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UZMETKOMBINAT JSC

CONSTRUCTION OF THE CASTING AND ROLLING COMPLEX

Environmental and Social Impact Assessment

Final Report

Book 2

128-0948-ESIA-PE-2

2023

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6.1 Climate

Climate of the study area is continental-subtropical. Key features include the drastic annual temperature drops and negligible amount of annual precipitation.

Summers are hot and long, with an average temperature of +27.9°C in July and a maximum of 41.4°C. Stable hot weather persists from April to September.

The coldest winter month is January with the average temperature of 0.98°C and the lowest is minus 18.3°C.

Severe frosts occur due to penetration of cold air masses from the north (Table 6.1.1).

Climatic characteristics

Table 6.1.1 - Climate characteristics of the Bekabad Weather Station

Summary		Mid	Min	Max	Cp.min	Cp.max
Wind speed		2,04		35,00		
Air temperature		15,26	-18,30	41,40	-2,62	35,23
Average air temperature in January		0,98				
Average air temperature in July		27,92				
Soil surface temperature		16,67	-16,00	64,00		
Soil temperature under natural cover	0.2					
	0.4					
	0.8					
	1.2					
	1.6					
	2.4					
	3.2					
Soil temperature under bare ground	0.05					
	0.10					
	0.15					
	0.20					
Precipitation (mm) and fog (hours)	Precipitation	306,31				
	Fog	14,30				

Wind recurrence by rumba						
	N	NNE	NE	ENE	E	ESE
	0,36	0,02	0,83	0,01	32,80	0,02
	SE	SSE	S	SSW	SW	WSW
	26,52	0,00	5,58	0,01	8,21	0,00
	W	WNW	NW	NNW	Dead calm	
	17,93	0,02	7,71	0,00	34,92	

Number of occurrences by gradation						
	0-1	2-3	4-5	6-7	8-9	10-11
	71,20	14,30	6,91	1,35	1,01	1,26
	12-15	>15	U*			
	3,18	1,71	9,88			

Duration of periods with the average daily air temperature above 10 °C is 7 months, below 10 °C - 5 months.

Humidity is insufficient, amounting to 360 mm/year. Evaporation rate is 3.5 times higher than annual precipitation. Atmospheric precipitation distribution by seasons of the year is uneven; the main amount falls on winter months (30% of the annual amount) and spring months (40%).

The rainiest months are March to April and October to November. The least precipitation occurs during the summer months of May through October. Precipitation may be frozen, liquid and mixed. Throughout the year, with the exception of January, rain

precipitation predominates. In winter months, their frequency is 32 to 47%. In spring, it increases to 66 to 100%. In January, the mixed precipitation is more often observed; its frequency of occurrence is 40% of all other types.

Stable snow cover in Bekabad is not annually reported, but in certain years it is formed in the last decade of December. The snow cover in late winter disappears so quickly that it is difficult to keep track of its changes by the average monthly snow cover heights. The number of days with snow cover varies significantly from year to year, varying from about 28 to 30 days.

Location of Bekabad town in a narrow valley that connects Golodnaya Steppe with Fergana basin results in the advantage of winds in both directions. The prevailing winds are east, south-east (52%), and west and north-west (25.6%) (Figure 6.1.1).

N	NE	E	SE	S	SW	W	NW	Dead calm
11	6	60	3	0	5	10	5	18
14	3	21	13	1	12	23	13	23
9	3	39	12	3	8	18	8	23

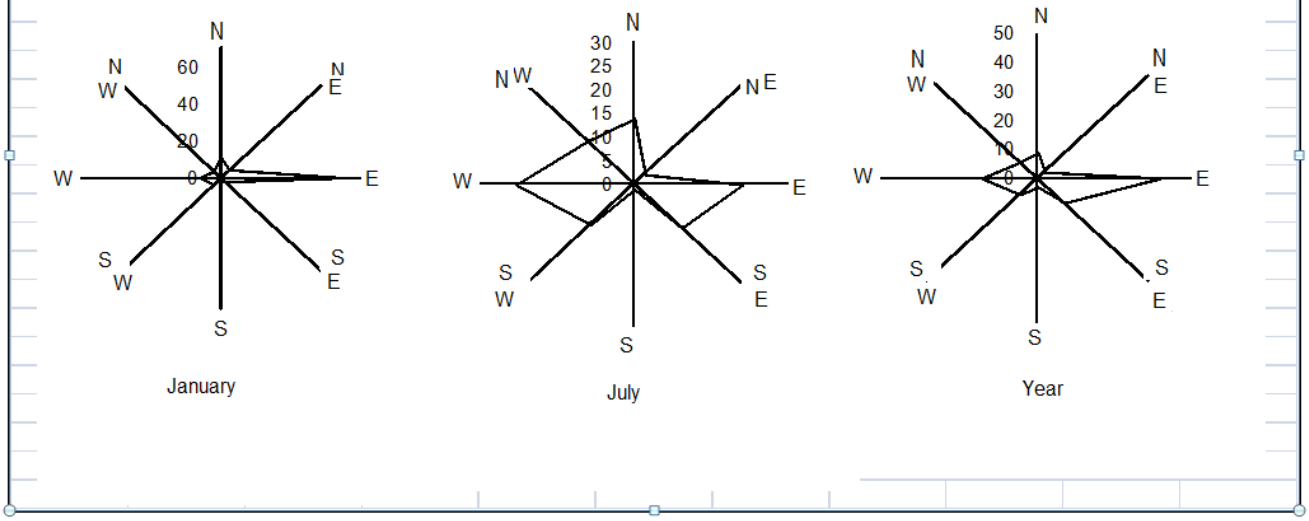

Figure 6.1.1 - Prevailing wind directions in the annual cycle

Among the dangerous hydro-meteorological events observed in the area of Bekabad are squally wind (up to 40 m/s), the so-called Ursatiev wind. It occurs up to 70 times a year, most often in January. The vertical thickness of the wind flow is usually up to 300 m, sometimes up to 1.5 km. The Ursatiev wind has a vertical mesostream profile. In certain cases, the eastern wind covers a considerable atmosphere strata and can reach the rate of more than 50 m/s at the 700 m altitude. The western Ursatiev wind of the storm speed is also observed in the mountain passageway.

The Consultant contacted the Trinity Consultants (USA) to acquire the meteorological data for the AERMOD pollutant dispersion model.

The company recommends a weather station that has a series of observations of wind conditions applicable to the conditions of Bekabad.

Figure 6.1.2 summarizes the hourly wind observations at the Khujand meteorological station for 2018-2020.

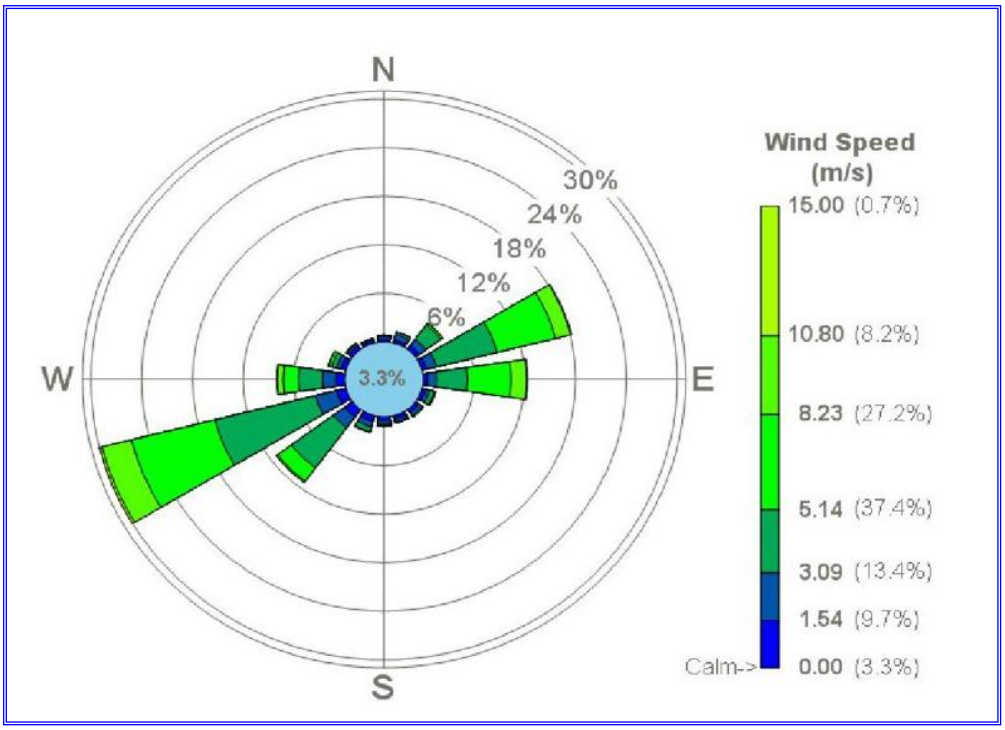

Figure 6.1.2 - Recurrence of wind directions and speeds according to the data of the Khujand weather station (Republic of Tajikistan)

The prevailing wind directions in the annual section are west and southwest (more than 53%), and northeast and east (more than 36%). This means that in case of western and south-western winds, the urban area is located on the windward side from the enterprise and the emissions generated by UMK have a lesser impact on it.

In the case of north-eastern and eastern winds, the inhabited territory is located on the leeward side from the production enterprise, and the pollutant emissions have a relevant impact.

The wind speed has a great influence on the dispersion of pollutant emissions. According to the Khujand weather station the prevailing speeds are from 5.14 m/s to 8.23 m/s, they account for 64.6% of all cases.

At the average annual mean wind speed of 3.09 m/sec. (13.4%), the dispersion of harmful substances from high hot sources improves, but the dust content in the area increases due to disturbed land and low dusty sources.

The district of Bekabad is characterized by strong winds and dust storms. The share of winds with a speed of more than 10 m/s - 15 m/s accounts for 8.9% of cases. Strong winds carry pollutants from hot high emission sources over long distances and raise dust from un-bottomed areas.

Weak winds and doldrums (0.00 to 1.54 m/s) accounts for 13%, which creates conditions for pollutants accumulation from low fugitive sources, cause the additional increase in the concentration of harmful emissions from industrial enterprises.

Unfavourable atmospheric phenomena include ice and fogs.

Significant surfaces of buildings and internal roads in the UMK territory in the daytime contribute to the heating of concrete walls and asphalt and thermal radiation from them at night.

It should be noted that in the last decade the territory of UMK has completely changed: the share of landscaped areas with drip and sprinkler irrigation has grown, the old tree and shrub plantings have been conserved and young trees have been planted. There are green zones with sprinkling systems near almost every shop and department, alongside internal roads.

The green areas located in the UMK territory have a favourable effect on the microclimate, lowering summer temperatures and raising winter temperatures. It is not only the shade of trees that provides coolness. Increased humidity due to irrigation and evaporation of moisture from the leaves of trees results in lower air temperatures and creates more comfortable conditions for personnel (Figure 6.1.3)

Figure 6.1.3 - Location of green areas and vegetation at UMK

Thus, local weather parameters affect the conditions of contaminants dispersion in the following way:

- high air temperatures, low precipitation, frequent occurrence of high wind speeds increase the dust formation, yet they also improve the dispersion environment of pollutants;
- the considerable occurrence of low wind speeds and dead calm contributes to the pollutants precipitation in the vicinity of low emission sources, instead.
- green areas at UMK promote the microclimate improvement by lowering summer and mitigating winter temperatures, while irrigation increases the humidity locally. The tree crowns keep the spread of dust.

6.2 Relief

Bekabad is located within the boundaries of the current valley of the Syrdarya River, with a floodplain and four floodplain terraces. The first terrace above the floodplain is most widely developed on the left bank of the Syrdarya River; it is 0.2-2.0 km wide at the top and rises 2.0-3.0 m above the water's edge. Absolute surface elevations vary between 288-300 m.

The second terrace above the floodplain is widespread in the north and northeast of the city, where its width in some places reaches 16 km. In the southern part of the city, the terrace has a limited development with a width of 0.3-1.0 km on the top. Absolute surface elevations vary within the range of 295-305 m. This terrace is everywhere cut off by an erosion scarp 2.0-8.0 m high to the surface of the first terrace.

The third terrace is extensively developed in the east (foothills of the Mogol-Tau). Absolute elevations of the land surface vary between 312.0 to 318.0 m. The third terrace is cut by an erosion scarp to the surface of the second terrace at a height of 9 to 15 m and to the surface of the first terrace at a height of 16 to 18 m. The surface of the ledges is dissected by a large number of scour holes, ranging in length from a few tens of meters to 1.0 km. Along the ledges there are sinkholes of 3.0 m in diameter. In the east and northeast, the third above floodplain terrace is a sloping surface, complicated by deposits of merged removal cones of temporary watercourses of the Mogol-Tau piedmont. The height of the terrace scarp here varies from 3.0 to 6.0 m.

Uzmetkombinat JSC is located on alluvial terraced plain formed by the Syrdarya River. The territory has a flat, slightly wavy relief with a slope towards the Syrdarya River of 0.001-0.003. Absolute elevations at UMK vary from 303 m in the northern part to 313 m - in the southern part of the combine.

The relief of the UMK territory has been changed by the anthropogenic activity. A considerable amount of planning work was completed during the construction of the plant. The current relief of the industrial site is complicated by technogenic forms - slag dumps, located in the "old" UMK territory. Currently, slag dumps are being processed by the company itself and contractors (Figure 6.2.1).

Figure 6.2.1 - Waste-occupied areas at the UMK industrial site

6.3 Engineering and geological conditions

The Report on engineering and geological conditions of the site for the project "Reconstruction and resolution of production facilities of Uzmetkombinat JSC with construction of casting and rolling complex at the base of Uzmetkombinat JSC in Bekabad city of Tashkent region (State Design Research Institute of Engineering Surveys in Construction, Geoinformatics and Urban Cadastre "O'ZGASHKUTI" DUK, 2019) determined the geotechnical conditions, physical and mechanical and hydrophysical properties of soils of the casting and rolling complex site.

Seismicity of the casting and rolling complex site is estimated in Bekabad town and amounts to seven (7) points with a frequency of once per 100 years and eight (8) points with a frequency of once per 1,000 years.

The geological structure of the territory under consideration consists of Quaternary deposits, which thickness reaches 200 and more meters.

Quaternary deposits are represented by various genetic types of sedimentary rocks of the Tashkent, Golodnaya Steppe and Syrdarya ages.

The deposits of the Tashkent complex (pQ_2^{ts}) include conglomerates that are exposed at the depth of 4.99 to 18.6 m. They are deposited on the eroded surface of the Sokh or Falunian sediments and are superimposed from the surface by sediments of Golodnaya Steppe age. The thickness of conglomerates is from 0.1 to 24.5 m.

The eastern bank of the Syrdarya River from the surface is composed of loess-like loam underlain by gravel to the depth of about 5-6 m. The section of floodplain-channel deposits includes sand and gravel material. Gravel and pebbles are well rounded, oval, ovoid, and less often angular in shape. Sand is mostly fine-grained and clayey.

The site is composed of coarse-clastic soils up to 40.0 m in depth, represented by various clastic pebbles of gray color, with sandy aggregate. The pebbles are predominantly rounded, well rounded with inclusions of clay soils up to 3 m thick. The condition of the pebbles ranges from wet to water-saturated.

According to the data of particle size analysis, the aggregate is sandy, the content of which in the total mass is up to 22.5%.

The thickness of the unit is from 12.2 to 37.5 m.

The soils of the geotechnical unit (GTU) GTU-1 by the content of readily soluble salts are estimated as non-saline.

According to the content of sulphates for concrete grades W4 W6 *W8* on water resistance are estimated from non-aggressive to highly aggressive to concrete on Portland cement, and non-aggressive to concrete on sulphate-resistant cements for normal and humid environment.

In relation to reinforced concrete structures, soils, according to the content of Cl' ions and SO_4'' ions (in terms of Cl' ions), are estimated from non-aggressive to moderately aggressive.

From the surface clay soils, overlain by bulk soils - thickness from 1.9 to 3.1 m and represented by loam disturbed structure with the inclusion of domestic and construction debris. The survey site belongs to the area of old buildings, where the thickness of bulk soils may be more significant.

The bulk soils are heterogeneous in composition and density and cannot be used as foundations.

The results of determining the corrosion aggressiveness of soils in relation to carbon steel from low to high.

The maximum depth of seasonal freezing of soils is 0.70 m with a frequency of once in 50 years and 0.48 m with a frequency of once in 10 years (for Bekabad).

Among modern exogenous geological processes in the territory adjacent to UMK, waterlogging, erosion of terraced slopes and gully formation are developed.

In the depressed areas, where the groundwater level is closest to the ground surface, waterlogging is observed.

The surface of terrace slopes is covered by erosion processes, which are dissected by a large number of gullies with the length from several tens of meters to one kilometre.

The gully formation is specific for the western part of the third terrace above the floodplain of the Syrdarya River.

No exogenous natural processes were detected at the industrial site of UMK.

Recommended engineering activities:

- anti-seismic activities in accordance with the Building Code (KMK) 2.01.03-96;
- protection of buildings and structures from corrosion in accordance with KMK 2.03.11-96;
- anti-shrinkage activities in accordance with the requirements of KMK 3.02.01-97;
- drainage;
- flood protection engineering measures;
- bulk soils are subject to removal in accordance with the requirements of KMK 2.02*01-98.

Sources

1. The Report on engineering and geological conditions of the site for the project "Reconstruction and resolution of production facilities of Uzmetkombinat JSC with construction of casting and rolling complex at the base of Uzmetkombinat JSC in Bekabad city of Tashkent region. State Design Research Institute of Engineering Surveys in Construction, Geoinformatics and Urban Cadastre "O'ZGASHKUTI" DUK, 2019
2. KMK 2.01.03-96 "Construction in seismic areas".
3. KMK 2.03.11-96 "Protection of building structures from corrosion".
4. KMK 3.02.01-97 "Underground Structures, Bases and Foundations".
5. KMK 2.02*01-98 "Foundations of buildings and structures".

6.4 Surface waters

The main waterway of the town is the Syrdarya River. The Syrdarya flows from southeast to northwest and divides the territory of the town into the left- and right-bank parts. In the area of Bekabad, the river splits into arms, forming islands and residual mountains.

The natural river flow regime is disturbed by the presence of the Kayrakum and Farkhad reservoirs. The Farkhad reservoir regulates the river flow and supplies water to the Farkhad hydropower plant and irrigation channels.

According to the average long - term data, the water flow in the river in the gauging site of the Nadezhdinsky village (located below Bekabad town) is 364 m^3/sec [1](Table 6.4.1).

[1] "Yearbook of surface water quality in the area of Uzhydromet activity," 2019.

Table 6.4.1 - Syrdarya River discharges (according to Uzhydromet)

Observation site	Normal annual discharge	2018	2019		
		Average	Average	Maximum	Minimum
Nadezhdinsky village	364	387	275	1350	10,0

Several irrigation channels flow from the Syrdarya River in the area of the planned activity.

The Dalverzin Channel, flowing at UMK and used for water supply to the enterprise, originates from the Farkhad reservoir and flows from south to north. Discharge is 75 m^3/sec[2].

The channel's width along the bottom is 7 to 13 m, the water depth in the channel is 2.5 to 3 m, and the channel bed is concreted.

6.5 Underground water

Groundwater of the investigated territory is supplied by inflow from the western slope of Mogoltau and Fergana Valley through pebbles, and also through irrigation channels Dalverzin, Bayaut, Yuzhnolodnostepsky, Dustlik (former Kirov channel), Derivatsionny. The territory under consideration is located within the Dalverzin groundwater deposit.

The state and depth of groundwater occurrence is influenced by the proximity of irrigation structures and irrigated areas.

Some groundwater is fed by infiltration of atmospheric precipitation during their intensive fallout in areas with relatively close occurrence of groundwater table.

In order to determine fluctuations of groundwater table and necessary measures on dewatering, in 2019 State Unitary Enterprise "Uzbekhydrogeology" prepared a report on dewatering for the project "Construction of casting and rolling complex" of Uzmetkombinat JSC in Bekabad district of Tashkent region".

According to the report, there are wells Nos. 42, 42A and 43 at the CRC site and a single well 42B under the SPS-2 building. There are no pumps installed in the wells. The depth of the wells is about 20-25 m with the filter placed between 4-14 and 8-18 m (Figure 6.5.1).

[2] Letter No. 82/01-06-51 dated 01.02.2022 from the Chirchik-Akhangaran Irrigation System Basin Management.

42a - Operating drainage wells

136n - Observation wells of the Akhangaran HGS

Figure 6.5.1 - Location of existing wells at the CRC

Quaternary aquifers of groundwater are developed in the upper part of the section to a depth of about 40-50 m.

The first groundwater aquifer from the surface, where the groundwater penetrates, is confined to alluvial-proluvial sediments, represented by pebbles with sand and gravel aggregate with boulders inclusion. The thickness of water-bearing horizon of the territory varies from 18 to 50 m.

The aquifer is supported by a layer of loams, less often by dense loamy sands. Water movement of the horizon is in the direction of the Syrdarya River valley.

According to the results of the long-term data of the onsite monitoring observations in the wells it was identified that the deepest maximum groundwater levels are in the winter-spring period of the year and is from 4.99 to 7.75 meters. Lowest, closest to the surface ground water levels are observed in summer and amount to 1.82 m to 4.75 m.

6.6 Soils

Soil-forming rocks in the area of the planned activity are light brown loess-like sandy loams and loams with inclusion of small pebbles, sand and clay concretions, from wet to water-saturated, from hard to fluid plastic. They lie, as a rule, on pebbles.

Zonal soils are represented by light grey soils. They are characterized by a low content of humus (0.9-2.0%) and nitrogen. Fluctuations in the content of humus in soils depend on the degree of soil cultivation. In connection with this, the thickness of the humus part of the profile also varies.

The natural soil cover of the territory of UMK is completely transformed by the land use planning and management of the territory and the creation of artificial tree and shrub plantings, as well as by the arrangement of lawns. The cultivated sierozemic soils are formed under the artificial planting, irrigation and preservation of litter.

Man-made non-structured soils are formed within the industrial and communal zone in the UMK territory. The aggregate is most often represented by construction waste with inclusions of fragments of natural soil horizons.

6.7 Flora

According to the scheme of botanical and geographical zoning of Uzbekistan (Tojibaev et al., 2017), the planned activity area belongs to the Middle Syrdarya botanical and geographical district of Turan province, which occupies the Tashkent-Golodnostepskaya depression, located in the middle course of the Syrdarya River, between the mountain systems of Tien Shan and Pamir-Alay and Kyzylkum desert.

In accordance with the requirements of the IFC PS-1 and PS-6, as well as the provisions of the Laws of RUz "On Nature Protection", "On Ecological Expert Review", "On Environmental Control", "On Environmental Audit" as part of the environmental and social impact assessment in the planned activities botanical studies were conducted to obtain baseline data to study the potential impact of the casting and rolling complex project on the flora.

As part of the flora research, a review of the literature data on the flora and vegetation of the Tashkent and Syrdarya regions was carried out and field studies were conducted covering the diversity of natural and transformed habitats (biotopes) in the UMK area.

According to the results of the research, a description of the main types of plant communities and habitat types (biotopes) of the study area was prepared, the species composition of the flora was determined, including the composition of endemic species and species listed in the Red Book of Uzbekistan and the IOCN, a brief description of their ecology was prepared, locations of threatened plant species were identified and the status of their populations was assessed (see Report 128-0948-BLS-Bio1).

Researches revealed that in the area of the planned activity the transformed (anthropogenic) habitats prevail - agricultural irrigated lands, settlements, industrial enterprises, infrastructure facilities. The vegetation cover is formed mainly by cultivated vegetation on agricultural irrigated lands.

The largest area in the area of the planned activity is occupied by arable fields on which agricultural crops (woolly cotton - *Gossypium hirsutum*, soft wheat - *Triticum aestivum*, corn - *Zea* mays, alfalfa - *Medicago sativa,* potatoes - *Solanum tuberosum,* rice - *Oryza sativa*, sunflower - *Helianthus annuus*, peanuts - *Arachis hypogaea*, etc.) are cultivated under artificial irrigation.

A smaller area is occupied by perennial plantings – apple and apricot orchards, planting of other fruit tree crops. On the head lands, along the channels and field roads, the field shelter-belts are planted of white mulberry (*Morus alba*), poplar (*Populus alba, Populus*

afghanica), elm (*Ulmus glabra*), white willow (*Salix alba*), sporadically with the participation of walnut (*Juglans regia*), sycamore, or Oriental plane tree (*Platanus orientalis*), Ajanta (*Ailantus altissima)*, ash - leaved maple (*Acer negundo),* robinia (*Robinia pseudacacia)* and other native and non-native tree species.

Saltwort-juniper communities (fragments of natural communities of halophilous vegetation) and synanthropic ephemera-grass communities grow along the margins of fields, roadsides, and along irrigation networks. They include, besides native species (*Alhagi kirghisorum* - Kyrgyz camel's thorn, *Alhagi pseudalhagi* - false camel's thorn, Bromus tectorum - roofing brome, Capparis spinosa - spiny caper, *Carthamus turkestanicus* - Turkestan safflower, *Hordeum murinum ssp. leporinum* - hare barley, *Heliotropium ellipticum* - heliotrope ellipticum, weedy species of wormwood - *Artemisia annua*, *A. scoparia, Ceratocarpus arenarius, Halocharis hispida*, and other representatives of the *family Amaranthaceae* - species of *genera Atriplex*, Climacoptera, *Salsola*, *Suaeda*), adventive weed*s (Centaurea iberica*, *Iberian cornflower, Centaurea solstitialis*, *Convolvulus arvensis*, Cynodon dactylon, *Xanthium spinosum*, Xanthium strumarium, etc.).

Along the banks of irrigation and drainage channels and ditches there are communities of mesophilic, halophilic and hydrophilic species (*Elaeagnus angustifolia*, Tamarix hohenackeri, T. ramosissima, Phragmites australis, Typha angustifolia, Calamagrostis dubia, Alhagi pseudalhagi and others), representing fragments of tugai vegetation.

In the rural inhabited landscape, the weed and cultural vegetation is formed by the same species that are characteristic of the agrolandscape (except for cotton, wheat, rice and peanuts), but the area occupied by vegetation is smaller compared to the area of buildings and road network. The same applies to the region's urban residential landscape, but the area occupied by vegetation is even smaller.

Natural biotopes, preserved in the zone of influence of the casting and rolling complex project, are represented by areas of tugay and solonchak vegetation, which have a medium or strong degree of anthropogenic disturbance and are confined to the floodplain and floodplain terrace of the Syrdarya River.

Native undisturbed (background) natural phytocenoses are absent in the area of the planned activity.

The type of solonchak vegetation combines phytocenoses dominated by halophytic plants, confined to solonchaks and other saline habitats (including transformed ones). Fragments of meadow, residual and secondary alkaline soils, dominated by typical representatives of alkaline soil vegetation: annual saltwort (species of genera Atriplex, *Climacoptera*, *Salsola*, *Suaeda*, *Ceratocarpus arenarius,* Halocharis hispida), as well as Alhagi pseudalhagi - false camelina and *Aeluropus littoralis* - saltwort.

Riparian forest vegetation, distributed along the river valleys of the arid regions of the Anterior, Middle and Central Asia, is a relict type of vegetation, the area of which has been catastrophically reduced in recent decades and which represents one of the most threatened ecosystems of the Central Asian region.

The possibility of using the relevant IFC PS-6 criterion to assess critical vegetation habitat is limited by the fact that Uzbekistan has no officially approved national list of threatened and unique habitats (ecosystem types), Central Asian ecosystems for the IUCN Red List of Ecosystems have not been assessed either.

Riparian communities in the region under study are formed by tree species – poplar setalistem or Asiatic poplar (*Populus pruinosa*), the oleaster (*Elaeagnus angustifolia*), Mesopotamia and halophytic shrubs – chemism silver (*Halimodendron halodendron*), the Goji (*Lycium ruthenicum*, *L. dasystemum*), the tamarisk (*Tamarix hohenackeri, T. ramosissima*),

vines (*Clematis orientalis*, *Cynanchum acutum* subsp. *sibiricum*), the grass tier is composed of camel thorn or yantak (*Alhagi pseudalhagi*), karelinia (*Karelinia caspia*), licorice (*Glycyrrhiza glabra*), reed (*Phragmites australis*), cattail (*Typha angustifolia*), halophytes (*Atriplex micrantha*,*Caroxylon micrantherum*, *Climacoptera intracata*, *Girgensohnia oppositiflora*, *Halocharis hispida*, *Salsola tragus, Suaeda arcuata, Limonium otolepis*, *Zygophyllum oxianum*), wormwood (*Artemisia ferganensis, A. scoparia*), cereals (*Calamagrostis dubia*, *Hordeum murinum* ssp. *leporinum*, *Poa bulbosa*).

Most of the areas of natural tugai vegetation in the area of the planned activity are located on the lands of state forestry enterprises, which are protected natural territories of category VI (according to the IUCN classification).

The main anthropogenic factors affecting the vegetation of the area of the planned activity:

- agricultural industry;
- urbanization;
- construction;
- extraction of gravel, clay and sand;
- regulation of the flow of the Syrdarya river;
- unauthorised landfills;
- the spread of adventitious species.

There is no complete list of the flora of the Middle Syrdarya botanical and geographical district, but according to the available estimates (Tojibaev et al., 2017), the level of species richness of the flora is about 1000 species, with a significant part of them being weedy and adventive species, as well as feral cultivated plants. The endemic element in the flora of the Middle Syrdarya botanical and geographical district is represented by only one species of *Climacoptera malyginii* (Amaranthaceae family). There are also a small number of subendemic species entering the neighboring desert areas (Climacoptera amblyostegia, *C. intracata*, *C. lachnophylla*, *C. minkwitzae*).

According to the currently published data, the list of flora of the Syrdarya region includes 347 plant species (Sulaimonov, Kushiev, and Shomurodov, 2015), including 4 species included in the national Red Book (2019): *Climacoptera amblyostegia, Climacoptera malyginii, Climacoptera merkulowiczii* (Amaranthaceae family), *Nonea calceolaris* (Boraginaceae family). The first 3 species belong to Category 2 - rare, *Nonea calceolaris* refers to Category 0 - probably an extinct species.

For the plain part of Tashkent region, 691 plant species have been established (Gaziev, 2021), including 5 species listed in the Red Book of Uzbekistan (2019): *Climacoptera amblyostegia, Colchicum kesselringii,* (Colchicaceae family), *Tulipa greigi*, *Tulipa korolkowii*and *Tulipa lehmanniana* (Liliaceae family). The first species, as stated above, is in Category 2, the other 4 species are in Category 3 (reducing).

According to the results of field studies 73 plant species were identified at 11 representative plots of the planned activity area. 18 of them are weedy synanthropic species (including 6 adventive ones), 9 are cultural (including both introduced and locally grown species).

All mentioned imported species have been naturalized in Uzbekistan for quite a long time and are widely spread in anthropogenic landscapes across the country. No quarantine weeds included in the national list of quarantine facilities were detected. The index of species diversity varies from 20 to 39 species.

Endangered plant species listed in IUCN Red List were not found in the area of the planned activity.

As a part of the flora, there is the species close to endangered (Category NT) - the dominant of *Populus pruinosa* riparian forests. As a result of the survey in the transformed biotopes, two locations of *Climacoptera amblyostegia*, a subendemic species listed in the Red Book of Uzbekistan, were identified. One more species listed in the Red Book of Uzbekistan, Eastern Sycamore (*Platanus orientalis*), in the area of planned activity grows in culture, as part of landscaping of settlements and field-protective forest belts.

Thus, the baseline studies of the flora showed that the vegetation cover of the studied region is largely transformed as a result of human economic activity, most of the territory is occupied by transformed habitats (agricultural irrigated land, settlements, industrial plants, infrastructure facilities) with communities of cultural and weed synanthropic vegetation.

The flora of the proposed activity area has relatively poor species composition, a significant part of which is made up of weedy synanthropic species. At the same time, the share of adventive species in the flora is rather low (8.34%), both in natural and anthropogenic habitats mainly dominated by native plant species (not counting plantations of agricultural crops).

6.8 Wildlife

6.8.1 Terrestrial wildlife

To collect the baseline data to determine the potential impact of the project on wildlife in accordance with the requirements of the IFC PS-1 and PS-6, as well as the norms of the Laws of RUz "On Nature Protection" and "On Ecological Expertise" zoological studies were conducted in the projected activity area in November 2021.[3]

As part of the baseline studies of fauna, a review of literature data on the fauna of terrestrial invertebrates, freshwater fish, amphibians, reptiles, birds and mammals of Tashkent and Syrdarya regions was carried out and field studies covering the diversity of natural and transformed habitats (biotopes) in the area of direct and indirect project impact were conducted.

According to the results of the research, a characteristic of biodiversity of fauna, communities and habitats was prepared, the species composition of fauna was determined, including the composition of endemic species and species listed in the Red Book of Uzbekistan and IUCN, a brief description of their ecology was prepared, the locations of threatened species of fauna were identified, the state of populations was assessed.

When describing and mapping habitat types (biotopes) and assessing the state of vertebrate fauna in the study area, natural and transformed habitats were identified in accordance with the requirements of clauses 9-15 of IFC PS-6.

The material for assessment of the current state of fauna of the planned activity area was the data of field surveys conducted in November 2021.

By the time of the field work, the construction of a 23 km power line was almost completed (supports were installed, wires were stretched on most of the power line), and a 1.2 km road was put into operation.

Field studies on the fauna of terrestrial invertebrates have not been conducted, since this time of the year does not coincide with the period of activity of these organisms.

[3] For more information, see Report 128-0948-BS-Bio2.

According to stock and literature data it is established that in the area of projected activity at least 500 species of insects live, of which at least 30% are endemic.

The occurrence of 16 endemic species has been reliably identified. Among the species included in the Red Book of the Republic of Uzbekistan (2019), at least 3 can be found - *Ancylocheira (Buprestis) salomonii*, *Chlorion regale* and *Cephalota (Cicindela) galatea*. To clarify the information on the species composition and ecology of insects, field studies during at least one warm season are advisable.

The same is true for studies of the herpetofauna of the area. In this regard, it was decided to carry out a detailed literature review of these species. Using the analysed sources of information and the results of a short field trip, 2 amphibian and 10 reptile species belonging to 6 families are observed in the area of the planned activity at the moment.

The total number of amphibian species is 40% of the total diversity of the amphibian fauna of Uzbekistan, reptiles - 16.1%. Two species - transverse striated wolf-cup and eastern steppe viper are included in the Red Book of the Republic of Uzbekistan (2019).

There is no International Union for Conservation of Nature (IUCN) Red List species registered in the area. One species could potentially be found, the Eastern Steppe Viper, a species listed in Appendix I of the Convention on International Trade in Endangered Species of Fauna and Flora.

Among reptiles, two species of the grey goose gecko and multi-coloured goose are synanthropic species, which is 20% of the total number of species inhabiting the project area. Semi-aquatic species, if we take the total list of herpetofauna of the area, includes 3 species - Pevtsov toad, Lake Frog and water snake, which is 25% of the total number of species inhabiting the project area.

The remaining species are more associated with adyrs, ravines, and bluffs located in the vicinity of the project area.

On the basis of available data and results of field survey in November 2021, 152 bird species out of 477 birds inhabiting the territory of the republic were marked in the projected activity area including SPZ of UMK and associated facilities (power lines and highways) and their impact zone.

The total number of bird species is 31.9% of the total diversity of avifauna of Uzbekistan. Among them, 18 species (11.8% of the total number of species inhabiting the project area) are listed in the Red Book of the Republic of Uzbekistan (2019); 16 species (10.5%) are listed in the International Union for the Conservation of Nature (IUCN Red List); 27 species (17.7%) - in the CITES (Convention on International Trade in Endangered Species of Fauna and Flora); CMS - 73 species (48%); Bern Convention - 77 species (50.6%).

Most bird species in the project area are waterfowl and semiaquatic - 61 species, which is 40.1% of the total number of species inhabiting the project area. This is due to the close proximity of the Syrdarya River and many fisheries.

The main habitats of such species are the channel and floodplain of the Syrdarya River, channels originating from it, as well as old reservoirs.

A significant share of bird species is represented by species that are characteristic of floodplain forests (tugai) which is 32 species, representing 21.1% of the total number of species inhabiting the project area. Among the bird species inhabiting tugai forests no rare and endangered species were noted. However, during migrations in riparian forests the Greater Spotted Eagle, Imperial Eagle and Steppe Eagle, Long-tailed Eagle and Osprey may stay for rest.

Synanthropic species are represented by 10 species, which is 6.6% of the total number of species inhabiting the project area.

Birds of open spaces, fields and adyrs are represented by 21 species, which is 13.8% of the total number of species inhabiting the project area. The remaining species visit the project area during the migration period and can be found in many habitats.

Nowadays, 14 species of mammals relating to 5 groups are reported in the area of projected activity. The total number of mammal species is 12.8% of the total diversity of theriofauna of Uzbekistan. Among them, one species - steppe polecat is listed in the Red Book of the Republic of Uzbekistan (2019), which is 7.1% of the mammal species inhabiting the project area. There are no registered species in the territory included in the Red List of the International Union for Conservation of Nature (IUCN Red List), as well as Annexes to the Convention on International Trade in Endangered Species of Fauna and Flora. Among these species, synanthropic species are 3 species - house mouse, grey rat and dwarf bat, near-aquatic, if we take the general list of mammals of the area, - 1 species - muskrat. The remaining species are more associated with floodplain forests (tugai), adyrs, ravines and cliffs.

The middle course of the Syrdarya River is important for waterfowl and semi-aquatic birds during the breeding, feeding and wintering period; it is used as a flying corridor for many bird species, including globally endangered species such as: steppe eagle, imperial eagle, Mac-Queen's bustard, great bustard, Dalmatian pelican, etc.

The Syrdarya River Valley and the migration corridor are part of the Central Asian Flyway. The main migration periods occur in spring (late February-May) and autumn (August-October).

The periods of spring and autumn migrations are extended due to the biology and breeding sites of many groups of birds that fly along this corridor. During migrations, valley habitats and the river serve not only as reference points for birds, but also as feeding and resting places.

In the valley of the Syrdarya River, there are few patches of tugai vegetation, which is all that remains of the once huge tugai massif, which extends along the middle course of the river.

However, even now the remaining areas of riparian vegetation serve as habitat, nesting, feeding and resting places for many vertebrates of the area. Jackal, rabbit, long-eared hedgehog, etc. live here. Many passerine birds nest like little banded goshawk, Syrdarya pheasant, black-crowned night heron, etc. Tugais (bottom-land forests) attract a huge number of insects.

According to the results of field surveys at 11 representative plots in the area of projected activity 50 bird species were marked in total, 5 of which are listed in the Red Book of the Republic of Uzbekistan: pygmy cormorant, white stork, great black-headed gull, white-tailed eagle and Imperial Eagle, which is 10% of all species encountered. Of these, only the Imperial Eagle is listed in the IUCN Red List with VU Status - vulnerable.

The total number of bird species encountered is 32.9% of the observed species according to the published data.

One species of amphibian, the green frog, was also reported, which is more of an exception to the rule, as most amphibians and reptiles are in hibernation at this time of the year.

Three mammal species have been identified - Oriental northern mole vole (Ellobius talpinus), Aral yellow souslik (Citellus fulvus), and Asiatic jackal (Canis aureus). These

mammal species are widespread and even mass in the territory of the Republic of Uzbekistan. The index of species diversity on separate sites was from 4 to 25 species.

Baseline studies of fauna have shown that anthropogenic habitats (agricultural irrigated lands, settlements, industrial enterprises, infrastructure facilities) prevail in the area of planned activities.

In this regard, the fauna of terrestrial vertebrates has undergone significant changes and is currently represented by a rather scarce set of species capable of coexisting with humans - synanthropic species such as house mouse (Mus musculus), grown rat (Rattus norvegicus), common Bat (Pipistrellus pipistrellus), myna (Acridotheres), magpie (Pica), etc.

On the contrary, avifauna is characterized by a relatively large variety due to the proximity of the project area to the Syrdarya River, which attracts a large number of birds both during migration and for wintering.

6.8.2 Ichthyofauna

According to zoogeographic zoning, the territory in question belongs to the Aral District of the Ponto-Caspian-Aral province of the Mediterranean subdistrict of the Holoarctic region.

Within the framework of baseline studies, a review of available published data on the qualitative composition of ichthyofauna and the nature of fish distribution in the middle reaches of the Syrdarya River was carried out and field studies covering the diversity of natural and transformed habitats (biotopes) in the UMK area were conducted.

The ichthyofauna in the natural state (before the large-scale irrigation construction of the 1960s) was considered in sufficient detail in the classic works of L.S. Berg (1905, 1934, 1949, 1962), G.V. Nikolsky (1938, 1940), F.A. Turdakov (1946, 1963) and G.U. Lindberg (1948, 1955, 1972).

The state of ichthyofauna during the period of large-scale irrigation construction and changes in the basin hydrography is indicated in the works of G.K. Kamilov (1973).

L.S.Berg notes 38 fish species and subspecies for the Syrdarya River, including the Aral section. G.V. Nikolskiy gives a similar composition of ichthyofauna for the Syrdarya river basin. G.K.Kamilov (1973) gives the greatest number of fish species in the Syrdarya basin - 54 species. The latter list, in which a large volume of literature is summarized, is presented by T.V. Salikhov and B.Kamilov (1995); it also includes fishes of mountain sections of the rivers.

The ichthyofauna of the Syrdarya midstream is under the influence of the Kairakum, Farkhad (upstream of UMK) and Chardara (downstream) reservoirs, whose dams created obstacles for fish movements and divided the united populations' habitats in the past.

As a result of realization of adaptive potentials of fish species inhabiting the middle reaches of Syrdarya, intraspecific groups (populations) emerged, in which the specified reservoirs became fattening water reservoirs, and the flowing parts of rivers became spawning grounds.

Thus, the UMK area is a small section of the available spawning grounds located in its upper part (spawning grounds of native fish extend from the mouth and mouth section of the Syrdarya in the Chardara reservoir to the dam of the Farkhad reservoir).

Basically, spawning grounds of phytophilic, rheophilic and other fish lie below the Project area. Spawning of pelagophilous fish occurs when water in the river significantly rises in May-early June (during floods); the water current carries the eggs downstream during the mentioned significant rise in the level.

It is typical for the ichthyofauna of the Syrdarya middle reaches that fish in the channel of the main river and large channels (including Dalverzin) do not create herds, the flocks are tied to abandoned loops, backwaters, and pits. Numerous herds of large fish appear during the spawning run from the Chardarya reservoir. The middle reach of the river have become the place of spawning run and spawning grounds of fish population gaining weight in the Chardarya reservoir.

According to the long-term studies conducted by the Institute of Zoology of the Academy of Sciences of Uzbekistan, the fish fauna in the vicinity of Bekabad includes 17 fish species: roach (Rutilus rutilus), Chinese carp (Ctenopharyngodon idella), Silver carp (Hypophthalmichthys molitrix) and Bighead carp (H. nobilis), Aral asp (Aspius aspius), European bream (Abramis brama), Aral white-eye (Abramis sapa), Gibel carp (Carassius gibelio), Carp (Cyprinus carpio), Catfish (Silurus glanis), Sander (Sander lucioperca), Snakehead (Channa argus warpachowskii), Pseudorasbora parva, False gudgeon (Abbotina ruvularis), Sawbelly (Hemiculter leucisculus), Sabrefish (Pelecus pelecus), Rhinogobius (Rhinogobius sp.).

All types of fish are fish species widely distributed in the plain zone of the Amudarya, Syrdarya, Kashkadarya, and Zarafshan basins.

Rare and endangered species in the area of the planned activity are not reported.

Aquatic biotopes have been largely transformed by irrigation system construction. Converted habitats include irrigation channels, and regulated riverbeds. Natural habitats with thickets of riparian aquatic vegetation are located in areas of slow flow.

There are no critical natural and/or transformed ichthyofauna habitats meeting the IFC CD-6 criteria in the UMK area.

6.8.3 Organisms of aquatic ecosystems

In November 2021, the hydrobiological research was conducted in the area of planned activity. As a result of studies of aquatic ecosystems, a review of literature data and stock materials on hydrobionts of the middle course of the Syrdarya river in Bekabad district of Tashkent and Syrdarya Region was performed, field studies covering biotopes of natural and transformed habitats in the zone of direct and indirect impact of casting and rolling complex project (see report 1280948-BS-Bio3) were conducted.

Based on the results of the research, the main taxonomic structures of aquatic communities (phyto-zooplankton, periphyton and benthofauna) were described, the species composition of hydrobionts was determined. Their ecology was described, locations of widespread species were established and the state of their populations was assessed, surface water quality and the ecological state of the study areas were determined.

It was determined that no threatened, rare and protected species of organisms, including invertebrate species included in the IUCN Red List and the Red Book of Uzbekistan were found in the aquatic communities of the Syrdarya River in the study area.

As a result of hydrobiological investigations of the sections of the Syrdarya river with reference sections above Bekabad city (1 km to the west of the border with Tajikistan) and the control section, it was found that anthropogenic factors, especially pollution from economic activities (regulated flow, water intake for irrigation of agricultural lands, etc.), cause changes in the composition, structure and ecological state of aquatic biocenoses in different depths.

The taxonomic composition and structure of aquatic biocenoses of the first two sites located in the floodplain of the Syrdarya River upstream of Bekadaba town are largely

identical. The species composition of hydrobionts is represented mainly by widespread mesosaprobic species of organisms.

In general, the hydrobionts of the studied river sections at the time of sampling are characterized by a constant complex of eurybiont, freshwater-saline-water species-indicators of b-, b-a-mesosaprobic conditions.

Biocenoses change to the greatest extent at the river section downstream of urban wastewater discharge: there is a change of dominant complexes of organisms, simplification of ecological structure, appearance of high-sampled invertebrate animal species as dominants and an increase in specific ratio of halophilic species of organisms indicating some increase in water salinity.

Water quality in the surveyed sections of the river corresponds mainly to class III (moderately polluted water), which is associated with pollution and slightly increased salinity.

Values of biotic periphyton index (BPI) mainly - 6 points, biotic indices (BI) - 1.78-1.81, modified biotic index (MBI) - 5-6 points, ecological condition - AB (satisfactory ecological condition, characterized by metabolic and ecological progress of biocenosis) and on Vytoka 1: IS -2.09, BPI, MBI - 4-6 points, ecological condition transitional AB-Ab.

6.9 Territories with special conditions of use

6.9.1 Specially protected areas

According to the results of the preliminary environmental and social assessment on the basis of the published data it was established that there are no specially protected territories of state, regional or local significance in the area of Bekabad town (Report 128-0948-SR).

At the stage of baseline studies of flora (Report No. 128-0948-BLS-Bio1) it was determined that the state forestry enterprises, [4]Bekabad and Syrdarya, which, according to the national legislation of Uzbekistan[5], belong to the VII category of natural areas of protection (hereinafter - NAP): Areas for management of certain natural resources, according to IUCN classification belong to protected natural areas of VI category are located in the projected activity area.

In areas for the management of certain natural resources, the introduction of new species and subspecies of living organisms for the purpose of their acclimatization and other activities that may cause harm to the flora and fauna are prohibited.

In areas for the management of certain natural resources, the use of flora and fauna is allowed in accordance with the procedure established by law.[6]

The Dalverzin State Forestry and Hunting Farm is located 30 km north of Bekabad.

The Dalverzin farm is located in the floodplain of the middle course of the Syrdarya River. Its area is 6000 ha, more than 70% (4200 ha) are tugai (coastal) forests, over 20% - rice and wheat fields, 5-7% - water bodies (large lakes Kolganyr and Krivoye, the system of Urtokly channel (flows into the Syrdarya River).

[4] Areas for the management of certain natural resources (lands of the forest fund) Article 42 of the ZRU № 710-II "On protected natural areas".

[5] The Law No. 710-II of the Republic of Uzbekistan dated 03.12.2004 "On protected natural territories".

[6] https://www.lex.uz/acts/86109 The Law No. ZRU-475 of the Republic of Uzbekistan dated 16.04.2018 "On Forest"

The area used for wildlife breeding has had a protected status since 2000 and is governed by regulations concerning the management of nature reserves, national parks, and hunting grounds in the Republic of Uzbekistan.

The main game species are tolai hare, pheasants, jackal, wild boar and ducks. Various crops are grown at the farm as fodder for birds and animals. The territory is also used as a recreation area for residents of Tashkent and Bekabad district of Tashkent region.

From the ornithological point of view, the area is interesting in autumn and winter (October-March), when many waterfowl birds are concentrated here. In summer, only species with a limited biome are of interest. Stork colonies are located 3-5 km from the hunting grounds.

In Tajikistan, 10 km east of the city of Bekabad town, there is a protected area of Mogoltau.

Mogoltau is a low mountain massif 40 km long and 15-25 km wide, occupying an area of about 350 sq. km, with the highest points 1600-1620 m above sea level. The central and main elevated part of the massif is Muzbek peak at an altitude of 1,624 m above sea level. The Mogoltau massif is a vast plain of rubble, pebbles, gravel, boulders and loess-like loam, cut by dried riverbeds formed by the flows of spring (April) rains.

The territory of the massif has long been subjected to anthropogenic impact, there are many settlements: Khujand, Uchbog, Chengalyk, Kichikayra, Katorbulok, Chorukhdaron, Mirzorabat, Holbabulon and others.

6.9.2 Critical habitats

According to Clause 16 of PS-6 of the IFC, critical habitats include habitats:

- significantly important for critically endangered and/or endangered species (this includes IUCN Red List species with CR or EN status) as well as species listed in national/regional red lists based on criteria similar to the IUCN criteria;
- significant importance for endemic and/or range-restricted species.

In the valley of the Syrdarya river there are areas of tugai vegetation - this is all that remains of the once huge tugai massif, extending along the middle course of the river.

Relict tugai vegetation refers to threatened plant communities in the project area, but the possibility of applying this criterion to assess critical habitat is limited by the fact that in Uzbekistan there is no officially approved national list of threatened and unique habitats (types of ecosystems), assessment of ecosystems of Central Asia for the corresponding global Red List IUCN also was not conducted.

Thus, the November 2021 field geobotanic survey indicated that there are no critical natural and/or converted habitats meeting the IFC PS-6 criteria in the area of the TMF and associated sites.

Riparian sites provide habitat, nesting, feeding, and resting habitat for many vertebrates in the area. Jackal, rabbit, long-eared hedgehog, etc. live here. Many passerine birds, pheasants, quacks, etc. nest here. Tugays attract a large number of insects.

According to the results of the faunal survey conducted in November 2021 in the area of UMK and associated facilities, the habitats potentially meeting the criteria of IFC PS-6 - floodplain complexes of the Syrdarya River (tugai) along the Syrdarya channel - were identified, it is advisable to conduct specialized complex studies in appropriate seasons to establish their status (Figure 6.9.1).

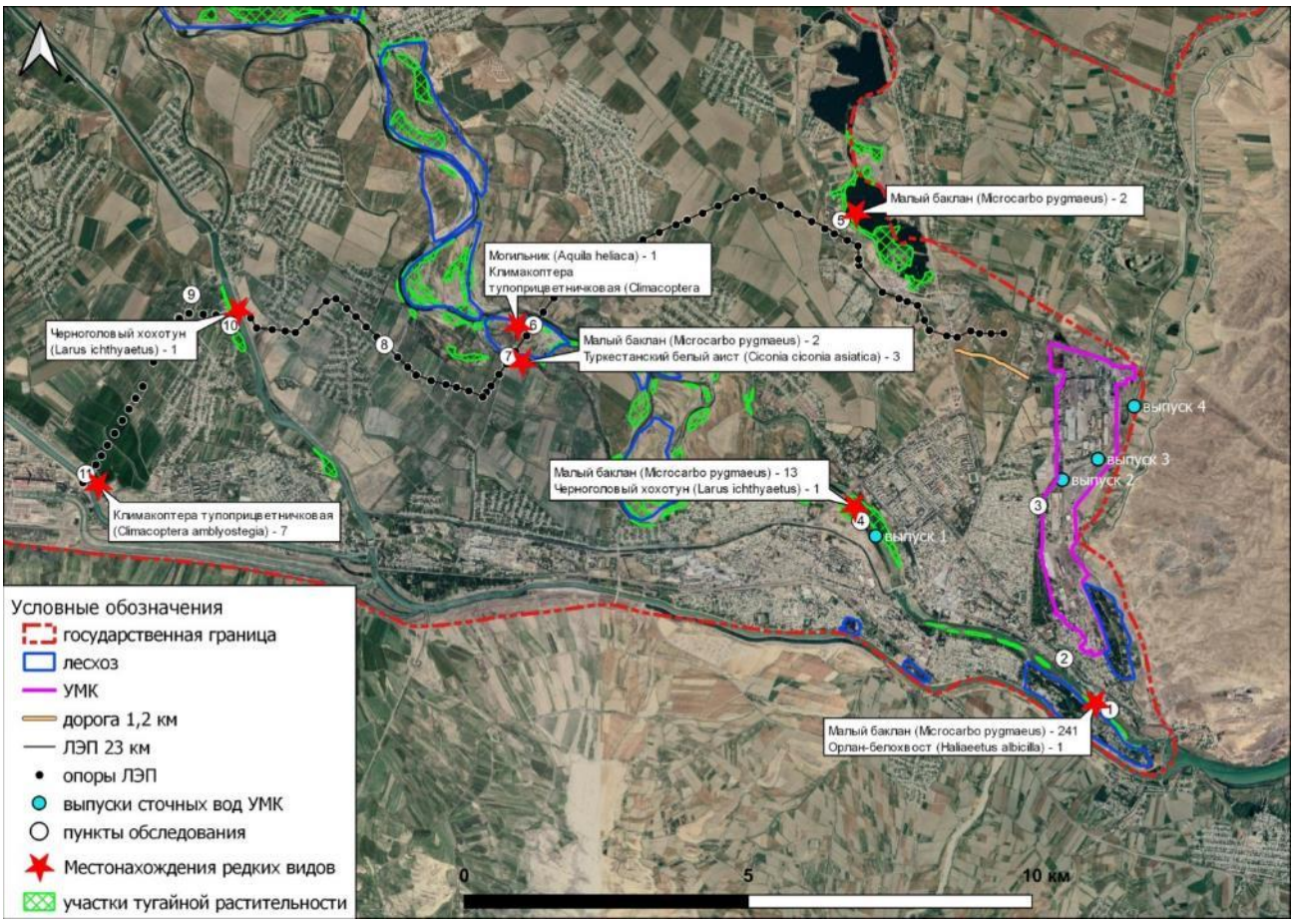

Figure 6.9.1 - Map of the location of rare species, areas of riparian vegetation and forestry in the area of planned activities Migration corridors

6.9.3 Migration corridor

The middle reaches of the Syrdarya River is important for waterfowl and water-related birds during the breeding, feeding and wintering periods, and is used as a flyway corridor for many bird species, including globally endangered species such as the Steppe Eagle, Imperial Eagle, Mac-Queen's bustard, great bustard, Dalmatian pelican, etc.(Figure 6.9.2).

The Syrdarya River and the migration corridor are part of the Central Asian Flyway. The main migration periods occur in spring (late February-May) and autumn (August-October).

The periods of spring and autumn migrations are extended due to the biology and breeding sites of many groups of birds that fly along this corridor.

During migrations, valley habitats and the river serve not only as reference points for birds, but also as feeding and resting places.

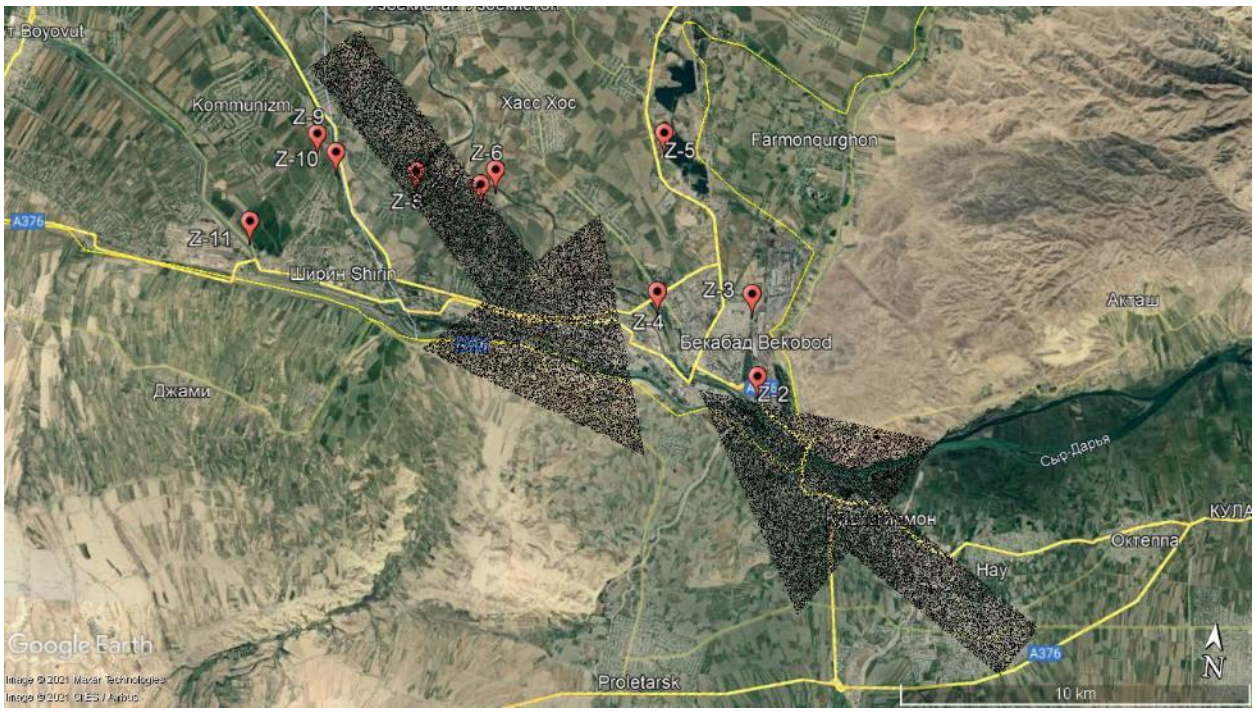

Figure 6.9.2 - Migration corridor of birds along the Syrdarya River valley in the Bekabad town area Environmental assessment

6.10 Environmental assessment

6.10.1 Atmospheric air quality

To acquire the relevant and reliable information on the level of chemical pollution of the atmosphere in the area of the location of Uzmetkombinat JSC, the monitoring was conducted to collect the information on the background conditions of chemical pollution of the atmospheric air.

Measurements of concentrations of nitrogen oxides, sulphur dioxide, carbon monoxide, suspended particles (PM1, PM2.5 and PM10) were carried out in six points in Bekabad using Zephyr, a compact air quality monitor.

Additional control of nitrogen dioxide and sulphur dioxide content is carried out using passive diffusion tubes installed at six points in Bekabad town with a monthly exposure.

Schematic map of diffusion tubes location is given in Figure 6.10.1.

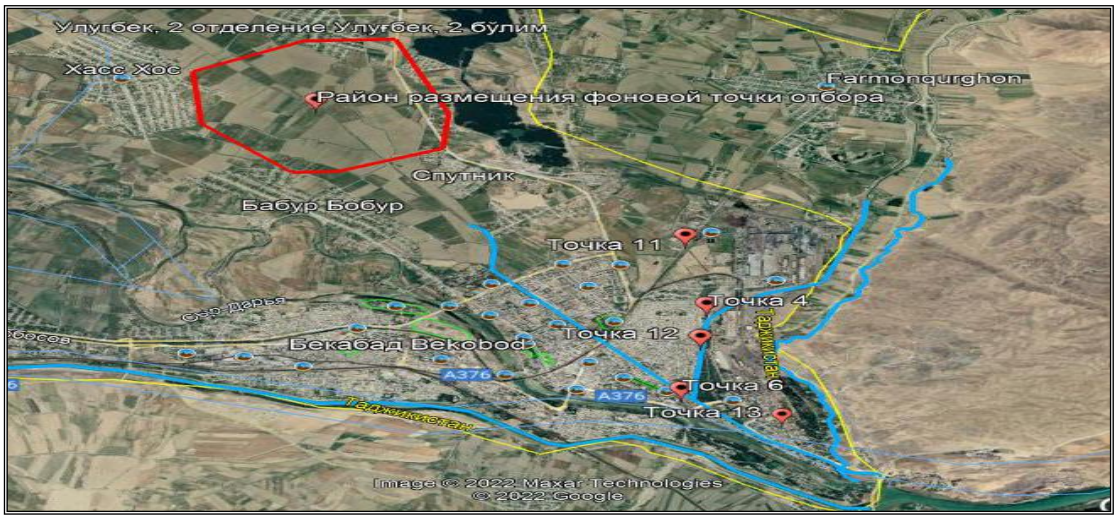

Figure 6.10.1 - Schematic map of diffusion tubes

The works are intended to determine the content of metals and polycyclic aromatic hydrocarbons in the atmospheric air and atmospheric precipitation.

In addition, the total content of suspended substances in the atmospheric air is determined, for this purpose atmospheric precipitation collection plates are installed for a period of 30 days each.

The Report 128-0948-BLS-Air was prepared based on the results of the researches. It contains the results of the field and laboratory researches performed within the baseline studies of the atmospheric air pollution in the projected activity area.

6.10.1.1 Research using diffusion tubes

The diffusion tubes are easy to use and can be used to collect representative data on pollutant concentrations in addition to automatic data. Samples are analysed by a UK laboratory, Gradko International, a UKAS-certified laboratory, which is also the supplier of the diffusion tubes (Figure 6.10.2)

Figure 6.10.2 - Diffusion tube

In the first month of observations, 6 diffusion tubes were installed (locations Nos 4, 6, 11, 12, 13 and 16). By the end of the first month, the tube installed in the location 16 was lost, respectively; no information on this site was obtained.

During the second month of observations (7 December 2021 – 10 January 2022), 6 diffusion tubes were installed at the same points (Table 6.2).

Table 6.10.1 – Monitoring points (diffusion tubes)

No	Point reference on the map	Location	Coordinates	
1.	4	Termezskaya Street, Kirovsky settlement, Bekabad, the nearest residential house to UMK	40°13'34.82"N	69°16'54.13"E
2.	6	UMK's medical station	40°12'33.15"N	69°16'43.59"E
3.	11	Industrial zone bordering UMK from the north-west	40°14'24.91"N	69°16'42.68"E
4.	12	Navoi Street, Metallurgov settlement, the nearest residential house to UMK	40°13'10.88"N	69°16'51.82"E
5.	13	The nearest residential house to UMK's south-eastern border	40°12'16.31"N	69°17'31.76"E
6.	16	South-eastern edge of Khos village	40°15'55.47"N	69°12'43.27"E

According to the results of two-month observations with the use of diffusion tubes, the following conclusions can be made:

- In winter, when air pollution is typically high, concentrations of NO2 were below monthly average national thresholds and IFC-recommended values;
- Concentrations of SO2 were below the monthly average MPC at Points 6, 11 and 12, although air pollution is typically higher in winter (as households in single-family neighbourhoods use individual heating systems);
- Concentration of SO2 was in the range from 39.72 to 129.31 mg/m3. At Point 13 (the nearest residential house to UMK's south-eastern border), MPC was exceeded by 30%;
- The first month of observations revealed a 10% exceedance of MPC for SO2 at Point 4 (the nearest residential house to UMK on Termerzskaya Street); however, no exceedance was registered during the second month;
- NO2 concentration was in the range from 22.30 to 28.16 mg/m3 (MPC = 50 mg/m3, IFC's daily average standard = 40 μg/m3), and no excessive concentrations of nitrogen dioxide was identified from diffusion tube monitoring;
- Pollution of air with SO2 and NO2 at the baseline point (Point 16, the south-eastern edge of Khos village) in general matches the average concentration of these substances in Bekabad.

It was concluded that the observations conducted from 8 November 2021 to 10 January 2022 have produced an accurate picture of air quality in the project area.

Based on the results of atmospheric air quality studies using diffusion tubes for the entire exposure period (monitoring results), the following conclusions can be made:

Although the data of diffusion tubes are relatively short-term, they clearly show the variability of the pollution level and allow getting an idea of average concentrations of pollutants in the area of planned activity taking into account the influence of external facilities. Monitoring results essentially reflect the cumulative impact on the atmospheric air (contributions of motor vehicles, other enterprises, municipal sources).

6.10.1.2 Atmospheric air quality studies using the Zephyr sensor

A baseline study of chemical pollution of air was conducted in the project area from 15 December 2021 to 12 April 2022 using a Zephyr sensor.

Nitrogen dioxide (NO2), nitrogen oxide (NO), sulphur dioxide (SO2), carbon oxide (CO) and suspended particles PM10, suspended particles PM1, PM2,5 and PM10 were measured in seven test sites (Nos 1, 5, 7, 8, 10, 13,14) in the territory of Bekabad town, the planned duration of monitoring was 2 months. Data from the Zephyr sensor is transmitted on-line to the cloud resource https://portal.earthsense.co.uk/. The list of test sites, where the Zephyr sensor research is planned to be carried out, is given in Table 6.10.2.

Table 6.10.2 - Monitoring points (Zephyr sensor)

No.	Location	Coordinates	
1	Bekabad town, Microdistrict 15, 8 Buyuk Ipak Yuli str.	40°14'25.64"N	69°16'1.65"E
4	Bekabad town, Kirovsky Village, Termezskaya str. , the nearest house to UMK	40°13'49.03"N	69°16'48.34"E
5	Bekabad town, Kirovsky Village, 4 Beruniy str.	40°13'23.67"N	69°16'52.06"E
7	Bekabad town, Kirovsky Village, 50 Beruniy str.	40°12'49.42"	69°16'50.33"B
10	Bekabad town, industrial zone No. 2, Private Entrepreneur "Valiev Rafik"	40°15'0.06"N	69°16'58.19"E
13	Bekabad town, the nearest house to the south-eastern border of UMK	40°12'19.45"N	69°17'24.65"E
14	In Tajikistan, the Bunyodkor enclave	40°11'58.95"N	69°18'12.45"E

Schematic map of the Zephyr sensor monitoring locations is shown in Figure 6.10.3.

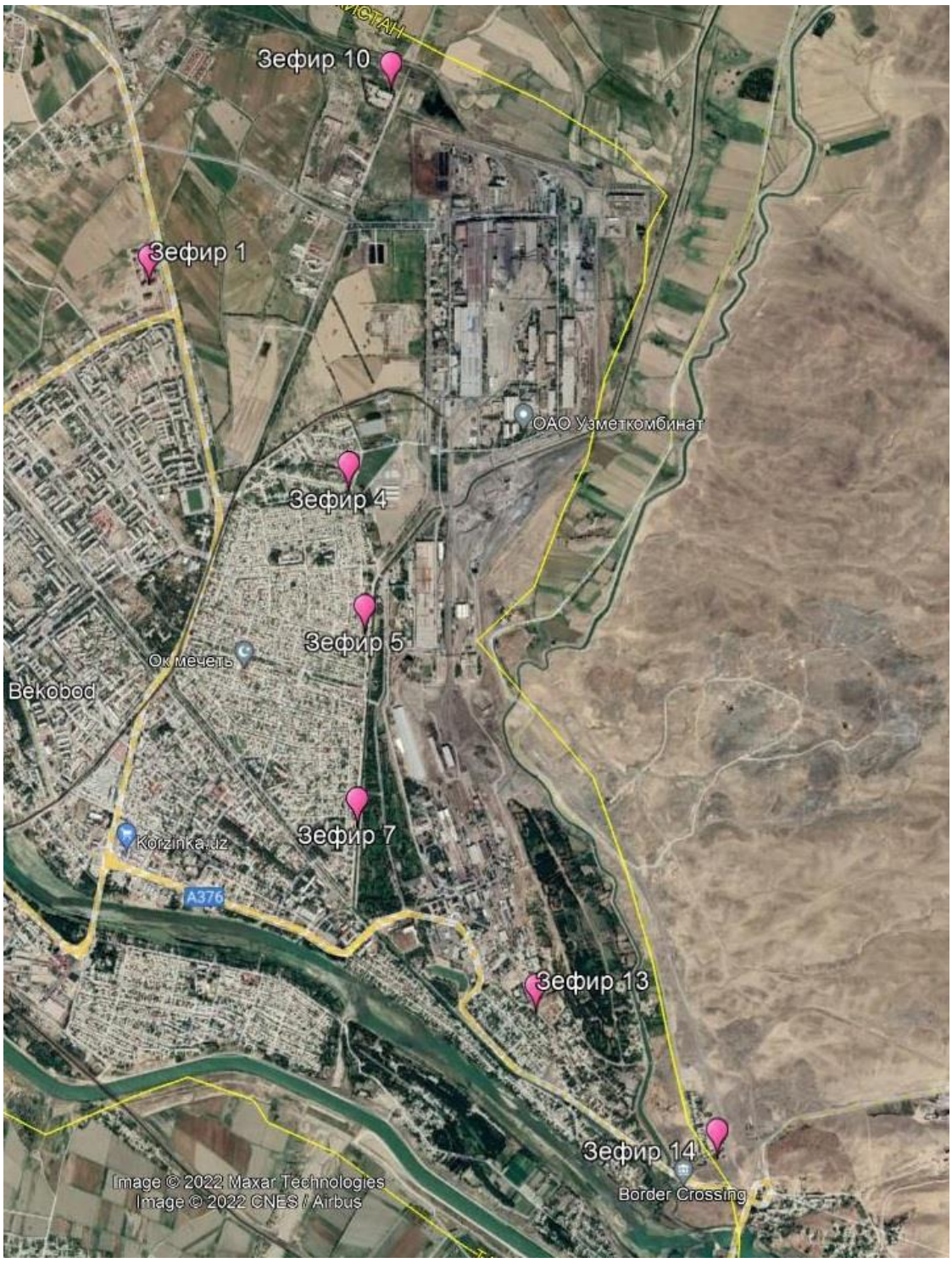

Figure 6.10.3 - Schematic map of the Zephyr sensor monitoring locations

A review of the air pollution monitoring using the Zephyr sensor indicated the following:

1. Isolated exceedances of the national one-time MPCs were recorded:
   - One-time MPCs were exceeded for carbon oxide: at Point 1 – in one out of 189 measurements (repetition of 0.5%), at Point 4 - 6 out of 247 measurements (repetition of 2.4%). At the same time, one-time MPCs for carbon oxide were exceeded in 4 measurements at Point 4 on 17 March 2022, from 9:00 to 13:00. At other monitoring points, no exceedances were reported.

- At point 10, one-time MPCs for PM 1 were exceeded in one out of 220 measurements (repetition of 0.5%), for PM 2.5 – in 2 out of 220 measurements (repetition of 0.9%). At the same time, increased concentrations of PM 1 and PM 2.5 were observed simultaneously. At other monitoring points, no exceedances were reported.

2. Exceedances of the WHO-recommended daily average limits for PM 1 and PM 2.were observed at all monitoring points. The highest level of pollution is typical for PM 2.5, whose highest concentration was 3.41xMPC (and 2.20xMPC for PM 1). The average level of pollution with PM 2.5 was 2.66xMPC (1.68xMPC for PM 1). The highest levels of pollution with both PM 1 and PM 2.5 were typical for Points 5 (5 Beruniy Street, Bekabad) and 13 (the nearest residential house to UMK's south-eastern border); the lowest values were observed in the Bunyodkor enclave in Tajikistan (Point 14).
3. The highest daily average air concentrations of PM 10 was 1.40 shares of the WHO-recommended value, averaging at 1.06xMPC. Exceedances of the WHO limit were observed at three of the seven monitoring points: Points 5, 7 and 13. Spatial distribution of PM 10 following a pattern typical for PM 1 and PM 2.5: the highest values were recorded at Points 5 (1.40xMPC) and 13 (1.32xMPC), the lowest value was measured at Point 14 (0.72xMPC) in Tajikistan.
4. For the other pollutants (nitrogen dioxide, nitrogen oxide, sulphur dioxide, PM 10), neither one-time nor average daily MPCs were exceeded.

An increased concentration of PM 1 and PM 2.5 in air was recorded, and the highest concentrations of were localised in areas adjacent to the central and southern parts of UMK's industrial site.

It is possible that the local maximum of PM 1 and PM 2.5 is associated with the influence of UMK's slag dumps. At the points adjacent to the central part of the industrial site, these concentrations of are somewhat lower, but still exceed the average daily standards.

6.10.1.3 Studies of atmospheric air on the content of metals and polycyclic aromatic hydrocarbons

The scope of baseline investigations included studies of chemical pollution of atmospheric air with collection of air samples at 9 points: 7 points in Uzbekistan and 2 points in the Bunyodkor enclave in Tajikistan) (Figure 6.10.4). In addition, atmospheric precipitation sampling plates were installed at the same locations for 30 days. Atmospheric air sampling is performed twice at each location.

Point 16 (the south-eastern edge of Khos village) was chosen at a considerable distance from UMK and is conditionally a baseline point in relation to the other sampling points and plate locations. Therefore, the results of air and aerogenic precipitation studies fallout are compared with the investigation results for Point 16.

In samples of atmospheric air and atmospheric fallout, quantitative chemical analysis is carried out for the content of pollutants not detectable by diffusion tubes and the Zephyr sensor: metals and polycyclic aromatic hydrocarbons. The sum of suspended substances is additionally determined in the atmospheric air samples.

Locations, where atmospheric air sampling and installation of plates is planned, are given in Table 6.10.3Table 6.10.3.

Table 6.10.3 - Locations for installing plates for collecting atmospheric precipitation and one-time sampling

Location No.	Address	Geographical coordinates

Location No.	Address	Geographical coordinates	
1.	Bekabad, Microdistrict 15, 8 Buyuk Ipak Yuli str.	40°14'25.64"N	69°16'1.65"E
2.	Bekabad, Kirovsky Village, 29 Abdulla Kakhkhora str.	40°13'49.03"N	69°16'48.34"E
5.	Bekabad, Kirovsky Village, 4 Beruniy str.	40°13'23.67"N	69°16'52.06"E
7.	Bekabad, Kirovsky Village, 50 Beruniy str.	40°12'49.42"N	69°16'50.33"E
8.	Bekabad, 3 Jabarov str.	40°12'19.45"N	69°17'24.65"E
9.	On the border with Tajikistan, in the north direction from UMK	40°14'57.46"N	69°17'1.59"E
14.	In Tajikistan, the Bunyodkor enclave	40°11'58.95"N	69°18'12.45"E
15.	In Tajikistan, the Zhomiy enclave	40°11'34.61"N	69°18'53.05"E
16.	South-western edge of the Khos Village	40°15'55.47"N	69°12'43.27"E

The map of air sampling points and location of plates for collection of atmospheric precipitation is given in Figure 6.10.4.

Figure 6.10.4 - Schematic map of atmospheric air sampling sites and atmospheric precipitation plates

Laboratory tests are performed by the Typhoon Federal State Budgetary Institution (Obninsk, Kaluga Region, Russia) certified by the Federal Accreditation Service (Rosakkreditatsiya).

Rosakkreditatsiya is a full member of the International Laboratory Accreditation Organization (ILAC), the Asia Pacific Laboratory Accreditation Organization (APLAC) of the International Accreditation Forum (IAF), which ensures international recognition of the results performed by its accredited testing laboratories.

An analysis of air and precipitation for metals and PAH showed the following:

1. PAH content in atmospheric air is below the measurement limit.
2. PAH content in precipitation in UMK area is 1.5-2.5 times above background values with the exception of acenaphthene, fluorene, and phenanthrene, whose concentrations practically do not change with increasing distance from UMK. Despite the low (below detection limits) content of PAH in atmospheric air, the precipitation

analysis shows that that there are a number of sources emitting these substances including all fuel-burning plants and facilities like Bekabad-Cement OJSC, boiler houses, vehicles, and households.

3. No exceedance of reference concentrations of metals in the atmosphere were detected. As the distance from UMK increases, the content of metals in the atmosphere drops. At the same time, the total air content of metals near UMK is approximately 2 times higher. The investigation shows that steel production significantly contributes to the content of iron, chromium and aluminium in atmospheric air, although threshold values are not exceeded.
4. There is a clear inverted correlation between the content of metals in precipitation and the distance to UMK: the content of all metals at the baseline point is significantly below not only the average values, but in most cases also below the lowest values recorded for the UMK area. Thus, UMK is a significant source of atmospheric air contamination with metals.
5. A comparison of the relative content of metals in air and precipitation shows a satisfactory degree of correlation as the total content of metals in the total mass of suspended solids (dust) is 0.37÷0.38%. Small fluctuations in the metal content can be explained both by an error of analytical research methods and the presence of local and insignificant emission sources.
6. The investigations identified two instances of exceedance of the MPC established by SanPiN RUz 0239-11 for suspended solids: a 20% exceedance at Point 7 (50 Beruniy Street, Kirovsky settlement, Bekabad) and a 50% exceedance at Point 14 (the Bunyodkor enclave in Tajikistan). Given that that sampling at these points was carried out during southern and north-eastern winds respectively and that UMK is located to the north-east, east and south-east of Point 7 and to the west and north-west of Point 14, the influence of UMK on the dust content at points 7 and 14 is minimal. The local highest concentrations of dust in the atmosphere can be associated with dust from Beruniy Street, at Point 14 - with dust from the storage areas of slag from open-hearth production of UMK and, possibly, with the cement plant located in Tajikistan. The air content of dust in areas adjacent to UMK is 2-2.5 times higher than in areas located at a greater distance from the plant.
7. At Point (3 Dzhabarov Steeet, Bekabad), precipitation of suspended solids from atmospheric air is 20–25 times higher than at other points in Bekabad. Dust monitoring using the Zephyr sensor at Point 13 (the closest to Point 8) showed the highest content of suspended solids for all of the points in Bekabad. An analysis of air samples from this point showed that concentrations of suspended solids were below the measurement limit, which may be caused by local fluctuations at the time of sampling.

A comparison of the monitoring results using different techniques generates the following conclusions:

- Sulphur dioxide measurements taken with diffusion tubes showed an excess of the monthly average at Point 4 from 8 November 2021 to 7 December 2021 and at Point 13 from 8 November 2021 to 8 January 2022. Measurements using the Zephyr sensor performed at the same points 1.5-2 months later showed that sulphur oxide concentrations were below the detection limits of the sensor. It is obvious that there were sources of influence that caused an increased contamination of air sulphur dioxide during the period of monitoring with diffusion tubes in the areas near at Points 4 and 13. However, it is almost impossible to reliably identify these sources.

- A comparison of air content of dust (total suspended particles) between the Zephyr sensor and filter-based air sampling shows that dustiness inside Bekabad is higher than outside of the city and exceeds the daily average recommendations of the WHO. The activities of UMK are not the only source of dust: the highest pollution levels recorded with the air sampling technique were noted during wind directions that rule out the ingress of suspended solids from UMK.
- The highest content of suspended solids in atmospheric air was noted in Bekabad to the west and south-west of UMK.

The measurements taken in in the Bunyodkor enclave in Tajikistan using the Zephyr sensor (Point 14) showed the following:

- Atmospheric pollution does not exceed the permissible limits for all pollutants with the exception of PM 2.5, whose daily average concentration exceeds the WHO recommendations by 86%.
- Sampling of atmospheric air onto filters in Bunyodkor showed a significant (1.5 times) exceedance the one-time MPC of dust as established by Uzbek SanPiN 0239-11. During sampling, wind blew in the north-eastern direction, which makes it possible to associate the exceedance with the influx of dust from the open-hearth slag storage areas in Tajikistan and, possibly, with the influence of the cement plant, also located in Tajikistan.
- The content of nitrogen dioxide, nitrogen oxide, carbon monoxide and suspended particles (PM 1, PM 10 and PM 2.5) in the Bunyodkor enclave is on average lower than in Bekabad.
- The concentration of sulphur dioxide in the Bunyodkor enclave is higher than the average for Bekabad: the maximum content is 20% higher, and the average content is 60% higher.
- The content of polycyclic aromatic hydrocarbons in precipitation in the Bunyodkor enclave is significantly below the average for Bekabad, and the PAH content in atmospheric air is below the detection limit of the method.
- The content of metals (aluminium, beryllium, cadmium, chromium, copper, iron, manganese, nickel, lead, vanadium, zinc, mercury) in atmospheric air in Bunyodkor is below the threshold values: for any of the listed metals, the highest concentration in air does not exceed 0.06xMPC (for aluminium – as per Russian SanPiN 1.2.3685-21, for the rest - according to Uzbek SanPiN 0239-11).
- Relative to Bekabad, the concentration of metals in the air in Bunyodkor is in most cases slightly higher (x1.5–2.5) with the exception of chromium and vanadium, whose air content in Bunyodkor is 2.5-7.5 times below the average for Bekabad. Sampling for metals in atmospheric air was carried out simultaneously with sampling for total dust content, and took place during a north-eastern wind. Thus, the increased content of metals in atmospheric air in the Bunyodkor enclave in Tajikistan correlates with the increased dust content of air and is probably associated with the influx of dust from the open-hearth slag storage areas in Tajikistan and with the influence of the cement plant, also located in Tajikistan.
- The average content of metals in precipitation in Bunyodkor corresponds to the lowest concentration of these metals in precipitation in Bekabad. It can thus be concluded that the elevated content of metals in atmospheric air in Bunyodkor is not typical for this community.

The total amount of suspended solids precipitating from atmospheric air in Bunyodkor is 2.5–5 times higher than in the areas adjacent to the north-western border of UMK (a conditional baseline area), but is 4–8 times lower than in the areas south-east of UMK. This is consistent with the analysis of air samples for suspended solids, but contradicts the dust measurements taken using the Zephyr sensor, which indicated that the levels of suspended particles in atmospheric air in Bunyodkor were lower than in Bekabad. This contradiction can be explained by the short duration of Zephyr measurements in Bunyodkor, which failed to collect a representative amount of data on air dustiness.

6.10.2 Physical factors

6.10.2.1 *Noise*

In order to determine the background acoustic situation in the area of UMK, including the assessment of compliance of noise impact with hygienic standards in the residential area and to determine the requirements for noise protection measures in buildings and areas with the standardized level of noise impact, acoustic measurements were taken in the background studies, the results of which are summarized in the report 128-0948-BLS-Noise.

For research in the residential area of Bekabad town in the area of UMK 9 locations were selected (Figure 6.10.5).

Figure 6.10.5 - Schematic map of acoustic measurement points

Noise measurements were carried out in accordance with the GOST 23337-2014 "Noise. Methods of noise measurement in residential and public buildings".

Frequency of measurements in the daytime (from 7.00 am to 19.00 pm) - 6 times, in the night-time (from 23.00 pm to 07.00 pm) and in the evening (from 19 to 23.00 pm) - 6 times on weekdays and weekends.

As a result of measurements it was established:

1. Sound pressure levels do not comply with SanPiN RuZ 0267-09 "Sanitary norms and rules to ensure permissible noise in the premises of residential and public buildings and in residential areas" at locations Nos 1, 2, 3, 6. At the location No. 9 (on the border with Tajikistan), the noise level does not comply with SanPiN RuZ 0267-09 for the

territories immediately adjacent to residential buildings, but at this point, there are no territories with a rated quality of noise impact.

2. Sound pressure levels at measurement points Nos. 1, 2, 3, 6 do not meet international requirements:

- International Finance Corporation. The World Bank Group. Guidelines for Environmental Health and Labour Protection (EHS). General guidance on EHS: Environment. Noise level control. 1.7 Noise. 2007
- WHO recommendations on background noise in residential areas. World Health Organization. 1999

6.10.2.2 *Vibration and infrasound*

Vibration measurements are made in accordance with GOST R 53964-2010 "Vibration. Vibration measurements of structures".

The infrasound measurements were made in accordance with MI PKF-14-016 Methods of measurement of sound pressure levels in the infrasound frequency range at workplaces in production facilities and in the territory.

Infrasound levels were measured at 9 locations along the border of the residential area (Figure 6.10.5.). In all locations measurements were conducted during the day (from 7:00 am to 19:00 pm) - 6 times, at night (from 23:00 to 07:00) and in the evening (from 19:00 to 23:00) - also 6 times on weekdays and weekends.

4 locations (Figure 6.10.6) were selected for vibration measurements in the residential area of Bekabad in the UMK area.

Figure 6.10.6 - Schematic map of vibration measurement locations

As a result of measurements it was established:

1. The total level of infrasound and levels of infrasound pressure in the octave frequency bands do not exceed the maximum permissible levels established for the areas immediately adjacent to residential buildings.

2. The vibration levels in the octave frequency bands in the living room do not exceed the permissible values.

6.10.3 Surface water quality

In the course of background studies, double sampling of surface waters (the Syrdarya River, the Dalverzin Channel) was carried out in several river stations:

- 1 - Baseline station of the Syrdarya River;
- 2 - Control station of the Syrdarya River;
- 3 - Baseline station of the Dalverzin Channel (above the territory of the enterprise at the highway bridge in the area of checkpoint No. 2)
- 4 - Dalverzin Channel main-stream station (at the UMK site; the first channel station available for sampling in the area of the Industrial Zone barrier on the border with Tajikistan);
- 5 - UMK water intake from the Dalverzin Channel (bucket-sump).

Samples were taken in accordance with the surface water sampling methods approved in the Republic of Uzbekistan.

The surface water studies included the analysis of samples for the following indicators: temperature, pH, BOD, COD, dissolved oxygen, total hardness, alkalinity, phosphates, sulphates, chlorides, ammonium nitrogen, nitrates, nitrites, dry residue, iron, chromium, manganese, calcium, magnesium, suspended substances, cyanides, fluorides, total content of oil hydrocarbons (oil products), benz(a)pyrene, phenols total, suspended solids, and total salt content.

The results of the surface water studies are detailed in Report No. 128-0948-BLS-GW.

As a result of quantitative chemical study of surface waters the following peculiarities were revealed - exceeding the target indicator[7].

BOD – exceedance of the target was noted for the Dalverzin Channel (water intake of UMK).

Alkalinity - exceedance of the target value was detected in all samples.

Sulphates - exceedance of the target value was recorded in all samples during the second sampling and at the section of the Syrdarya River (Sample 1).

Nitrates (nitrate nitrogen) - exceedance of the target value was recorded for all gauges, except for the baseline gauge of the Syrdarya River in the first sampling.

Nitrites (nitrite nitrogen) - exceedance of the target value was observed for all sampling sites during the first sampling.

Magnesium - exceedance of the target was recorded for the baseline section of the Syrdarya River (Sample 1) and exceedance at all points during the second sampling (in some cases, the exceedance was above x2.5).

Total petroleum products - during the second sampling exceedance of the target value was observed in all sections, except for the samples from the Dalverzin Channel control section and the UMK water intake.

Total salt - insignificant exceeding of the target value was noted for the Dalverzin Channel control section.

[7] The lowest permissible concentration of the value depending on the category of water use (domestic-drinking, irrigation, cultural-domestic, fishery) was adopted as the target value, for details see Report No. 128-0948-BLS-GW.

Thus, an insignificant anthropogenic impact was detected for surface waters - the target indicator of petroleum products was exceeded.

Elevated concentrations of the other indicators are most likely due to natural factors.

Also, it is important to consider the impact of irrigation channels after the flushing of land: the Dalverzin channel is used for irrigation of agricultural land.

6.10.4 Groundwater quality

During baseline surveys in November 2021, two groundwater sampling was performed - Groundwater Outlets No. 2, No. 3 into the Dalverzin Channel, groundwater wells No. 19 and No. 47 at UMK JSC.

The groundwater studies to determine the level of their pollution included sampling of water from the drainage wells of UMK and their subsequent analysis according to the following indicators: pH, BOD, COD, total hardness, alkalinity, phosphates, sulphates, chlorides, ammonium nitrogen, nitrate nitrogen, nitrite nitrogen, dry residue, iron, chromium, manganese, calcium, magnesium, suspended solids, cyanides, fluorides, total petroleum hydrocarbons (oil products), phenols, total salinity, copper, surfactants, mercury, lead, nickel, vanadium, zinc, and benz(a)pyrene.

As a result of quantitative chemical study of ground (subsoil) water revealed the following features - exceeding the target parameter[8].

pH - exceeding of the target indicator was noted for samples of outlets No. 2 and 3 during the first and second sampling, as well as for well No. 19 during the second sampling.

Total hardness - exceeding the target value was noted for all samples in the second sampling. For the drain No. 3 - exceeding by more than 2 times.

Alkalinity - exceedance of the target value was noted for all samples in the first and second sampling.

Sulphates - exceedance of the target value was noted for the drain No. 2 of the well No. 19 during the first sampling, multiple exceedance for all samples during the second sampling.

Nitrates (nitrate nitrogen) - exceedance of the target value was reported for the outlets Nos 2, 3 during the first sampling.

Nitrites –nitrogen of nitrites) - multiple exceeding of the target indicator was noted for the outlets Nos 2, 3 in the first selection.

Calcium - there was a slight excess of the target in the drain No. 3 in the second sampling.

Magnesium - excess of the target parameter was detected for all samples in the second sampling.

Total salt content - insignificant exceeding of the target parameter was noted for the outlets Nos 2, 3, well No 19 in the second sampling.

Total petroleum hydrocarbons (oil products) content - exceeded the target parameter for the drain No. 3 in the first sampling and for the drain Nos 2, 3 in the second sampling.

Fluorides - multiple exceedances of the target parameter were detected for the outlets Nos 2, 3, well No. 19 in the first sampling and for the well No. 3 in the second sampling, as well as a slight exceedance for the well No. 47 in the second sampling.

[8] The lowest permissible concentration of the value depending on the category of water use (domestic-drinking, irrigation, cultural-domestic, fishery) was adopted as the target value, for details see Report No. 128-0948-BLS-GW.

Synthetic surfactants - exceeding the target parameter was seen in the first and second selection for the outlets Nos 2, 3.

Thus, technogenic impact has been revealed for underground (ground) waters – the targets of synthetic surfactants and petroleum products have been exceeded. Increased concentrations of other parameters are most likely associated with natural factors (fluorides, calcium, magnesium, alkalinity, pH, total salinity) and the impact of intensive agricultural production (nitrates, nitrites).

6.10.5 Quality of waste water of UMK

In the course of baseline studies, two samples of effluent from UMK were taken:

- inlet flow of storm water effluents at UMK treatment facilities (point 6);
- the output flow of industrial wastewater at the treatment facilities of UMK (point 6.1);
- the drain of sewage treatment plants of industrial wastewater of UMK (point 7).

Samples were taken in accordance with the surface water sampling methods approved in the Republic of Uzbekistan.

Wastewater samples were tested for the following parameters: pH, dissolved oxygen, total hardness, alkalinity, phosphates sulphates chlorides, ammonium nitrogen, nitrate nitrogen, nitrite nitrogen, dry residue of iron, chromium, manganese, calcium, magnesium, suspended substances, cyanides, fluorides, total petroleum hydrocarbons (oil products), phenols, total salinity, copper, and synthetic surfactants.

Detailed results of wastewater studies are presented in the Report No. 128-0948-BLS-GW.

As a result of a quantitative chemical study of wastewater, the following features were identified - exceeding the target value[9].

pH - exceeding the target value for all samples in the first and second samplings.

Total hardness - exceeding the target value was detected for all samples in the second sampling.

Alkalinity - exceeding the target value for all samples at the first sampling and less significant at the second sampling.

Sulphates - exceeding the target value for all samples during the second sampling.

Nitrates (nitrogen of nitrates) – exceeding the target value was detected for the outlets of sewage treatment plants during the first sampling.

Nitrites - exceeding the target value was detected in almost all samples during the first and second samplings.

Dry residue - insignificant exceeding of the target value was noted for all samples in the second sampling.

Magnesium - exceedance of the target value was observed for all samples during the second sampling.

Total petroleum product content - exceedance was detected for all samples taken.

[9] The lowest permissible concentration of the value depending on the category of water use (domestic-drinking, irrigation, cultural-domestic, fishery) was adopted as the target value, for details see Report No. 128-0948-BLS-GW.

Phenols - exceeding of the target value was detected for the effluent outlet of the industrial storm water treatment plant, the outlet from the treatment plant during the first sampling and for all samples during the second sampling.

Total salt content - insignificant exceeding of the target value was observed for all samples during the second sampling.

Synthetic surfactants - exceedance was detected in all samples during the first and second sampling.

Thus, technogenic impact was detected for wastewater - the target values of petroleum products, phenols, surfactants and surfactants were exceeded.

Increased concentrations of other indicators are most likely related to natural and anthropogenic factors of Dalverzin Channel source water.

6.10.6 Soils

Quantitative chemical analysis of soils and soil-forming rocks (soils) was performed to assess the potential impact of the planned activity on soils and grounds within the framework of baseline studies[10].

In total, 9 samples were taken from the upper genetic horizon of soils on 10*10 m sample plots. Assessment of the state of soils (grounds) was carried out taking into account the standards of the Republic of Uzbekistan, and the soil quality criteria given in the Soil Remediation Circular (2013).

Soil sampling was performed within the boundaries of the casting and rolling complex site (S-05), in areas where visible contamination was detected (S-03, S-04, S-06, S-07, S-08), and in areas without visible soil disturbance (S-01, S-09), as well as in the forestry areas in the vicinity of UMK (S-02).

Sampling was carried out on the basis of existing normative-technical documents, in accordance with the established standards and regulations of the relevant types of works.

Soil samples were tested in the radiological testing laboratory of the Institute of Nuclear Physics of the Academy of Sciences of the RUz, as well as in Gidrokhimlaboratory of State Unitary Enterprise Uzbekgidrogeologiya.

According to UzHydromet (Uzbek Hydrometeorological Service) (Investigations were conducted when updating the General Plan of Bekabad), given in the Report " Draft EIA for reconstruction and expansion of production facilities of Uzmetkombinat JSC with construction of casting and rolling complex" (2020), the content of mobile forms of metals in soil (soil) samples in the area of UMK is:

- lead - 3.08÷23.99 mg/kg;
- cadmium - 0.67-1.49 mg/kg;
- copper - 1.82-6.72 mg/kg;
- zinc - 1.0-30.48 mg/kg; and
- mercury – 0.001-0.017 mg/kg.

The gross arsenic content according to the same data varies from 3.96 to 13.49 mg/kg. It has been noted that the soils of the Central Asia as a whole are characterized by extremely high content of arsenic, which is not associated with anthropogenic factors, but reflects the natural geochemical features of the landscapes. The highest concentrations of

[10] For more information, see the Report No. 128-0948-BLS-GW.

mercury and arsenic are reported in the western direction from UMK. In general, an increased content of lead, copper and zinc is noted in the soils of the planned activity area, which, presumably, is associated with the long-term activities of UMK.

Almost all of the considered trace elements (metals and arsenic) can be present in the scrap supplied for processing to the mill. Some trace elements are found in trace amounts (e.g., cadmium, lead), and some are significant components of steels and alloys, as they are used in small quantities to improve their quality.

The results of soil and soil sampling showed that the content of almost all analysed trace elements and hydrocarbons (benz(a)pyrene and oil products) exceeds concentrations of conditionally background sites, and in most cases exceeds MAC established in RUz for mobile forms of metals (except for mercury) and gross forms of arsenic and mercury.

It is worth noting that soil quality parameters for mobile forms of metals are targeted at the assessment of contamination, forming the risks of translocation impacts (first of all the risks in the production of agricultural products used to feed the population).

From this perspective, and given the production purpose of the UMK industrial site, recommendations for intervention levels Soil Remediation Circular (2013), there are no restrictions for the CPC project related to soil contamination.

The high content of phenols at the industrial site of UMK in the area of the temporary storage site of waste of TIMS (components containing phenol (resins) are used in the production of TIMS (S-07) and the wagon cleaning site (S-08) is quite indicative.

The MAC for benz(a)pyrene and the reference level of petroleum products in soils and grounds were not exceeded at any of the sample sites, although their concentrations were higher than those observed at the background sites.

6.10.7 Radiological Assessment

To assess the risks associated with possible contamination of the territory of the casting and rolling complex with radionuclides,[11] studies of the radiation-ecological state of the casting and rolling complex site were conducted:

- gamma-ray surveying of the territory;
- measurement of the flux density of the isotope radon-222, Rn222 (PPR) from the ground surface;
- determination of radionuclide content in soil samples; and
- measurement of total alpha and beta radioactivity in a groundwater sample.

Gamma imaging of the casting and rolling complex site included measurement of equivalent dose rate of gamma and X-ray radiation, performed by measuring the equivalent dose rate at control points located 15 meters from each other.

EDR (gamma exposure rate) measurements on 150 control points using search radiometer-spectrometer MKS-A03 were performed.

To measure the radon-222 flux density (*RFD*) from the surface of the soil in the studied area a certified technique based on the passive sorbent method with subsequent measurement of intensity of gamma-radiation of radon-222 progeny (RP) - radionuclides Bi-214 and Pb-214 was used.

Carbon cassettes for adsorption of radon-222 were installed at 10 control points. Exposure duration was 3 hours.

[11] For more information, see the Report No. 128-0948-BLS-GW.

10 soil samples were taken at the CRC.

Results of radiation and environmental studies of the casting and rolling complex site:

- As a result of the gamma-ray survey of the zone, no anomalous zones were detected. The measured EDR values are within 0.09-0.11 μSv/h and are consistent with the baseline values.
- Measurement of the radon-222 flux density of the RP did not reveal the radon hazardousness of the territory. The measured values of the RP are significantly lower than the regulated value of RP - 250 mBq/(m2×s) according to clause 5.1.2 of OSPORB-2006..
- The measured values of radionuclides 40K, 226Ra, 232Th in soil samples are specific for this territory. Specific activity of other gamma-emitting radionuclides, including Cs-137, is below the sensitivity of the measuring equipment.
- Total alpha and beta activity of the groundwater sample is below the value regulated by p. 5.3.5 of SanPiN № 0193-06 (0.2 Bq/kg and 2 Bq/kg respectively).

As a result of radiological environmental studies of the territory of the casting and rolling complex no excess of permissible indicators was detected, no special measures to ensure radiation safety are required.

6.10.8 Waste management facilities

The problem of unauthorised landfills is very urgent for the Bekabad town. Many landfills are located along the banks of the Syrdarya River and channels, on vacant lots, sites of inactive enterprises.

The landfills are a source of unpleasant odours, there is a high risk of air pollution during the decomposition of waste and, especially, in the case of burning garbage. During the rainy season, atmospheric precipitation penetrates into the waste and forms contaminated streams, which are sources of secondary pollution of soil, surface and ground water.

The creation of the sustainable municipal waste management system is one of the most important tasks in Bekabad.

The problem is exacerbated by the fact that there are no waste disposal facilities (landfills) in the town and the region, which are arranged according to the requirements of environmental safety: availability of waterproofing, layered filling of waste with inert material, gas drainage and gas recovery systems, treatment of storm water and leachate, timely reclamation etc.

Thus, the disposal of any type of waste at the municipal facilities of Bekabad town does not essentially solve the problem of environmental pollution in waste management, but only changes the subject of potential liability.

Section 9.4 of Report No. 128-0948-ESIA-PE-3 discusses proposals for the organization for the waste disposal facility.

7 SOCIAL AND ECONOMIC ASPECTS

7.1 Republican and Regional Context

Uzbekistan is the most densely populated republic in Central Asia. Covering an area of 447,000 km^2, Uzbekistan is the only Central Asian republic that borders all four other states in this group.

Tashkent region borders in the north and northwest with Kazakhstan, in the northeast – with Kyrgyzstan, in the east – with Namangan region, in the south – with Tajikistan, in the southwest – with Syrdarya region.

The date of establishment of Tashkent Region is 15 January 1938. The administrative centre is the Nurafshon town.

Main industries: electric power, non-ferrous metallurgy, machine building, metal processing, fuel (oil and gas), chemical and gas-chemical, building materials, light and food industries. Main agricultural sectors: cotton growing, grain farming, meat and dairy cattle breeding, horticulture and viticulture, poultry farming and silkworm breeding.

The main branches of agriculture: cotton growing, grain farming, meat and dairy cattle breeding, horticulture and viticulture, poultry farming and silkworm breeding.

The region is divided into 15 administrative districts: Akkurgan, Akhangaran Bekabad, Bostanlyk, Buki, Chinaz, Kibray, Parkent, Piskent, Kuyi-Chirchik, Orta-Chirchik, Yangiyol, Tashkent, Yukori Chirchik and Zangiata.

The administrative division of the Tashkent region is shown in Table 7.1.1 and Figure 7.1.1.

Table 7.1.1 - Administrative areas of Tashkent region

Item	Name of the area	Administrative centre
1.	Bekabad district	Zafar
2.	Bostanlyk district	Gazalkent
3.	Bukinskiy district	Buka
4.	Chinazsky district	Chinaz
5.	Kibraisky	Kibray
6.	Akhangaran	Akhangaran
7.	Akkurgansky district	Akkurgan
8.	Parkentsky district	Parkent
9.	Piskentsky district	Pskent
10.	Kuyi-Chirchik district	Dustobad
11.	Orta-Chirchik district	Toytepa
12.	Yangielsky district	Gulbahor
13.	Yukori-Chirchik district	Yangibazar
14.	Zangiatinsky district	Eshanguzar
15.	Tashkent district	Keles

Source: https://stat.uz/ru

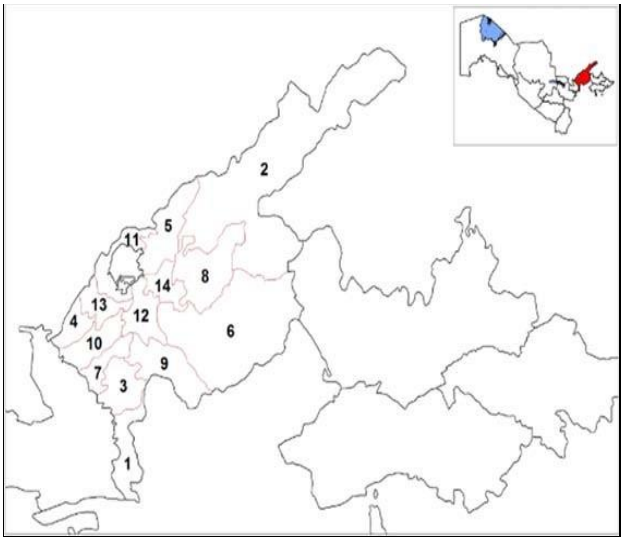

Figure 7.1.1 - Administrative areas of Tashkent region

Socio-economic figures of the Tashkent region are given in Table 7.1.2.

Table 7.1.2 - Social and economic figures for the Tashkent region Table

Description		Figures
Territory, km^2		15,250
Population		
Population density, pers./km^2		194.2
Total number of people		2,961,600
Women, pers.		1,477,100
Men, pers.		1,484,500
Urban population, pers.		1,454,900
Rural population, pers.		1,506,700
Educational institutions		
Primary schools		870
Secondary vocational institutions (colleges)		120
Academic lyceums		6
Higher Educational Institutions		2
Medical institutions		
Hospitals		81
Municipal clinics		9.9
Infrastructure, km		
Vehicles	Highways	3,965
	Railways	391
	An airport	Tashkent Airport

Source: https://stat.uz/ru

UMK JSC is located in Tashkent region, in the city of Bekabad, in the immediate vicinity of Tajikistan and Bekabad district.

Bekabad district covers an area of 760 km^2.

There are 81 settlements, 51 makhallas, 41.9 thousand families are located in the Bekabad district.

The district borders the Republic of Tajikistan, Syrdarya Region, the city of Bekabad and Bukinsk district of Tashkent region.

The area of Bekabad is 350 km^2.

As of 2021, there are 35 makhallas and 28,200 families in Bekabad.

7.2 Demographic Profile

As of January 2021, there are 34,558,900 people living in Uzbekistan. Since 2016, the country's population has increased by more than 9%, mainly due to natural increase, although the country has maintained a negative migration balance over the past 20 years.

Approximately 50.1% of the population lives in cities.

On average, a family in Uzbekistan consists of five people. The average age of residents of Uzbekistan is 27.8 years.[12] (Figure 7.2.1).

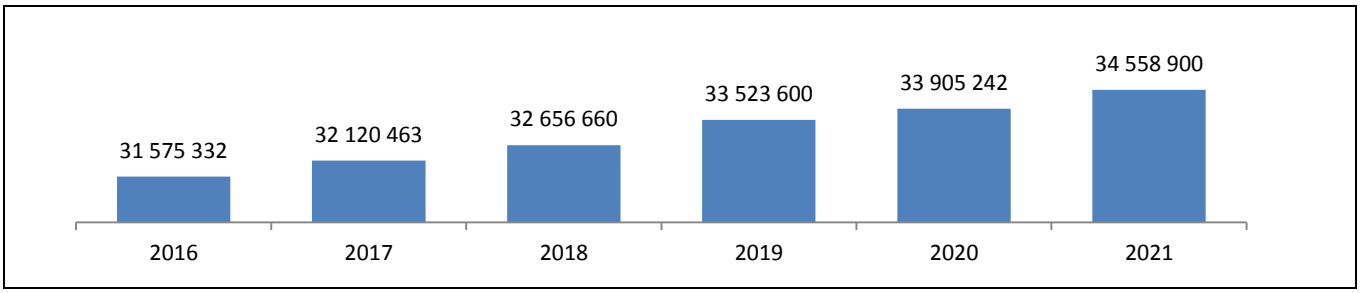

Figure 7.2.1 - The population of Uzbekistan as of the beginning of the year, persons.

Source: https://stat.uz/ru

There are 2,961,600 people in Tashkent province (early 2021), with 49% of the population living in urban areas.

According to available data, the population of the Bekabad district is 159,900 people.

The population in Bekabad is growing and in 2021 reached 96,900 people. Distribution of the number of permanent population of Bekabad city by main age groups is shown in Figure 7.2.2 - Permanent population of Bekabad by age groups, persons

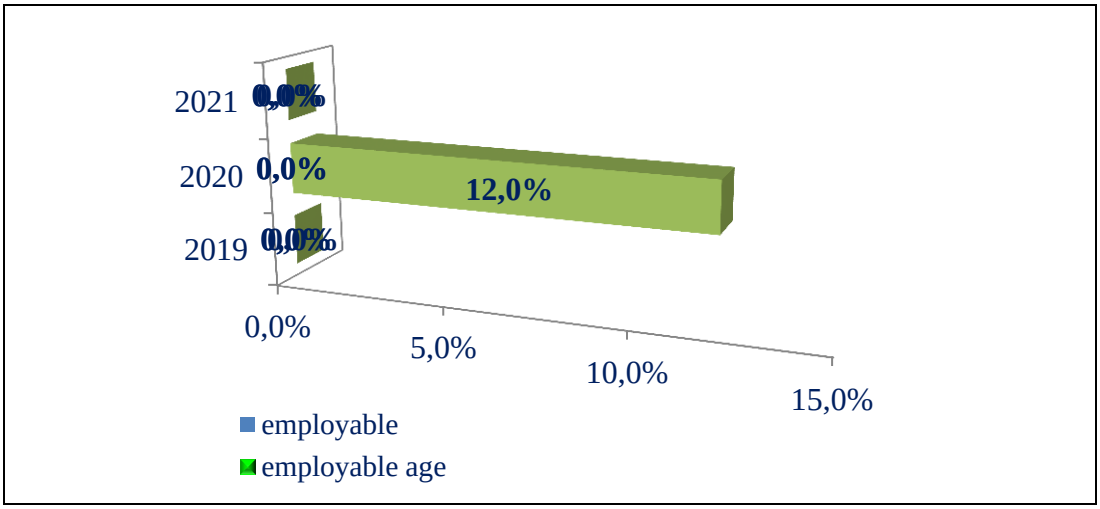

Figure 7.2.2 - Permanent population of Bekabad by age groups, persons (at the beginning of the year; in relation to the total number of the population, in %)

Source: https://stat.uz/ru

In 2020, according to https://countrymeters.info/ru, life expectancy in Uzbekistan was estimated at 72.5 years. According to this figure, the republic ranks 100th among 228 countries of the world. For comparison, Tajikistan ranks 113th in this rating (life expectancy is

[12] Reports of the State Committee of Statistics of the Republic of Uzbekistan.

70.8 years), and the UK is in 22nd place (81.4 years). Life expectancy in the Republic is 69.5 years for men and 75.7 years for women, 69.8 years for men and 75.1 years for women in Tashkent province and 70 years and 74.2 years for men and women in Bekabad.

Based on the above, life expectancy of women in Bekabad is lower than the national and regional level, life expectancy of men is slightly higher than the national and regional level.

The average age of the population of the city of Bekabad is shown in Figure 7.2.3.

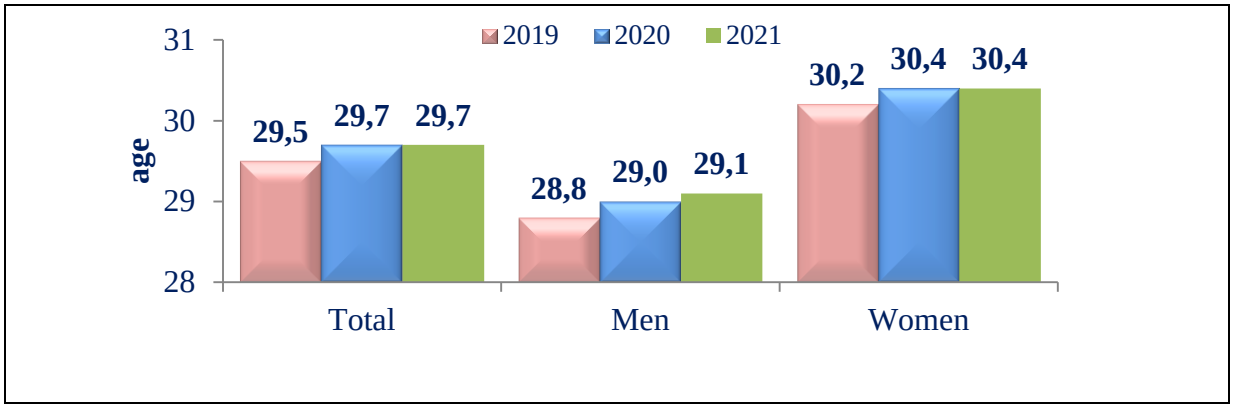

Figure 7.2.3 - Average age of the population of Bekabad (at the beginning of the year; years)

Source: https://stat.uz/ru

The average age of the population of Uzbekistan is 28.6 years, while the average age of male is 28 years, and female - 29.2. The figure above shows the average age of the population of Bekabad, which is on average one year higher than the population in the republic.

In 2020 and 2021, a stable population growth was observed in the Republic of Uzbekistan, it amounted to 1.93%, which is slightly more than the indicator for the Tashkent region (1.16%). The population growth in the town of Bekabad (1.13%) is slightly lower than in the Tashkent region and is one of the lowest in other regions of Uzbekistan.

Table 7.2.1 - Figures of natural movement of the population of Bekabad (per year; people)[13]

Figures	As of early 2019.		As of early 2020.		As of early 2021.	
	Quantity	per 1000 people .	Quantity	per 1000 people .	Quantity	per 1000 people .
Birth rate	3570	23,2	3775	24,2	3641	23,0
Mortality	735	4,8	777	5,0	817	5,2
Infant mortality* (aged under 1)	34	10,2	36	9,7	26	7,0
Natural growth	2835	18,4	2998	19,2	2824	17,8
Weddings	1436	9,3	1423	9,1	1572	9,9
Divorces	162	1,1	155	1,0	125	0.8

Over the period 2019-2021 the fertility rate for the Republic of Uzbekistan increased from 23.3‰ to 24.6‰, while the fertility rate for Tashkent region, being one of the lowest

[13] Reports of the State Committee of Statistics of the Republic of Uzbekistan.

among other regions (only Bukhara and Khorezm regions are lower) was 22.4‰ at the beginning of 2021.

The birth rate in Bekabad town is higher than that of Tashkent region, and showed a definite growth from 2019-2020. The birth rate in Bekabad town is higher than that in Tashkent region (23.2% and 24.2%), but decreased sharply at the beginning of 2021 to 23 ‰, showing a level below 2019.

Figure 7.2.4 - Birth rate in the town of Bekabad

Source: https://stat.uz/ru

Mortality rate in Uzbekistan rises from 4.7 ‰ to 5.1 ‰ in 2019-2021, while Tashkent region, the highest among other regions, has 6.2% by the beginning of 2021. The mortality rate in Bekabad town is much lower than in Tashkent region, despite a certain increase from 2018 to the beginning of 2021 (4.8% - 5.2%), demonstrates the mortality rate in Uzbekistan on average.

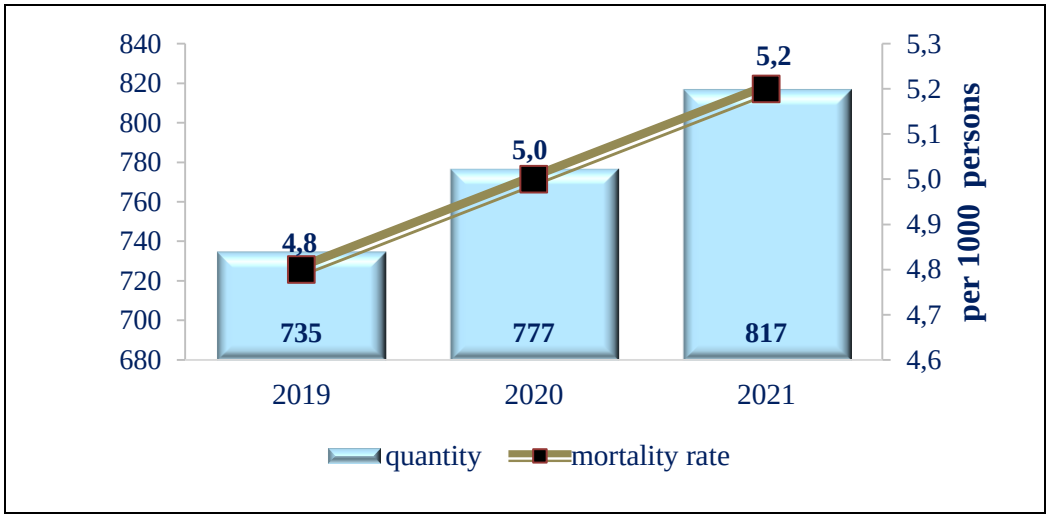

Figure 7.2.5 - Mortality rate in Bekabad town

Source: https://stat.uz/ru

In the zone of potential social impact of the project (see 128-0948-ESIA-PE-3, Section 8.2) there are the following makhallas (Figure 7.2.6), subject to potential direct and indirect impacts of planned activities:

- The Metallurg makhalla is located in 1000 m zone from the project area, the total area is 56 hectares, there are 779 households in this area. In total, 4,597 people live in this makhalla, including 2,310 women.
- Makhalla Mukimi is in 1000 m zone from the project area, the total area is 116,3 ha, there are 1065 households on this territory. In total, 5,782 people live in this makhalla, 3,450 of them are women.
- Saihun makhalla is located in 1000 m zone from the project area, the total area is 321 ha, 416 households are located in this area. In total in this makhalla there live 2251 people including 1084 women, this makhalla is in 4.5 km from Tajikistan.
- Makhalla Uzbekistan is in 1000 m zone from the project area, the total area is 45 hectares, there are 617 households on this territory. In total, 4,568 people live in this makhalla, including 2,291 women.
- Tarakkiyot makhalla is located in 1000 m zone from the project area, the total area is 130 ha, there are 520 households in this area. A total of 2525 people live in this makhalla, including 1332 women.

Total number of residents in the social impact zone of the project is 10 379 people including 5760 women (55.5%), and men 4,619 (44.5%). Youth and children under the age of 18 make up 2,760 people (26.59%) of the population of the project area.

Characteristics of the population of Uzbek enclaves in the Republic of Tajikistan are given in the section 7.12

Table 7.2.2 - The population of the project's social impact zone.[14]

Makhalla	Metallurg	Mukimiy	Sayhun	Uzbekistan	Tarakkiet	Total
Population, people	4597	5782	2251	4568	2525	19723
Households, ea.	779	1065	416	992	520	3772
Number of families, ea.	1047	1572	626	1457	716	5418
Women, pers.	2310	3450	1084	2291	1332	10467
Men, pers.	2287	2332	1167	2277	1193	9256
Women, %	50,25%	59,67%	48,16%	50,15%	52,75%	53,07%
Men, %	49,75%	40,33%	51,84%	49,85%	47,25%	46,93%
Children aged under 18, people	1112	1648	956	1621	841	6178
Children under 18, %	24,19%	28,50%	42,47%	35,49%	33,31%	31,32%

[14] According to the makhalla passports.

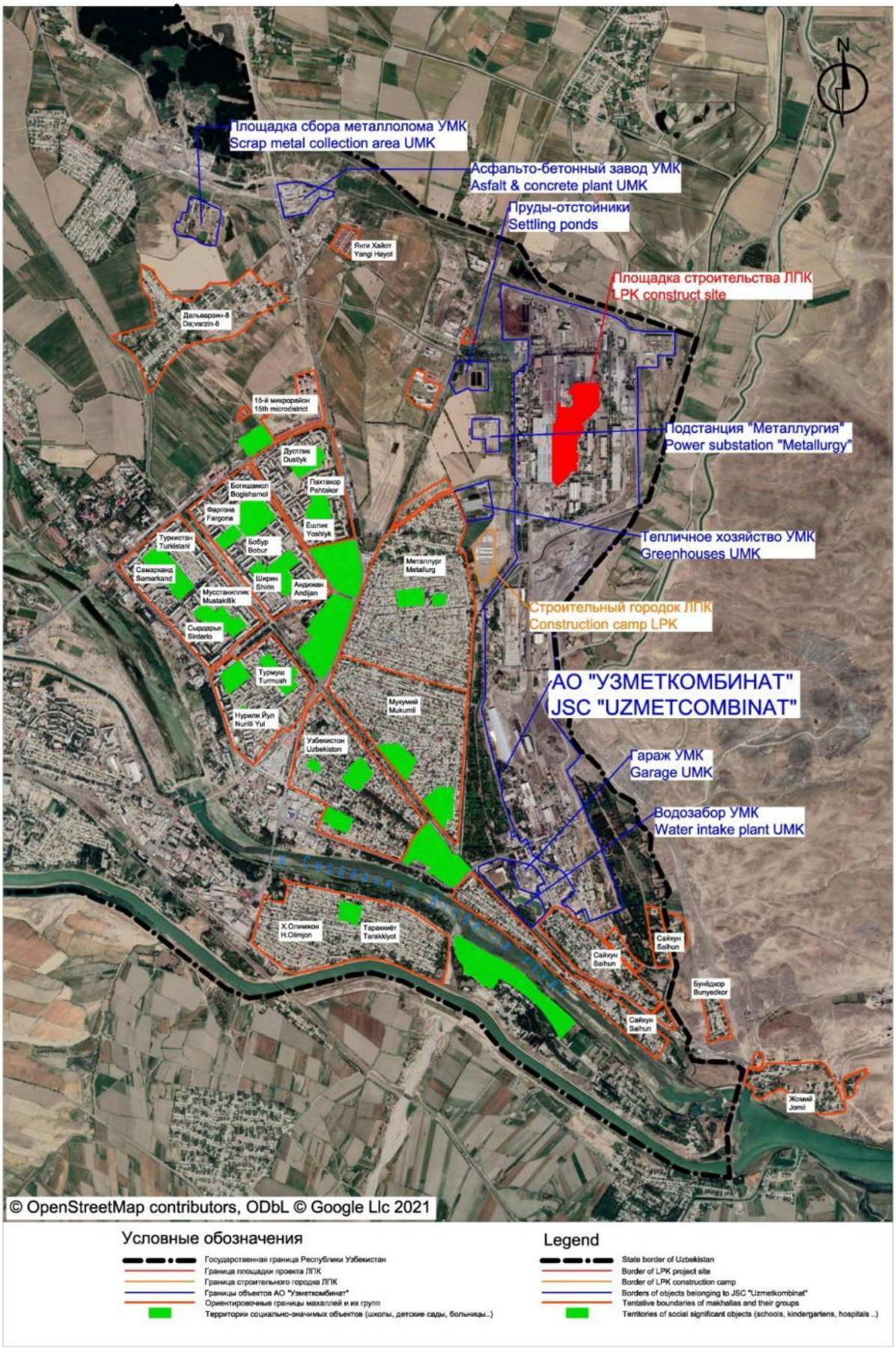

Figure 7.2.6 - Location of makhallas and other sensitive areas

7.3 Ethnicity, indigenous peoples, religion and language

The territory of Uzbekistan is traditionally inhabited by peoples of Turkic (Uzbeks, Kazakhs, Karakalpaks), Semitic (Bukhara Jews), and Iranian (Tajiks) origin, as well as representatives of other peoples who came here under the Russian Empire and the USSR (Russians, Crimean Tatars, Meshketian Turks, Koreans, and a small number of Ashkenazi Jews).

Uzbeks are the largest ethnic group in Uzbekistan. According to an updated official estimate published in 2017, the Uzbek population is just over 26.9 million (83.8% of the country's population) and the Tajik population is 1,544,700 (4.8%).

Between 1991 and 2017, the share of Uzbeks increased by 11% and reached 84%, while the share of Russians (by 5.4%), Kazakhs (by 1.6%), Tatars (by 1.4%), and Ukrainians (by 0.5%) decreased markedly as a result of emigration from these ethnic groups (Table 7.3.1).

Table 7.3.1 - Ethnic structure of the population of Uzbekistan, %

Ethnic group	1991	2017	Ethnic group	1991	2017
Uzbeks	72,8	83.8	Tatars	2,0	0,6
Karakalpaks	2,1	22.	Turkmens	0,6	0,6
Tajiks	4,8	4,8	Koreans	0.9	0,6
Kazakhs	4,1	2,5	Ukrainians	0.7	0,2
Russians	7,7	2,3	Other	3,4	1,5
Kyrgyz	0.9	0.9			

Source: https://stat.uz/en/open-data

The project area is dominated by the Uzbek population. According to the results of the study of documents, consultations and interviews, indigenous peoples or groups (i.e. Tajiks, Kyrgyz, Tatars, Turkmen) with collective attachment to a geographically defined habitat, traditional lands or ancestral territories in the project area, as well as to natural resources in this habitat and in such territories have not been identified.

The state language of the Republic of Uzbekistan is Uzbek. The second most important language is Russian, which is spoken by a significant part of the population and which is widely spoken in the country. In addition to Uzbek, which has the status of the official state language, several regions also use other languages. In the Autonomous Republic of Karakalpakstan, the second official language is Karakalpak.

Historically, Tajiks lived in the vicinity of the city of Bekabad due to the proximity of the Sughd region of Tajikistan. The native language of most of the city's population is Uzbek, but many also speak Tajik.

Consultations with representatives of local authorities in the area of planned activities (in makhallas) were conducted in Uzbek - the native language of the majority of representatives of affected population groups. The ethnic composition of Bekabad town is presented in Table 7.3.2.

Table 7.3.2 - The ethnic composition of Bekabad town

Description	2019	2020	2021
Uzbeks	72052	73695	74792
Tajiks	5973	6037	6112
Koreans	4988	4983	4903
Kazakhs	3476	3450	3475
Russians	1694	1629	1596
Tatars	1082	1011	1039

Description	2019	2020	2021
Other	5024	5028	4995

Source: https://stat.uz/ru

The main religions in Uzbekistan are Sunni Islam, Orthodoxy and Judaism. In the republic as a whole, the distribution of confessions is as follows: Muslims - 79% (mainly Sunni of Khanafi mazkhab; Shiite minority does not exceed 1% and is concentrated mainly in Bukhara and Samarkand regions), Orthodox - 4% (the share of Orthodox decreases, which is caused by emigration of Russians, Ukrainians, Belarusians, etc.). The share of other Christianity is 3% (Roman Catholics, Korean Christians, Baptists, Lutherans, Seventh-day Adventists, Evangelical Christians and Pentecostals, Jehovah's Witnesses), as well as Buddhists, Baha'is, Krishnaists, and atheists.

In the context of the definitions of IFC PS-7, the existing minority groups are assimilated and do not have any socio-economic or political characteristics that would distinguish them from the dominant groups living in the territory of the project.

In this regard, the IFC PS-7 requirements for indigenous peoples are inapplicable to the project and are excluded from further evaluation.

7.4 Public Health and Healthcare System

Uzbekistan has 1,205 hospitals (as of 2020), including 575 private clinics (approximately 5% of the total). Since 2018, 40 new hospitals have been opened. There are 153,400 hospital beds, including 18,700 hospital beds (about 12%) in private clinics. On average, there are 45.2 hospital beds per 10,000 inhabitants, which is less than in Russia or Kazakhstan.

There are 535 polyclinics in the Tashkent region, the number of hospitals in the Tashkent region is 85 units.

There are 23 polyclinics in Bekabad district, the number of polyclinics decreased by 8 compared to 2017, despite the growth of the district population. There are 6 polyclinics and 4 hospitals in the town of Bekabad (Table 7.4.1).

As of the beginning of 2021, the degree of availability of hospitals (per 10 thousand people) in Bekabad city on the basis of 96 thousand people was 62.5%, while the availability of outpatient polyclinics is higher than the index of availability.

Table 7.4.1 - Existing health care facilities in Bekabad district and Bekabad town

Description	2018	2019	2020
Bekabad district			
Number of polyclinics and outpatient facilities	22	22	23
Hospitals (clinics, hospitals, medical centres, and other inpatient facilities)	1	1	1
Of these, rural medical centres	6	6	6
Bekabad town			
Number of polyclinics and outpatient facilities	15	15	13
Hospitals (clinics, hospitals, medical centres, and other inpatient facilities)	5	5	6

Source: https://stat.uz/ru

The general morbidity rate of the population of Bekabad for the period 2019-2021 tended to increase by an average of 6% (Table 7.4.2).

Table 7.4.2 - Classification of main diseases of the population in Bekabad town

Description	2019	2020	at the beginning of 2021
Total diseases	63445	63968	67993
Some infectious and parasitic infections	2588	2507	2442
Newly formed tumours	138	171	115
Diseases of the endocrine system, digestion, metabolic disorders	1364	1034	612
Blood and hematopoietic organ diseases and some disorders affecting the immune mechanism	13520	10510	6791
Psychological and mental disorders	58	124	127
Nervous system disorders	1341	2069	1633
Eye and vision disorders	3574	2205	4250
Ear and nasopharyngeal diseases	1996	1921	1853
Circulatory system diseases	732	2348	2218
Respiratory diseases	19106	18602	14543
Digestive system disorders	11566	12155	29145
Diseases of the urinary and reproductive system	3304	3992	3606
Complications of pregnancy, childbirth, and postpartum complications	890	573	3583
Skin and cutaneous skin diseases	589	1097	1336
Diseases of the motor system and connective tissue	1092	1607	2097
Congenital anomalies, deformities and chromosomal abnormalities	39	13	19
Complications related to an external cause, injury and poisoning	1409	2830	4628

Source: https://stat.uz/ru

In the general morbidity structure of the urban population, the diseases of digestive organs hold the leading place (43% of the total number of cases), diseases of respiratory organs come second (21% of the total number of cases), blood and blood forming organs diseases come third (16%). Then come injuries and poisonings (6.8%), diseases of the eye and its appendages (6.25%), diseases of the urogenital system (5.30%), complications of pregnancy, childbirth and postnatal complications (5.2%). Endocrine system diseases, mental and conduct disorders, skin and subcutaneous tissue diseases and neoplasms account for 6.3% of the total. Congenital anomalies (less than 1%), neoplasms (less than 1%), mental and behavioural disorders (less than 1%) account for the smallest share in the morbidity structure.

The health of the population is in a certain relationship with the state of the environment. Environment-induced classes of diseases represent one of the most important criteria for assessing the quality of the environment, an indicator of its favourability for human life activity.

When we analyse the morbidity it is necessary to use both the indicator of general morbidity and indicators of morbidity by separate classes of diseases of ICD-10 WHO[15].

Environment-induced classes of diseases can particularly clearly indicate the impact of the environment on the health of the population. The blood-forming, cardiovascular,

[15] http://who-fic.ru/icd/

central nervous, genitourinary and respiratory systems are the most sensitive to the effects of environmental factors.

Based on the data submitted, the classes of diseases (respiratory diseases 21% and diseases of blood and hemopoietic organs 16%) are more strongly manifested in the area of the proposed activity, in one way or another associated with environmental conditions, in particular, the level of atmospheric air pollution and the way of life of the population.

7.5 Education

In Uzbekistan, education includes four main levels (Table 7.5.1):

(i) general education training,
(ii) professional education,
(iii) additional education
(iv) professional development.

Table 7.5.1 - The education system in Uzbekistan

General education training	Professional education	Additional education	Professional development
Preschool education (children aged 3-7)	Secondary vocational education (colleges and technical schools)	Additional education for children and adults	Vocational training is intended for people of all ages to develop professional competencies necessary to perform specific work (job) functions, including the operation of specific equipment, technology, hardware and software and other professional tools. Such training is aimed at the development of certain skills of a worker or employee (in accordance with the requirements for a certain grade, class, category) without changing the general educational qualification.
Primary general education (1-4th academic year) - compulsory	Higher education (Bachelor's degree)	Additional professional education	
Basic general education (5-9th academic year) - compulsory	Higher education (Master's degree)		
Secondary general education (9-11th academic year)			

Source: https://stat.uz/ru

There are 10,130 schools (as of school year 2021-2022) teaching in the following languages: 8,227 in Uzbek, 88 in Russian, 143 in Kazakh, 245 in Karakalpak, 92 in Tajik, 21 in Kyrgyz, and 23 in Turkmen. In total, 7,408 schools operate in rural areas. A total of 7,408 schools operate in rural areas.

There are 688 pre-school institutions in Tashkent province, 35 in Bekabad district, and 32 in Bekabad (Table 7.5.2).

Despite the fact that the population of Bekabad district is 60 thousand more than the population of Bekabad city, the number of preschool institutions is almost the same. Meanwhile, the number of children in 32 kindergartens in Bekabad is almost double the number of children in 35 kindergartens in Bekabad district, which determines the shortage of places and overcrowding of pre-school institutions in Bekabad town.

Table 7.5.2 - Pre-school education of the Bekabad district and Bekabad town

District/city	2018	2019	2020
Bekabad district Number of pre-school education institutions	29	29	35
Number of children in pre-school institutions, pers.	2521	2700	2805
Number of seats	3070	2660	2806

District/city	2018	2019	2020
Bekabad town Number of pre-school education institutions, pers.	25	26	32
Number of children in pre-school institutions, pers.	4309	4672	4651

Source: https://stat.uz/ru

There are 894 schools in Tashkent province, 59 in Bekabad district, and 20 in Bekabad town. Meanwhile, the average number of students in schools in Bekabad town is almost twice as high as the average number of schools in Bekabad district. The average occupancy rate of one school in Bekabad is 912 students, which shows an insufficient number of schools in the city and overcrowded classes (an average of 40 students per class) (Table 7.5.3).

Table 7.5.3 - Secondary education of the Bekabad district and the city of Bekabad

District/city	2018/2019 academic year	2019/2020 academic year	2020/2021 academic year
Bekabad district Number of schools in total	57	58	59
Number of students, pers.	26938	28284	29051
Bekabad town Number of schools in total	18	20	20
Number of students, pers.	17153	18293	18251

Source: https://stat.uz/ru

There are 16 vocational colleges in Tashkent Region, 1 in Bekabad district and 1 in Bekabad town ("Bekabad Industrial College"). Since 2019, the total number of colleges in the region has decreased from 121 to 16 due to the education reform associated with the introduction of 11-year secondary education (Table 7.5.4).

Due to the fact that there are many industrial facilities in Bekabad, most of the young people have specialized technical education received at the Bekabad Industrial College, which is confirmed by the participants of the focus groups: Out of 41 participants, 15 have a college diploma and 17 have graduated from university. Furthermore, the unemployment rate among young people in the town is high.

Table 7.5.4 - Vocational and technical education of the Bekabad district and in Bekabad town

District/city	Unit of measurement	2018/2019 academic year	2019/2020 academic year	2020/2021 academic year
Bekabad district Number of vocational colleges	Unit	7	5	1
Number of students	Person	2113	811	132
Bekabad town Number of vocational colleges	Unit	6	6	1
Number of students	Person	3181	1607	238

Source: https://stat.uz/ru

7.6 Labour Force and Employment

According to the official World Bank data, the gross domestic product (GDP) of Uzbekistan in 2019 was $57.92 billion, which corresponds to 0.05% of the world economy.

The working-age population of Uzbekistan is 56% (as of the end of 2020). About 66% of this number is actually employed in the country's economy. 1,336,500 people of working age live in the Tashkent region, 89% of whom are currently employed.

The official unemployment rate in Uzbekistan is 10.5% (at the beginning of 2020), almost double that of 2016. Similar figures are reported by the Tashkent regional khokimiyat: 10.5% of residents of the region, and in Bekabad town - 10.8% (6,600 people) have the status of the unemployed in 2021, which is higher than the level of the region and the country as a whole.

The dynamics of official unemployment in the republic as a whole and in the Tashkent region shows an increase in this parameter since 2017. More recently, the decline in employment can likely be attributed to the COVID-19 pandemic crisis - at the end of 2020, the unemployment rate among the working-age population was 10.6% (Figure 7.6.1)

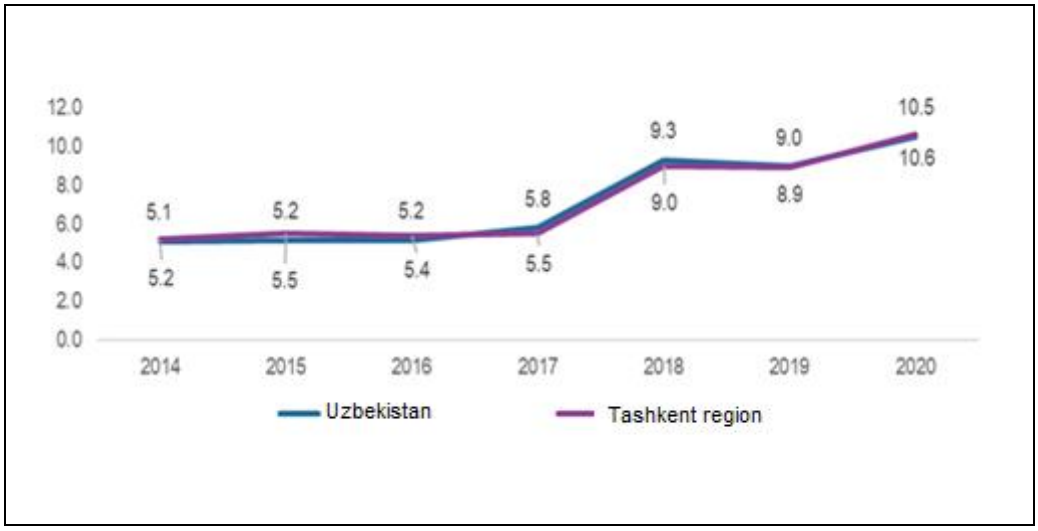

Figure 7.6.1 - Dynamics of unemployment in Uzbekistan and in the project implementation region, %

https://stat.uz/en/open-data

It should be noted that the actual level of unemployment, especially in rural areas, may differ from the official statistics, since not all local residents register with employment agencies. Thus, the real unemployment rate is most likely higher. There may also be cases of part-time employment, where citizens work part-time but would prefer full-time employment and are able to work full-time.

Before the pandemic (in March 2020), the average nominal wage in Tashkent region was 2,865,160 Uzbek sums. The average nominal monthly wage at the district level - Bekabad town - is lower than the average, and decreased by 1% (1,976,600 soms) compared to 2020.

According to the statistical data of Bekabad district, the economically active population is 61.7 thousand people, including employed population - 55.1 thousand people, the number of unemployed - 6.6 thousand people (Table 7.6.1).

Based on statistical data, the unemployment rate considered for 2019-2021 decreased from 12.8 to 10.8%. Representatives of local communities claim that the number of unemployed is increasing every year, the unemployed do not register at the labour exchange, as the jobs offered are low-paying and the unemployed prefer "gray" work in the markets or go to work in other regions.

Table 7.6.1 - Employment of the population of Bekabad (people

Figures	2019	2020	2021
Working age population	61834	62241	62864
including women	32180	32401	32723
Population below working age	26007	26204	26485
including women	12304	12381	12470
Population above working age	7202	7320	7563
including women	4122	4106	4202
Human resources	54245	53871	55888
Employment rate, %	87,2	87,8	89,7
Gainfully employed population	45401	45408	45996
Employment rate, %	87,2	87,8	89,7
Unemployment rate, %	12.8	12,2	10,8

Source: https://stat.uz/en/open-data

The distribution of the employed population by type of economic activity has not changed significantly over the period from 2019 to 2021. Such activities as industry, education, health care and social services gradually increased the employment of workers throughout the marked period and were the most in demand in the city (Table 7.6.2).

The estimated number of migrant workers increased by 13% over the period, including female migrant workers. The smallest number of the population is engaged in agriculture, although the increase over the period was 30%; makhalla residents began to rent fields and engage in seasonal agricultural work.

Table 7.6.2 - Labour market: Sectoral structure of employment in Bekabad town

Employment by type of activity (people)	2019	2020	2021
Agriculture, forestry and fishing	37	41	48
Industry	12480	12721	13154
Construction	602	666	776
Trading	764	812	902
Transportation and storage	301	332	388
Education	1864	1921	2029
Health and social services	1856	1892	2072
Public catering	404	438	473
Other activities	732	766	821
Estimated number of migrant workers	7091	7121	8472
including women	2860	2928	3218

Source: https://stat.uz/en/open-data

During consultations, representatives of makhallas reported a high level of unemployment among the local population, especially among women and young people. Young people, despite having specialized education, have little chance to earn an independent income or get a qualified job.

The main source of income of local residents of the surveyed communities is work at the enterprises of the city, trade at local markets, as well as work in the municipal services of the city. In the meantime a significant part of the able-bodied population has a desire to get a job at the Uzmetkombinat JSC, due to a fairly high level of wages, the availability of social package, etc.

Many counselling participants wait for employment and have periodic interviews for three to five years.

Women are engaged in sewing shops, medical facilities, pre-schools, or trading at bazaars. Men are also engaged in construction sphere.

Official data show that the rates of labour migration in the surveyed makhallas are quite high, and interviews with local residents show that one person from each family, mostly young men, usually go abroad to work.

Directions of labour migration - Tashkent, Russian Federation, and Kazakhstan. Since men now form the majority of migrant workers, women are forced to cope with the responsibilities of head of household.

Taking into account all sources of income, the monthly income of households averages 2.5-5 million soms per month. Families with an income of more than 5,000,000 sum are considered wealthy, while a minimum income is 1,200,000 sum.

Among the main sources of income of residents of settlements is the income, usually of one or two members of the family from work in manufacturing, in state organizations, in the form of wages (kindergartens, schools, medical and obstetric centres, etc.).

Remittances from migrant workers are an important source of income for many families. Regarding the pattern of household expenditures, it can be concluded from interviews with residents that the main expenses go for food, utilities, education, and ritual expenses (weddings, funerals, etc.).

7.7 Status and Use of Land

The casting and rolling complex project is implemented at UMK JSC, no additional land acquisition is required.

Project related facilities new access road 1.2 km and power transmission line 23 km are located in Bekabad district, Tashkent region, Bayaut district and Shirin town in Syrdarya region.

The construction of the casting and rolling complex infrastructure (associated facilities) has led to economic displacement of land users, the surveys found that compensation payments were mostly made.

At the stage of basic social research, consultations with local farmers' associations and khokimiyats of Bekabad and Bayaut districts, as well as in-depth interviews with affected farmers were conducted.

Consultations were held to obtain information about the owners and land plots allocated (on a permanent and temporary basis) and separately for each farm (the amount of payments, verification of estimated and applied national legislative procedures and IFC PS-5).

In particular, the exact number of affected farms has been determined.

The total number of sites affected by power line and road projects is 38, of which 3 sites are assigned to enterprises and organizations, 2 sites are reserved lands of khokimiyats, and 2 sites are located in the SPZ of the plant. The rest of the land – 31 plots - belonged to farms.

The assessment of impacts associated with the acquisition of rights to land and economic displacement, according to SR-5, included a social audit of the associated facilities: the construction of a 23 km power line and a new access road 1.2 km.

For more information, see 128-0948-ESIA-PE-3 in Section 10.

7.8 Access to Public and Social Services

According to the national statistics for 2021, 87.6% of households in rural areas of Uzbekistan have access to drinking water services at the basic level. The vast majority of rural settlements (90%) do not have sewage systems (Table 7.8.1).

Table 7.8.1 - Proportion of Uzbekistan's population with access to safe drinking water

Category	2016	2017	2018	2019	2020
Households receiving basic drinking water supply services, urban settlements	93,9	94,1	91,1	91,4	92,8
Households receiving basic drinking water supply services, rural settlements	83,2	80,4	81,2	81,2	81.9
Households receiving basic drinking water supply services	88,8	87,6	86,4	86,6	87,6
Households with access to safe drinking water, urban settlements (% of households in cities)	99,8	99,1	98,8	99,1	98,8
Households with access to safe drinking water, rural settlements (% of households in rural settlements)	96,1	97,2	96,7	98,0	98,7
Households with access to safe drinking water (% of households)	98,0	98,2	97,8	98,6	98,7

Source: https://stat.uz/

In Tashkent province, more than 74% of households in rural settlements have access to drinking water supply services, in Bekabad city 91.8% of households are connected to drinking water supply services. All settlements of the region are connected to the power supply network (Table 7.8.2).

Table 7.8.2 - Proportion of households in Bekabad with access to infrastructure

Description	2019	2020	2021[16]
People using safe drinking water services (% of the population)	100	100	100
Number of households (houses) connected to the centralized water supply system, units.	21206	21295	21366
The number of households connected to the centralized water disposal (sewerage) system, units.	16081	16108	16144
The number of households connected to the centralized power supply system, units.	22753	23232	23576
The number of households connected to the centralized gas supply system, units.	23031	23160	23363

Source: https://stat.uz/

Based on official data, a total of 23,576 households were registered in Bekabad at the beginning of 2021, 100% connected to the centralized electricity system, 99% of households were supplied with gas centrally. 90% of households are connected to the centralized water supply system, the rest use water from wells. The sewage system is much worse, with only 68% of households connected to it.

Households in Bekabad town in the project area are provided with centralized utilities to varying degrees.

[16] According to the official statistics According to a survey of the population, more than half of the respondents answered that they use imported water for drinking purposes, not trusting the quality of drinking water.

According to information received during the consultations with representatives of the makhallas, the settlements are fully gasified and connected to the electricity grid, but local residents complain about power outages, and despite the centralized water supply, they use imported drinking water and also do not have a centralized sewage system.

Social facilities of the project impact area are presented in the table below. Uzbekistan makhalla is the most developed in the social sphere, in addition to the market, kindergarten and school, it also has two polyclinics, which is not available in any of the makhallas. Also, Uzbekistan makhalla has 16 pharmacies and 313 stores, while there are no pharmacies in other makhallas, and the number of stores varies from 3 to 8 (Table 7.8.3).

Table 7.8.3 - Social facilities of the territory of the planned activity[17]

Description	Metallurg	Mukimiy	Sayhun	Uzbekistan	Tarakkiet	Total
Kindergartens	1	1	0	1	1	4
Colleges	0	0	0	0	0	0
Schools	1	1	1	1	1	5
High education facilities	0	0	0	0	0	0
Polyclinics	0	0	0	2	0	2
Pharmacies	0	0	0	16	0	16
Stores	8	6	3	313	4	334
Restaurants	0	1	1	2	0	4
Catering	0	0	0	12	1	13
Open-air Market	0	0	0	1	0	1
Children'S/sports playground	0	1	0	3	1	5
Beauty Studios	0	0	0	0	0	0
Training Centres	0	1	0	4	0	5
Mosques	0	1	0	0	1	2
Recreation Centres	0	0	0	1	1	2
Industrial enterprises	0	0	3	0	0	3
Cemeteries	0	0	0	0	0	0

Characteristics of the social infrastructure of Uzbek enclaves in the Republic of Tajikistan are given in section 7.12

7.9 Transport Infrastructure

The main route from Tashkent to Bekabad city is R-20 route with the length of 167.7 km.

In 2020 in Bekabad district and Bekabad city all types of road transport carried 3,793.0 thousand tons, which is more than the same period last year, the growth dynamics was 51.0%. Its share in the region was 1.7%. Its share in the region was 1.7%.

Cargo turnover in the region by road transport in 2020 was 52.4 million tons-km, which growth dynamics compared to the same period last year reached 72.6%. Its share in the region was 3.2%

In 2020, 23621.2 thousand passengers were transported by all motor vehicles in the district, which is 87.1% more than in the same period last year.

[17] According to the makhalla passports.

Passenger turnover in the district by all types of road transport in 2020 amounted to 915.7 million passengers/km, the growth dynamics of which reached 89.3% compared to the same period of the previous year. Its share in the region was 6.0%.

The traffic flow on the R-20 highway, the section before the entrance to Bekabad town, near the turn to UMK is quite intense and almost continuous, 6-15 vehicles per minute on a weekday (based on 30 minute observations in the morning, afternoon and evening hours on a weekday and weekend). Traffic intensity data is presented in the table below (Table 7.9.1).

Table 7.9.1 - Traffic intensity on the R-20 Highway

Description	Weekday			Weekend		
	09.00am till 09.30am	16.45pm till 17.15pm	from 20.00pm up to 20.30pm	9.00am up to 9.30am	16.45pm up to 17.15pm	from 20.00pm up to 20.30pm
Passenger cars	455	429	315	308	214	110
Trucks	26	34	10	5	4	3
Total	481	463	325	313	218	113

The Khavast-Kokand railway line passes through Bekabad. Numerous channels, roads, and railroads divide the city into isolated neighbourhoods. The railroad is the main way for the combine to deliver metal scrap (the main production raw materials), as well as to export finished products.

The number of stations of the railway workshop is 4: "Shirin", "Zavodskaya", "Prokatnaya" and "Severnaya".

The length of the approach lines is 69.8 km, with 194 sets of switches.

During the initial consultations, based on the complaints of the population of the project area, it was determined that there are 5 unregulated railway crossings along the entire length of the railway track in Bekabad town, which causes accidents and accidents at the crossings, as well as a significant source of noise.

The throughput capacity of the receiving-departure tracks of Zavodskaya station, with 5 receiving-departure tracks, does not allow to process the expected volume of car flows in the amount of 289 cars after the launch of the casting and rolling complex. Accordingly, a decision is required from the mill to increase the capacity, install barriers at unregulated crossings, as well as move the railway tracks out of the city, according to the decisions of the General Plan of Bekabad.

7.10 Gender Aspects

There is no legislation on gender equality in Uzbekistan, although recent national reforms have improved economic opportunities for women.

In February 2019, the president of Uzbekistan signed a decree aimed at "radically improving support for women and strengthening the institution of the family." The law criticizes the current situation with women's rights and their participation in the affairs of the country. Moreover, in recent years the issues of gender equality have been raised to the level of state policy, 25 legislative acts have been adopted, the share of women in political parties has reached 44%, in higher education - 40%, in entrepreneurship - 35%, women are widely involved in information and communication, innovation, energy and engineering spheres.

The Women's Affairs Committee of Uzbekistan, established in 1991, cooperates with political parties representing women's interests, provides support and assistance to women in various social spheres, such as health, education, culture, sports, etc. It also establishes adaptation centres, holds seminars, workshops and trainings for women who want to start

their own business, offers them consulting services, and organizes exhibitions and fairs. The Women's Affairs Committee is also engaged in legislative activities, developing gender laws aimed at improving the status of women in society.

In 2013, together with the Women's Affairs Committee of Uzbekistan, the website of the State Statistics Committee was developed (www.gender.stat.uz). The website contains information in three languages: Uzbek, Russian and English to provide users with gender-sensitive information in areas such as population, health, labour, social security, etc. However, a mechanism for the regular collection of gender statistics has not yet been established.

National employment statistics show (Figure 7.10.1)) that women employed in industry and agriculture in Uzbekistan account for approximately 44% of the total employment and only 6% of the total employment in the construction sector. The same ratio is maintained in the area of the planned activity.

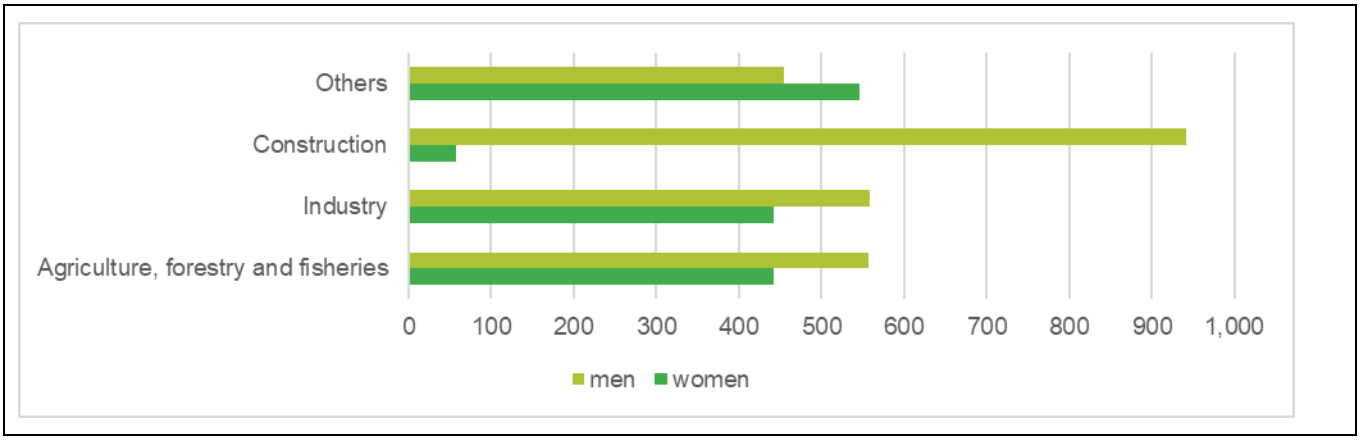

Figure 7.10.1 - Employment broken by sector and gender, 2020 Figure

Source: https://gender.stat.uz/en/

Following the results of focus group research, out of the total number of respondents, 41 people, 5 makhallas of the social impact zone were formed. 5 makhallas of the social impact zone, a focus group of women of the project area (13 women) was formed.

Almost 90% of the women surveyed do not work because there are no employment opportunities, most of them trade at the market or do home-based work. In the meantime, many have diplomas from colleges and even institutes.

To the question of what jobs are available in the region for women, 21 respondents answered that there are no jobs at all, 5 responded that there is an opportunity to get a job as a teacher in pre-school institutions, with appropriate education, and 10 people answered that you can get a job in a sewing shop, but the job is tied to orders, which is not always stable.

7.11 Vulnerable groups of the population

Vulnerable groups include families without breadwinners, women, heads of households and victims of gender imbalance, single elderly people (pensioners and war veterans), the disabled, the unemployed, including unemployed young people and women, poor and dysfunctional families.

Vulnerable populations living in nearby makhallas are likely to be highly affected by the Project as they are more likely to be affected by the Project and/or be more limited than others in their ability to benefit from the Project due to their social status (Table 7.11.1).

Table 7.11.1 - Vulnerable groups of the population of the makhallas of the project territory [18].

Description	Metallurg	Mukimiy	Sayhun	Uzbekistan	Tarakkiet	Total	Percentage (%) of the total number [19] of families/residents of the makhallas
Number of families without breadwinners, units.	11	17	4	18	20	70	1,29%
Number of single mothers/fathers, pers.	1	7	2	14	6	30	0,15%
Lonely elderly people, pers.	0	4	0	3	2	9	0,05%
Number of large families, ea.	15	25	18	24	22	104	1,92%
Number of poor families, ea.	0	0	0	0	6	6	0,11%
Number of recipients of financial assistance, ea.	1	7	0	0	5	13	0,07%
Number of recipients of disability benefits, ea.	104	59	36	45	38	282	1,43%

Social research estimates that the female population is about 10,467, including 5,464 women of working age.

There are 5,418 families in total in 5 makhallas (Table 7.11.1). Living conditions in the makhallas are assessed at a fairly high level, given that almost all households have access to water, electricity and gas supply.

Families who have lost a breadwinner are considered dysfunctional households experiencing difficulties in maintaining their income due to the loss of household members involved in economic activity.

The available data indicate a small number of such families, only 70 families, which is only 1.29% of the families of all makhallas. There are also 104 large families registered in the makhallas, 6 families have the status of poor and receive an appropriate allowance.

7.12 Location and proximity to borders

The facilities of the casting and rolling complex are located on the site of UMK, the boundaries of the mill actually coincide with the state border of Uzbekistan, beyond which is the Sughd region of Tajikistan, the administrative centre of which is Khujand, 33 km east of Bekabad.

An important fact is the presence of two Uzbek enclaves, the Jami and Bunyodkor makhallas in Tajikistan, not far from the cement factory (Figure 7.2.6)

The territory of Bunyodkor makhalla is 32 hectares, Jami - 20 hectares and they are located 700 and 2000 meters from the state border.

[18] According to the makhalla passports.

[19] The total number of families is 5418, the total number of inhabitants is 19723 people (5 makhallas).

Table 7.12.1 - Population of enclaves of Uzbekistan in the Republic of Tajikistan [20]

Makhalla	Bunyodkor	Jami	Total
Population	960	1190	2150
Households	148	127	275
Families	172	210	382
Women	478	598	1076
Men	482	592	1074
Women, %	49,79%	50,25%	50,05%
Men, %	50,21%	49,75%	49,95%
Children aged under 18, people	272	378	650
Children under 18, %	28,33%	31,76%	30,23%

The ethnic composition of Bunyodkor makhalla are Uzbeks (827 people), Tajiks (126), and there are also six Russians and one Kyrgyz.

The ethnic composition of Jami makhalla is Uzbeks (1,110 people), Tajiks (75), and there are also four Russians and one Kyrgyz.

There is one cemetery and a sports ground within the Bunyodkor makhalla, there are no pharmacies, stores, hospitals, schools and kindergartens.

There are two shops and one school within the Jami makhalla, there are no pharmacies, hospitals, kindergartens, pharmacies.

Provision of social facilities is defined as low, given the limitations associated with the location in another state, there are difficulties in access to health services, the provision of medicines and products.

During the initial project consultations, the population of the makhallas in the project area voiced many complaints about the impact of the cement plant In Tajikistan. The magnitude of the impact is due to the strong seasonal winds from Tajikistan between October and April.

Besides, the administration of Bekabad town submitted the official information confirming the complaints of the population about air pollution from the cement plant (sent to the State Committee of Ecology of the Republic of Uzbekistan).

7.13 Cultural Heritage

In Bekabad district, there are 23 archaeological monuments and one architectural monument registered in the state registry. There is only one archaeological monument in Bayaut district, Syrdarya region - Qurghontepa1.

The most significant and closest to the project area cultural heritage site is Kyzyl Mazar (Uzbek Qizil mozor) - a mausoleum (mazar), one of the largest architectural monuments of the Tashkent region(Figure 7.13.1).

Located in the Babur Settlement (formerly Takachi) of Bekabad district, 3 km northwest of Bekabad town and at a distance of 1.2 km from the new power line.

The monument is a single-domed almost square structure made of burnt brick. It is surrounded by a large existing cemetery on all sides. The mausoleum of Kyzyl mazar has many uncertainties, for example, it has not yet been exactly established for whom it was built. It is interesting that folk tradition associates its construction with the name of Babur (i.e. the

[20] According to the makhalla passports.

first half of the 16th century), who erected it, according to one version, in memory of the dead Indian princess, according to another - in honour of his friend and military leader, who died here in battle with the Indian army (Table 7.4.2).

Figure 7.13.1 - Kyzyl Mazar Mausoleum

A request was sent to the Cultural Heritage Agency of Tashkent region for data on significant cultural and archaeological heritage sites located near the 23 km power line under construction (passes through the two main districts of Bekabad, Tashkent region and Bayaut, Syrdarya region) and the constructed 1.2 km road from UMK to the R20 Highway.

The Agency reported that the tower of power transmission line No. 24 is located in the protected area of the Uchtepa archaeological monument dating back to 12^{th}-14^{th} centuries, which is registered in the national list of immovable cultural heritage sites within the Khos makhalla, Bekabad district.

Visual inspection of the monument and the protected area was carried out as part of a joint field visit by specialists from UMK and the Cultural Heritage Agency of the Tashkent region.

According to the results of the survey, it was found that the installation of the power line support had no impact on the monument itself, and a letter with the Agency's instructions on further actions of UMK regarding this archaeological monument is currently being prepared.

Since the site for the casting and rolling complex is located on the developed industrial territory of UMK, the impact on the archaeological and cultural heritage at this site is not considered.

The 1.2 km road was built and put into operation without affecting the monuments of architectural and cultural heritage.

Based on the above, it is appropriate to include a Chance Find Procedure in the Environmental and Social Management Plan.