district of Kyzylorda region (**Figure 1**). Therefore, the baseline presented here includes:

- Kyzylorda region, Shieli district, the village of Kosuyenki, as well as its administrative centre, the village of Shieli;
- Turkestan region, Sozak district, the village of Aksumbe.

7.1 Kyzylorda Region

7.1.1 Administrative division

The Kyzylorda region is in the south of the RK (**Figure 1**). Kyzylorda is the largest city in and the administrative centre of the region. The other large cities of the regions are Baikonur, Aralsk, Kazalinsk.

The region includes 7 districts and 2 cities of regional significance, 2 cities of district significance, 2 towns of urban significance and 230 villages [C15].

7.1.2 Demography

The population of Kyzylorda was 839.4 thousand (September 1, 2023). Population growth is stable mainly due to natural increase.

Some 53.1% of the region's residents lived in rural areas and women constituted 50% of the population (beginning of 2023). The population is dominated by the working age population, but Kyzylorda region is one of the “youngest” regions in the country.

Migration is negative in keeping with the other labour-surplus southern regions of the country. The region's population is ethnically homogeneous with Kazakhs being the majority.

7.1.3 Public health

In Kyzylorda a healthy lifestyle mass sports characterise the population. Almost 30% of the region's population participate in sport [C16].

Nevertheless, the following disease numbers per 100,000 people in the region from 2018 to 2022 annually exceed the national average [C17]:

- endocrine system, nutritional disorders and metabolic disorders,
- nervous system,
- eye and its adnexa,
- ear and mastoid process,
- digestive diseases.

The number of people with diseases of the blood, hematopoietic organs and disorders involving the immune mechanism, as well as anaemia is significantly higher in the region than the national average (**Figure 13**). Also, the region annually has one of the highest incidence rates of acute intestinal infections [C17].

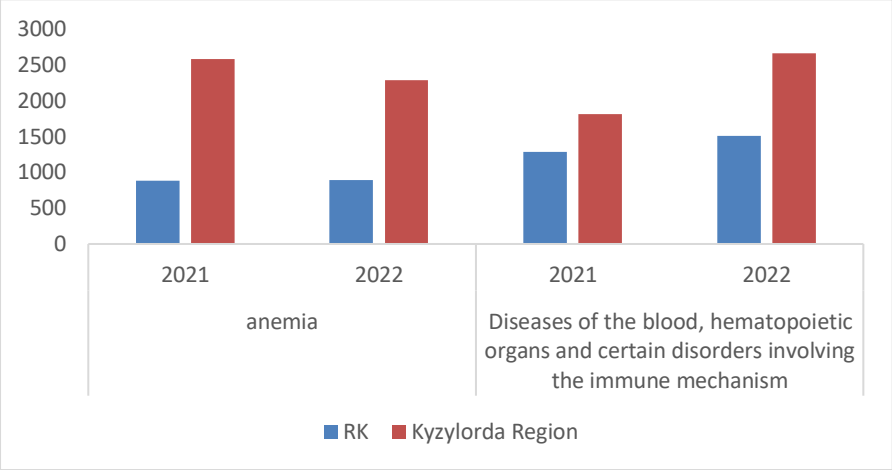


Figure 13. Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism, as well as anaemia per 100,000 people of the corresponding population [C17].

The main causes of mortality are diseases of the circulatory system, malignant neoplasms, respiratory diseases and so forth. The regional mortality rate from infectious and parasitic diseases exceeds the country average [C17].

For many years, infant mortality rate has remained one of the highest in the country [C18], largely due to conditions arising in the perinatal period.

7.1.4 Social infrastructure

In 2022, in Kyzylorda had 143 outpatient clinics (national average of 162), 34 hospital organizations, including regional adult and children's hospitals, an infectious diseases hospital for adults, a perinatal centre, and others. [C17].

There are 680 preschool education institutions (national average of 555), 327 secondary schools (381), 30 technical, vocational and post-secondary education institutions (36) and 3 higher education institutions (6) [C19]. Conditions for inclusive education have been created in 80% of schools [C20]. There are 410 state cultural organizations and archives operating in the region [C21].

The transport infrastructure of the region is well developed: [C22]:

- The total length of roads in Kyzylorda region is 3,420 km. Of these, 1,016 km are national roads, 555.6 km are regional roads and, 1,848.7 km are district roads.
- The length of the main railway network is 1,055 km and there are 8 railway stations.
- The Korkyt Ata International Airport has 22 flights per week.
- There are 205 bus routes connecting 212 settlements with the district and regional centres, as well as international and interregional bus routes.

7.1.5 Economic development; main sectors of regional economy

Kyzylorda is an industrial-agrarian region. GRP per capita was 1,350 thousand tenge (in 2022), less than the national average (2,382 thousand tenge) [C23]. GRP share for Kyzylorda Region is no more than 5% of the country's GDP [A19]. Industry accounts for the largest share of GRP. Crude oil production is the dominant industry in Kyzylorda but has been declining in recent years. Most of the fields are coming to the end of their lives [C24]. The region has rich reserves of vanadium, uranium, zinc, lead, and there are reserves of copper, titanium, gold, molybdenum, zirconium, and others.

Kyzylorda is the main producer of rice in the country (90%). All districts of the region are involved in rice growing, except for the Aral district.

The region is a country leader in fish catch, the main share of which derives from the Aral district.

The tourism development roadmap for the RK includes four areas of Kyzylorda region [A20].

7.1.6 Land use

The Kyzylorda region is 24.1 million ha, which is 8.3% of the country. Of these: lands leased from the Karaganda region - 2,210.9 thousand ha; lands leased to the Russian Federation – 702.0 thousand ha.

Distribution of the region's land fund by category [C30]:

- Agricultural land – 2,922.3 thousand ha, arable land – 181.1 thousand ha, fallow land – 38.3 thousand ha,
- Land in populated areas – 838.3 thousand ha,
- Industry, transport communications, other non-agricultural land - 265.5 thousand ha,
- Specially protected natural areas – 163.5 thousand ha,
- Forest fund lands – 6,510.5 thousand ha,
- Water fund lands – 2,285.9 thousand ha,
- Reserve lands – 11,124.8 thousand ha.

7.1.7 Standard of living of the population, income and expenses

The labour force is 64.3% of the population. at some 330,133 people (95% of the total labour force). Most work in the “wholesale and retail trade sector; car and motorcycle repair and education" [C26].

The unemployment rate remains at 4.9% (**Figure 14**), which is the same as the national average over the past three years.

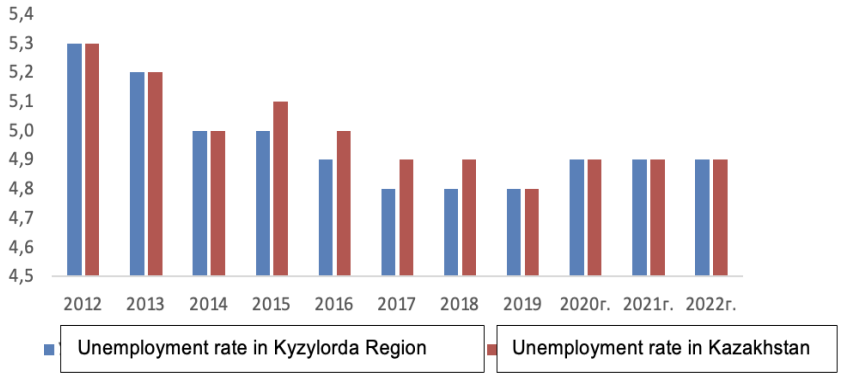


Figure 14. Unemployment rate in Kyzylorda region and in the RK in the period from 2012 to 2022, %

Source: Office for National Statistics [C27].

Consistent with the national average, most income is in the form of wages. However, the share of the population receiving benefits in the region is twice as high as the national average. Most expenditure, consistent with the national average, are consumer expenses, specifically food.

Average monthly nominal wage in the region amounted to 330,567 tenge (RK national average was 365,502 tenge) (2nd quarter, 2023). Despite year on year growth, monthly nominal wages remain below the national average (**Figure 15**).

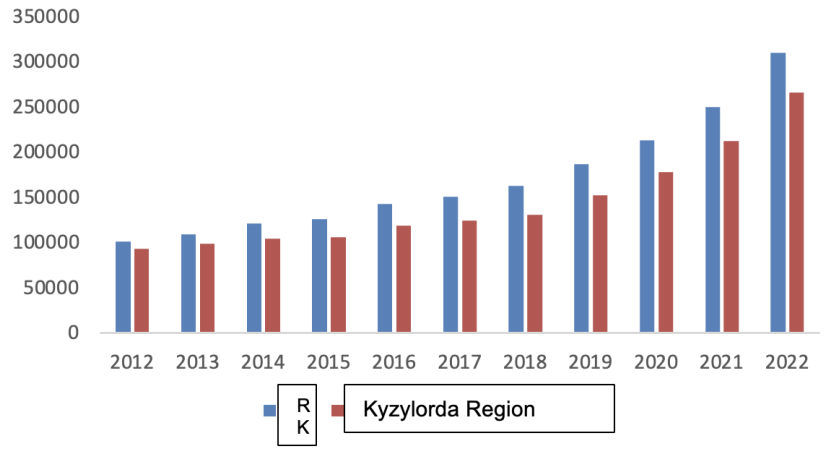


Figure 15. The average monthly nominal wages in the RK and in Kyzylorda region in the period from 2012 to 2022, tenge

Source: Office for National Statistics [C28, C29]

7.1.8 Socially disadvantaged/vulnerable groups of the population and social protection

Some 5.4% of the population have incomes below subsistence (about 99 US dollars) (end 2nd quarter,2023) and generally exceeds the national average of 5.1%. Households of five or more persons constitute most in the region with incomes below subsistence. Poverty in the region decreased compared to the previous year and is 0.5% (RK national average was 0.8%) and 0.1% (RK national average was 0.2%), respectively.

In 2022, there were 13 organizations providing special social services in the region, with 1,105 people (363 women) being accommodated [C80]. It is mostly people with disability and old-age pensioners living in these organisations.

7.1.9 Gender issues

Gender equality indicators in the region for employment, career opportunities and wages for the population for the 1st quarter of 2023, show: [C32, C33, C34]:

- There were 60% women in the women labour force and 67.7% men in men labour force – in both urban and rural areas;
- The unemployment rate for women was 4.8%, but 5% for men, again in urban as well as rural areas;
- More than half of unemployed women do not work due to housekeeping and have never worked;
- The gender wage gap was 9.4%[15];

For political structures:

- women constituted 33.5% of district maslikhats, 42.9% of city maslikhats, and 25% of regional maslikhats (at the end of 2022) [C35].
- Not a single woman was head of an akimat of the region, Kyzylorda city or districts (Regional akimat website, 2023). As of the 2024 information for Shieli district, one women became a members of the district maslikhat.

[15] Which means that on average women earn 90.6% of the average salary of men

There is one crisis centre to combat violence against women, which received 315 complaints in 2022 (10th place among all regions of the country in terms of complaint numbers).

The number of registered criminal offenses committed in the family and domestic sphere in the region is one of the lowest of the RK [C36].

7.2 Shieli District

7.2.1 Administrative division

Shieli district includes 1 village, 22 rural districts and 39 settlements. The administrative centre of the district and the only populated area of the Shieli rural district is the village of Shieli.

7.2.2 Demography

The population of the district is growing annually and was 85,772 people (10% of the total population of the region), including 42% living in the administrative centre of the district - the village of Shieli and 58% living in rural areas in September, 2023. The district shares a high natural rate of increase with other districts in the region.

The gender and age structure of the district matches the regional structure with women constituting half of the population. Most residents are of working age. There are many children under the age of 16 in the district making up 36% of the population.

The population of the district is characterized by ethnic homogeneity. Residents predominantly speak Kazakh, and all office work is conducted in Kazakh.

There is an annual out migration of work seekers again matching other districts). The working age population mostly leaves for Astana, Almaty and Shymkent.

7.2.3 Public health

Some 38% of the population participates in physical education and sport (altogether 24 sports) [C46]. Sports complexes were established using public-private partnerships in a number of settlements.

Morbidity rates in Shieli district per 100,000 population over the past five years are [C65]:

- newly diagnosed incidence decreased by 25.4% (2018 – 64,648.4, 2022 – 51,543.8);
- the overall incidence decreased by 5.8% (2018 – 70,857 per 100,000 population, 2022 – 66,972).

Residents suffer principally from circulatory system diseases, the incidence of which in 2022 was 3,273.2 per 100,000 population, an increase of 6.3% from 2018. The incidence exceeds the regional average in 2022 - 2 937.5.

The main causes of mortality are circulatory system, respiratory, and digestive diseases, neoplasms, and others. (**Figure 16**). Infant mortality rate increased by 3.4% over five years (12 cases were registered in 2018, indicator – 5.9; 20 cases – in 2022, indicator – 9.3).

The region is a natural hotbed for the spread of Crimean-Congo haemorrhagic fever (CCHF). The main carriers are ticks [16].

[16] Ticks of the genus Hyalomma marginatum, Hyalomma asiaticum and Hyalomma anatolicum play a special role in the spread of CCHF.

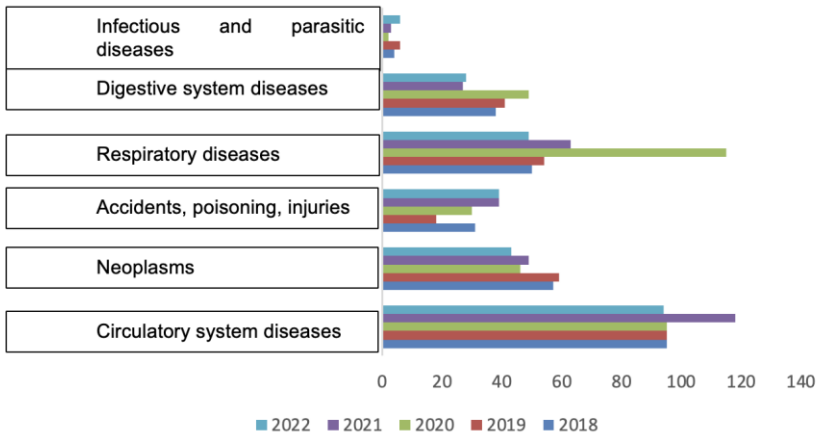


Figure 16. Main causes of mortality among residents of Shieli district in the period from 2018-2022, persons

Source: State Institution "Health Administration of Kyzylorda Region" [C65].

7.2.4 Social infrastructure

Presently, the central district hospital with outpatient services includes: 1 hospital, 1 central clinic, and 1 rural clinic. [C37].

There are 102 preschool educational institutions and 40 secondary schools in Shieli district. The share of schools with inclusive education is 87.5% [C38].

There is a regional Cultural and Creative Centre named after Budabay Kabyluly, a village House of Culture "Arman", 25 rural houses and clubs, Nartai House of Arts and 32 libraries in Shieli district [C39].

The total length of highways in Shieli district is 323.4 km, including 80 km of national roads, 98 km of regional roads, 145.4 km of district roads. 73% of regional roads are in good or satisfactory condition. Roads of national and regional importance are 100% tarred [C40]. There is gas supply in 8 settlements. Currently, 88% of 39 settlements in Shieli district are provided with high-quality drinking water. There is no central sewerage system in the district, except for several areas in the village of Shieli. Septic tanks are used instead. Residents of the district mainly use coal for heating as not everyone has access to gas. There is no central heating in the district, apart from five high-rise buildings (out of 89 high-rise buildings in the area) which have separate boiler rooms.

7.2.5 Economic development, main sectors of the economy

Mining and quarrying accounts for 46% of total industrial production - the extraction of non-ferrous metal ores. The manufacturing industry in the district is mainly food industry products and ferroalloys production.

The district has seen an annual stable increase in gross agricultural output. Some 73% of total production is crop production, accounting for 25% of gross crop production in the region. The district is the largest crop producer in the region [C41].

7,254 active SMEs were registered in the district (the most in the region) [C43].and the district is the second most visited by tourists in the region after the Aral district [C48].

7.2.6 Land use

The total land fund of the district is 3,239,755 ha, including [C44]:

- agriculture– 250,520.2 ha,
- settlements – 61,614 ha,

- industry, transport, defence, communications and other purposes - 14,601.4 ha,
- forest fund – 1,663,935 ha,
- water fund – 18,436.1 ha,
- state fund – 1,230,648.3 ha.

7.2.7 Standard of living of the population, income and expenses

Annually Shieli district has the largest economically active population among the districts of the region, as well as the largest share of the employed population. In 2022, 34.4 thousand people were employed in the district (95% of the total economically active population of the district) [C47].

At the same time, the unemployment rate since 2016 has exceeded the regional average and in 2022 amounted to 5% (in the region - 4.9%) (**Figure 17**).

As in the region, most income is in the form of wages with most expenditure being food.

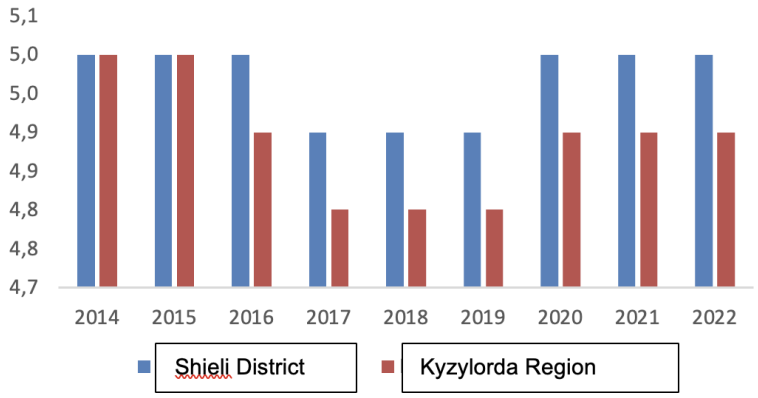


Figure 17. Unemployment rate in Kyzylorda region and Shieli district from 2014 to 2022, %

Source: Office for National Statistics [C47]

The average monthly nominal salary was 345,593 tenge (2nd quarter of 2023), which exceeds the regional average of 330,567 tenge [C42]. This nominal salary is the second highest in the region after Zhanakorgan district.

7.2.8 Socially disadvantaged/vulnerable groups of population and social protection

In Shieli district, as of October 1, 2023, 2,408 disabled people were registered, including group I - 203, group II - 736, group III - 927, disabled children under 16 years old - 542 [C45].

Currently, 1,806 citizens are on the housing waiting list including orphans and children left without parental care (164), mothers with many children (575), and so forth.

As Shieli district is a designated environmental crisis zone[17], its residents are provided with social support by the state in accordance with RK law [A21].

[17] The main criteria for determining the boundaries of an environmental crisis zone are:
- steady increase in specific morbidity of the population;
- exceeding the limits on permissible concentrations of pollutants in the environment at levels hazardous to public health;

7.2.9 Gender issues

Among 15 members of the district maslikhat, only 1 position is occupied by a woman.

The work plan of the district commission for women's affairs and family and demographic policy under the district akimat for 2023 was approved, and several events held.

The profiles of settlements in the Shieli district (the village of Shieli and the village of Kosuyenki) are given in the appendices (**Annex 1**).

7.3 Turkestan Region

7.3.1 Administrative division

The administrative and territorial structure of Turkestan region comprises 14 districts, including 7 cities, 825 villages, 174 rural districts [C49]. The administrative centre of the region is Turkestan city.

7.3.2 Demography

The population at the beginning of 2023 was 2,119.2 thousand people, ranking 2nd in the RK. The Turkestan region is the most densely populated in the country, with a population density 17 persons/km². The population is predominantly rural (75%). The percentage rural population in Turkestan is the largest of all regions of the country. Population growth is solely natural reproduction. At the beginning of 2023, women made up approximately half of the region's population. The largest group of people is the working age population. Turkestan region is a leader among the regions of the RK in numbers of children.

The region experiences high out migration, from especially the rural population. The main reason for the outmigration is the limited economic prospects in the region. Turkestan region is one of the most labour-abundant regions of the country.

The population of Turkestan region, despite the numerical predominance of Kazakhs (75%), is characterized by significant ethnic diversity. Uzbeks are widely represented (about 18% of the population), Russians (1.4%), Tajiks (1.8%), Azerbaijanis (1.1%), and others. [C50].

Islam is the predominant religion in the region. The local population predominantly speaks Kazakh, which is the business *lingua franca*.

7.3.3 Public health

Population morbidity of Kazakhstan and Turkestan region for 2021 and 2022 is presented in **Table 13**.

Table 13. Morbidity of the population (number of first-time cases per 100,000 population)

Source: Statistical collection "Health of the population of the RK and the activities of healthcare organizations" [C17]

ALL DISEASES										
Total		of which are women		18+		15-17		0-14		
2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	
53 180.5	49 143.1	57 284.0	53 680.5	44 448.9	39 827.7	59 247.8	55 781.9	71 993.6	68 943.2	RK
27 405.6	28 699.3	31 493.9	33 915.9	25 608.8	24 407.8	26 179.5	30 520.4	30 222.4	34 947.8	Turkestan region

- reduction in species composition and structural integrity of ecosystems, 75 per cent reduction in ecosystem bioproductivity;
- crisis shallowing of water bodies exceeding the average multi-year fluctuations.

Morbidity in the RK is decreasing, while in Turkestan morbidity is generally increasing.

The main causes of mortality are circulatory system disease, (23% of all registered deaths), 9% from accidents, poisonings and injuries, 9.3% from neoplasms, 7.2% from respiratory and digestive organ diseases. The infant mortality rate was 6.13 per 1000 live births.

7.3.4 Social infrastructure

In 2022, there were 273 outpatient clinics, 1,369 preschool institutions (1,054 in rural areas), 1,004 secondary schools (842), 49 technical, vocational and post-secondary education organizations and 3 higher education institutions in Turkestan. There were also 395 libraries (including 356 libraries in rural areas), 252 cultural and leisure organizations (including 244 in rural areas), 27 museums, 3 theatres, 3 cinemas, and 27 amusement and recreation parks.

The transport infrastructure includes: [C51]:

- 17,503.9 km of highways and streets of settlements is: 723.1 km of roads of national significance; 5,755.1 km of local roads, and 11,025.7 km streets in settlements.
- The region is well-connected by railways of some 915.6 km, including long-distance trains, providing travel for passengers to cities in Uzbekistan, Kyrgyzstan, the Russian Federation and Ukraine. Turkestan is also located on the axis of the international highways Orenburg – Tashkent and the Turkestan-Siberian Railway.
- There are 6 bus terminals, 25 bus stations and 10 passenger service points in the region (41 in total).
- There is an international airport – “Hazret Sultan” International Airport.

7.3.5 Economic development, main sectors of the regional economy

The region's economy is based on agriculture (18.2%), industry (18.4%), real estate transactions (10.1%), construction (9.2%), and transport and warehousing (9.0%) [C52].

The region is a major producer of cotton, leather raw materials, vegetable oil, fruits, vegetables, grapes, melons, pasta, tobacco products, and alcoholic and non-alcoholic products. The region also produces uranium ore, cement, petroleum products, power transformers, oil switches, hosiery, clothing and furniture [C53].

GRP per capita in 2022 was 1,671.8 thousand tenge, the lowest in the RK [C23].

Turkestan region is one of the most visited regions of the RK by tourists. Tourism over the past five years has increased 1.7 times and reached 472,094 people in 2022 [C25].

7.3.6 Land use

As of November 1, 2021, the distribution of land was as follows in Turkestan region [C57]:

- Agricultural: 4,475.7 thousand ha;
- Settlements: 799.4 thousand ha;
- Industry, transport, communications, etc.: 108.6 thousand ha;
- Specially protected natural areas: 430.5 thousand ha;
- Forest fund: 3,009.7 thousand ha;
- Water fund: 134.4 thousand ha;
- Reserve lands: 2,652.0 thousand ha.

7.3.7 Standard of living of the population, income and expenses

The labour force aged 15 years and older was 835,218 in 2022. The regional economy employed 792,167 people (95% of the labour force). The employment rate for the population aged 15 years and older was 63.9%.

Unemployment annually exceeds the national average (**Figure 18**), and in 2022 amounted to 5.2% (the RK is 4.9%).

The main source of income for the population is wages. The percentage population receiving benefits is the highest among the regions of the RK and significantly exceeds the national average [C62]. The region has the largest share of the population with incomes below subsistence amongst the regions of the RK– 9.7% (the RK is 5.1%) [C62].

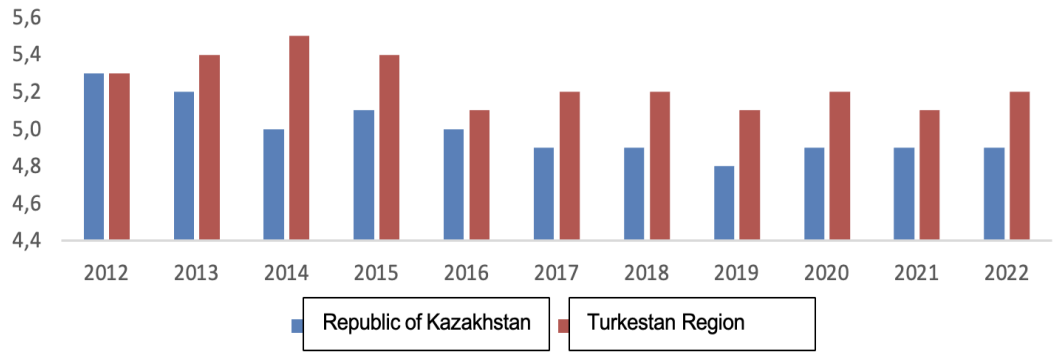


Figure 18. Unemployment rate in Turkestan region and in the RK from 2012 to 2022, %

Source: Office for National Statistics [C62].

The average monthly salary was 299,042 tenge (Q2 of 2023), (the RK is 365,502 tenge) [C55]. The bulk of the population's expenses go towards food [C56].

7.3.8 Socially disadvantaged/vulnerable groups of population and social protection

In 2022, 21 organizations were providing special social services in the region. Some 2,457 people (1,180 women), of which 24% were old-age pensioners, and 16% were single and without family, were living in these organisations [C80].

The region has the largest percentage of population with incomes below subsistence among the regions of the RK at 9.7% (the RK is 5.1%) [C64].

7.3.9 Gender issues

Gender equality indicators of employment, career opportunities and wages for the population for 2022 are [C35]:

- labour force participation rate for women was 42%, for men it was 52%;
- unemployment rate for women was 6.1%, which is significantly higher than for men at 4.4%;
- most unemployed women do not work due to housekeeping, with the rest for family (personal) reasons. More than half of unemployed women in the region have never worked;
- the gender wage gap was 7.4%.

According to a report on the analysis of the population situation in Turkestan region [C58]:

- 21% of women, i.e. one in five women aged 18-75, who have had a partner, have experienced physical and/or sexual violence by an intimate partner, which is higher than the national figure (17%). The physical and sexual violence was repeated many times;
- women in urban areas who have had a partner report a higher rate of intimate partner violence in their lifetime (26% compared to 15% in rural areas).

7.4 Sozak District

7.4.1 Administrative division

The administrative centre of the district is the village of Sholakkorgan. There are 30 settlements and 10 rural districts in the district.

7.4.2 Demography

The population of Sozak was 63,056 people (beginning 2022) and growing year on year. The population density is 1.5 people/km^2. The gender and age structure sees women constituting just over half of the population. The majority of inhabitants are working age.

The national composition of Sozak is Kazakhs at 90.68%, Uzbeks at 7.52%, and the rest are Russians, Tajiks, Azerbaijanis, Tatars and other nationalities [C50]. The main religion is Islam. The Kazakh language is the state language used by the local population and in which all official documentation written.

Both the district and the region experience an annual outmigration of population.

7.4.3 Public health

The primary morbidity rate per 100,000 population has decreased by 22.8% (2018 – 42,750.3, 2022 – 32,997.3) [C66] over the past five years. Residents mainly suffer from circulatory system disease.

Circulatory system, respiratory system, digestive system and other diseases are the main causes of mortality (**Figure 19**).

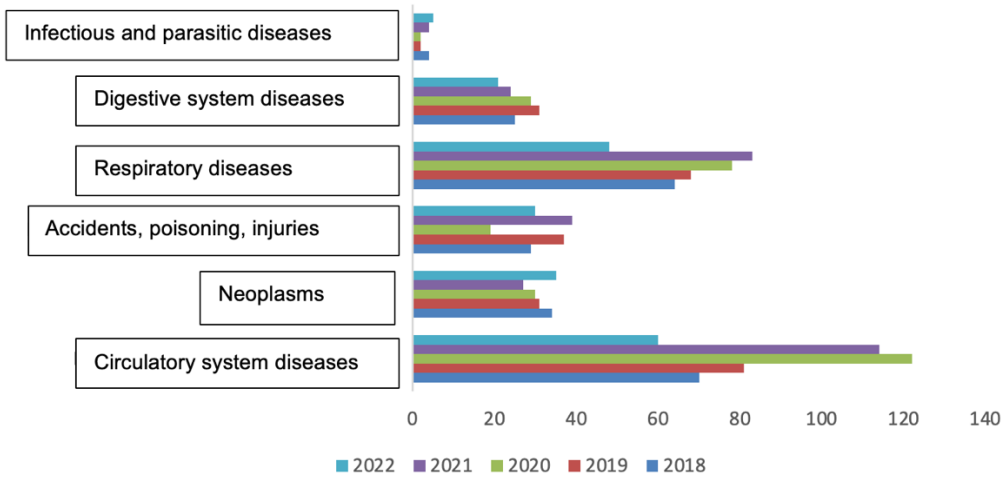


Figure 19. Main causes of death among residents of Sozak district from 2018 and 2022, per 100,000 population

Source: Turkestan Region Health Care Department [C66]

7.4.4 Social infrastructure

The medical network includes 1 central district hospital, 1 primary health care centre, 9 medical outpatient clinics, 13 medical posts and 4 paramedic and obstetric stations.

There are 73 educational institutions, 38 cultural institutions, 23 libraries, 2 children and youth sports schools, and others in the district [C59].

There are 917 km of roads in the district, including 435 km of regional roads, 79 km of district roads and 403 km of internal settlement. Some 239 km (59%) of internal roads of settlements are tarred [C59].

Centralized drinking water is supplied to 62,910 people in 29 settlements (2 villages, 27 rural settlements) out of 35 settlements in the district [C59].

Between 2021 and 2022 a gas pipeline was installed for 3,500 consumers located on 100 streets with a length of 175 km [C60].

7.4.5 Economic development, main sectors of the economy

Almost all of industrial production (89.9%) is from mining. Mining companies are the main producers of mining products (92.1%).

About 60% of uranium reserves in the RK have been explored and are mined in Sozak.

Sozak district is a leader in livestock production not only in Turkestan, but also Kazakhstan. Livestock farming provides 73% of the total gross output. The high aridity limits crop production. Farmers mainly grow melons, wheat and vegetables.

In 2022, there were 4,766 active SMEs registered in the district (last place among all districts of the region) [C54]. There were 9 accommodation facilities with 65 rooms operating in Sozak district [C61].

7.4.6 Land use

The total area of the district is 4,104.5 thousand ha. All agricultural land is 3,519.9 thousand ha, including 13.9 thousand ha of arable land, (5.8 thousand ha of irrigated arable land), 8 thousand ha of dry land, 337 ha of perennial plantings, 11.7 thousand ha of hayfields and 3,493.9 thousand ha of pastures.

Land by categories:

- agricultural – 673.3 thousand ha;
- settlements – 261.3 thousand ha;
- purposes other than industry, transport, communications, defence, agriculture – 54.5 thousand ha;
- specially protected natural parks – 799 ha;
- forest fund – 1,014.9 thousand ha;
- water fund – 3 thousand ha [A22].

7.4.7 Standard of living of the population, income and expenses

Some 26,389 people are employed (95% of the labour force) with 1,325 unemployed. The overall unemployment is 5.0%, below the regional average (5.2%). In the employed population, there are 19,509 hired workers and 5,555 - self-employed.

Income is mainly wages followed by social transfers (benefits, pensions). Average monthly salary in 2022 was 389,371 tenge, which is the highest among the districts of the region and exceeds the regional average by 60% [C63].

7.4.8 Gender issues

In Sozak and in the region, there are many mothers with many children. The region has one of the lowest numbers of obstetricians and gynecologists [C17].

Gender issues for the region are also relevant for Sozak.

Below (**Annex 2**) the profile of the village of Aksumbe (Sozak district) is provided.

8 ECOSYSTEM SERVICES IN THE PROJECT AREA

IFC Performance Standard 6 (PS 6) defines ecosystem services (ES) as *the benefits that people and businesses derive from ecosystems* [C72]. IFC PS 6 recognises four types:

- provisioning services, which are the products people obtain from ecosystems (e.g. food, water, raw materials);
- regulating services, which are the benefits people obtain from the regulation of ecosystem processes (e.g. pollution assimilation, regulation of climate, water regime and ozone layer etc.);
- supporting services, which are the natural processes that maintain the other services (including soil formation, photosynthesis, circulation of chemicals and water in the environment etc.);
- cultural services, which are the nonmaterial benefits people obtain from ecosystems (recreation, aesthetic values, spiritual, ethical, religious and historical values).

ES that have been identified in the project area by terrestrial and freshwater ecosystems along with the ES consumers are described below.

8.1 Provisioning or resource services

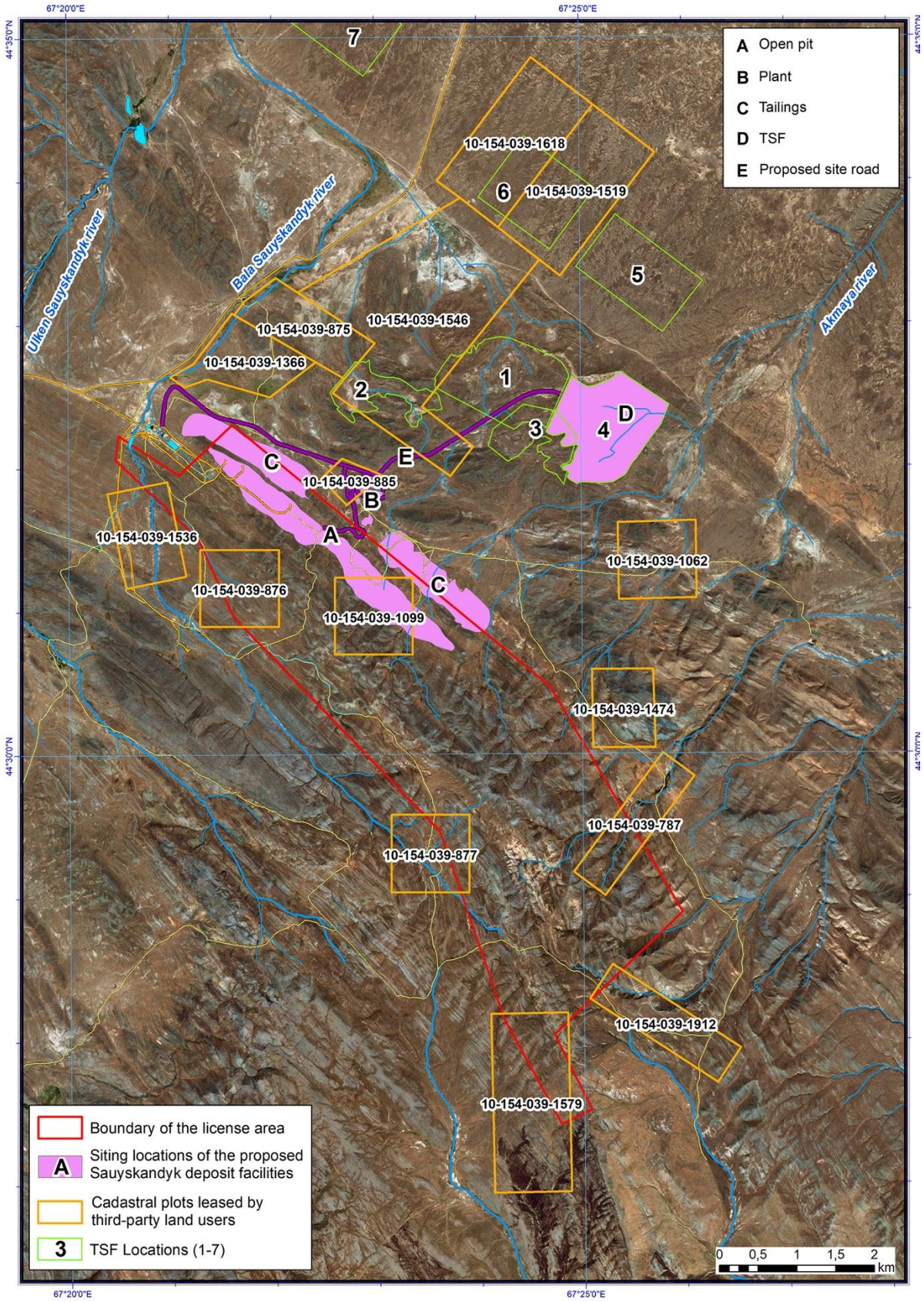
Provisioning services in the Project area are natural pastures, timber, hunting and water resources.

The Shieli District Agriculture and Land Relation Division [C79], has leased 10 pasture plots for livestock grazing. One 100 ha plot is within the license area, partly overlying the ore body. Three pastures partly overlap the license area and three other pastures partly lie within a 1,000 m buffer zone for the Project (**Figure 20**).

The initial field observations (September 2023) indicate that pastureland in the Project area might be used efficiently. The value of the pastures and their utilisation will be assessed as part of the full-scale ESIA, together with the potential for alternative pastures to replace those that will be converted to the Project.

Residents may collect tamarisk and Russian thistle as firewood. Eight mammal and 15 bird valuable game species [A31] occur in the Project area but more information is required to assess the scale at which these services are used.

Freshwater is one of the most valuable resources in the area. Local water resources are currently used for cooking and drinking at the mine camp (groundwater sources) and for filling the process water pond (surface water from the Balasausqandiq River). Water accumulated in water collection pits, wells and ponds amid the pastureland is used to water livestock.



Source: developed by the Consultant

Figure 20. Cadastral Plots Leased to Third Party Land Users

8.2 Regulating Services

8.2.1 Greenhouse Gas Flow Regulation

Greenhouse gas flow regulation refers to balancing the sinks and sources of greenhouse gases. Pastureland is the major type of land covered by vegetation in the Project area. Pastures in Kazakhstan acted as carbon sinks in 1990-2021 [C74] the carbon absorption rate in 2021 was about 0.135 tonnes CO_2 per hectare on average. Degrading the pastures through poor management and overgrazing would turn pastures into a source of greenhouse gases.

The sink/source balance for natural pastures located in the Project area can be assessed once the level of pasture degradation and pasture use forecasts are known.

8.2.2 Carbon Sequestration

Natural ecosystems absorb (capture and store) carbon from the atmosphere. Carbon is accumulated and stored by living and once-living biomass and soil. The estimated average carbon sequestration rates (benchmarks) in Kazakhstan are 2.77 t/ha for living biomass, 4.11 t/ha for once-living biomass, and 51.3 t/ha for soil (a surface layer of 0 to 30 cm) [C74].

Data on the types of soils and areas occupied by each soil type are required to assess how much carbon is stored in ecosystems in the Project area.

8.2.3 Water Regulation (Surface Runoff Management)

Exposed areas with no vegetation cover accumulate little or no surface runoff in the Project area, so it flows further down the terrain where ecosystems capture “upstream” flow and precipitation to form a network of larger watercourses and smaller streams draining the area. The Balasausqandiq River collects its flow from two sources – spring water (primary source) and precipitation.

8.2.4 Soil Erosion Prevention

Undisturbed ecosystems protect soil from erosion, weathering and other processes, and promote slow accumulation of flow and groundwater recharge. This service can be assessed by comparing the area of anthropogenically disturbed ecosystems with the area of undisturbed sections and predicting how this ratio would change in the future.

8.3 Supporting Services

8.3.1 Maintenance of Biodiversity

Biodiversity is a biotic ‘stabiliser’ that supports ecosystem resilience. Ecosystems also support natural genetic resources and conditions for evolution of rare plants and animals.

The Project area and its surroundings are potentially inhabited by 171 terrestrial vertebrate species including 36 mammal species, 122 bird species, 2 amphibian species and 11 reptile species (see **Section 6.9.3**). In the context of Kazakhstan that is home to 740 terrestrial species, and the Project area has a relatively rich diversity of wildlife species, i.e. 23% of the country’s animal fauna and about 25% of bird fauna. As regards rare terrestrial species, 17% of species listed in the RK Red Data Book occur in the Project area.

According to initial estimates, the vegetation cover of the area is rather poor. The area’s floral species diversity will be assessed after the completion of field surveys.

8.4 Consumers of Ecosystem Services

The following consumers of ecosystem services have been identified in the Project area:

- Shieli District residents use natural pastures, water resources for livestock watering, hunting and timber resources;

- tourists visiting the Petroglyphs in the Souskandyk Archaeological Landscape site; this service is expected to become more popular with the development of recreational industry in the country;
- scientists and environmental organisations use the biodiversity maintenance service; the importance of this service is likely to grow significantly if rare and endangered species are encountered;
- the Project is the current and future user of ecosystem services (mineral resources, groundwater and surface water, preventing soil erosion, and managing surface runoff); the significance of these services will be very high;
- the people of the Earth: regulating and supporting services provided by local ecosystems, including management of carbon flows, carbon sequestration, and maintaining genetic diversity, play a role in maintaining the global biosphere stability; the significance of these services for this group of users is going to be minor as the area under consideration is relatively small.

9 CULTURAL HERITAGE

9.1 Legal and regulatory framework

9.1.1 Legislative requirements of the RK

Cultural heritage requirements are defined in RK by the Law “On the Protection and Use of Historical and Cultural Heritage Objects” [A9], and several by-laws.

The law defines objects of historical and cultural heritage (HCH) as "immovable objects with associated works of painting, sculpture, applied art, science, technology and other objects of material culture, resulting from historical processes and events, that are of interest from the point of view of history, archaeology, architecture, urban planning, art, science, technology, aesthetics, ethnology, anthropology, social culture".

Historical and cultural monuments are: (1) archaeological monuments; (2) monuments of urban planning and architecture; (3) ensembles and complexes; (4) sacred objects; (5) monumental art constructions. These categories are tangible cultural heritage.

The law establishes the need to protect HCH monuments and associated tools and requirements.

The Order of the RK Minister of Culture and Sports[18] distinguishes three protection zones: 1) protection zone; 2) regulated development zone; 3) natural landscape protection zone.

A special regime of land use is established for the protection zone, restricting economic activity is restricted and construction prohibited unless for the preservation of the monument, in these protection zones.

In the development regulation zone, road and transport construction is restricted, and industrial enterprises and warehouse complexes prohibited.

Activities that do not change the character of the landscape, water supply system, vegetation and other stipulated elements are allowed.

9.1.2 Cultural heritage of the project region

The RK ratified the Convention for the Protection of the World Cultural and Natural Heritage on April 29, 1994. There are 6 UNESCO World Heritage sites in Kazakhstan with a further 13 sites officially proposed as potential World Heritage Sites [A26]. Potential World Heritage Sites includes “Petroglyphs in the archaeological landscape of Souskandyk”.

Southern Kazakhstan is archaeologically one of the most interesting and yet least studied regions of Central Asia. The Karatau ridge determined the most important communication routes, since ancient times connecting Bactria and Margiana, Northern Iran, Western and Central Kazakhstan, and the Urals. Settlements concentrated along the oases of the northern Karatau ridge were caravanserais for traders and travellers for many centuries. The Karatau ridge is also one of the richest rock art provinces in Kazakhstan.

9.2 Historical and cultural heritage of the Kyzylorda Region

The Kyzylorda region is rich in historical and cultural heritage monuments Some 560 objects of historical and cultural heritage are protected. Among these are 31 objects of republican

[18] No. 285 dated September 15, 2021 "On Amendments to the Order of the Minister of Culture and Sports of the RK No. 86 dated April 14, 2020 "On Approval of the Rules for determining the protection zone, development regulation zone and the zone of protected natural landscape of a historical and cultural monument and the regime of their use"" [A24].

significance, 256 of local significance and 273 objects are included in the preliminary list of objects of historical and cultural heritage [C31].

There is a historical and cultural heritage site directly in the project area - Souskandyk petroglyphs (virtualmap.xyz). This site is included in the State List of Historical and Cultural Monuments of Republican Significance [A25]. IFC PS IFC 8 obliges the recognition and protection of internationally recognized historical and cultural heritage sites.

The Syganak settlement, an archaeological site of national and international significance which is 2 kilometers northwest of the village of Sunakata, Zhanakorgan district is 50 km from the project site (**Figure 21**) and so it is highly unlikely that the site would be affected in any way by the mining. RK [C75].

9.3 Historical and cultural heritage of the Turkestan region

The Turkestan region is rich in cultural and historical sites with some 1,754 historical and cultural monuments, including 1 UNESCO site of international significance (mausoleum of Kh. A. Yasawi), 31 objects of republican significance, 421 objects of local significance.

The closest monument to the project site, the Akbikesh Tower which is a monument to military-defensive and religious architecture of the Middle Ages. is approximately 9 km southeast of the license area (**Figure 21**).

Source: developed by the Consultant

Figure 21. Nearest historical and cultural heritage sites in the project area

9.4 Archaeological complex "Petroglyphs of Souskandyk"

9.4.1 History of discovery and brief description

The first mentions of rock paintings carved in the Souskandyk gorge in the foothills of the Karatau Mountains appeared in the late 19th century in the reports of the Turkestan Archaeological Society. Russian officers and orientalists wrote about the presence of unknown drawings on the rocks. In 1906 Russian scientist geographer Alfred Kirchhoff

described rock paintings of Souskandyk Gorge in more detail. A methodical and systematic survey of the petroglyphs of the Souskandyk Gorge began in the 1960s [C76].

> Petroglyphs were studied in detail during the scientific research of the Turanian archeological expedition of the International Kazakh-Turkish University named after H.A. Yasavi, under the leadership of M. Eleuov in 2004 (chief of squad S. Murgabaev) [C77]. Since 2005, the study of petroglyphs in the Souskandyk tract was continued under the general guidance of Z. Samashev, with some interruptions until 2014. Z. Samashev called it one of the most promising and interesting in the history of the study of petroglyphs of Kazakhstan. During the work, instrumental fixation of all planes with drawings was carried out, while the complex itself was divided into several conventional groups. The new, more careful copying of Souskandyk images, conducted by the petroglyphic squad of the branch of the Institute of Archaeology named after A.H.Margulan in recent years, has made it possible to clarify many images. Based on the results of the research, a number of monographs have been published, among which the fundamental publication "Petroglyphs of Souskandyk" [C77, C78] should be especially noted.

Souskandyk is a large complex of various archaeological monuments (petroglyphs, individual and group burials, remains of buildings, etc.) associated with various aspects of the social and cultural life of local communities from the Bronze to Middle Ages inclusive. There are ethnographic drawings and tamgas of Kazakhs up to the 20th century.

Petroglyphs or rock paintings are the most valuable and numerous (more than 3000 in total) objects of the archaeological heritage of Souskandyk. All of them were made using the technique of picketing and engraving with stone and metal tools.

Archaeological sites/monuments are located on both sides of the small mountain river Balasausqandiq, which flows along the bottom of a deep gorge, between the mountains Ulken Sausqandiq and Balasausqandiq, in the direction from east to west-southwest, for more than 4.5 km (**Figure 22**).

In addition to rock carvings, the Souskandyk complex includes memorial and burial structures as mounds (an embankment above the burial chamber) and kurums (ground structures with masonry, burial chambers).

A group of mounds is located on the right bank of the river in a small valley at the foot of a hill with drawings of the 2nd group. The stone-filled mounds are located chaotically. The total number of mounds is 8. Average dimensions are 6-10 m, height 0.4-1 m.

Also, on the left bank of the river, on a small elevation, among the drawings of the VIII group, a single mound was recorded. The mound is in disrepair; part of the stone embankment was demolished due to the probable construction of winter quarters in this tract.

The next type of monuments - kurums, are located in the western part of the Souskandyk complex in the upper part of the mountain range of the 1st and 2nd groups of petroglyphs. The total number is 9, of which 6 are located on the hill of the 1st group, 3 - on the north-eastern part of the hill of the 2nd group. The size of kurums in diameter varies from 6 to 10 m.

9.4.2 International significance of the Petroglyphs of Souskandyk monument

There are several large petroglyph complexes in Kazakhstan, the most famous of which are located in the Karatau and Zhetysu mountains such sites as Tamgaly, Eshkiolmes, Koitas, Arpauzen and Koybagar.

The petroglyphs of Souskandyk are among the largest complexes of rock paintings in Kazakhstan. The great historical value of the Souskandyk monument (more than 3000 ancient drawings along 4.5 km), is why the site was included in the Tentative World Heritage List.

9.4.3 Protection zones

In accordance with the existing regulatory and legal requirements [A32] for the monument “Petroglyphs of Souskandyk”, protection and regulation zones were developed and approved [A27] (**Figure 22**):

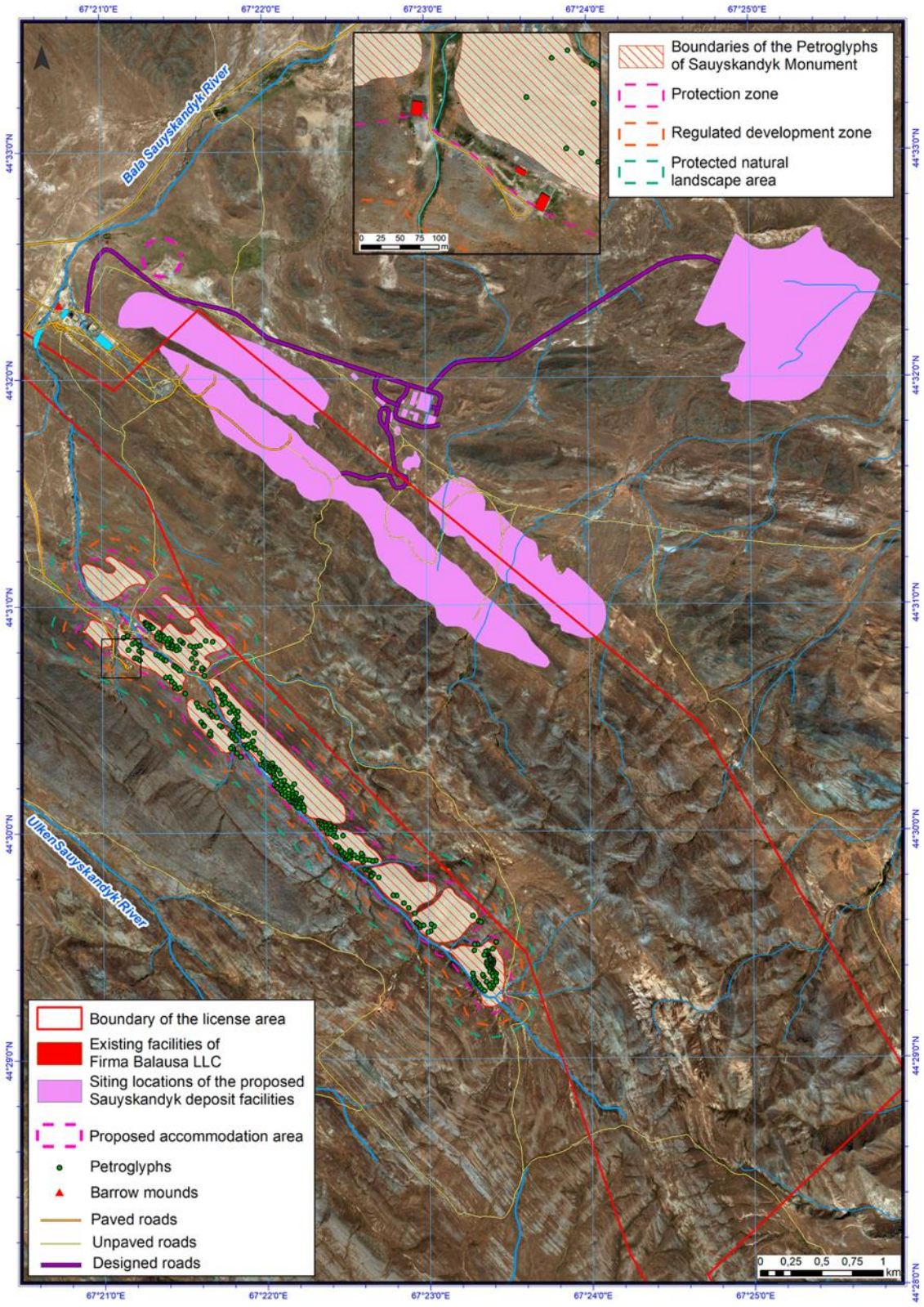
- Protection zone of the monument area of 85.7 hectares (ha)
- Development regulation zone with the area of 130.1 ha
- Protected natural landscape zone with the area of 122.8 ha

The total area of the monument is 472.3 ha.

9.5 Exploratory coverage of the study area and necessary research

The “Petroglyphs of Sauskandyk” have been studied quite well. However, land adjacent to the monument, including the licensed area, has not been studied archaeologically. This work was carried out in March-May 2024 as part of the ESIA. Field archaeological research was carried out, an expert opinion was drawn up and approved by the authorized state body. The results are presented in a separate report [B6].

Further studies will be conducted as part of the full ESIA. The survey boundaries are shown below (**Figure 23**).



Source: developed by the Consultant

Figure 22. Location of the monument "Petroglyphs of Sauskandyk" and its protection zones in relation to the licensed area and facilities of the designed mining and processing complex

9.6 Analysis of gaps in existing information

A gap analysis of existing information conducted in **Sections 6-9** shows that geological and hydrogeological studies required for the design of the mine and ore-processing facility have been conducted in the same area, including searching for groundwater to supply fresh water. Data on the environmental condition of the area available in open sources is insufficient and there is virtually no hydrological information, and the biota has not been studied.

No archaeological studies have been conducted at the planned mining and processing plant; therefore, the necessary studies are being conducted within the framework of the ESIA. The boundaries of the hydrological, environmental, and archaeological studies, including biodiversity studies, are provided below (**Figure 23**). Full-scale studies required for the ESIA are being conducted on the sites of the main mining and processing plant facilities, including the SPZ (quarry, waste heaps, tailings ponds), equal to 1 km (the boundary is indicated by a solid green line).

Preliminary screening studies (archaeology, hydrology) are being conducted in an area not directly affected by the projected facilities, which, however, may be further developed if the tailings storage facilities of Sites 6 and/or 7 are selected for the project. A detailed study of this area is not required at this stage, but the key information will be useful for a further development strategy for the Mining and Processing Plant. Biodiversity studies are being conducted over a much larger area, including the zone of possible Project impact on sensitive recipients of flora and fauna, as well as the habitats of animal species found in this area. Botanical and faunal studies are to be conducted by specialists; the results will be presented within the framework of Stage 2 of the ESIA (full-scale impact and risk assessment). The boundaries of the social studies are defined in **Section 7**.

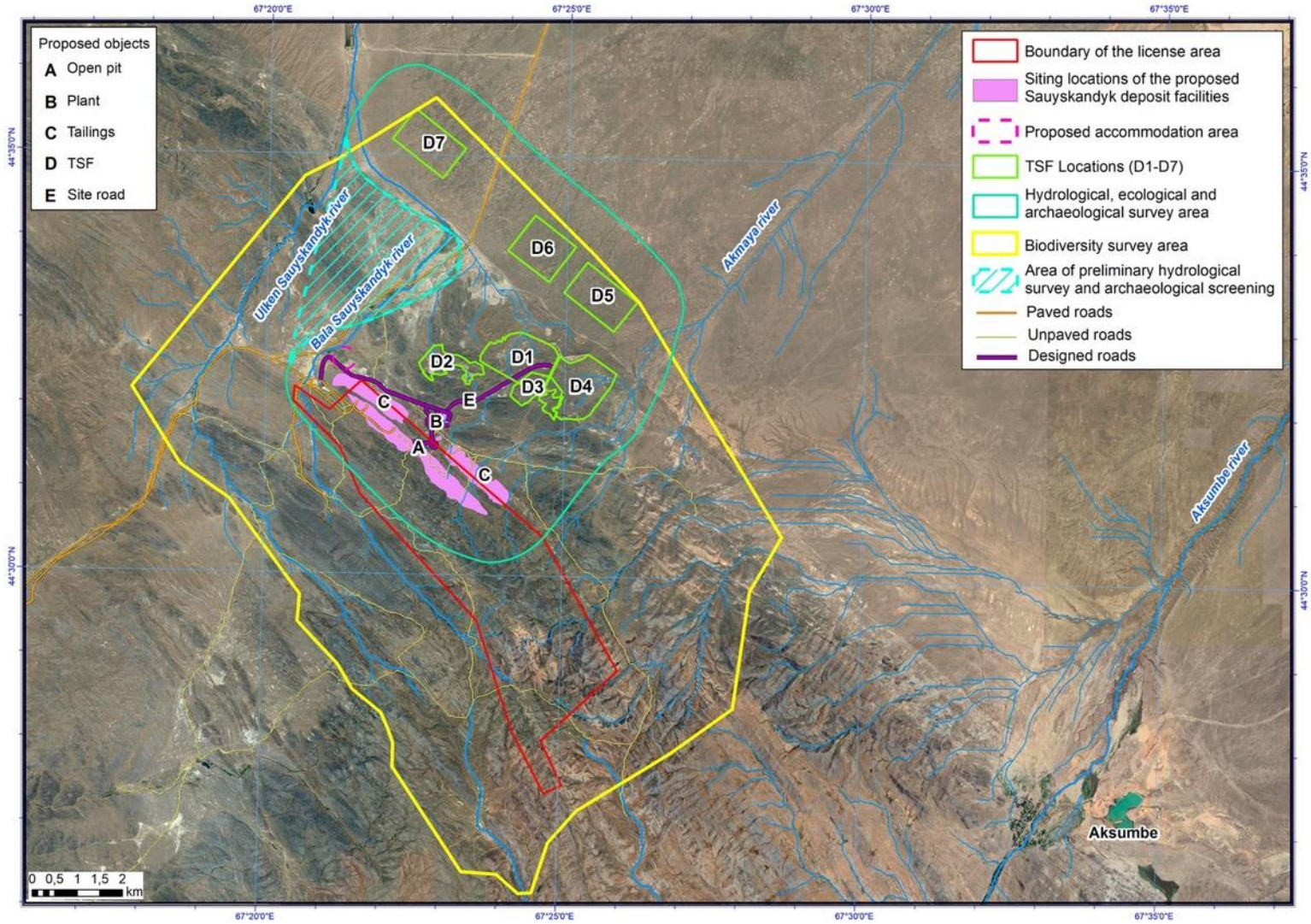
10 POTENTIAL ENVIRONMENTAL IMPACTS

In this section potential environmental and social impacts are identified as a function of the aspects described in **Table 2** and the environmental and social baseline. The following assumptions apply (**Section 2**):

1. The nature and scope of activities taking place at the existing mine remains unchanged with environmental and social impacts remaining within existing guidelines and limited to the established site Sanitary Protection Zone (SPZ) [B4].
2. Existing and planned facilities are significant distances apart (**Figure 3**). Cumulative impacts of current and planned operations are highly unlikely and therefore will not be considered in the full-scale ESIA. That said, there might be some interactions on certain social impacts, and these will be addressed as they are identified.

Preliminary findings of the ESIA's first stage, Scoping, are presented based on:

- Preliminary assessment and ranking of potential environmental and social impacts and risks that require detailed assessment at the next stage of the ESIA, i.e. full-scale assessment of risks and impacts;
- Planning ESIA activities, including:
    - Field surveys required to assess baseline environmental and social conditions and address gaps identified in Sections **4-9**;
    - Estimations, qualitative and quantitative assessments required to determine the magnitude and significance of impacts and risks;
- Initial conclusions and recommendations from the scoping.



Source: developed by the Consultant

Figure 23. Preliminary boundaries of ecological, hydrological, archaeological surveys

10.1 Impact on Geology

The construction and operation of the mining and processing plant would result in a profound transformation of the geology, including the emergence of new landforms both convex (waste rock dumps, tailings dam) and concave (pits, artificial water bodies, and tailings storage facility). The Project activities would change the local landscape and create new sources of impacts on ambient air, surface and groundwater, flora and fauna (considered below in **Sections 10.2-10.8**). Direct impacts of the Project on local geology include preparatory works (overburden stripping), ore and host rock excavation, long-term waste rock disposal and storage, and construction of the tailings storage facility and onsite haul roads.

- Overburden stripping will commence at the construction stage to access the orebody. Mining operations will take place strictly within the license area and be limited to the planned pit site (ore body OB1). The host rock hardness means premining stripping and ore mining will require drilling, blasting, and heavy mining machinery. These activities will cause the deconsolidation and fissuring processes in the rock strata disturbed by faulting, followed by groundwater inflow and active weathering.
- Overburden striping would expose ore and rock to precipitation and air, causing acid rock drainage and metal leaching (see **Section 10.3**). It is recommended that overburden stripping occurs as close as possible to the commencement of mining operations.
- Mining will cause change in the stress regime of rocks hosting the ore body, leading to increased groundwater inflow to the pit and more active weathering processes in the pit walls.
- Overburden and host rock dumping and low-grade ore stockpiling might slightly affect underlying soils by decreasing their filtration properties.
- Landscape transformation and emergence of new landforms would affect the visual amenity of the local landscape.

All these impacts, including landscape and visual impacts, will be assessed in the full-scale ESIA, including their relative significance and appropriate mitigation.

10.2 Project Emissions and Ambient Air Quality Impacts

The construction stage will include various construction activities to build, onsite roads and infrastructure, including topsoil stripping, site grading, earth excavating and moving, hauling building materials, and mining/processing equipment delivery. The pre-mining works will include overburden stripping at the pit site.

Construction will require more intensive traffic with larger exhaust emissions as well as dust from road surfaces. The following construction phase emissions are expected:

- Emissions from construction machinery working and vehicles including nitrogen (NO_x), sulphur (SO_x), and carbon (CO, CO_2) oxides and volatile organic compounds (VOCs);
- Dust (particulate matter (PM) of different particle sizes) from earth moving (site grading, building structures, etc.) and topsoil stripping and management;
- Drilling and blasting emissions, associated with overburden stripping at the planned pit site (OB1) including PM and NO_x.

Operations phase emissions include:

- The pit (OB1, **Figure 23, A**) and drilling/blasting operations, ore loading/unloading for haulage to the processing plant, pit machinery and vehicles (bulldozers, excavators, loaders etc.);

- Heavy-duty vehicles hauling ore and other supplies to the site on the road to/from the Shieli Station (NO_x, SO_x, PM);
- Waste rock dumps, ore stockpile, and finished products storage: aeolian generated dust;
- Processing plant with its crushing and milling processes (PM) and stack emissions (PM, NO_x, and VOCs);
- Boiler house (NO_x, SO_x, PM; and VOCs),
- TSF's dry beaches (PM).

These emission sources are potentially significant and so likely ambient air quality will be modelled using internationally recognised methods[19]. Smaller, less significant emissions sources, will be assessed qualitatively and further addressed as part of the national design and EIA process governed by the RK legislation.

The Project's direct impact on ambient air quality is not expected to extend beyond the mandatory SPZ set in RK as 1,000 m for mining/processing plants and tailings storage facilities [A29]. With the Project site being far (more than 9 km) from populated areas, no material human health impacts are expected. The impact of dust on flora and fauna could be significant. Plants as the most sensitive environmental receptors could be adversely affected even if actual pollutant concentrations comply with sanitary and health guidelines.

Potential air quality impacts on biota will consider good international practice and apply scientifically justified threshold values to ensure the safety of vulnerable biota. The need for such assessment will derive from the results of the biodiversity survey now being completed. The full-scale ESIA (and ongoing environmental surveys) will finalise the list of vulnerable environmental receptors, determine the magnitude and significance of impacts, and identify appropriate measures for protecting biodiversity.

10.3 Process Water Discharges and Impact on Surface Waters

During ***construction*** impacts on aquatic ecosystems through surface runoff from construction sites where key process facilities, onsite haul roads and site infrastructure will be developed. A preliminary description of impact sources is provided below:

- Surface runoff from construction sites will contain elevated concentrations of suspended solids. Runoff varies seasonally and is highest during snowmelt and rainfall. It is most likely that surface runoff from the site would affect the Akmaya River with its left tributaries and the Balasausqandiq with its right tributaries as the site is in the interfluvial area between the Akmaya and Balasausqandiq Rivers. Suspended solids and petroleum products are likely to be key pollutant risks requiring appropriate management of surface runoff.
- Construction-related freight and passenger vehicle traffic if allowed to use unauthorised access roads and/or poorly-engineered river crossings and haul roads would pose significant potential impacts on water bodies.
- Domestic sewage: the design of the domestic sewage management system for the construction stage is currently underway. It will be described and assessed in the full-scale ESIA. At this stage, however, design requirements and criteria can be defined as a function of GIIP.

[19] The modelling exercise will be conducted using the AERMOD software (https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models)

Contaminated surface runoff could also pose a risk to groundwater and so this risk will be assessed in the full-scale ESIA.

All these impacts will be considered in the full-scale ESIA as those of high priority; the ESIA will also provide recommendations for the detailed design (including the Construction Management Plan (CMP) and other relevant Management Plans.

During ***operations*** mine water, processing plant effluent, acid rock drainage, and excess water all pose impact risks.

- Mine water accumulates because of groundwater inflow, atmospheric precipitation and surface runoff inflow to the pit. Some mine water could be used for dust suppression on the haul roads and at the processing plant. Excess water should be released to the TSF (**Figure 6**). The required mine dewatering will be estimated as a function of a Project water balance and seasonal factors.
- Domestic sewage from the Project facilities and staff accommodation premises will be treated on-site and discharged to the TSF (**Figure 6**). Associated ground and surface water risks will be assessed.
- Surface water runoff risk to surrounding water resources will be assessed and suitable mitigation identified.
- Mineral recovery process discharge quality and volume would depend on the technology chosen. As the Project is being undertaken in a region facing acute water shortages, maximising water reuse/recirculation and minimising fresh water consumption is essential.
- The long-term storage of waste rock, low-grade ore and tailings containing sulphide-rich minerals could cause acid rock drainage if exposed to precipitation and air. Acid drainage may mobilise toxic compounds from minerals present in waste rock and tailings and release. Acid generation and neutralisation potential (carbonate content) is currently being assessed. The acid rock drainage risks associated with waste rock dumping, low-grade ore storage and tailings management will be assessed together with suitable impact mitigation.
- Excess water refers to stormwater and surface runoff that exceeds the capacity of the TSF. Excess water is likely to arise only during the snowmelt and extreme rainfall events which must be used in the TSF design to prevent flooding. A flash flood scenario will be assessed. Full-scale ESIA with additional measures for managing and reusing excess water at the Project site provided if necessary.

10.4 Impact on Groundwater

Groundwater impacts could occur due to:

- The development of depression cone due to mine water pumping.
- Increasing groundwater levels at the TSF due to sludge water seepage, causing physical and chemical changes in groundwater.
- Infiltration of contaminated surface runoff into groundwater aquifers. Such contamination could be as a result of oil and/or fuel spills. Local groundwater is weakly protected (see **Section 6.6**), and so vulnerable to soil or water pollution especially in the fault zones where fissured groundwater aquifers decant.
- Groundwater will be the main source of water and a permit application to extract groundwater for the purposes of the Project has been agreed. Sustainable groundwater yields will be defined and assessed against the Project's water demand.

10.5 Solid Waste Generation/Management and Related Impacts

Construction will result in construction waste, domestic waste, and overburden.

Operations waste includes waste rock, various industrial waste such as tailings, pit machinery and vehicle maintenance waste, domestic solid waste, medical waste, and waste equipment.

The maintenance of construction and mining equipment and vehicles will generate spent oil, used tires, batteries and so on). The list of waste streams arising during the construction and operation of the Project facilities.

- Construction waste (including excavated soil, residual building materials, packaging waste,) is largely non-hazardous and can be partially recycled onsite (e.g. excavated soil), or disposed via specialised waste management companies for recycling/recovery, and/or landfill disposal;
- Spent oils from motor vehicles, construction and mining machinery, ore processing equipment, transformer oils will need specialised waste management for recycling and recovery;
- Domestic solid waste will be disposed of at a sanitary landfill possibly the Shieli Municipal Landfill. The Project may construct its own dedicated landfill, but a decision is still to be made. To minimise landfilling, there are plans to have separate collection system for domestic and industrial waste. Recyclable fractions can then be sent to specialised recyclers;
- Overburden and host rock will be excavated from the pit and stored at the waste rock dumps during the Project construction and operation (**Figure 23, C**). The environmental impact of these operations is considered in **Sections 10.1** and **10.3**.

The following environmental impacts from solid waste disposal will be assessed:

- Land transformation for waste disposal facilities (waste rock dumps, tailings storage facility, and solid waste storage sites);
- Dust due to wind erosion from the exposed surfaces of waste rock dumps (see **Section 10.2**);
- Potential soil contamination in the areas receiving drainage flow and/or contaminated surface runoff (see **Section 10.3**);
- Landscape transformation and visual amenity loss;
- Potential littering along the access road is a risk and a lack of MSW storage arrangements (waste containers, bins etc.) at the parking lots and filling stations.

The nearest MSW landfill in Shieli is already beyond its capacity and could only be used by the Project if upgraded storage capacity increased.

10.6 Physical Impacts (Noise, Vibration, Electromagnetic Radiation, Artificial Light)

The construction and operation stages will increase noise and vibration levels due to the mining activities:

- Noise and artificial light produced on site would likely disturb wildlife in areas around the Project. Noise from the sludge pipeline could affect tunnelling animals including the Central Asian tortoise;
- Blasting/drilling and mining operations are a major source of noise and vibration. The Sauskandyk Petroglyph Site is very sensitive to vibration. Given the CH value of the site (**Section 9**), requiring a thorough assessment of drilling and blasting and associated vibration risk is required.

Noise and vibration will be modelled using internationally recognised models. Special attention will be paid to the propagation of vibration caused by blasting and its potential impact on the Sauskandyk Petroglyph Site.

10.7 Impact on Biodiversity

Potential biodiversity impacts to be assessed are (see **Sections 10.1-10.6** for more details):

- Vegetation clearance will see the loss of all vegetation in those areas. Botanical surveys will be completed to ascertain the presence of rare/vulnerable plant species.
- Dust deposition (**Section 10.2**), can potentially inhibit vegetation growth and pollute surface water.
- Man-made water bodies (the tailings storage facility for example) could attract especially migratory birds Avifauna will be characterised and risks of bird impacts ascertained.
- Light, noise and vibration would likely force wild animals, birds and amphibians to move away from the area of the mine and surrounds. Species potentially so affected will be identified and likely consequences for those species assessed.

10.8 Project and Climate Change

10.8.1.1 Climate Change Impact on the Project

Current climate change forecasts for Kyzylorda (**Section 6.1.5**) indicate an increase in the near-surface air temperature all year round, more frequent extreme heat periods, less summer precipitation and more winter and autumn precipitation with greater intensity of extreme precipitation events. More frequent droughts are forecast for the end of the century.

Higher temperatures pose risks to mine staff. While flood events may compromise the integrity of pit walls. Extended drought conditions may lead to drying of TSF beaches and an increase in size, resulting in additional dust loading.

Given the arid character of the area the climate change impact on the Project is expected to be adverse and potentially significant.

10.8.1.2 Project Impact on Climate Change

Project activities will see the intensive use of machinery and vehicles with exhaust emissions containing greenhouse gases (mainly carbon dioxide and nitrogen oxide). Construction will result in the degradation of topsoil and vegetation limiting carbon sequestration and carbon emissions. Possible changes in the local carbon balance will be assessed.

Blasting activities will cause nitrogen oxide emissions and energy requirements for the operation Project will also have greenhouse gas emission implications. The project contribution to climate change is unlikely to be significant but will still be important given global efforts to limit further GHG emissions.

10.9 Site Closure and Restoration Impacts

Mine closure would see the demolition of structures and restoration of disturbed areas, waste rock dumps and tailings storage facility. Waste from this process would create additional pressure on the existing municipal waste facilities. Waste volumes will need to be reduced by maximising recovery and recyclability of waste and using demolition waste onsite as far as this can be incorporated in the mine closure.

Revegetation of disturbed areas is required to restore land disturbed by the Project to a state of potential further use. The restoration of the TSF, pit and waste rock dumps will require special measures to manage potential hazards. Future land uses for restored areas will be identified at a later stage, with pastures after biological restoration being one option.

Restoration activities has the following risks:

- Dust;

- Contaminated surface runoff from the areas undergoing restoration might enter the Balasausqandiq and Akmaya Rivers;
- Secondary land transformation.

A Mine Closure and Restoration Plan must be developed to comply with the international lender and national legislation requirements.

11 POTENTIAL SOCIAL IMPACTS

11.1 Introduction

11.1.1 Social aspects of the Project

Social aspects of the Project include:

- Land use;
- Job creation;
- Infrastructure development;
- Tax revenues;
- Supply, procurement of goods and services.

These aspects may have multiple impacts on local communities at all stages of the Project implementation, both positive and negative. Social impacts may also reverse from positive to negative in some instances e.g. mine closure.

Social impacts include impacts on cultural heritage sites and ecosystem services, since the end users are local, national and international communities.

11.1.2 Key recipients and vulnerable groups

Impact recipients include:

- **local communities:** residents of the settlements of Shieli district and the village of Aksumbe in Sozak district;
- **national and international communities:** for some socially significant aspects, the scale of impacts can reach national and even international levels;
- **employees involved in the implementation of the Project:** employees of the company and contractors.

The assessment must focus on the affected population and particularly vulnerable/disadvantaged groups using this definition [A39]:

> "vulnerable persons are people or groups of people who may be more adversely affected by the impacts of a project than others because of characteristics such as their gender, gender identity, sexual orientation, religion, ethnicity, indigenous status, age (including children, youth and older persons), physical or mental disability, literacy, political opinion or social status. Vulnerable persons and/or groups may also include, but are not limited to, people in vulnerable situations such as people living below the poverty line, landless, single-parent households, natural resource-dependent communities, migrant workers, refugees, internally displaced persons or other displaced persons who may not be protected by national legislation and/or public international law".

This definition is applicable to projects implemented in the RK, since it includes, among other things, the criteria by which socially vulnerable groups of the population are defined in the national legislation of the RK [**section 4.1**].

Due to the distance of the mining and processing plant no direct environmental impacts are expected on populated areas. Both direct and indirect social impacts are possible and indeed likely as benefits as well as costs. The area of possible social impacts is approximately 50 km from the Project area and the villages and village residents are within this radius.

Vulnerable groups include the population of the nearby villages of Aksumbe (Sozak district) and the village of Kosuyenki (Shieli district).

- **The village of Aksumbe** is the closest village to the mining and processing plant. Because the village is far from other settlements and the highway there is high

unemployment. In most families, people of working age do not have jobs, and families live below the poverty line.

- **The village of Kosuyenki** is also far from other populated areas, including the district centre of Shieli (where the employment situation is quite stable). The village is connected to the district centre by a developed road network, so there are employment opportunities. The vulnerability of the residents of this village will be assessed.

11.2 Land use

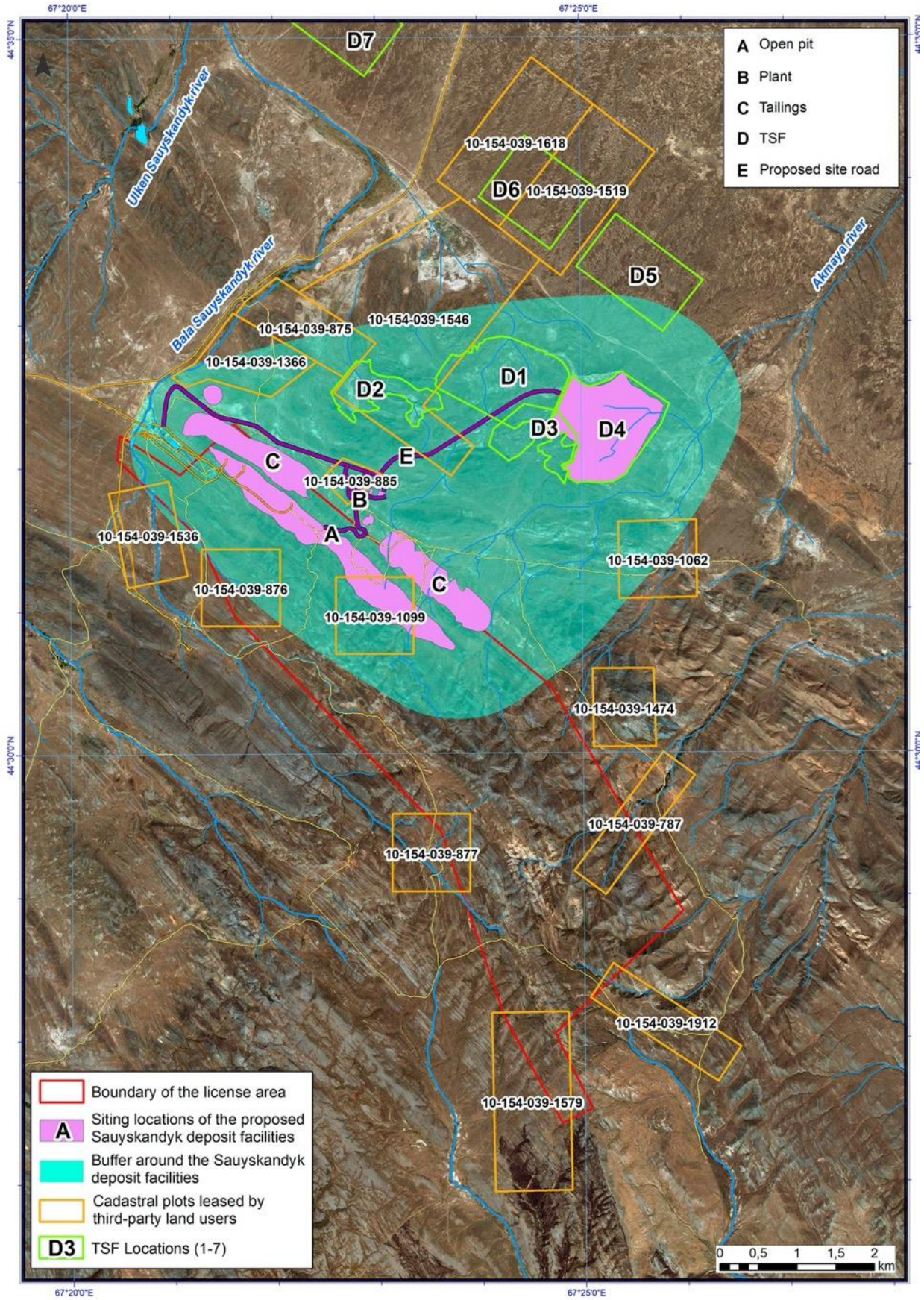
During construction, land-use in the areas necessary for the mining and processing plant facilities will be changed.

Currently, the lands are classified as agricultural. There are (in whole or in part) plots of 8 tenants used mainly for grazing cattle in the area of direct environmental impact and its approximate sanitary protection zone (**Figure 24**).

Grazing within the enterprise's sanitary protection zone cannot be allowed and access of cattle terminated already at the construction stage. Accordingly, lease agreements will be terminated and/or renewed on new sites to compensate for the loss of the pastures.

Potential impacts will be assessed for each tenant separately and mitigation defined as needed.

During operations rent will be paid to the state revenue department of the district where the facility is located.



Source: developed by the Consultant

Figure 24. Impact of the planned mining and processing plant on existing land use

The plant closure and land rehabilitation phase must be prepared well in advance. Planning for mine closure and recultivation will be prepared jointly by the Project engineering and ESIA teams.

11.3 Attracting labour resources

Project implementation will create jobs and attract work-seekers. Numbers of personnel, requirements for workers and terms of employment have not yet been determined so potential impacts are considered only in general terms.

The Company has been operating in the region for a long time and targets local employment. Currently, only five foreign citizens work at the enterprise. The main personnel are residents of the Shieli district, meaning a positive socio-economic impact. It is assumed that the company will continue to target local employment (subject to compliance with qualification requirements).

During construction a company specializing in construction of industrial facilities, with a good reputation and experience of working with IFIs will be sought. An EPC (engineering, procurement and construction) contract arrangement may be used. Bidders will be expected to have knowledge of IFI requirements, including environmental and social standards, and the ability to apply them.

During operations qualified personnel will be required to be capable of fulfilling, among other things, the requirements of international financial organizations (IFIs). It is highly likely that some personnel will need to be involved from outside the region (Kyzylorda region) and even from outside the RK, on a permanent basis (possibly on a rotational basis).

11.3.1 Job creation

The Project's need for labour is estimated at several hundred people at each stage. The creation of jobs will be of great importance to residents of the Project implementation area, primarily to residents of the nearby settlements of Kosuyenki and Aksumbe, whose population is considered to be a vulnerable group in this ESIA (see **Section 11.1.2**).

The ability to mobilize local labour to perform work on the Project will be one of the important criteria when selecting construction contractors.

Potential positive impacts associated with the creation of new jobs includes increases in the income and expenditure of a part of the population (directly or indirectly involved in the Project), which on average will lead to an increase in the well-being of the population and economic growth. At the same time, an increase in the income of a part of the local population and an influx of workers (who have income) from other regions will lead to an increase in prices for local goods and services and, accordingly, some deterioration in the well-being of a part of the local population not involved in the Project.

11.3.2 Labour migration and related impacts

Labour migration when working on a rotational basis is possible both during construction and operations. Workers from outside the region can potentially cause a number of negative social impacts and risks: create tension between local residents and visitors, increase crime, and an increase in socially conditioned diseases. A Labour Influx Management Plan will be developed to address the negative impacts of labour migration.

Future employees will require additional professional training, including those based at local professional training institutions. However, the most qualified personnel will need to be attracted, including from outside the region and, possibly, outside the RK. A personnel policy (available to all employees of the enterprise) and a publicly available hiring policy will be developed.

Labour market research is required to develop an optimal recruitment strategy for the Project.

Contractor management specifically in respect of environmental protection and occupational health and safety, so that IFC requirements are met, must be effected. This includes a grievance mechanism, provision of temporary housing and acceptable living conditions for visiting workers at the places of accommodation and ensuring occupational health and safety.

The Project impacts on employment and income levels of local residents during the construction and operation phases are provisionally ranked as positive impacts of high significance; impacts related to labour migration are ranked as negative, manageable, or of moderate significance.

During closure there will be a reduction in personnel; fixed-term contracts will be terminated, and permanent employees will be dismissed. Some employees may find work at other mining companies in the region (or country). Others may find themselves unemployed. This impact is quite critical in many projects. To mitigate the negative consequences, the Company will develop and implement a staff reduction procedure, which provides for compensation payments, a retraining program, and preliminary assistance in finding a job. In addition, the social impacts of the closure phase will be considered in detail in the Mine Closure and Disturbed Land Rehabilitation Plan, which will be developed in accordance with the national requirements of the RK, the IFC requirements set out in [A40], and the principles and approaches of the International Council on Mining and Metals (ICMM) [A41].

11.4 Socio-economic impacts

The economic aspects of the Project are analysed within the framework of the FS. This section considers only some socio-economic aspects that are important for local development, and namely:

- budget revenues,
- creation of new jobs;
- purchasing local goods and services.

11.4.1 Budget revenues

In connection with the activities of the mining and processing plant, significant revenues are expected to be received by budgets at all levels, including:

- tax revenues to budgets at all levels;
- land lease fees;
- environmental pollution fee;
- deductions for the socio-economic development of the region (in accordance with the subsoil use contract).

The Budget Code of the RK [A32] provides a mechanism for distributing budget revenues in Kazakhstan across various budget levels, including the republican, regional, district and local budgets. Depending on the type of income and its source, various distribution standards are established.

11.4.1.1 Republican budget

Key revenues include:

- corporate income tax from large business entities,
- Value Added Tax (VAT) on goods and services produced and imported into Kazakhstan,
- customs duties, including anti-dumping and countervailing duties.
- mineral extraction tax and rent tax on exports (excluding revenues from oil companies).

11.4.1.2 Regional budget

Revenues to the regional budget include:

- Corporate and individual income taxes, which are distributed according to the standards established by the regional maslikhat (no more than 50%).
- Social taxes and payments for negative impact on the environment.
- Deductions from subsoil users for the socio-economic development of the region and the development of its infrastructure.
- Payments for the use of natural resources such as water and forest resources, as well as income from the sale of land (except for agricultural land).

11.4.1.3 District and local budgets

The main sources of income include:

- Taxes on property of individuals and legal entities.
- Land tax and a single land tax on the land of settlements, as well as payment for the sale of the right to lease land.
- Deductions from subsoil users for the socio-economic development of the region and the development of its infrastructure according to income distribution standards established by the regional maslikhat.
- The district budget also receives a part of the revenues from corporate (at least fifty percent of the tax revenues received) and individual income taxes, with the exception of large business entities.

Thus, the structure of budget revenues is clearly divided depending on the budget level, which allows taking into account the specifics of socio-economic development and the needs of each region. The distribution of revenues by budget levels is described in more detail in the Annex (**Annex 3**).

Extrabudgetary revenues are also possible, under social responsibility programmes.

11.4.2 Increase in local purchases of goods and services; impact on small and medium business development

As the number and qualifications of workers are clarified, including the number of local residents of Shieli and Sozak districts, expected budgetary and extra-budgetary revenues and other socially significant information can be sourced and assessed.

11.5 Impacts on infrastructure

The Project will require energy supply, road construction (improvement of the access road, construction of internal roads), will increase pressure on social infrastructure, primarily the structure for handling solid household waste (landfill) and medical institutions.

The existing municipal solid waste landfill at Saskum is beyond capacity and cannot be used by the mine. The mine needs to consider building its own

It is assumed that Project materials will be delivered to the village of Shieli by rail or road, and then delivered to the mining and processing plant production site by heavy-duty vehicles. The additional load on the local road infrastructure will be mainly limited to the access road connecting the village of Shieli and the mining and processing plant site. According to preliminary estimates, the level of traffic load on this section of the road network during the operational phase will be approximately 20 to 40 vehicles per hour, respectively, with ore extraction volumes of 15 and 1,000 thousand tonnes per year. The size and significance of the additional traffic load will be assessed.

Decisions on energy supply are still to be made.

Impacts on the water supply system in the village of Shieli are not expected, since the designed mining and processing plant will have its own (autonomous) water supply and sewerage system, without connection to the village of Shieli.

Medical care for the enterprise personnel and employees of contractors (including pre-trip examinations, first aid, and so forth), will impact on the medical institutions of Shieli district, which are already limited. A medical unit will be established at the existing enterprise, for day-to-day medical requirements. Emergency medical care can be entrusted to the Central District Hospital (CDH) of Shieli District under contract. Medical examination and in-depth examination of personnel can also be carried out by Shieli CDH or the Multidisciplinary Regional Hospital of Kyzylorda Region (options are being discussed).

Some selected educational institutions may experience positive impacts if certain institutions are selected for training and/or selected as sponsored institutions (under social responsibility programs).

Impact on cultural and sports infrastructure facilities is not expected or will be very limited.

11.6 Risks to public health and safety

Public health impacts due to emissions of pollutants are not expected but ambient air quality will be modelled to assess possible impacts both on public health and biota and other environmental components.

There are two risks to public health and safety:

- Increased traffic due to transportation of goods and passengers during the construction and operation phases of the mining and processing plant may create risks of accidents for the population of settlements through which the access road will pass; living conditions for the population in residential areas adjacent to the roads will also deteriorate due to noise, vibration, and emissions from internal combustion engines and road dust;
- Due to the increase in labour migration (which is possible both during the construction phase and the operational phase), the risks of communicable diseases may increase.

Public health risks invoke moderate to high significance.

11.7 Health and safety risks for Project workers and labour discipline

Potential risks to the health and safety of workers during Project implementation includes:

- risks of road accidents at the production site and access road involving Project vehicles;
- risks associated with certain types of construction work and work on the reconstruction of sections of the access road: earthworks, drilling and blasting operations, work at height, asphalt laying work, etc.;
- potential risks to workers' health due to:
    - increased concentrations of dust, suspended particles and exhaust gases in the air of the working area (as a result of emissions from construction equipment and vehicles, dusting of disturbed surfaces);
    - work outdoors during extreme weather conditions (heat, frost, strong winds, etc.);
    - noise and vibration from construction equipment and vehicles;
    - contact with hazardous materials/chemicals at the production site.

In addition, potential risks associated with emergency situations at construction sites are emerging: destruction of temporary structures, accidents on access roads involving vehicles transporting hazardous substances and materials.

It is expected that the assessment of risks to personnel associated with construction works will be carried out at further stages of design. A Framework Plan for Occupational Health and Safety for the Project will be developed, as well as an Emergency Response Plan, which will have to comply with the legislation of the RK and PS2, PS4 of the IFC. It is important to note that the IFC requirements provide for the responsibility of the borrower company for the safety of both the main personnel of the company and temporary workers, as well as the personnel of contractors and subcontractors.

There may be risks to the health and safety of personnel associated with violations of labour discipline, including poaching and the use of alcoholic beverages and drugs.

The significance of risks to the health and safety of personnel is preliminarily assessed from moderate to high both at the construction stage and at the operational stage.

11.8 Impacts on ecosystem services

A preliminary assessment of the impacts on resource and supporting services provided by the Project area (natural pastures, fresh water reserves, hunting resources) and on cultural and ecosystem services (intangible benefits acquired by people – consumers of the service from communication with the natural environment and such objects as the Balasausqandiq petroglyphs) was conducted.

11.8.1 Impacts on pastures

During construction, the main impacts are the loss of part of the pastures and a reduction in the area of natural pastures available for use by local residents (**Figure 24**). About 150 hectares of land leased for pastures are located within the area of direct environmental impact. At the same time, the area of land used for grazing cattle in the Project area may also be significantly larger than the area of leased plots. Potentially, all lands falling within the area of direct environmental impact can currently be used as pastures to one degree or another.

During operations, no new plots are expected to be lost. Lands within the established sanitary protection zone will be used for the needs of the Project.

> In accordance with national legislation, agricultural lands for growing industrial crops not used as food products may be located in the sanitary protection zone of industrial facilities, with due justification. The possibilities of using the sanitary protection zone territory as pastures are not specified, there are no prohibitions.

Thus, during the operational phase, grazing of livestock in the sanitary protection zone of the mining and processing plant facilities is theoretically possible. However, the use of pastures within the sanitary protection zone boundaries will also require due justification. At the same time, for safety reasons, it is necessary to exclude access of outsiders (farmers and shepherds), livestock and wild animals to the enterprise site. In this way, access of domestic animals to the site will be limited by a perimeter fence (the position of which has not been determined yet). Also, noise from drilling and blasting operations may be a disturbance factor for livestock, limiting the use of the area as pastures.

It is assumed that upon completion of the Project and land recultivation, most of the land can be used again as pasture. However, this possibility requires careful study as part of the development of the Mining and Processing Plant Closure and Land Rehabilitation Plan.

11.8.2 Impacts on fresh water

Surface watercourses of the Project area do not have a permanent surface runoff. During the spring flood, the storage pond in the floodplain of the Balasausqandiq River is filled, which is used by Firma Balausa LLP for the technical water supply of the pilot production. Groundwater is considered as a source of technical water supply for the designed mining and processing plant.

The significance of the impact of groundwater withdrawal for the Project will be assessed during the full-scale assessment phase, based on the data about the volumes of required

water consumption and the reserves of the groundwater deposit. Due to the limited reserves of groundwater in the Project area, this impact is considered negative, with a significance ranging from moderate to high.

11.8.3 Impacts on hunting resources

Some 8 species of mammals and 15 species of birds, which are hunted may occur in the Project area. Also, the migration routes of migratory birds pass through this territory, some of which are also objects of hunting.

It is assumed that the Project may cause migration of commercial species of wild animals and birds from the Project area to neighbouring areas, since the importance of this area as a hunting ground will be reduced to a minimum. The significance of the negative impact on hunting resources will be assessed at the stage of a full-scale impact assessment.

11.9 Impacts on cultural and historical heritage

As stated above (**Section 9.4**), the Sauskandyk Petroglyphs monument is located near the license area. Despite the fact that the monument is located outside the license area (and outside the area of direct environmental impacts, **Figure 25**), nevertheless, the high (international) significance of the monument and the fragility of the rocks that compose it require special caution. As part of Stage 2 of the ESIA, the modelling of vibrations during drilling and blasting operations will be modelled and the potential impact on the Sauskandyk Petroglyphs monument will be assessed. The vibration level of 10% of the MAC will be chosen as the threshold of permissible impact, which will certainly (and with multiple excess) ensure the preservation of the monument.

In March-May 2024, archaeological exploration work was carried out at the site of the planned mining and processing plant, during which new, previously unknown objects of cultural and historical heritage were identified (**Figure 25**):

- The M-1 burial ground is located on the very boundary (edge) of the alternative site No. 4 of the TSF;
- The M-2 burial ground is located on the territory – the edge between the ore body and the possible territory for the dump placement;
- Group of mounds 1 is located in close proximity to both existing facilities and the planned shift camp;
- Single burial mound 1 is located outside the study area, but is nevertheless quite close to it;
- Single mound 2 is located in close proximity to the boundaries of the waste dump area.

As part of the ESIA Stage 2, a special Cultural Heritage Management Plan will be developed, which will include the necessary measures related to the preservation/excavation of identified historical and cultural heritage sites and a procedure for handling chance finds.

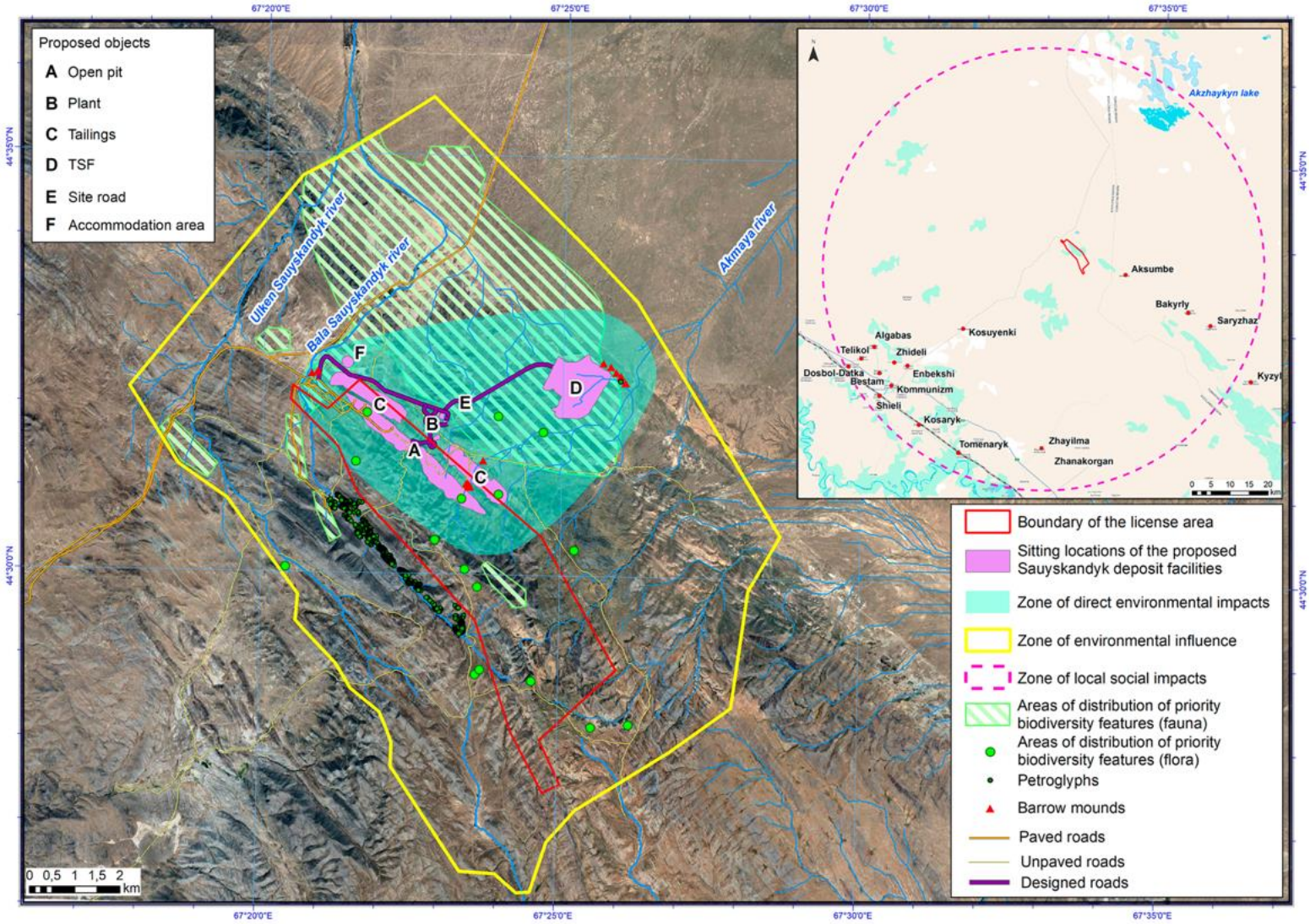
12 PRELIMINARY ZONING

At this stage of the ESIA (preliminary assessment / scoping), the following zones of potential environmental and social impacts and risks have been identified:

- ***zone of direct environmental impact / approximate sanitary protection zone of the mining and processing plant***, within which the dispersion of pollutant emissions to standard values occurs.
- ***zone of environmental influence***, within which the measured indicators do not exceed the established standards, but certain changes in the environment may be observed due to the presence of particularly sensitive recipients (for example, nationally and/or internationally protected species of animals and plants, their critical habitats, endemic species, unique landscapes, as well as natural and cultural heritage sites (petroglyphs, burial mounds)), etc.
- ***zone of local social impacts***, within which social effects (positive and/or negative) at the local level may be observed.

  It is expected that the Project will have multiple socio-economic impacts (mostly positive), which may affect not only the Shieli district, but also the entire Kyzylorda region (and possibly part of the Turkestan region). In this section, the greatest attention is paid to social impacts at the local level.

It should be noted once again that the zones of potential environmental and social impacts have been preliminarily determined. The main objective of the zoning is to identify areas where it is necessary to conduct the most thorough research and assessment. The boundaries of the zones will be specified at the second stage of the ESIA (full-scale risk and impact assessment). Measures will be proposed to reduce the possible negative impact on the natural environment and the social sphere and to increase the positive effects of the Project implementation. Detailed consultations will be held at all stages of the ESIA. The Company expects to maintain an active and constructive dialogue with all stakeholders.



Source: developed by the Consultant

Figure 25. Preliminary zoning scheme of potential environmental and social impacts of the planned Balasausqandiq mining and processing plant

13 INFORMATION DISCLOSURE AND STAKEHOLDER ENGAGEMENT

13.1 The Company's current practice on stakeholder engagement

The Company carries out stakeholder engagement in connection with its current activities in accordance with the requirements of the legislation of the RK. Thus, in 2023, the Company held public hearings twice:

- On 20.10.2023, public hearings were held in the village of Kosuyenki on the Project: Report on possible environmental impacts to the "Project for the reconstruction of the technological line of the autoclave processing plant for ore from the Balasausqandiq deposit. The hearings were held in the form of an open meeting.
- On 29.12.2023, public hearings were held on the draft emission standards, the Environmental Protection Section of the working draft: "Project for the reconstruction of the technological line of the autoclave processing plant for ore from the Balasausqandiq deposit", Waste Management Program, Environmental Action Plan, Industrial Environmental Monitoring Program."

All information on the public hearings, including the Project description, announcements to the media, minutes and audio/video materials of the hearings, were made public in accordance with the requirements of national legislation [C81]. The Company does not conduct a broader dialogue with stakeholders on the environmental and social aspects of its current activities.

The Company does not have its own official website yet, but FAR does have one [C82]. The FAR website contains information on the current activities of the experimental site and the planned Project based on the Balasausqandiq field, existing and planned infrastructure, etc. The email address and other contacts of FAR are also indicated. The website does not contain information on the environmental and social aspects of the company's current activities. The current information on the website is focused on clients and investors; this Internet resource practically does not disclose information that may be of interest to local residents and does not provide for the possibility of interaction with various stakeholder groups.

13.2 Stakeholder Engagement as part of the Project

Stakeholder engagement under the Project is defined by the Stakeholder Engagement Plan [B5] (hereinafter referred to as the Plan or SEP). The Plan has been developed in accordance with IFC requirements and takes into account all applicable requirements of the legislation of the RK. The Plan is based on the initial stakeholder analysis, carried out based on information available in open sources, as well as information obtained as part of the socio-economic baseline study conducted by the Consultant from 31.08.2023 to 08.09.2023 [B7].

The research included 24 interviews with government agencies and organizations, 2 interviews and 10 focus groups with the local population of Shieli and Sozak districts. A total of 83 people took part in the research. In all forms of interaction, general information about the Project was provided, respondents asked questions of interest to them, shared their thoughts, concerns and expectations in connection with the Company's current activities and development plans.

The SEP includes a detailed Programme of activities aimed at timely information and meaningful consultations with stakeholders. Consultations will begin with a discussion of this “Environmental and Social Impact Assessment Scoping Report” and will be conducted in accordance with the developed Programme. The activities of the Programme include several components:

- Disclosure of information and engagement with the local population by Firma Balausa LLP with the support of local authorities within the framework of:
    - Preliminary assessment as part of the ESIA. This report, the SEP, an information booklet about the Project and the preliminary ESIA will be made

public. Public consultation meetings will presumably be held in Shieli, Kosuyenki and Aksumbe. Comments will be accepted before the publication of the E&S documents at the next stage of the assessment.

- Full-scale assessment of impacts and risks. The environmental and social documentation package for the Project, which will be made public at the second stage of the ESIA, includes: the ESIA report, the Environmental and Social Action Plan (ESAP), this SEP, the Non-Technical Summary (NTS), and the Action Plan for the Preservation of Cultural Heritage. Public hearings will also be held in Shieli, Kosuyenki and Aksumbe. The duration of the ESIA package disclosure is at least 60 days[20].

- Thematic discussions on cultural heritage and sustainable use of water resources.

Interested parties will be notified of any meetings in advance.

The list of activities may be expanded based on the results of the consultations. The results of the SEP implementation will be analysed by the Company on an annual basis and provided in the form of a report to stakeholders. The SEP will be updated regularly.

The Company has not established a grievance mechanism yet. Such a mechanism has been developed within the framework of the SEP and is currently being introduced.

[20] The duration of disclosure may depend on additional requirements of international financial institutions (for example, it may be 120 days).

14 PROGRAMME OF WORK FOR A FULL-SCALE ASSESSMENT OF RISKS AND IMPACTS

This section presents the programme of work to be carried out as part of Stage 2 of the ESIA, “Full-scope risk and impact assessment”. This Programme is based on the studies and assessments carried out during Stage 1, “Preliminary environmental and social assessment”. The results and key findings are set out above. This report has been prepared for disclosure. Stakeholder consultations will be carried out in accordance with the Stakeholder Engagement Plan [B7].

Table 14. Work programme for a full-scale risk and impact assessment

№	Aspect	Impact	Survey/Assessment	Comments and recommendations
1	**Construction stage**			
1.1	Land use			
1.1.1	Land acquisition	Reduction of pasture lands	Consultations with the Shieli district administration and land users; Expert assessment	Determine the significance of the reduction of pasture lands and the necessity/feasibility of using free areas of the SPZ for grazing livestock
		Impact on tenants (mainly farmers)	Consultations with the Shieli district administration and land users; Expert assessment	The negotiation process between the administration and tenants is important
1.2	Construction works			
1.2.1	Earthworks, removal and storage of topsoil	Impact on soils and biodiversity	Expert assessment	Determine the main characteristics of the topsoil, the feasibility of removal and storage conditions
		Dusting	Modelling of dispersion using RK methods	Development of dust suppression measures, taking into account the limited water resources
1.2.2	Stripping operations, drilling and blasting operations, formation of stockpiles	Noise, vibration	Modelling, international methods	Modelling limits – up to 5% of acceptable levels
		PM, NOx emissions	Emission dispersion modelling, international models	Modelling limits – up to 5% of MAC
		Acid drainage and metal leaching hazards: risk of water catchment area and watercourse contamination with toxic metals	Expert assessment of decisions taken based on the study of acid-forming potentials of ores and rocks	Preliminary, the waste rock and low-grade ores of the deposit have significant acid-forming potential. As part of the ESIA, a Wastewater Management Plan will be developed, including the management of acid waste and the prevention of its formation - development of a Waste Rock Management Plan
		Landscape transformation; visual impact	Visual landscape analysis	
		Impact on fauna: noise, light	Modelling of noise pollution. Expert assessment	Assess the significance of impacts on vulnerable recipients at values below the standard. It is advisable to adopt calculation
		Impact on flora: dust emissions,	Modelling of pollution dispersion,	

№	Aspect	Impact	Survey/Assessment	Comments and recommendations
		NOx	CALPUFF or AEROMOD models	limits of up to 5% of permissible values[21]. The real limits of potential impacts, including at impact values below the standard, will be assessed within the framework of Stage 2 of the ESIA
		Impact on archaeological sites: vibration	Ensure that there is no impact on the petroglyphs Organize excavations in accordance with the recommendations of the Conclusion [B5].	
1.2.3	Technical water supply [22]	Use of natural waters	Calculation of the water balance of the territory (as part of engineering design).	It is assumed that at the construction stage, both groundwater (well) and melt water and storm water can be used for technical purposes.
		Impact on groundwater reserves	Expert assessment (within the framework of the ESIA)	
1.2.4	Discharges	Cleaning and disposal of household wastewater	Expert assessment of proposed technical solutions	As part of the ESIA, a Wastewater Management Plan will be developed (during the construction phase)
		Impact of meltwater and storm runoff on watercourses and water catchment areas	Expert assessment of proposed technical solutions	
		Possibility of formation of acid drainage runoff	Expert evaluation of technical solutions	
1.2.5	Waste management	Waste rock dumps (overburden)	Expert assessment of proposed technical solutions	As part of the ESIA, a Waste Management Plan (during the construction phase) and a Waste Rock Management Plan will be developed.
		Household waste	Expert assessment of proposed technical solutions	
		Construction waste	Expert assessment of proposed technical solutions	
1.2.6	Transportation of goods and passengers	Road accident hazards/transport risks for the population	Expert assessment	Development of a Traffic Safety Plan
		Risk of using unauthorized roads and unequipped crossings over watercourses	Detailed analysis of cartographic material. Expert assessment	Vehicle Movement Control Plan (as part of the Traffic Safety Plan)
1.2.7	Creation of new jobs	Growth of income and expenditure of the population	Detailed expert assessment	Personnel data is required (number, qualifications, salary level)

[21] Permissible levels of noise, vibration and maximum permissible concentrations of pollutants are established according to sanitary and hygienic criteria. Vulnerable recipients (Biodiversity objects, CH objects) may have fundamentally different sensitivity.
[22] At the moment, it is assumed that drinking water will be delivered to the site from external sources.

№	Aspect	Impact	Survey/Assessment	Comments and recommendations
		Labor migration, the risk of growth of socially conditioned diseases	Detailed expert assessment	Data on the number of workers (local, recruited from other regions, foreign workers) is required
		Increase in budget revenues at all levels	Detailed expert assessment	Personnel data is required (number, qualifications, salary level)
		Involvement of small and medium businesses	Expert assessment of local capabilities	Need a list of goods and services that can be obtained locally; local market research
2	**Operational stage**			
2.1	Ore extraction, quarry formation	Gradual extraction of resource (ore)	Not required	It is necessary to strictly follow the ore mining schedule until the resource is completely extracted.
		Changes in stresses in the host rock mass, the flow of underground and surface water into the quarry, and the activation of weathering processes in the quarry walls	Expert assessment of design solutions developed by the engineering group during the design process	It is necessary to develop regulations for monitoring the condition of quarry sides, primarily in areas where flooded zones of increased fracturing of faults have been recorded.
2.2	Drilling and blasting operations	Noise, vibration	Noise pollution modelling, vibration impact modelling, international models	Similar to paragraph 1.2.2b, the modelling limits are up to 5% of the permissible level.
		PM, NOx emissions	Modelling of emission dispersion, using international models	
		Impact on biodiversity	Expert assessment of proposed technical solutions	
2.3	Use of mining equipment and freight transport	Noise, vibration	Modelling of noise pollution, modelling of vibration impact, use of international models and methods of the RK	The modelling will be carried out within the framework of the 2nd stage of the ESIA and EIA of the Project.
		PM, NOx emissions	Modelling of emission dispersion, use of international models and methods of the RK	
2.4	Technical water supply	Use of natural waters	Calculation of the water balance of the territory (as part of the design).	At the operational stage, underground, quarry, melt and storm water will be used for technical purposes, and recycling water supply for the processing plant will be organized. Drinking water will be brought in
		Impact on groundwater reserves	Expert assessment (within the framework of the ESIA)	
		Recycled water supply at the processing plant and the TSF	Expert assessment (within the framework of the ESIA)	The degree of recycling water supply and its share in the total technical water supply will be carried out within the framework of the 2nd

№	Aspect	Impact	Survey/Assessment	Comments and recommendations
				stage of the ESIA and EIA of the Project
2.5	Flows	Impacts on the hydrographic network	Expert evaluation of design solutions	Treated domestic and technical water will be reused. Taking into account the climatic features and water balance of the territory, the formation of a large amount of wastewater is unlikely.
2.6	Storage of waste rock, poor ores and tailings	Dust. Potential for acid drainage and metal leaching	See items 1.2.1 and 1.2.2	
2.7	Household and construction waste	Environmental impacts at waste disposal sites (temporary and permanent) and downstream from the sites	Expert assessment of proposed technical solutions	The waste management plan, design solutions for the location and arrangement of waste disposal sites will be developed at stage 2 of the ESIA.
2.8	Attracting labour resources. Creating new jobs	Decrease in unemployment; increase in employment	Expert assessment	A Personnel Policy (including recruitment policy) will be developed.
		Growth of income and expenses of local population	Expert assessment, local population surveys	
		Labor migration, possible growth of local conflicts and socially conditioned diseases	Expert assessment	At present, the Company adheres to the policy of hiring local unskilled labour. However, the implementation of a large international Project may require clarification of this policy and the involvement of foreign personnel, among others.
	Revenues to budgets at all levels	Replenishment of budgets at local, regional and national levels	Expert assessment	
	Purchase of goods and services	Local Business Development. Revitalizing the Local Economy	Expert assessment	
2.9	Closure of the mining and processing plant and rehabilitation of the territory	Environmental and social impacts will depend on the chosen strategy and directions of land rehabilitation.	In conjunction with the engineering department, develop a Site Closure and Reclamation Plan in accordance with IFC [A40] and ICMM Guidelines [A41] and national legislation requirements	The plan for the closure of the mining and processing plant and the reclamation of the territory is being developed in stages and involves a negotiation process with the local administration and the future owner (authority or legal entity) to whom the territory will be transferred after the closure of the mining and processing plant. A Conceptual Plan will be developed within the framework of the ESIA.
		The social consequences associated with the dismissal of personnel will require preventive mitigation measures and will depend on the chosen strategy for the early adaptation of dismissed personnel.	Together with the Company's human resources, development and implementation of programs for the social adaptation of personnel (as part of the Mining and Processing Plant Closure and Territory Rehabilitation Plan)	

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Annex 1. PROFILE OF SETTLEMENTS OF SHIELI DISTRICT (SHIELI VILLAGE AND KOSUYENKI VILLAGE)

Shieli village

Shieli village is the only settlement of the Shieli rural district, formed in September 1928.

36,212 people live in the village of Shieli, which is 42% of the total population of the district. About half of the village population are women. Most of the residents are of working age. Natural increase is the main factor in the growth of the annual population in the village.

Kazakhs make up about 97% of the population of Shieli village. Islam is the main religion among local residents. There are three mosques in the village.

The population speaks predominantly Kazakh.

The village pays great attention to the development of mass sports and promotion of a healthy lifestyle. There are 46 sports facilities in the village, including 4 sports complexes, 2 stadiums, 12 gyms, 5 football fields, etc.

The main categories of morbidity among residents of the village are diseases of the cardiovascular system, diseases of the digestive system, respiratory diseases, diseases of the nervous system, etc.

There are two rural hospitals, one clinic, 7 state kindergartens, 50 private kindergartens, 9 public schools, 3 private schools, 1 boarding school, 1 college, 1 rural cultural complex, 3 rural libraries, etc. in the village of Shieli.

There are more than two hundred streets in the village. The total length of roads is 153 km, of which 57.5% is asphalted.

The village has a railway station on the Kyzylorda - Arys line. There is also Samara - Tashkent highway on the territory of the village.

All residential buildings in Shieli are connected to gas. 100% of the village residents are provided with drinking water. Design and estimate documentation has been developed for the replacement of dilapidated existing electrical networks in the village. Local residents mostly burn garbage. Central sewerage is available only in a few areas (RU-6, Kokshaky) in Shieli. Other residents use septic tanks.

For 9 months of 2023, the volume of industrial production amounted to 57 billion tenge, which is 6% more than in the same period last year. 83% of the district industrial production is produced by industrial enterprises of Shieli.

Most of the livestock in the village are privately owned. There are 661 peasant farms, 2,665 individual entrepreneurs and 387 legal entities registered in Shieli.

Most of the tourists visiting the area stay in the village of Shieli. This is where most of the accommodations operate.

The total land fund of Shieli is 4,974 ha

The area of pastures is 1,949 ha.

The employed population of the settlement is 10,865 (93% of the labour force), which is 30% of the district population. 874 persons are unemployed, while 7,420 persons are self-employed.

As of September 2023, the average salary in the village was 345,593 tenge, which is 20% higher than in the same period of the previous year.

The main source of income for residents of Shieli is labour activity. As at the regional and district level, most of the population’s expenses are spent on food products.

269 families in the village receive social assistance from the state.

Workplaces for women include government institutions, in particular schools, hospitals, kindergartens, clinical diagnostic laboratories, etc.

Kosuyenki village

Kosuyenki village is part of Enbekshi rural district of Shieli district.

As of September 2023, the population of the village of Kosuyenki make up 241 persons, of which 54% are men, 46% are women. The majority of the population is of working age. There are 36 families who live in the village.

100% of the population of the village are Kazakhs and speak the Kazakh language. Local residents profess Islam.

The main categories of morbidity among village residents are diseases of the cardiovascular system, diseases of the digestive system, diseases of the respiratory system, diseases of the nervous system, etc.

There is a paramedic and obstetric station in Kosuyenki, where residents can receive primary health care.

There is 1 school for 50 pupils in the village and 1 preschool institution for 20 children. There is also a village club.

The distance from the regional center to the village is 140 km. The distance to the district center and to the railway is 22 km. 100% of paved roads are in satisfactory condition. The village has 2 streets 1.7 km long and 22 cars.

All houses (36) in the village have electricity. The length of power lines is 48 km. The depreciation of electrical networks is 155%. Local residents mostly burn garbage. Villagers use septic tanks.

There are 5 peasant farms registered in Kosuyenki. The livestock numbers: 80 cattle, 18 horses, 1,099 goats and sheep.

There are 3 individual entrepreneurs and 2 legal entities registered in the village.

The general land fund of the village is 6,862 ha, of which:

- lands of the rural settlement – 1,770 ha,
- pastures – 300 ha,
- irrigated land – 100 ha,
- hayfields – 94 ha,
- others – 221 ha,
- reserve land – 4,377 ha.

The employed population of the village is 71 persons (91% of the labour force). 7 persons do not work.

The main source of income for the residents is their labour activity. As at the regional and district level, most of the population’s expenses are spent on food products.

None of the residents of Kosuyenki receive social benefits.

The main workplaces for women in the village are the local school, the paramedic and obstetric station and the kindergarten.

Annex 2. PROFILE OF THE VILLAGE OF AKSUMBE (SOZAK DISTRICT)

Aksumbe village is the administrative centre of Karatau rural district. The village is located 156 km northwest of the village of Sholakkorgan, which is a district centre.

As of January 1, 2023, there were 78 families registered in Aksumbe. The population is 471 people, of which 55% are women. The majority of the population is of working age.

The village has a total population of 471 people, of which 99.6% are Kazakhs. Local residents profess Islam. The population speaks Kazakh.

The only medical institution in the village is a paramedic and obstetric station.

There is 1 school named after S. Kozhanov in the village. It is a small educational institution that was opened in 2022 by state order. The school has 98 pupils from 1 to 11 grades.

There is a shop, a mosque, a school and a cultural club in the village.

There were 6 peasant farms in the agriculture of Karatau rural district at the beginning of 2023. The total number of livestock in Aksumbe settlement as of January 1, 2023 was as follows: 736 cattle, 3,199 small ruminants, 2,282 sheep, 917 goats, 138 horses, 19 camels and 689 birds (chickens).

The total land area of Aksumbe village is 7,183.65 ha, of which 31.9 ha are allocated for agricultural use, including 28.71 ha of arable land and 7,104.28 ha of pasture land.

There are few jobs in the village; 40% of the population do not have permanent employment. Men often work in shifts. For women, the main employer is the school. Many residents are engaged in household farming. Production of agricultural products for sale is practically not practiced.

The number of officially registered unemployed – 3 persons.

The main source of income for residents of Aksumbe village is work for hire. The family budget mainly consists of wages. The average salary varies from 200 to 300 thousand tenge per month. Most of the financial expenditure of the local population goes to the purchase of food products.

The total number of pensioners is 46 persons, home front veterans – 3 persons, hero mothers – 3 persons, Golden Pendant holders – 13 persons, Silver Pendant holders – 21 persons, Afghan War veterans – 1 person, as well as citizens with disabilities – 13 persons.

The main job for women in the village is the school.

Annex 3. DISTRIBUTION OF BUDGET REVENUES IN KAZAKHSTAN

National Budget	Regional Budget	District/City with Regional Status Budget	District Municipality/Village/ Township/Rural District Budget
Corporate income tax from large-scale enterprises as per the list	Personal income tax as per the income distribution guidelines set by the Regional Maslikhat	Personal income tax as per the income distribution guidelines set by the Regional Maslikhat, except the personal income tax imposed on self-employed individuals who have their place of registration or place of residence in a district/city with regional status at the time of registration with the state revenues authority	Land tax collected from individuals and legal entities for land plots located within the jurisdiction of a district municipality/village/township; Single land tax; Land use fee
Value added tax including VAT on the manufactured goods, completed works and delivered services within the RK and VAT on goods imported to the RK	Corporate income tax as per the income distribution guidelines set by the Regional Maslikhat. i.e. no more than 50% of tax revenue collected except those collected from large-scale enterprises	Corporate income tax as per the income distribution guidelines set by the Regional Maslikhat. i.e. no more than 50% of tax revenue collected except those collected from large-scale enterprises	Fines imposed for administrative offences by the Akims heading district municipalities, villages, townships and rural districts
Excise duties on goods imported to the RK as per the RK legislation	Social tax as per the income distribution guidelines set by the Regional Maslikhat	Social tax as per the income distribution guidelines set by the Regional Maslikhat	Voluntary contributions made by individuals and legal entities
Excess profit tax revenues except those received from oil industries	Adverse environmental impact fee	Property tax revenues collected from legal entities, individuals and private entrepreneurs, except those collected from individuals for taxable property located in a district municipality, village, township or rural district	Other non-tax revenues collected to the budget of a district municipality, village, township or rural district
Bonuses, except those collected from oil industries	Surface water use fees	Land tax except land tax revenues collected from legal entities and individuals for taxable property located in a district municipality, village, township or rural district	Revenues from land property transactions except those from agricultural land transactions
Minerals extraction tax revenues except those collected from oil industries	Forest resource use fees	Land use fees except properties located in a district municipality, village, or township	Fees charged on land rental transactions
Rent tax on exports, except rent tax revenues collected from oil industries	Work permit fees paid by migrant workers coming to RK	Single land tax paid to the city with the regional status budget	

National Budget	Regional Budget	District/City with Regional Status Budget	District Municipality/Village/ Township/Rural District Budget
Share due to the RK under the product sharing agreements except oil industries	Plant resources use fees paid under the special resource use permits	Fines imposed by the state authorities financed from the district/city with regional status budget, except fines imposed by the Akims of district municipalities, villages, townships or rural districts	
Additional charge paid by mineral resource users operating on the basis of product sharing agreements, except oil industries	Wildlife resources use fees	Contributions paid by mineral resources users to finance regional socio-economic and infrastructure improvements as per the income distribution guidelines set by the Regional Maslikhat	
Custom duties on imports and exports of goods	Fixed fee paid as a compensation of historical costs	Tourist fees paid by foreign tourists	
Customs duties paid as per the RK Customs Law	Fines, penalties, sanctions and charges levied by the state authorities financed from the regional budget	Other non-tax revenues collected to the district/city with regional status budget	
Special anti-dumping and compensation duties designed to protect the domestic market	Contributions paid by mineral resources users to finance regional socio-economic and infrastructure improvements	Revenues from land property transactions except agricultural land or land owned by district municipalities, villages or townships	
Fines, penalties, sanctions and charges levied by the state authorities financed from the national budget	Compensatory damages received from the facility operators under damage compensation claims, except oil industries	Fees charged on land rental transactions except land owned by district municipalities, villages and townships	
	Administrative fines, penalties, sanctions and charges levied by law enforcement officials, bailiffs and other court officials authorised by a chief judge or presiding judge, except those levied on oil industries and tax law offenders		
	Other non-tax revenues collected to the regional budget		

The regional budget, budgets of the city of republican significance, the capital, district (city of regional significance) budget, budgets of the city of district significance, village, settlement, rural district are related to local budgets.