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CONSTRUCTION OF THE CASTING AND ROLLING COMPLEX

Environmental and Social Impact Assessment

Final Report

Book 3

128-0948-ESIA-PE-3

2023

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8 PLANNED ACTIVITY'S AREA OF INFLUENCE

According to the definition given in IFC Performance Standard 1, the area of influence (impact zone) is the area, which is likely to be affected by:

- the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;
- impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or
- indirect project impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods are dependent.

The area of influence of the CRC project includes territories, which will be directly and indirectly affected by the primary facilities of the project and its infrastructure, as well as UMK's facilities, which are used in the implementation of the planned activity.

The area of influence of the CRC project on the environment includes (Appendix 8.1.1):

- UMK's industrial site, including land plots, intended for construction of CRC's facilities;
- area of discharge of treated industrial wastewater of UMK to the Syrdarya river[1];
- UMK's area of permissible influence on ambient air taking into account the proposed development;
- Municipal territories bordering UMK (Makhallas) including municipal territories located within UMK's sanitary protection zone;
- acoustic discomfort area (residual impact[2]), including the acoustic impact area of the access railway to the Zavodskaya station;
- areas where the public health risk, caused by the air chemical pollution, takes minimum values (the individual carcinogenic risk does not exceed 1.0E-06, the hazard quotients (HQ) of substances do not exceed 0.1, the hazard indices (HI) of exposure of organs/systems are less than 1.0);
- the right-of-way of associated facilities (motor roads, power transmission lines) and related areas of chemical and acoustic pollution of the air;

The area of social influence of the project includes territories associated with directly and/or indirectly affected communities, which may be affected by the facilities of the CRC project, its infrastructure facilities, as well as UMK's facilities used in the implementation of the planned activity.

The inset on the figure in Appendix 8.1.1 shows UMK's air impact zone. The zone is defined by a cumulative isoline of concentrations equivalent to 0.05xMPC of all pollutants (taking into account the implementation of emission reduction activities), beyond which the impact of UMK (with the operational CRC) becomes negligible.

The area of social influence of the CRC project includes (Appendix 8.1.2):

[1] The location of the industrial and storm water outlet of UMK is given in the graphical Appendix 9.5.1. It is proposed not to discuss the domestic wastewater outlet of Bekabad's municipal sewerage as the share of UMK's wastewater in total flow of municipal sewerage is minor.

[2] After the implementation of the noise control measures, it is equivalent to SPZ.

- UMK's industrial site, including land plots, intended for construction of CRC's facilities (contractor's camp);
- municipal areas (makhallas) adjacent to the plant, within the boundaries of UMK's SPZ[3];
- the area of indirect influence of the project includes the entire town of Bekabad, the Bekabad and Bayaut districts of the Tashkent and Syrdarya regions.
- the right-of-way of associated facilities (motor road, power transmission lines) and related farm lands;

The basic recipients include components of the social environment: personnel, population, infrastructure and socioeconomic factors (living conditions of the population, including employment, demographic shifts, social infrastructure, ethnic characteristics, etc.).

[3] The state border with the Republic of Tajikistan and the town of Bekabad does not limit the area of indirect influence of the CRC project and also includes two enclaves of Uzbekistan within the Republic of Tajikistan (Bunyodkor and Jami makhallas, see 128-0948-ESAI-PE-2, Section 7.12).

9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 Air quality impact

The impact of the proposed activity on ambient air was computed using software adopted nationally (Ecologist) and internationally (US EPA AERMOD).

The use of computational forecasting of chemical pollution of ambient air is deemed a reasonable and the only possible solution given that the use of direct measurements of air pollution depends on numerous factors, mainly including operating patterns of industrial facilities, and given the absence of reasonable alternatives to modelling of chemical air pollution from the proposed activities[4].

Computational methods are also preferable as they employ a conservative approach to projecting air quality, i.e. they take into account the simultaneous impact of air pollution sources of potentially worst combinations of meteorological factors.

9.1.1 Assessment method

To assess the level of air chemical pollution, the quality standards, established by the hygienic standards in SanPiN of the Republic of Uzbekistan No. 0293-11, were used [2].

When developing measures, necessary to prevent, mitigate and/or compensate for the adverse impact on the air, the requirements of the IFC industry practices were used. Production facilities of UMK and CRC are subject to the General EHS Guidelines, and Industry Sector EHS Guidelines for Integrated Steel Mills [5], Lime Manufacturing [6] and Thermal Power Plants [7].

The EHS Guidelines propose efficiency levels and parameters that are generally deemed achievable at greenfield facilities with modern technologies and at a reasonable cost. Application of the EHS Guidelines to existing facilities may require a development of special targets for each individual facilities and an achievement timeline.

The air emission levels given in the EHS Guidelines meet good international practice and should be achieved (without dilution) at least 95% of the time that the plant or unit is operating, to be calculated as a proportion of annual operating hours. These standards are achievable under normal operations for facilities designed and operated on the basis of pollution prevention and abatement methods.

Appendix 9.1.16 assesses emissions from UMK and CRC against requirements of IFC [5, 6, 7]. Following this comparison, recommendations were given for some of UMK's existing facilities for the achievement of IFC emission standards. The full list of these measures is given in Item 9.1.5.1.

Emissions (concentration of pollutants at the outlet of sources) of CRC are IFC-compliant.

A pollutants dispersion simulation was made using the unified programme for calculation of air pollution (UPCAP) "Ecologist", version 4.60 (Integral LLC, Russian Federation).

The programme enables to calculate the patterns of maximum one-time concentrations of pollutants, corresponding to a combination of unfavourable meteorological

[4] The results of monitoring of current chemical contamination of ambient air at UMK are given in Report 128-0948-BLS-Air. Also see Section 6.10.1 of Report 128-0948-ESIA-PE-2.

conditions, and average concentrations of pollutants in the air, corresponding to a long averaging time, in particular, annual average concentrations.

Also, when assessing the level of air pollution, quotas for the permissible content of pollutants in the ground layer of the air, determined for UMK's location in accordance with the requirements of [3], were taken into consideration.

To assess the public health risk, caused by the air chemical pollution at the operation stage of CRC, the pollutants dispersion simulation was made using US EPA AERMOD model and the initial data provided by Trinity Consultants (U.S.) (see Section 9.1.4).

9.1.2 Construction stage

Sources of pollutant emissions at the construction stage of CRC will be construction machines and vehicles:

- welding and painting works;
- ready-mix station;
- earthmovers (bulldozers, excavators);
- mounting equipment (truck cranes, crawler cranes);
- construction machines and vehicles, forklifts.

The sources associated with construction emit 327,826 tonnes of pollutants of 18 names into the air per year. The emission capacity will be 12.040 g/s.

The calculations were made on the site of 4,200 x 7,000 m, covering the territory of the plant's sanitary protection zone and the nearest residential development area in Bekabad. The grid spacing for the site was assumed to be equal to 100 m. Additionally, 19 reference points were selected in the residential areas of Bekabad, the height of which corresponds to the level of respiration: 2 m.

The calculations of air pollution were made taking into account the existing sources of emissions of UMK (Appendix 9.1.15). The calculation results are given in the table (Table 9.1.1).

The assessment of air pollution at the construction stage shows that there are no excess of the maximum permissible concentrations, in the Republic of Uzbekistan [2], in the residential areas of Bekabad.

Table 9.1.1 Air pollution levels at the construction stage

Pollutant		Type of MPC	Value of MPC (RSIL) mg/m^3	Hazard class	Maximum concentration on housing, shares of MPC
0123	Iron oxide	MPCot MPCda MPCaa	0.200 0.120 0.040	3	0.09
0143	Manganese and its compounds (in terms of manganese (IV) oxide)	MPCot MPCda MPCaa	0.005 0.003 0.001	2	0.18
0301	Nitrogen dioxide (nitrogen peroxide)	MPCot MPCda MPCaa	0.085 0.060 0.040	2	0.89
0304	Nitrogen (II) oxide (nitrogen monoxide)	MPCot MPCda MPCaa	0.600 0.250 0.060	3	0.03

Pollutant		Type of MPC	Value of MPC (RSIL) mg/m^3	Hazard class	Maximum concentration on housing, shares of MPC
0328	Carbon (black pigment)	MPCot MPCda MPCaa	0.150 0.100 0.050	3	0.1
0330	Sulphur dioxide	MPCot MPCda MPCaa	0.500 0.200 0.050	3	0.06
0333	Dihydrosulphide (sulphurous hydrogen, dihydrosulphide, hydrosulphide)	MPCot MPCda MPCaa	0.008 -- --	2	0.01
0337	Carbonous oxide (carbon monoxide; sweetdamp)	MPCot MPCda MPCaa	5.000 4.000 3.000	4	0.04
0616	Dimethylbenzene (mixture of o-, m-, p-isomers) (methyltoluene)	MPCot MPCda MPCaa	0.200 -- --	3	0.12
0703	Benzo(a)pyrene	MPCot MPCda MPCaa	1,00e-06 1,00e-06 1,00e-06	1	0.09
1325	Formaldehyde (formic aldehyde, oxomethane, methylene oxide)	MPCot MPCda MPCaa	0,035 0,012 0,003	2	<0.01
2704	Petrol (low-sulphur petroleum petrol) (in terms of carbon)	MPCot MPCda MPCaa	5.000 3.000 1.500	4	0.06
2732	Kerosene (direct distilled kerosene; deodorised kerosene)	RSIL	1.200		0.03
2752	Mineral spirit	RSIL	1.000		0.02
2754	Alkanes C12-C19 (in terms of C)	MPCot MPCda MPCaa	1.000 -- --	4	0.11
2902	Suspended particles	MPCot MPCda MPCaa	0.500 0.350 0.150	3	0.13
2907	Non-organic dust, >70% SiO2	MPCot MPCda MPCaa	0.150 0.100 0.050	3	0.14
2908	Non-organic dust, 70-20% SiO2	MPCot MPCda MPCaa	0.300 0.200 0.100	3	0.51

The impact on the air during the construction period is characterised by a short duration, in doing this, the area of excess pollution is localised outside the residential development. Thus, the impact on the air during the construction period is allowable.

9.1.3 Operation stage

Currently, the basic industrial sources of air pollution at UMK are:

- Section Rolling Shop No. 1;
- Electric Steelmaking Shop;
- Section Rolling Shop No. 2;

- Electrical Repair Shop;
- Casting and Mechanical Shop;
- Mechanical Repair Shop;
- Consumer Goods Shop;
- Energy Shop;
- Works Central Laboratory;
- Acids Warehouse;
- Fuel and Lubricants Warehouse;
- Oxygen Compressor Shop;
- Railway Shop;
- Instrumentation and Automation Service;
- Procurement Division;
- Motor Transport Shop;
- Steel Wire Shop;
- Slag Dump Processing Shop;
- Non-Ferrous Metal Production Shop;
- Thermal Insulation Materials Shop;
- Ferroalloys Shop;
- Area Development and Landscaping Shop;
- Construction and Installation Department;
- Steel Structures Shop.

According to the Draft Environmental Standards for Maximum Permissible Emissions of Pollutants into the Air of UMK (2020), taking into consideration the measures to reduce emissions of pollutants for the future (Appendix 9.1.5), the emission of pollutants into the air from the sources of emissions of the existing facilities includes 55 names.

The total emission of pollutants will be:

- maximum one-time emissions – 128.680457 g/s;
- gross emissions – 2,732.479497 t/y.

The list of pollutants, entering the air from the sources of the existing facilities at UMK, is given in Appendix 9.1.6.

The new Casting and Rolling Complex is expected to be located on UMK's site and will include an Electric Steelmaking Production Plant; a Scrap Yard; Ferroalloys, Additives and Hot-Briquetted Iron Warehouses; a Continuous Casting Department; a Hot-Rolled Strip Production Plant; Equipment Repair and Maintenance Areas; and a Roll Grinding Workshop.

According to the Draft Environmental Impact Statement for Restructuring and Expansion of the Production Facilities of UMK with the Construction of the Casting and Rolling Complex (2020), taking into consideration the requirements for the design solutions of CRC (Appendix 9.1.5), 18 pollutants are planned to be emitted into the air from the sources of emissions of proposed CRC. The total emission of pollutants will be:

- maximum one-time emissions – 93.428050 g/s;
- gross emissions – 2,402.917083 t/y.

The list of pollutants, entering the air from the sources of CRC is given in Appendix 9.1.7.

The total emission of 55 pollutants from 309 sources of emissions from UMK's production areas and CRC will amount to 5,135.396579 t/y with the emission rate of 222.108507 g/s.

The list of pollutants, entering the air from the sources of UMK's existing facilities and CRC, is given in Appendix 9.1.8.

The layout of the sources of emissions into the air is given in Appendix 9.1.1.

The calculations of the air pollution were made on the site of 4,200 x 7,000 m, covering the territory of the plant's sanitary protection area and the nearest residential development area in Bekabad. The grid spacing for the site was assumed to be equal to 100 m. Additionally, 32 reference points were selected along the perimeter of SPZ, the height of which corresponds to the breathing layer: 2 m.

To account for the contribution of proposed CRC into the air pollution, the calculations were performed both for the current situation (maximum one-time concentrations - Appendix 9.1.9, annual average concentrations - Appendix 9.1.10, daily average concentrations - Appendix 9.1.11) and for the future, taking into account the commissioning of CRC's facilities (maximum one-time concentrations - Appendix 9.1.12, annual average concentrations - Appendix 9.1.13, daily average concentrations - Appendix 9.1.14). The calculation results are given in the table (Table 9.1.2).

Taking into consideration the implementation of the measures to reduce emissions of pollutants from UMK's existing sources and the suggestions for the CRC project (Appendix 9.1.5), the maximum concentrations of pollutants at the boundary of SPZ and the residential areas will not exceed the established [2] standards for the air quality, taking into account the requirements [3] for the allowable content of pollutants in the ground layer of the air.

As the calculations show, the commissioning of proposed CRC will not lead to a significant (more than 0.1 MPC) increase in air pollution within the areas adjacent to UMK.

The area of allowable impact of UMK on the air quality, taking into account the prospects for development of the works and the cumulative impact based on the quotas[5] established for the works is shown in the layout in Appendix 9.1.2.

The pollution area of 1.0 MPC is localised within the boundaries of UMK's industrial site (Appendix 9.1.3).

[5] The quotas are allowable contributions to ground concentrations, adopted by the authorised body of the Republic of Uzbekistan and representing the potential impact of other sources of emissions in such a way that the total cumulative impact does not exceed the allowable levels of air pollution [3].

Table 9.1.2 Air pollution levels at the operation stage

Name of pollutant		MPC or RSIL, mg/m^3		Hazard class	Established quota (in shares of MPC)	Maximum concentration in shares of MPC		Compliance with the established quota (+/-)
						Before commissioning of CRC	After commissioning of CRC	
0101	Dialuminium trioxide (in terms of aluminium)	MPCda	0.01	2	0.2	<0.01	Unchanged	+
		MPCaa	0.005			<0.01	Unchanged	+
0123	Iron oxide	MPCot	0.2	3	0.25	0.08	0.09	+
		MPCda	0.12			<0.01	0.02	+
		MPCaa	0.04			<0.01	<0.01	+
0128	Calcium oxide (calcium lime)	RSIL	0.3	3	0.25	0.2	0.2	+
0143	Manganese and its compounds (in terms of manganese (IV) oxide)	MPCot	0.005	2	0.2	0.1	0.1	+
		MPCda	0.003			0.01	0.03	+
		MPCaa	0.001			0.01	0.01	+
0146	Cupric oxide (in terms of copper) (copper oxide; black copper)	MPCot	0.01	2	0.2	0.04	Unchanged	+
		MPCda	0.006			<0.01	Unchanged	+
		MPCaa	0.002			<0.01	Unchanged	+
0155	Sodium carbonate	MPCot	0.15	3	0.25	<0.01	Unchanged	+
		MPCda	0.05			<0.01	Unchanged	+
0163	Nickel and its compounds	MPCot	0.005	2	0.2	0.08	Unchanged	+
		MPCda	0.003			0.01	Unchanged	+
		MPCaa	0.001			<0.01	Unchanged	+
0168	Tin (II) oxide	MPCda	0.02	3	0.25	<0.01	Unchanged	+
0184	Lead and its compounds	MPCot	0.0015	1	0.17	0.08	Unchanged	+
		MPCda	0.001			<0.01	Unchanged	+
		MPCaa	0.0003			<0.01	Unchanged	+
0203	Chromium (in terms of chromium (VI) oxide)	MPCot	0.0075	1	0.17	<0.01	Unchanged	+
		MPCda	0.0045			<0.01	Unchanged	+
		MPCaa	0.0015			<0.01	Unchanged	+
0207	Zinc oxide (in terms of zinc)	MPCot	0.25	3	0.25	<0.01	Unchanged	+
		MPCda	0.15			<0.01	Unchanged	+
		MPCaa	0.05			<0.01	Unchanged	+
0301	Nitrogen dioxide (nitrogen peroxide)	MPCot	0.085	2	0.2	0.18	0.19	+
		MPCda	0.06			0.01	0.05	+
		MPCaa	0.04			0.01	0.01	+

Name of pollutant		MPC or RSIL, mg/m^3		Hazard class	Established quota (in shares of MPC)	Maximum concentration in shares of MPC		Compliance with the established quota (+/-)
						Before commissioning of CRC	After commissioning of CRC	
0302	Nitric acid (based on the HNO3 molecule)	MPCot	0.4	3	0.25	<0.01	Unchanged	+
		MPCda	0.3			<0.01	Unchanged	+
		MPCaa	0.15			<0.01	Unchanged	+
0304	Nitrogen (II) oxide (nitrogen monoxide)	MPCot	0.6	3	0.25	0.02	0.02	+
		MPCda	0.25			<0.01	0.01	+
		MPCaa	0.06			<0.01	<0.01	+
0316	Hydrochloride (based on the HCl molecule) (hydrogen chloride)	MPCot	0.2	2	0.2	<0.01	Unchanged	+
0317	Prussic acid	MPCot	0.03	2	0.2	0.01	0.02	+
		MPCda	0.02			<0.01	<0.01	+
		MPCaa	0.01			<0.01	<0.01	+
0322	Sulphuric acid (based on the H2SO4 molecule)	MPCot	0.3	2	0.2	0.02	Unchanged	+
		MPCda	0.2			0.01	Unchanged	+
		MPCaa	0.1			<0.01	Unchanged	+
0328	Carbon (black pigment)	MPCot	0.15	3	0.25	<0.01	0.01	+
		MPCda	0.1			<0.01	<0.01	+
		MPCaa	0.05			<0.01	<0.01	+
0330	Sulphur dioxide	MPCot	0.5	3	0.25	0.06	0.06	+
		MPCda	0.2			<0.01	0.01	+
		MPCaa	0.05			<0.01	<0.01	+
0333	Dihydrosulphide (sulphurous hydrogen, dihydrosulphide, hydrosulphide)	MPCot	0.008	2	0.2	0.01	Unchanged	+
0337	Carbonous oxide (carbon monoxide; sweetdamp)	MPCot	5	4	0.33	0.03	0.03	+
		MPCda	4			<0.01	0.01	+
		MPCaa	3			<0.01	<0.01	+
0342	Gaseous fluorides	MPCot	0.012	2	0.2	0.07	0.07	+
		MPCda	0.008			<0.01	0.01	+
		MPCaa	0.0025			<0.01	<0.01	+
0343	Highly soluble fluorides	MPCot	0.015	2	0.2	<0.01	Unchanged	+
		MPCda	0.01			<0.01	Unchanged	+
		MPCaa	0.005			<0.01	Unchanged	+

Name of pollutant		MPC or RSIL, mg/m^3		Hazard class	Established quota (in shares of MPC)	Maximum concentration in shares of MPC		Compliance with the established quota (+/-)
						Before commissioning of CRC	After commissioning of CRC	
0344	Poorly soluble fluorides	MPCot	0.1	2	0.2	0.01	0.01	+
		MPCda	0.05			<0.01	<0.01	+
		MPCaa	0.015			<0.01	<0.01	+
0616	Dimethylbenzene (mixture of o-, m-, p-isomers) (methyltoluene)	MPCot	0.2	3	0.25	0.12	Unchanged	+
0621	Methylbenzene (phenylmethane)	MPCot	0.6	3	0.25	<0.01	Unchanged	+
0703	Benzo(a)pyrene	MPCot	1.00E-06	1	0.17	0.02	0.02	+
		MPCda	1.00E-06			<0.01	<0.01	+
		MPCaa	1.00E-06			<0.01	<0.01	+
1042	Butane-1-ol (butyl alcohol)	MPCot	0.1	3	0.25	0.01	Unchanged	+
1061	Ethanol (ethyl alcohol; aethanolum)	MPCot	5	4	0.33	<0.01	Unchanged	+
1071	Hydroxybenzene	MPCot	0.01	1	0.17	0.07	Unchanged	+
		MPCda	0.007			0.02	Unchanged	+
		MPCaa	0.003			<0.01	Unchanged	+
1119	Ethyl ether of ethylene glycol	RSIL	0.700	3	0.25	<0.01	Unchanged	+
1210	Butyl acetate (butyl ether of acetic acid)	MPCot	0.1	4	0.33	<0.01	Unchanged	+
1401	Propane-2-on (dimethyl ketone; dimethylformaldehyde)	MPCot	0.35	4	0.33	<0.01	Unchanged	+
1555	Ethanoic acid (methanecarboxylic acid)	MPCot	0.2	3	0.25	0.04	Unchanged	+
		MPCda	0.012			0.09	Unchanged	+
		MPCaa	0.06			<0.01	Unchanged	+
2704	Petrol (benzene, low-sulphur gasoline) (in terms of carbon)	MPCot	5	4	0.33	0.06	Unchanged	+
		MPCda	3			0.01	Unchanged	+
		MPCaa	1.5			<0.01	Unchanged	+
2726	Resin	MPCot	0.3	4	0.33	<0.01	Unchanged	+
2732	Kerosene	RSIL	1.200	4	0.33	0.01	Unchanged	+
2735	Mineral hydrocarbon oil	MPCot	0.05	4	0.33	0.18	0.18	+
2752	Mineral spirit	RSIL	1.000	4	0.33	0.02	Unchanged	+
2754	Alkanes C12-C19 (in terms of C)	MPCot	1	4	0.33	0.18	0.18	+
2902	Suspended particles	MPCot	0.5	3	0.25	0.13	Unchanged	+
		MPCda	0.35			0.01	Unchanged	+

Name of pollutant		MPC or RSIL, mg/m^3		Hazard class	Established quota (in shares of MPC)	Maximum concentration in shares of MPC		Compliance with the established quota (+/-)
						Before commissioning of CRC	After commissioning of CRC	
		MPCaa	0.15			<0.01	Unchanged	+
2907	Non-organic dust, >70% SiO2	MPCot	0.15	3	0.25	0.18	Unchanged	+
		MPCda	0.1			0.04	Unchanged	+
		MPCaa	0.05			<0.01	Unchanged	+
2908	Non-organic dust, 70-20% SiO2	MPCot	0.3	3	0.25	0.23	Unchanged	+
		MPCda	0.2			0.03	Unchanged	+
		MPCaa	0.1			<0.01	Unchanged	+
2909	Non-organic dust, up to 20% SiO2	MPCot	0.5	3	0.25	0.17	0.2	+
		MPCda	0.35			<0.01	0.03	+
		MPCaa	0.15			<0.01	<0.01	+
2922	Polypropylene dust	RSIL	0.100	3	0.25	0.05	Unchanged	+
2930	Abrasive dust	RSIL	0.040	3	0.25	0.1	0.1	+
2936	Wood dust	MPCot	0.3	3	0.25	0.05	Unchanged	+
		MPCda	0.15			<0.01	Unchanged	+
		MPCaa	0.04			<0.01	Unchanged	+
2968	Soap powder dust	RSIL	0.100	3	0.25	<0.01	Unchanged	+
2981	Ferroalloy dust (Fe - 51%, SiO2 - 47%) (in terms of iron)	RSIL	0.020	3	0.25	0.04	0.04	+
3094	Microcrystalline cellulose (poly-1,4-beta-D-glucopyranosyl-D	RSIL	0.500	3	0.25	<0.01	Unchanged	+
3130	Borax	RSIL	0.020	3	0.25	<0.01	Unchanged	+
3747	Slag dust	MPCot	0.3	3	0.25	0.23	Unchanged	+
		MPCda	0.2			0.1	Unchanged	+
		MPCaa	0.1			0.03	Unchanged	+
3749	Coal dust	MPCot	0.3	3	0.25	0.09	Unchanged	+
		MPCda	0.1			<0.01	Unchanged	+
5101	Metallic dust	MPCot	0.2	3	0.25	0.09	0.09	+
		MPCda	0.12			<0.01	0.01	+
		MPCaa	0.04			<0.01	<0.01	+
5102	Potassium hydroxide	RSIL	0.010	2	0.2	<0.01	Unchanged	+

9.1.4 Public health risk assessment

The public health risk assessment is given in Report 128-0948-HRA.

The simulation of dispersion of priority air pollutants, contained in the facility's emissions, was performed using the AERMOD model (U.S. EPA).

The maps of air pollution with substances that create a significant risk (high HQ) of development of chronic non-carcinogenic effects at the boundary of UMK's SPZ are shown in the figures (Figure 9.1.1-Figure 9.1.3). The maps of pollution with other substances are given in Report 128-0948-HRA.

As a result of computer simulation, the quantitative characteristics of the risk of chronic non-carcinogenic and carcinogenic as well as acute effects on the population and their spatial distribution throughout the area of influence of emissions have been established.

According to the calculation data (Table 9.1.3-Table 9.1.5), the values of chronic risk for unidirectional exposure of respiratory organs to polluting substances, determined based on the annual average concentration, throughout the residential area and the boundary of UMK's SPZ are below the levels of allowable risk in terms of hazard quotients for individual substances (HQ) and the total hazard index (HI).

The maximum hazard quotients at the boundary of UMK's SPZ for individual substances are 0.85 (manganese), 0.79 (non-organic dust, >70%SiO2), 0.39 (sulphuric acid), 0.32 (slag dust), and the total hazard index is 1.41 (with the standard value of the hazard quotient of 1.0, and the hazard index of 3.0). The level of chronic risk of other organs/systems exposure is even lower.

As for acute effects, the risk levels that are significantly lower than the allowable values have been determined throughout the entire residence area (the maximum total hazard index is 0.37 with the standard value of 3.0). The acute exposure is mainly determined by slag dust pollution (HQ=0.35).

Table 9.1.3 Hazard quotients (HQ) of acute and chronic non-carcinogenic effects at the boundary of UMK's SPZ and in residential development area

Substance			HQ of acute exposure		HQ of chronic exposure		Direction of action	Risk level (at the boundary of SPZ)
Item No.	Code	Name	Boundary of SPZ	Residential area	Boundary of SPZ	Residential area		
1.	0123	Diiron trioxide	-	-	0.14	0.03	-	low
2.	0128	Calcium oxide	0.03	0.01	0.02	0.01	respiratory organs	minimum
3.	0143	Manganese	-	-	0.85	0.19	CNS, nervous system, respiratory organs	low
4.	0146	Cupric oxide	0.0002	0.0001	0.20	0.05	respiratory organs, systemic effect	low
5.	0163	Nickel	0.01	0.003	0.17	0.04	respiratory organs, blood, immune system, cancer, CNS	low
6.	0184	Lead	-	-	0.0001	0.00004	CNS, blood, development, reproductive system, hormonal system, kidneys	minimum

Substance			HQ of acute exposure		HQ of chronic exposure		Direction of action	Risk level (at the boundary of SPZ)
Item No.	Code	Name	Boundary of SPZ	Residential area	Boundary of SPZ	Residential area		
7.	0203	Chrome 6+	-	-	0.0001	0.00002	respiratory organs, liver, kidneys, immune system, digestive tract	minimum
8.	0301	Nitrogen dioxide	0.163	0.063	0.20	0.07	respiratory organs, blood (MetHb formation)	low
9.	0304	Nitrogen oxide	0.01	0.003	0.02	0.01	respiratory organs, blood (MetHb formation)	minimum
10.	0317	Hydrocyanide	0.01	0.003	0.26	0.07	cardiovascular system; CNS, hormonal system (thyroid gland)	low
11.	0322	Sulphuric acid	0.02	0.004	0.39	0.08	respiratory organs	low
12.	0328	Carbon (soot)	0.02	0.004	0.02	0.01	respiratory organs, systemic effect, teeth	minimum
13.	0330	Sulphur dioxide	0.04	0.02	0.07	0.03	respiratory organs, death	minimum
14.	0337	Carbon oxide	0.01	0.003	0.02	0.01	blood, cardiovascular system, development, CNS	minimum
15.	0342	Fluoric gaseous compounds	0.001	0.001	0.001	0.001	osseous system, respiratory organs	minimum
16.	0703	Benzo(a)pyrene	-	-	0.03	0.01	cancer, risk 1E-5, 1 ng/m, immune system, development	minimum
17.	1071	Phenol	0.001	0.001	0.11	0.11	cardiovascular system, kidneys, CNS, liver, respiratory organs	low
18.	2704	Petrol	-	-	0.01	0.01	eyes, respiratory organs, liver, kidneys, CNS	minimum
19.	2732	Kerosene	-	-	0.24	0.06	liver	low
20.	2735	Mineral oil	-	-	0.04	0.01	liver, kidneys, respiratory organs	minimum
21.	2907	Non-organic dust, >70% SiO2	0.03	0.01	0.79	0.19	respiratory organs	low
22.	2909	Non-organic dust, <20% SiO2	0.02	0.01	0.02	0.01	respiratory organs (by suspended particles)	minimum
23.	3747	Slag dust	0.35	0.05	0.32	0.05	respiratory organs	low

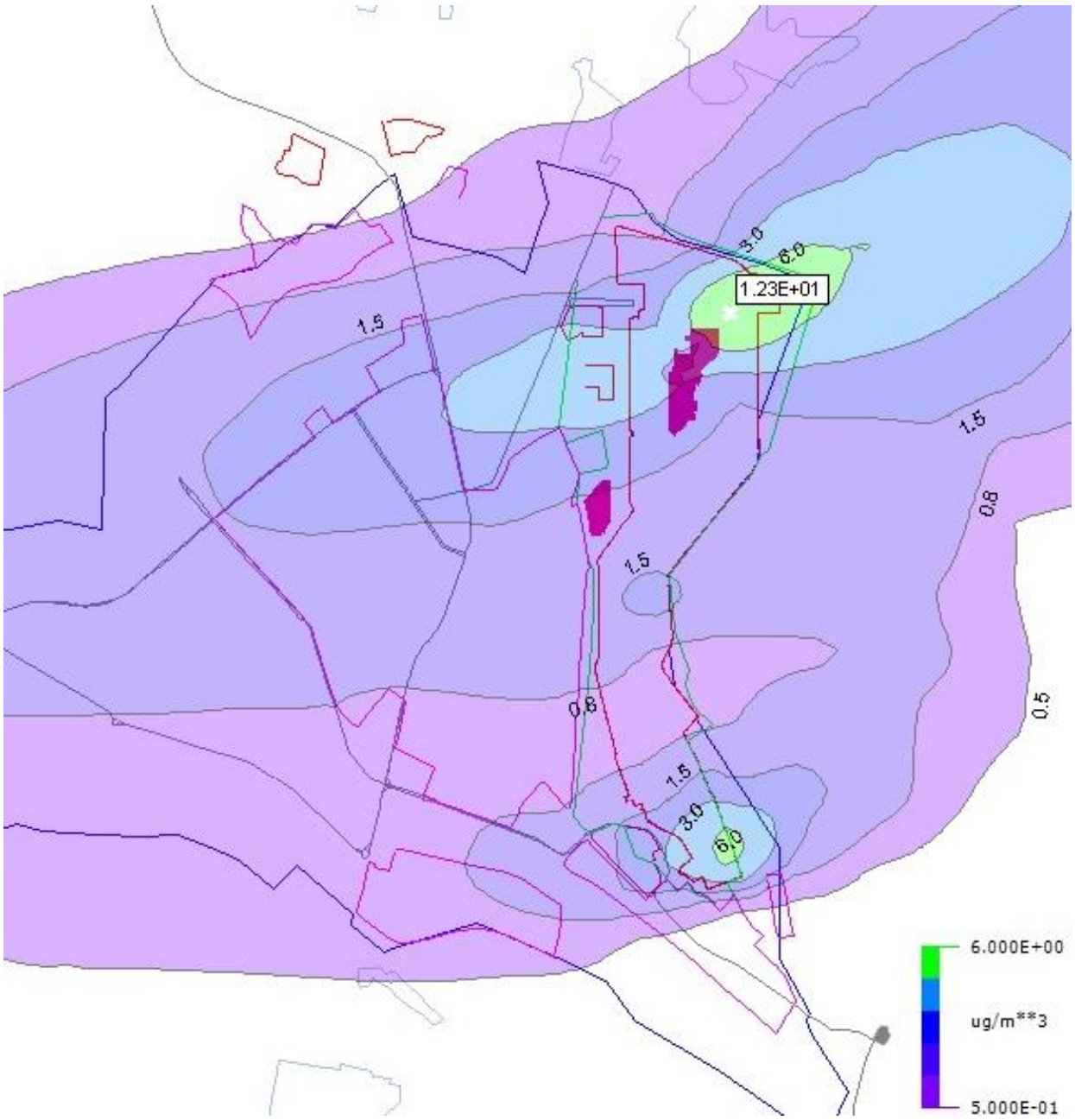

Figure 9.1.1 Results of simulation of the level of air chemical pollution using the AERMOD programme - annual average concentrations (μg/m3) of the substance: 0301 Nitrogen dioxide

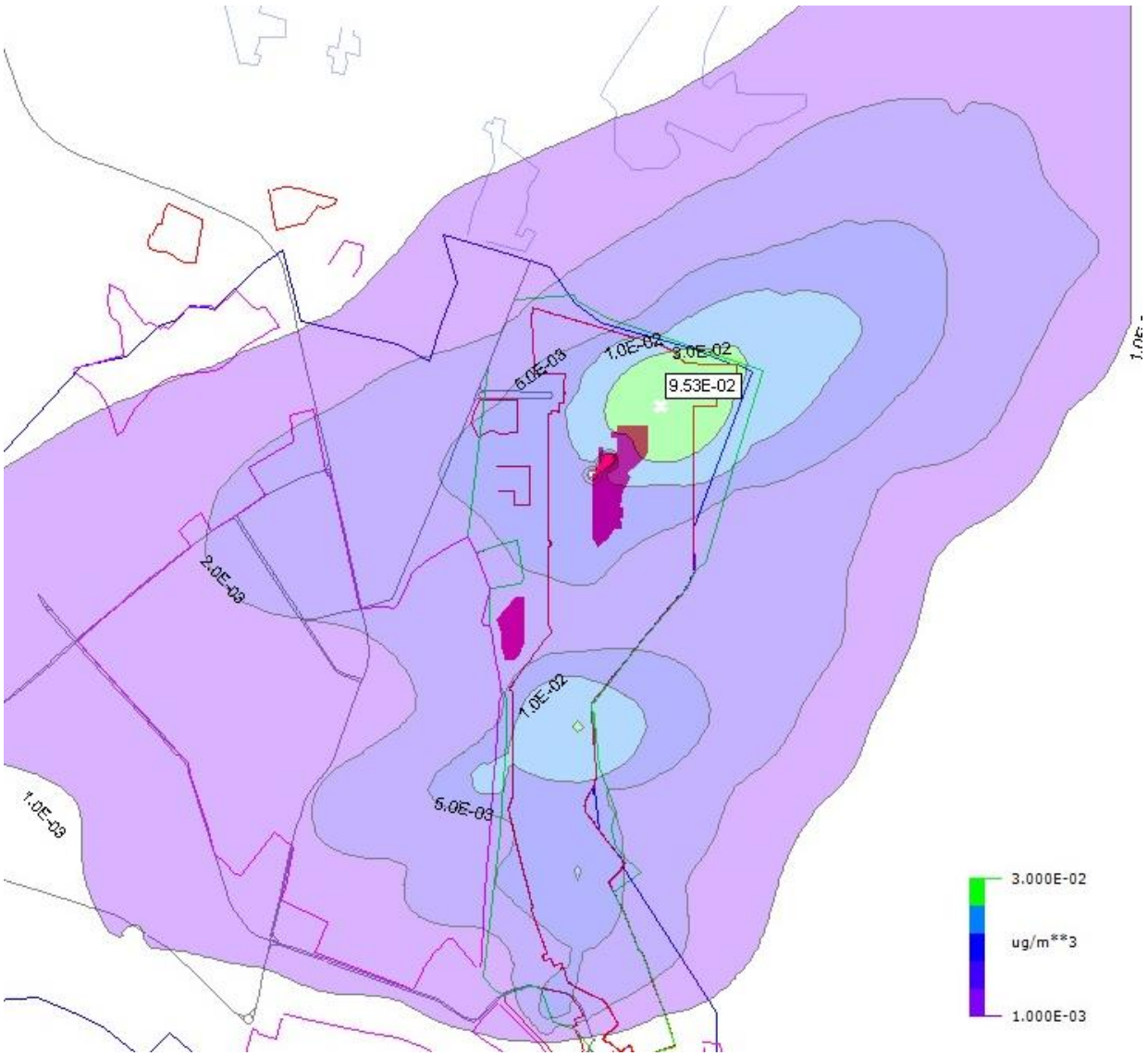
9.53E-02
3.0E-02
1.0E-02
5.0E-03
2.0E-03
1.0E-02
5.0E-03
1.0E-03
3.000E-02
ug/m**3
1.000E-03

Figure 9.1.2 Results of simulation of the level of air chemical pollution using the AERMOD programme - annual average concentrations (μg/m3) of the substance: 0143 Manganese

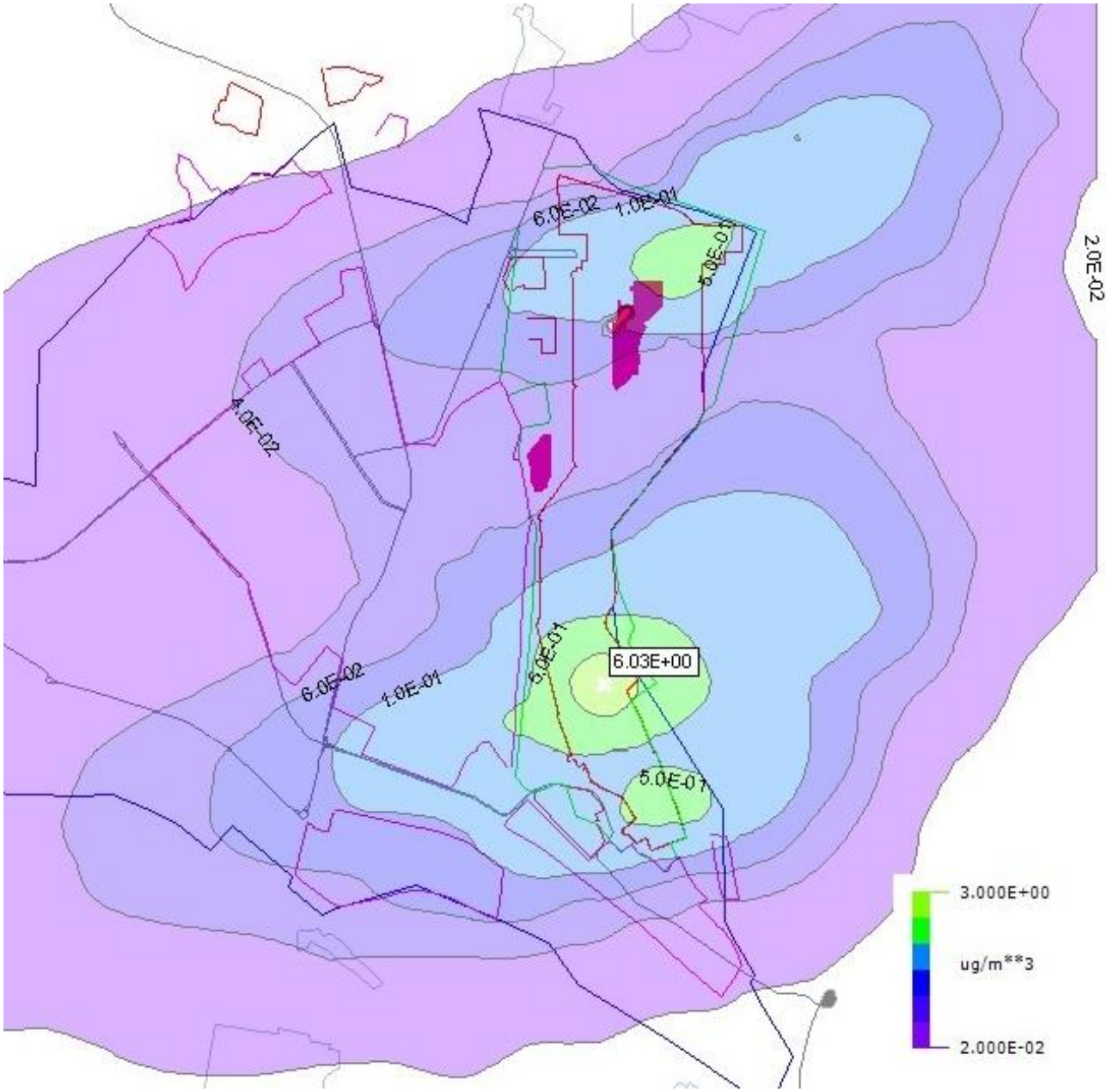

Figure 9.1.3 Results of simulation of the level of air chemical pollution using the AERMOD programme - annual average concentrations (μg/m3) of the substance: 2907 Non-organic dust, >70% SiO2

Table 9.1.4 Hazard indices (HI) of the risk of acute exposure, calculated based on the hourly concentration values

Critical organ/system	HI of acute exposure		Risk level
	Boundary of SPZ	Residential area	
Respiratory organs	0.37	0.09	minimum
Nervous system	0.01	0.003	minimum
Cardiovascular system	0.01	0.003	minimum

Critical organ/system	HI of acute exposure		Risk level
	Boundary of SPZ	Residential area	
Development	0.01	0.003	minimum
Eyes	0.001	0.001	minimum
Immune system	0.01	0.003	minimum

Table 9.1.5 Hazard indices (HI) of the risk of chronic exposure, calculated based on the annual average concentration values

Critical organ/system	HI of chronic exposure		Risk level
	Boundary of SPZ	Residential area	
Respiratory organs	1.41	0.54	low
Nervous system	1.18	0.29	low
Blood	0.27	0.12	minimum
Cardiovascular system	0.30	0.18	minimum
Liver	0.24	0.17	minimum
Kidneys	0.12	0.12	minimum
Development	0.03	0.01	minimum
Hormonal system	0.26	0.07	minimum
Immune system	0.817	0.210	minimum
Digestive tract	0.000	0.000	minimum
Eyes	0.008	0.008	minimum
Reproductive system	0.0001	0.00004	minimum
Osseous system	0.001	0.001	minimum
Teeth	0.024	0.006	minimum

The maximum carcinogenic risk (Table 9.1.6) at the boundary of UMK's SPZ is created by petrol (~60%). Soot (~28%) and nickel (~10%) also make a significant contribution.

Table 9.1.6 Calculated values of carcinogenic risk at the boundary of UMK's SPZ and the residential development area

Item No.	Code	Pollutant	Hazard as per IARC	Carcinogenic potential factor, SFi, kg*day/mg	Additional probability of developing cancer, CR = LADC * Sfi *20[m^3] / 70[kg] /1000	
					Boundary of SPZ	Residential area
1.	0163	Nickel	2B	0.84	2.05E-06	4.73E-07
2.	0184	Lead	2A	0.042	5.65E-10	2.63E-10
3.	0203	Chrome 6+	1	42	7.28E-08	2.02E-08
4.	0328	Carbon (soot)	1	0.0155	5.38E-06	1.24E-06
5.	0703	Benzo(a)pyrene	2A	3.9	2.97E-08	6.89E-09
6.	2704	Petrol	2B	0.035	5.90E-06	5.63E-06
Total carcinogenic risk					8.12E-06	5.82E-06

Thus, the assessments of risk level have shown that:

- the maximum level of the total individual carcinogenic risk CRt at the boundary of and outside the designed SPZ of UMK throughout the lifetime does not exceed the value of 1.0 E-04, which corresponds to a low/allowable level of risk.

- The values of non-carcinogenic risk at the boundary of UMK's SPZ and in the residential development area are characterised by a low level. The hazard quotients (HQ) and indices (HI) of acute and chronic exposure do not exceed the allowable values (1.0 and 3.0 respectively).
- It has been determined that there is no excess of reference concentrations (RfC) of acute and chronic exposure to all the priority pollutants at the boundary of and outside the designed SPZ of UMK, in the residential development area.

Thus, the atmospheric air pollution outside the boundaries of UMK's SPZ does not exceed acceptable levels for any risk indicator, and the impact of the works, taking into consideration the commissioning of CRC, is allowable in terms of the public health risk created.

9.1.5 Recommendations

9.1.5.1 *Measures to prevent and mitigate impacts*

Construction stage

To prevent the chemical pollution of the air at the construction stage, the planning solutions are used: the construction site of CRC is distant from the residential areas.

To mitigate the impact of pollutants on the air, the following organisational and technical measures are recommended:

- arrangement of construction in strict accordance with the planning, technological and technical solutions of the design;
- performance of works in accordance with good practice, compliance with the work rules, involvement of personnel with the necessary qualifications for the production of work;
- monitoring of the technical condition of engines and exhaust systems of vehicles, machinery (bulldozers, excavators, cranes) to avoid the operation of machinery with increased emissions of pollutants;
- avoidance of operation of car engines and construction equipment at the time when work is not performed.

As compensatory measures at the construction stage, the measures for the technical upgrading of existing sources of pollutants into the air are suggested (Appendix 9.1.5).

Operation stage

To prevent the air chemical pollution at the operation stage, the following shall be used at the proposed CRC:

- arrangement of the process with a minimum of repeated heating of billets;
- increase in the design height of stacks;
- the design provides for the use of gas-burning devices (burners, boilers) with a low level of NOx emission.

To mitigate the impact of pollutants on the air, the measures, listed in Appendix 9.1.5, are suggested:

- reduction of productivity of individual technological processes, workshops, areas:
  - Reduction of the painting station in the vehicle shop (Source 247);

- 50% reduction of productivity of the slag waste processing shop due to lower slag shipments to customers (Sources 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 270, 271, 272, 273, 274, 275, 286, 287, 289);
- Reduction of the part of the slag dumps of the slag waste processing shop to 5000 m^2 (Source 330);
- Reduction of productivity of the dump truck unloading station in the TIMS (Source 306);
- Reduction of productivity of the receiving hopper in the TIMS (Source 309);
- Reduction of productivity of pouring stations and dump truck loading and unloading station in the ferroalloys shop (Sources 357, 358, 359, 360, 361);
- Reduction of productivity of pouring, loading and unloading stations and the belt conveyor in the construction and installation department (Sources 140, 142, 340, 342, 345, 346, 347, 348);
- Reduction of the bitumen drain rate in the construction and installation department (Sources 334, 337);

- arrangement of a sanitary protection zone.

The following is suggested as compensation measures at the operation stage:

- upgrading of gas-burning equipment (burners, boilers) at UMK's existing sources to reduce NOx emissions;
- adjustment of the existing dust and gas treatment devices at UMK's subdivisions;
- retrofitting with dust and gas treatment devices of the sources of UMK where they are currently absent;
- replacement of dust and gas treatment devices with more efficient ones;
- equipping of fugitive emissions with exhaust hoods;
- upgrading of ventilation systems with an increase in the height of pipes and/or volumetric flow rates.

A replacement of dust and gas treatment equipment with more efficient analogues will also ensure compliance of pollutant concentration at outlets of the sources with IFC emission requirements to integrated steel mills (Sources 0039, 0046 and 0095) and lime manufacturing (Source 0048).

The suggested measures are summarised in Table 9.1.8.

9.1.5.2 *Monitoring and reporting*

To monitor the air chemical pollution, it is suggested to measure the level of pollution at points that simultaneously meet the following conditions:

- maximum proximity to UMK's SPZ;
- minimum distance to areas (sites, facilities) with specified environmental quality parameters;

- closest approximation to areas with maximum levels of chemical pollution and maximum values of public health risk criteria related to UMK and an associated facility (the access motor road)[6].

The following air quality instrumental monitoring points (IMP) correspond to the specified criteria:

Table 9.1.7 List and description of points of sanitary and hygienic monitoring of air quality

Point No.	Address/spatial reference	Wind direction
IMP-1	On the border with the Republic of Tajikistan, in the north direction from UMK	South-eastern
IMP-2	The settlement of Kirovsky, Termezskaya street, the nearest residential house to UMK's site	Eastern, south-eastern, north-eastern
IMP-3	The settlement of Metallurgov, Navoi street, the nearest residential house to UMK's site	Eastern, south-eastern, north-eastern
IMP-4	The nearest residential house to the south-eastern boundary of UMK	North-eastern, northern
IMP-5	Dalvarzin Block 8, the nearest residential house to the right of way of an associated facilities (the access motor road)	Eastern, south-eastern

The location of air pollution monitoring points is shown in Appendix 9.1.4.

The study (measurement) programme includes harmful (polluting) substances, which, based on results of the dispersion calculations at the boundary of the sanitary protection zone and at the boundary the nearest residential development area and/or other areas with specified environmental quality parameters, meet the following:

- specific substances characteristic of industrial emissions of UMK and emissions from vehicles (operation of the new motor road);
- substances that form the main risk to public health at the boundary of the sanitary protection zone and the residential development area within the area of influence of the works of over 1.0 HQ (hazard quotient) and/or individual carcinogenic risk of over $1*10^{-4}$ (the monitoring is made by daily average ground concentrations).

According to the criteria used, UMK and vehicular emissions are assumed as containing the following pollutants:

- nitrogen dioxide;
- sulphur dioxide;
- manganese oxide;
- dust (suspended particles).

Based on the criteria of public health risk for monitoring by daily average concentrations, the following substances should be included in the study (measurement) program:

- manganese oxide;

[6] To date, the road and power transmission line have been constructed. The road is in operation. An impact on ambient air is only possible during operation of the new motor road in terms of chemical and noise pollution.

- nitrogen dioxide;
- dust (suspended particles).

The sampling of chemicals is made during at least 50 days for each substance at each point.

The result of measurements of air pollution levels are records.

Based on results of monitoring, corrective actions are taken in the event of excess impact of UMK's sources of pollutant emissions on residential development areas:

- identification of sources that create maximum contributions into air pollution;
- development and implementation of additional air protection measures.

The suggestions for monitoring and reporting are given in Table 9.1.8.

9.1.6 Assessment results

The matrix of the assessment results for the air is given in Table 9.1.9.

It has been determined that the significance of impact of the planned activity on the state of the air is assessed as negligible at the construction stage and low at the operation stage; taking into consideration the suggested measures to minimise it and compensate for it.

Table 9.1.8 Measures to prevent and mitigate the impact on the air

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
1.	• Construction works (earthwork, general construction, welding, painting works) • Transportation and logistics (delivery of raw materials, fuels and lubricants, other transportations)	• Prevention of excess air pollution • Mitigation of the impact of pollutants on air • Compensation for excess air pollution	• Planning solutions (distance of the construction site from the residential areas) • arrangement of construction in strict accordance with the planning, technological and technical solutions of the design • performance of works in accordance with good practice; compliance with the work rules; involvement of personnel, having necessary skills, for the performance of works • monitoring of the technical condition of engines and exhaust emissions of vehicles, bulldozers, excavators, cranes, other machines to avoid the operation of machinery with increased emissions of pollutants • avoidance of operation of car engines and construction equipment at the time when work is not performed • implementation of measures to upgrade the existing sources of emissions at UMK	• SanPiN RUz No. 0293-11 • IFC General EHS Guidelines, Sections 1.1 and 4.1. • Interstate standard GOST 31967-2012. • RD 52.04.186-89 "Guidance on the control of air pollution"	• Measurement of air pollution levels in adjacent residential areas in accordance with the suggested schedule • inspections of the construction site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • training of construction contractors' personnel and maintaining their awareness • reporting on results of air pollution level measurements • reporting on inspection results
II.	**Operation stage**					
2.	• Primary production process • Maintenance of the core production activity • Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations)	• Prevention of excess air pollution • Mitigation of the impact of pollutants on air • Compensation for excess air pollution	• Arrangement of the process with a minimum of repeated heating of billets; • increase in the design height of stacks; • the design provides for the use of gas-burning devices (burners, boilers) with a low level of NOx emission. • reduction of productivity of individual technological processes, workshops, areas; • arrangement of a sanitary protection zone. • upgrading of gas-burning equipment (burners, boilers) at UMK's existing sources to reduce NOx emissions; • adjustment of the existing dust and gas treatment devices at UMK; • retrofitting with dust and gas treatment devices of the sources of UMK where they are absent; • replacement of dust and gas treatment devices with more efficient ones; • equipping of fugitive emissions with exhaust hoods; • upgrading of ventilation systems with an increase in the height of pipes and/or volumetric flow rates.	• SanPiN RUz No. 0293-11 • IFC General EHS Guidelines, Section 1.1 • IFC EHS Guidelines for Integrated Steel Mills, Sections 1.1 and 2.1 • IFC EHS Guidelines for Cement and Lime Manufacturing, Sections 1.1 and 2.1 • IFC EHS Guidelines for Thermal Power Plants, Sections 1.1 and 2.1 • RD 52.04.186-89 "Guidance on the control of air pollution"	• Measurement of air pollution levels in adjacent residential areas in accordance with the suggested schedule • monitoring of pollutant emissions at sources in accordance with the schedule developed in the draft environmental standards	• Implementation of environmental protection measures in accordance with the CRC project documentation and the List of Measures for Technical Upgrading of Sources of Pollutant Emissions into the Air • compliance with the requirements of the national laws in the area of environmental protection • training of UMK's personnel and maintaining their awareness • reporting on results of air pollution level measurements • reporting on results of monitoring the emission values at the sources

Table 9.1.9 Matrix of results of the assessment of effects on the air

Life cycle stage: construction

Recipient: population

Recipient's sensitivity: medium

Impact characteristics

Impact	Chemical pollution of the air within the residential development area and territories with specified environmental quality parameters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Violation of the living conditions of the population (influence on the respiratory organs), indirect effects on flora and fauna, soils				
Measures	• Planning solutions (distance of the construction site from the residential areas) • arrangement of construction in strict accordance with the planning, technological and technical solutions of the design • performance of works in accordance with good practice; compliance with the work rules; involvement of personnel, having necessary skills, for the performance of works • monitoring of the technical condition of engines and exhaust systems of vehicles, bulldozers, excavators, cranes to avoid the operation of machinery with increased emissions of pollutants • avoidance of operation of car engines and construction equipment at the time when work is not performed implementation of measures for technical upgrading of existing sources of pollutant emissions into the air				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Minor	Negligible

Life cycle stage: operation

Recipient: population

Recipient's sensitivity: medium

Impact characteristics

Impact	Chemical pollution of the air within the residential development area and territories with specified environmental quality parameters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Violation of the living conditions of the population (influence on the respiratory organs), indirect effects on flora and fauna, soils				
Measures	• Arrangement of the process with a minimum of repeated heating of billets; • increase in the design height of stacks; • the design provides for the use of gas-burning devices (burners, boilers) with a low level of NOx emission. • reduction of productivity of individual technological processes, workshops, areas; • arrangement of a sanitary protection zone. • upgrading of gas-burning equipment (burners, boilers) at UMK's existing sources to reduce NOx emissions; • adjustment of the existing dust and gas treatment devices at UMK; • retrofitting with dust and gas treatment devices of the sources of UMK where they are absent; • replacement of dust and gas treatment devices with more efficient ones; • equipping of fugitive emissions with exhaust hoods; • upgrading of ventilation systems with an increase in the height of pipes and/or volumetric flow rates				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

References

1. Law of the Republic of Uzbekistan "On Air Protection", 1996.
2. SanPiN of the Republic of Uzbekistan No. 0293-11 "Hygienic Standards. List of Maximum Permissible concentrations (MPC) of Pollutants in the Air of Populated Areas within the Republic of Uzbekistan".
3. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 14 dated November 22, 2018 "On approval of the Regulations on the Procedure for Development and Approval of Draft Environmental Standards".
4. IFC. Environmental, Health, and Safety Guidelines. General EHS Guidelines.
5. IFC. Environmental, Health, and Safety Guidelines. Integrated Steel Mills.
6. IFC. Environmental, Health, and Safety Guidelines. Cement and Lime Manufacturing.
7. IFC. Environmental, Health, and Safety Guidelines. Thermal Power Plants.

9.2 Assessment of climate change

Adoption of systemic measures to mitigate climate change effects is of paramount importance for the Republic of Uzbekistan as they have a decisive impact on the most important sectors of the country's economy: agriculture, water management and hydropower.

9.2.1 Greenhouse gas emissions

9.2.1.1 National context

Uzbekistan is a party to the following international treaties on combatting climate change:

- UN Framework Convention on Climate Change (1992) – since 1994;
- Paris Agreement on Climate Change (2015) – since 2017;

In accordance with the Paris Agreement, Uzbekistan undertakes to:

- formulate and publish a long-term development strategy that ensures low greenhouse gas emissions based on national conditions;
- develop and implement national climate adaptation plans;
- encourage innovation and the development and transfer of relevant technologies;
- prepare necessary reporting including the National Communications, biennial reports etc.;
- ensure international cooperation on climate change issues, including the development of early warning systems; emergency preparedness, climate risk assessment and management etc.

Pursuant to the Paris Agreement, Presidential Decree PP-4477 dated 4 October 2019 adopted the "Strategy for the transition of Uzbekistan to green economy for 2019-2030".

In recent years, efforts have been made in the country to promote the green agenda together with development partners (UNDP, World Bank, FAO, ADB etc.),

Uzbekistan implements the Strategy by carrying out the road map activities scheduled until 2030. The nearest activities of the road map include the following:

- doubling energy efficiency indicators;
- reducing GDP carbon intensity;
- development of renewable energy sources (RES) to increase their share to 25% of total electricity generation;
- providing access to modern, inexpensive and reliable energy supply sources for 100% of the population and all sectors of the economy;
- modernisation of infrastructure of industrial facilities to ensure their sustainability by increasing energy efficiency by at least 20%;
- expanding the production and use of motor fuels and vehicles with improved energy efficiency and environmental performance;
- development of electric vehicles;
- improving the efficiency of water use in all sectors of the economy.

Uzbekistan has also adopted regulations promoting the introduction of technologies and industries that reduce GHG emissions.

The Law “On the use of renewable energy sources” and the Law “On public-private partnerships” (2019) create the regulatory framework for the implementation of RES projects:

- the share of electricity production using RES will be increased to 25% by 2030;[7]
- new renewable energy facilities will be constructed with a total capacity of 10 GW (5 GW of solar, 3 GW of wind and 1.9 GW of hydroelectric power).[8]

For the first time in Uzbekistan, a 100 MW solar power plant has been commissioned, which will save up to 80 million cubic meters annually of natural gas and prevent about 160 thousand tonnes of GHG emissions.[9]

Energy saving measures will reduce the consumption of primary energy, mainly natural gas. Planned investments in energy efficient solutions and renewable energy sources are of high priority, primarily in terms of reducing GHG emissions.

Measures for mitigation and adaptation to the effects of climate change are also reflected in sectoral strategies, plans and programmes for the development of the country, in particular, in the following documents:

- Innovative development strategy for 2019-2021;
- Strategy for the management of municipal solid waste for 2019-2028,
- Agriculture development strategy for 2020-2030,
- The environmental protection concept until 2030,
- The power supply concept for 2020-2030 etc.

To mitigate the effects of climate change, 15 Clean Development Mechanism (CDM) projects have been implemented under the Kyoto Protocol. During the period of CDM projects in Uzbekistan, 15.3 thousand tonnes of certified emission reductions in CO2 equivalent were put into circulation and foreign private investments were attracted in the amount of 24.4 million US dollars. Measures and actions aimed at saving energy resources have allowed Uzbekistan to stabilise the level of greenhouse gas emissions and reduce the country’s contribution to global emissions.

According to the Paris Climate Agreement, Uzbekistan has committed itself to reduce by 2030 the specific emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide) per unit of GDP by 10% from the level of the base year 2010. The reduction is planned to be achieved through measures to develop alternative energy, improve energy efficiency and other measures announced in the Strategy for the transition to green economy.

In 2021, the United Nations Framework Convention on Climate Change (UNFCCC) published the first biennial report of Uzbekistan based on updated data, which presented greenhouse gas emissions for 1990-2017. The total greenhouse gas emissions in 2017

[7]The implementation of this ambitious plan, which is comparable in terms of its goals with plans for the transition to green energy in economically developed countries, first of all, depends on state policy and financial capabilities, since such projects are carried out using state regulation mechanisms (subsidies, control over electricity tariffs for different consumer groups).

[8]Due to the dependence of wind and solar power plants on seasons, time of day and weather conditions, the average (daily or annual) generation of RES of this type is significantly lower than the generation of thermal and nuclear power plants with equal installed generating capacity.

[9]Comparison of the parameters of this relatively powerful solar power plant (in terms of power, continuity of power supply throughout the day, reliability), which uses photovoltaic converters, with the current and future needs of the UMK shows the impracticality of using energy sources of this type for a continuously operating steel-making facility.

amounted to 189.2 million tonnes of CO_2-eq. (excluding absorption). In 1990-2017, GHG emissions increased by 6.7%, while 2013-2017 saw a decrease by 0.6% [1].

The main contribution to greenhouse gas emissions falls on the energy sector (76.3%) and agriculture (17.8%).

The current goal provides for a reduction in specific greenhouse gas emissions per unit of GDP in the country by 35% by 2030 from the level of 2010 (instead of the previously envisaged 10%).

By 2030, it is planned to generate 25% of the country's electricity from renewable energy sources, double the energy efficiency of GDP, modernise the infrastructure of industrial facilities to increase their energy efficiency by at least 20%, widely use green technologies, and achieve a neutral balance of land degradation [2].

Thus, it can be concluded that Uzbekistan's accession to the Paris Agreement initiated the development and adoption of strategic documents, analysis and assessment of climate change, including those related to greenhouse gas emissions, at the national level.

The strategy for the transition to green economy for the period up to 2030 sets the main goal of achieving sustainable economic growth that contributes to social development and the reduction of greenhouse gas emissions, increasing the climate and environmental sustainability of the economy. The strategy provides for the establishment of a monitoring, reporting and verification (MRV) system for greenhouse gas emissions, taking into account national circumstances, to continuously monitor the implementation of the country's quantitative obligations under the Paris Agreement and ensure reporting on greenhouse gas emissions.

However, at present, there are no national regulations and methodological documents applicable by business entities at the operational level in relation to:

- GHG emissions estimates;
- requirements for relevant reporting and its verification;
- defining measurable goals and setting targets for managing GHG emissions;
- development of a set of relevant measures and/or Action Plans;
- GHG monitoring and/or climate indicators.

Accordingly, the assessment of GHG emissions for the CRC project and UMK in general corresponds to the national agenda and trends, but its nature is largely determined by the requirements of the investment project and UMK's future plans in environmental and social responsibility (in particular, voluntary requirements for the introduction of ESG reporting).

References

1. First biennial update report of the Republic of Uzbekistan, 2021
2. The Republic of Uzbekistan. Updated Nationally Determined Contribution. Report in accordance with Decisions of the Conference of the Parties to the Framework Convention on Climate Change 4/CMA.1, 1/CP.21, 9/CMA.1 and 18/CMA.1, 2021

9.2.1.2 Assessment of greenhouse gas emissions during the operation phase of CRC

The impact is determined by air emissions of greenhouse gases. In accordance with the global standard for accounting for GHG emissions (the Greenhouse Gas Protocol[10]), the following scopes of GHG emissions are subject to accounting:

- Scope 1 – direct GHG emissions produced by an organisation: in relation to UMK this includes emissions associated with combustion of fuel and emissions of freons.
- Scope 2 – indirect GHG emissions associated with electricity purchased from third-party producers.
- Scope 3 – indirect emissions associated with the extraction and production of purchased materials, fuel and services, including transportation in vehicles not owned by the plant. Emissions of this category are a consequence of an organisation's activities, but come from external sources and accordingly are not controlled by the organisation. Scope 3 is optional (optional) for accounting and reporting[11], but enables the organisation to become a leader in GHG management; in relation to UMK this includes Scope 3 emissions, which are mainly associated with the transportation of raw materials and finished products[12].

A quantification of GHG emissions is performed by the calculation method for individual sources, groups of sources or the organisation as a whole according to the formula:

Epg = EF * FC, where:

- E_{pg} - emissions of CO_2 (and other GHGs), t of CO_2 ;
- FC - fuel consumption, thousand m^3 (for Scope 1), the volume of consumed (purchased) electricity, MWh (for Scope 2);
- EF - CO_2 emission factor from fuel combustion in t of CO_2/thous. m^3 of gas (for Scope 1) or from purchased electricity in t of CO_2/MWh.

The calculation of GHG emissions performed in accordance with [] is given in Appendix 9.2.1.

The calculation used the data provided by UMK: consumption of natural gas, motor fuels, freons, electricity consumption by the existing units of the plant, design estimates for CRC.

The results of the GHG emission assessment a result of the plant's activities are presented in Table 9.2.1.

[10] Joint project of the World Resources Institute and the World Business Council for Sustainable Development. https://ghgprotocol.org/

[11] Greenhouse Gas Protocol. Corporate Value Chain (Scope 3) Accounting and Reporting Standard, Item 1.4

[12] Not considered in this study. In the future, it is advisable to assess Scope 3 emissions based on an analysis of procurement and supply chains (taking into account consequences of the CRC commissioning), and the whole set of activities (based on the impact on the business and the amount of reliable information).

Table 9.2.1 GHG emissions from UMK's activities, thousand tonnes of CO2 equivalent [2, 3]

Characteristics	Scope 1 and 2 emissions
Current UMK emissions	648
Emissions associated with the CRC project	420
Total emissions of UMK after the implementation of the CRC project	1068

According to a report by the World Steel Association, the global average greenhouse gas emissions are 1.85 tonnes of CO_2 equivalent per tonne of steel [5]. The specific emissions of UMK+CRC is estimated at 1068 thousand tonnes of CO_2 / 2 million tonnes of steel = 0.534 t/t.

UMK's GHG emissions are significantly lower than the industry average due to the absence of mining in the process chain and due to the use of secondary raw materials and waste.

Currently, most of the greenhouse gases are associated with the use of natural gas in the production process and energy generation at the Syrdaryinskaya TPP, which is the main supplier of electricity for the plant.

Since the estimated volume of Scope 1 and 2 emissions exceeds 100,000 tonnes of CO_2-equivalent per year, below is a description of possible ways to additionally reduce GHG generation from the activities of UMK.

The share of motor fuel in the volume of greenhouse gas generation is insignificant.

9.2.1.3 *Ways to reduce greenhouse gas generation*

9.2.1.3.1 Conceptual approach

Despite the fact that CRC generates a significant amount of GHG emissions, the GHG emissions management objective must be formulated in relation to the whole UMK.

Measures to be developed should look not only at the prevention / minimisation of emissions, but also at possible compensatory activities.

Management of GHG emissions includes a series of solutions mainly represented by the following:

- Implementation of economically reasonable measures to prevent and/or reduce GHG emissions including energy and resource efficiency measures
- Use of mechanisms to minimise generation of gases along the production process including selection of raw materials with the lowest carbon footprint and optimisation of logistics with final products
- Monitoring and reporting.

It should be noted that in addition to the obvious contribution towards Uzbekistan's carbon neutrality, management of GHG emissions ultimately aims to minimise climate change.

Use of recyclable materials

The main source of raw materials for the ferrous production at UMK is secondary scrap, as well as hot briquetted iron (HBI)[13]and the metal-containing fraction of slag (own production waste).

[13]Currently, HBI is supplied from Russia's Belgorod Region; the distance to UMK exceeds 3 thousand km.

The company has a slag waste processing shop. The use of secondary raw materials and own waste in production eliminates the stages of ore mining and processing, which puts UMK in a more advantageous position compared to iron ore consuming plants with higher emissions from the production cycle.

However, UMK can further reduce emissions in the following ways.

Use of secondary raw materials

- The use of recycled building materials, such as asphalt concrete pavements and concrete from demolition of roads and buildings, at the construction stage of CRC and other facilities of the plant.
- The use of raw materials (scrap metal) from the nearby regions, with the effect achieved including by reducing fuel costs during transportation of raw materials.
- Use of own waste in the process cycle (iron-containing fraction of steel-smelting slag, offcuts from SRS-1, SRS-2, CMS and MRS).

The reduction in greenhouse gas emissions depending on different materials can be estimated based on the specific carbon content (C) in such materials, which directly determines the amount of greenhouse gas emissions (Table 9.2.2).

Table 9.2.2 Carbon content in various materials

Type of raw material for steel production	Carbon content, kg C/kg [14]	In terms of cast iron
Cast iron (purchased)	0.04	one
Scrap metal	0.04	one
DRI	0.02	0.5
HBI	0.02	0.5
Steel	0.01	0.25

Use of purchased slag-forming materials

Lime (CaO) is widely used in the steel production process as fluxes that improve the quality of steel and optimise slag generation.

Lime production from a high-level perspective consists of preparation of carbonate raw materials, its burning, crushing and sorting. During the burning of limestones and dolomites, greenhouse gases are generated from decomposition of carbonates and from burning fuel to heat them.

With an estimated gas consumption for burning 1 tonne of lime of around 100-120 m^3, the corresponding CO_2 emission will be ~0.14 tonnes. CO_2 contained in carbonate raw materials is also released: B = 0.12 * 44/12 / 0.56 = 0.79[15] .Thus, when using ready-made (purchased) lime, it is possible to prevent CO_2 emissions in the amount of ~0.9 tonnes of CO_2 per tonne of lime.

Improving the operating energy efficiency and recovery of heat

A significant reserve for reducing GHG emissions lies in the use of secondary heat, which (based on an analysis of open sources, e.g.) makes it possible to obtain/save tens of megawatts of thermal energy, thereby reducing fuel consumption and corresponding greenhouse gas emissions.

[14]Calculating Greenhouse Gas Emissions from Iron and Steel Production. A component tool of the Greenhouse Gas Protocol Initiative. 2008., IPCC 2006 Guidelines.

[15]Here: 0.12 - C content in limestone; 44/12 is the ratio of molecular weights of CO_2 and C; 0.56 is the stoichiometric content of CaO in $CaCO_3$ (IPCC 2006 Guidelines, Volume 2).

The use of recovery equipment is possible in sheet rolling, section rolling production, etc.

It is also technically feasible to utilise heat during the operation of the EAF (which is worth considering in the event of a potential reconstruction of the existing EAF). According to open sources (e.g. https://metalspace.ru/education-career/education/doklady-i-konferentsii/1506-utilizaciya-tepla-othodyashchih-gazov-dugovoj-staleplavilnoj-pechi.html), up to 80 % of the energy present in the exhaust gases can be recovered.

A certain effect can be achieved with the recovery of low-grade heat - for example, the heat of exhaust gases / air of the working area. Such heat probably cannot be used for process needs, but is suitable for use in ventilation, heating and air conditioning systems.

Transition to renewable energy sources

The plant is supplied with electricity from the Syrdaryinskaya TPP (gas thermal power plant) and, to a lesser extent, from the Farkhadskaya HPP [6].

UMK generates thermal energy in its own boiler houses using natural gas.

Natural gas is a non-renewable energy source, the extraction and subsequent combustion of which is associated with the release of greenhouse gases into the atmosphere. To reduce the emission of greenhouse gases, it is advisable to consider the possibilities of using renewable energy sources.

A promising source of renewable energy in the Republic of Uzbekistan is solar energy. The gross potential of solar radiation is estimated in the range from 525 to 760 billion kWh, while more than 70% of the country's territory is suitable for the construction and installation of solar power plants.

The climatic features of the site location - namely, the high frequency of winds of certain directions (for example, the winds of the west and east 45-degree points account for up to 70% depending on the time of year, see report 128-0948-ESIA-PE-2) - makes practical a consideration of using wind power generation.

In the long term, it is possible to generate energy using biofuels produced from waste vegetable oil, animal raw materials, waste products of organisms or organic industrial waste.

Despite positive pre-requisites for utilising renewable energy sources in general, these solutions have limited opportunities for at a steel plant[16].

Greenhouse gas absorption

Along with the prevention/reduction of GHG emissions, the absorption (discharge) of greenhouse gases from the atmosphere can make a certain contribution to the prevention of climate change. To increase the volume of biogenic discharge of greenhouse gases, currently only one effective way is available - the absorption of carbon dioxide by forests / plantations of young greenery.

UMK is currently carrying out a significant amount landscaping and tree planting. It would be practical for the plant to continue the landscaping programme both within and around the site. Along with GHG absorption, the creation of green spaces can also improve the microclimate.

[16] For more details, see Report 128-0948-REA.

9.2.1.3.2 Alternatives with lower GHG emissions

CRC is a greenfield project aiming to significantly increase the output of metallurgical products. It is commonly known that steel plants have a considerably carbon footprint due to GHG emissions.

CRC's process solutions designed by Danieli, initially assume the need to minimise GHG emissions. Given that CRC is a major source of GHG emissions and given a cumulative nature of this impact, a GHG management strategy should apply to the whole plant as other facilities of UMK have a certain carbon reduction potential.

In 2023, UMK commissioned a detailed resource efficiency audit. The audit report [12] analysed a series of resource efficiency measures (REMs) in order to improve resource and energy efficiency of UMK:

- REM 1 Scrap preheating by Consteel technology;
- REM 2 Hot charge in rolling mill reheating furnace;
- REM 3 Usage of process' released gas from iron alloys production to generate electricity (Organic Rankine Cycle group or steam generator);
- REM 4 Usage of process released gas from Coke production to generate electricity;
- REM 5 Usage of workshops roofs' space to generate electricity through installation of photovoltaic solar panels;
- REM 6 Revamping of the rolling mill.

UMK reviewed the report and gave their comments.

Based on a recommendation from the lender's consultant, alternative solutions with lower GHG emissions were assessed as part of the ESIA process. This analysis is given in Report 128-0948-REA [13].

Following a review of the efficiency proposals [12] and UMK's comments [13], REM 2 - Hot charging in rolling mill reheating furnace was recommended as the most suitable measure for implementation capable of providing a significant increase in energy efficiency of UMK while reducing greenhouse gas emissions. It should be noted that the design of the proposed CRC by Danieli already envisages hot charging of the rolling mill's reheating furnace.

Based on the combination of performance indicators, it also seems reasonable to take into further development REM 4 – Coke oven gas recovery.

The estimated efficiency of the proposed measures is given in Table 9.2.3

Table 9.2.3 Assessment of efficiency of GHG-reducing measures

#	Parameter	Hot charge in rolling mill reheating furnace in SRS-2	Coke oven gas recovery
1.	Natural gas savings, mln m3/y	9,6	7,0
2.	Reduction of CO2 emissions, tpy	19 796	14 412
3.	Estimated electricity savings, MW*h/year	39 117	28 478

In addition to the hot charging of SRS-2 furnace, UMK is recommended to consider hot charging of the furnace of SRS-1 by delivering hot slabs from the Electric Steel Melting Shop in thermally insulated wagons.

9.2.1.4 Assessment results

Proposals on activities, monitoring and reporting are given in Table 9.2.4.

The matrix of environmental impact assessment related to GHG emissions is given in Table 9.2.4.

It was established that the proposed activity will have a moderate significance in terms GHG emissions; the residual impact will be low, taking into account the proposed measures to prevent, minimise and compensate for GHG emissions[17].

[17] Assessment for the operation stage.

Table 9.2.4 Measures to prevent and mitigate the impacts associated with greenhouse gas emissions

No.	Activity/ process	Objective	Measures	Applicable requirements[18]	Monitoring	Method of implementation / reporting
I.	**Operation stage**					
1 .	• Main production process • Support of main production activities • Transport and logistics (delivery of raw materials and materials, fuels and lubricants, shipment of products, other transportation)	• Prevention and minimisation of GHG emissions • Compensation for the company's contribution to carbon footprint	• Development of a GHG emission management system (policy, procedures, resources, monitoring, reporting) • Using the possibilities of renewable energy • Increasing the energy efficiency of production and heat recovery • Use of purchased slag-forming materials • Use of secondary raw materials • Use of recyclable raw materials • Implementation of GHG absorption projects (landscaping of UMK and adjacent territories)	• IFC General EHS Guidelines Section 1.1 • IFC EHS Guidelines for Steel Mills Section 1.1 • ISO 14064-1:2018 Greenhouse Gases - Part 1: Specification with Guidance at the Organisation. Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals • ISO 14064-2:2019 Greenhouse Gases - Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancement • ISO 14064-3:2019 Greenhouse Gases - Part 3: Specification with Guidance for the Verification and Validation of Greenhouse Gas Statement • ISO 14067:2018 "Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification"	• Monitoring the implementation of measures to reduce GHG emissions (monitoring procedures may include schedules, roles and responsibilities, equipment, resources and methods for providing, assessing, measuring, calculating, summarising and analysing relevant data)	• Inventory of sources and quantitative assessment of GHG emissions of UMK (Scope 1,2,3) • Assessment of the carbon footprint of products • Assessment of the carbon intensity of UMK production processes against best practices / BAT (benchmark analysis) • Measurement programme to reduce GHG emissions: assessment of the effects following implementation of measures at UMK • Preparation of carbon reporting of UMK • Verification of the carbon reporting of UMK (optional)

[18]Only the key guiding documents are presented. As a rule, other documents are also used during the GHG inventory, for example, GHG Protocol Corporate, GHG Protocol Scope 3, GHG Calculation Tools, IPCC Guidelines for National Greenhouse Gas Inventories etc.

Table 9.2.5 Matrix of environmental impact assessment related to GHG emissions

Life cycle stage: operation

Recipient: Ambient air (climatic conditions)

Recipient's sensitivity: medium

Impact characteristic

Impact	Climate impacts associated with GHG emissions		**Direction**	**Genesis**	**Mechanism**
			adverse	direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long term	reversible	Medium	Moderate
Consequences	Violation of the living conditions of the population (through environmental factors influence on physiological processes), impacts on flora and fauna, soils, indirect impacts on the economy (industry and agriculture)				
Measures	• Development of a GHG emission management system (policy, procedures, resources, monitoring, reporting) • Using the possibilities of renewable energy • Increasing the energy efficiency of production and heat recovery • Use of purchased slag-forming materials • Use of secondary raw materials • Use of recyclable raw materials • Implementation of GHG absorption projects (landscaping of UMK and adjacent territories)				
Residual impact	**Extent**	**Duration**	**reversibility**	**Value**	**Significance**
	Local	Long term	Reversible	Minor	Low

9.2.2 Climate risk assessment

Climate risks, in terms of the probability of occurrence and the expected amount of losses, are among the most significant, threatening the global economy both now and in subsequent decades [11].

The climate risks include the risks of extreme weather events, as well as the risks that the economy will not be able to effectively mitigate and/or adapt to the effects of climate change and the risks of natural disasters.

The economic sectors most affected by extreme weather events and natural disasters typically include agriculture, fisheries, food processing, construction, trade, energy, tourism and transport.

The efforts of the world community to combat climate change have led to the emergence of climate risks that are not related to extreme events and/or long-term dynamics of climate characteristics, but are the result of the adoption of the green agenda in the economy. Examples of such risks include banning or limiting investment in carbon-intensive industries that have an impact on climate change.

Thus, taking into account the above, and the results of the GHG emissions assessment (see Section 9.2.1), there are obvious prerequisites that the CRC project may become exposed to climate risks. It is advisable to consider how exactly the climate agenda can affect the planned activities.

9.2.2.1 Regional context

9.2.2.1.1 General information

According to the Global Climate Risk Index (2021), Uzbekistan is not among the countries most affected by climate change, however, the geographical location and dependence of the country's economy on agriculture makes the country vulnerable to the effects of global warming [10].

Estimated warming rates in Uzbekistan exceed the projected global average temperature increase. According to the Country Climate Risk Profile prepared by the World Bank and the Asian Development Bank, average temperatures in Uzbekistan are expected to increase by 5.6°C by 2090 compared to 1986-2005 temperatures. [4].

In Uzbekistan in 1950-2013, temperatures have been rising by an average of 0.27°C per decade. The range of average annual temperatures in Uzbekistan has decreased over the same period, with the average minimum air temperature increasing by 2.0°C, the average maximum temperature increasing by 1.6°C between 1950 and 2013, and the number of hot days and nights is increasing , the daily temperature in summer can exceed 48°C.

Uzbekistan is among the twenty most drought-prone countries in the world [4]. Uzbekistan's arid climate and high temperatures are making droughts an increasingly regular occurrence, with an average of one drought every five years in the 1980s and 1990s and four droughts between 2000 and 2012.

The rivers of Uzbekistan, including the river Syrdarya, on which the UMK water supply ultimately depends, suffers from unstable feeding: climate warming leads to a reduction in snow cover and an increase in water evaporation in the catchment areas in the mountains.

A significant increase in the duration and scale of droughts in Central Asia is predicted by the end of this century with global warming levels of 1.5°C, 2.0°C and 3.0°C [4].

Droughts of this magnitude, which are currently extremely rare in Central Asia (100-year droughts), are projected to become 4-10 times more frequent under the same warming scenarios.

Droughts in Uzbekistan in 2000 and 2001 led to severe economic and social consequences due to the loss of agricultural products and the impact on the health of residents.

In general, settlements and important infrastructure can be affected by heat waves in summer and floods in spring.

An analysis of changes in the average monthly air temperature over a thirty-year observation period (1988-2018) according to Post 6 of the Bekabad meteorological station shows an upward trend (Figure 9.2.1).

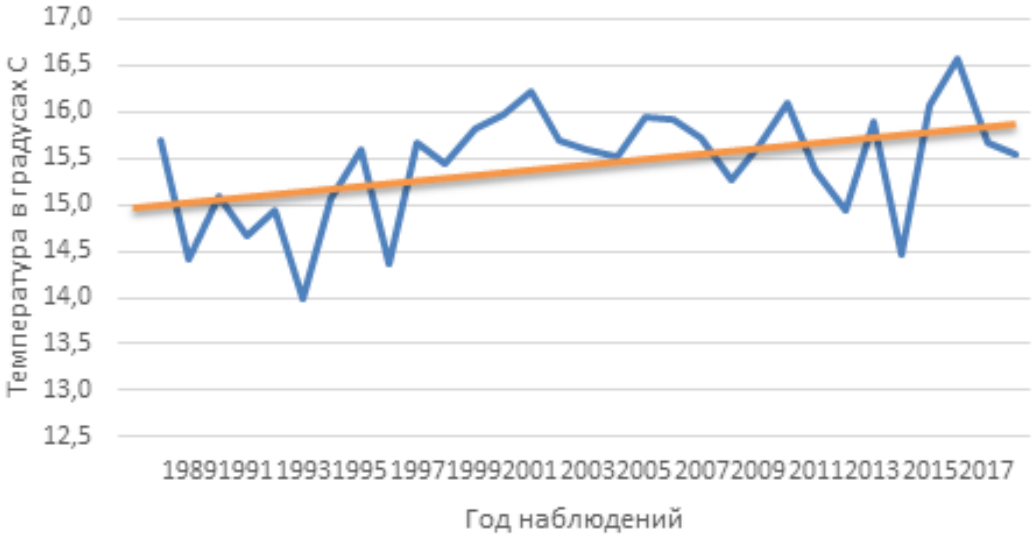

Figure 9.2.1 Average monthly air temperature (°C) in 1988-2018 according to data from Post 6 of the Bekabad weather station [7]

9.2.2.1.2 CCKP's climate change projections

Most of the current climate risks are mainly determined by the trend towards global warming.

The World Bank Group created a special web site – the Climate Change Knowledge Portal (CCKP) – used during environmental and social assessments of projects. The main data source for the Portal is the Coupled Model Inter-comparison Project Phase 5 (CMIP5) models, which are utilised within the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).

This models provide estimates of future temperature and precipitation. Four Representative Concentration Pathways (i.e. RCP2.6, RCP4.5, RCP6.0, and RCP8.5) were selected and defined by their total radiative forcing (cumulative measure of GHG emissions from all sources) pathway and level by 2100. In the analysis for Uzbekistan, RCP2.6 and RCP8.5, the extremes of low and high emissions pathways, are the primary focus where RCP2.6 represents a very strong mitigation scenario and RCP8.5 assumes business as-usual scenario. However, other scenarios are also considered including RCP1.9, which limits global warming to below 1.5 °C – the target value set by the Paris Agreement.

The climate projections for Uzbekistan given in [14] are derived from datasets available through the CCKP. These datasets are processed outputs of simulations performed by multiple General Circulation Models (GCM).

Due to the differences in the way GCMs represent the key physical processes and interactions within the climate system, projections of future climate conditions can vary widely between different GCMs, this is particularly the case for rainfall related variables and at national and local scales.

CMIP5 models indicate a steady warming trends irrespective of GHG emission standards, while precipitation projects vary strongly despite the fact that average annual precipitation has not shown statistically significant changes in Uzbekistan in recent decades [14].

The intensity of extreme rainfall events appears to be increasing with temperature.

Tables 9.2.6 and 9.2.7 provide information on temperature projections for the four RCPs over two distinct time horizons presented against the reference period of 1986-2005 [14, 15].

Table 9.2.6 Projected anomaly (changes °C) for maximum, minimum, and average daily temperatures in Uzbekistan from the reference period of 1986–2005 for all RCPs.

РТК	Average daily maximum temperature		Average daily minimum temperature		Average daily temperature	
	2040-2059	2080-2099	2040-2059	2080-2099 гг.	2040-2059	2080-2099
RCP2.6	1.5 (−0.5, 3.8)	1.5 (−0.5, 3.6)	1.4 (−0.2, 3.4)	1.3 (−0.3, 3.3)	1.4 (−0.4, 3.3)	1.3 (−0.5, 3.2)
RCP4.5	1.9 (0.1, 4.1)	2.7 (0.7, 4.9)	1.8 (0.2, 3.7)	2.6 (0.7, 4.6)	1.9 (0.0, 3.9)	2.5 (0.4, 4.7)
RCP6.0	1.8 (0.0, 3.7)	3.4 (1.4, 5.7)	1.6 (0.0, 3.5)	3.2 (1.5, 5.3)	1.6 (−0.2, 3.4)	3.0 (1.2, 5.2)
RCP8.5	2.5 (0.5, 4.8)	5.4 (3.2, 7.8)	2.5 (0.7, 4.5)	5.3 (3.3, 7.4)	2.5 (0.6, 4.6)	5.2 (3.1, 7.5)

Note: the table is showing the median of the CCKP model ensemble and the 10–90th percentiles in brackets.

Table 9.2.7 Projections of average temperature anomaly (°C) in Uzbekistan for different seasons (3-monthly time slices) from the reference period of 1986–2005 over different time horizons and emissions pathways

Scenario	2040-2059		2080-2099	
	Jun-Aug	Dec-Feb	Jun-Aug	Dec-Feb
RCP2.6	1.6 (−0.2, 3.6)	1.6 (−0.2, 3.9)	1.5 (−0.6, 3.5)	1.5 (−0.2, 3.7)
RCP4.5	2.1 (0.2, 2.4)	4.9 (0.2, 3.8)	2.9 (0.9, 5.2)	2.7 (1.1, 4.7)
RCP6.0	1.8 (0.3, 3.5)	1.8 (0.0, 4.0)	3.7 (1.7, 5.7)	3.3 (1.5, 5.4)
RCP8.5	2.9 (0.9, 4.9)	2.3 (0.4, 4.3)	6.0 (3.7, 8.4)	4.9 (3.3, 6.4)

Note: the table is showing the median estimates of the full CCKP model ensemble and the 10th and 90th percentiles in brackets.

Figure 9.2.2 shows the projected average temperature anomaly and projected annual rainfall anomaly in Uzbekistan, with outputs of 16 GCMs simulating RCP8.5.

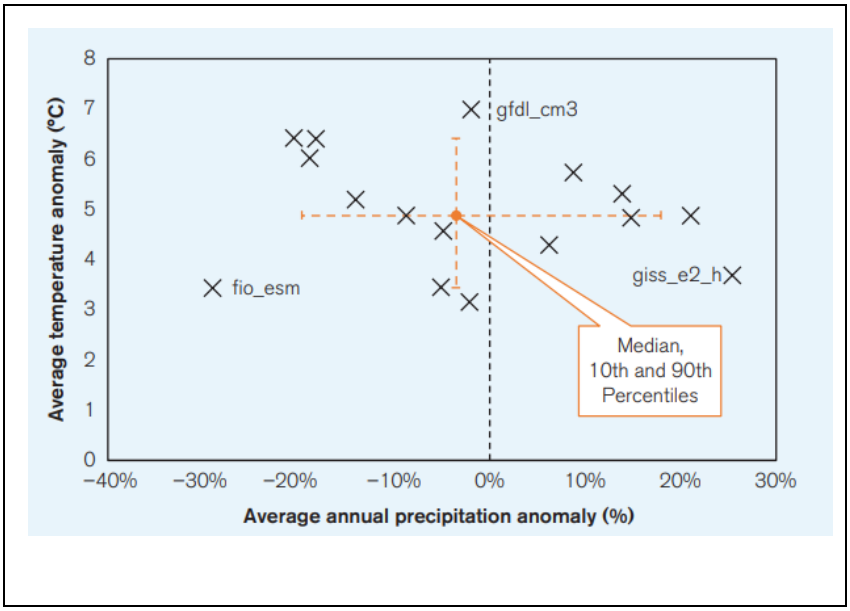

Figure 9.2.2 Projected average temperature and rainfall anomaly in Uzbekistan. Three models are labelled [19]

As seen in Figure 1, individual climate models projections can vary between a 30% reduction in annual precipitation and a 20% increase. While considerable uncertainty surrounds projections of local long-term future precipitations, some global trends are evident.

Spatial variation of future projections of annual temperature and precipitation for mid and late 21st century under RCP8.5 is presented in Figure 9.2.3.

[19] Outputs of 16 models within the ensemble simulating RCP8.5 over the period 2080–2099.

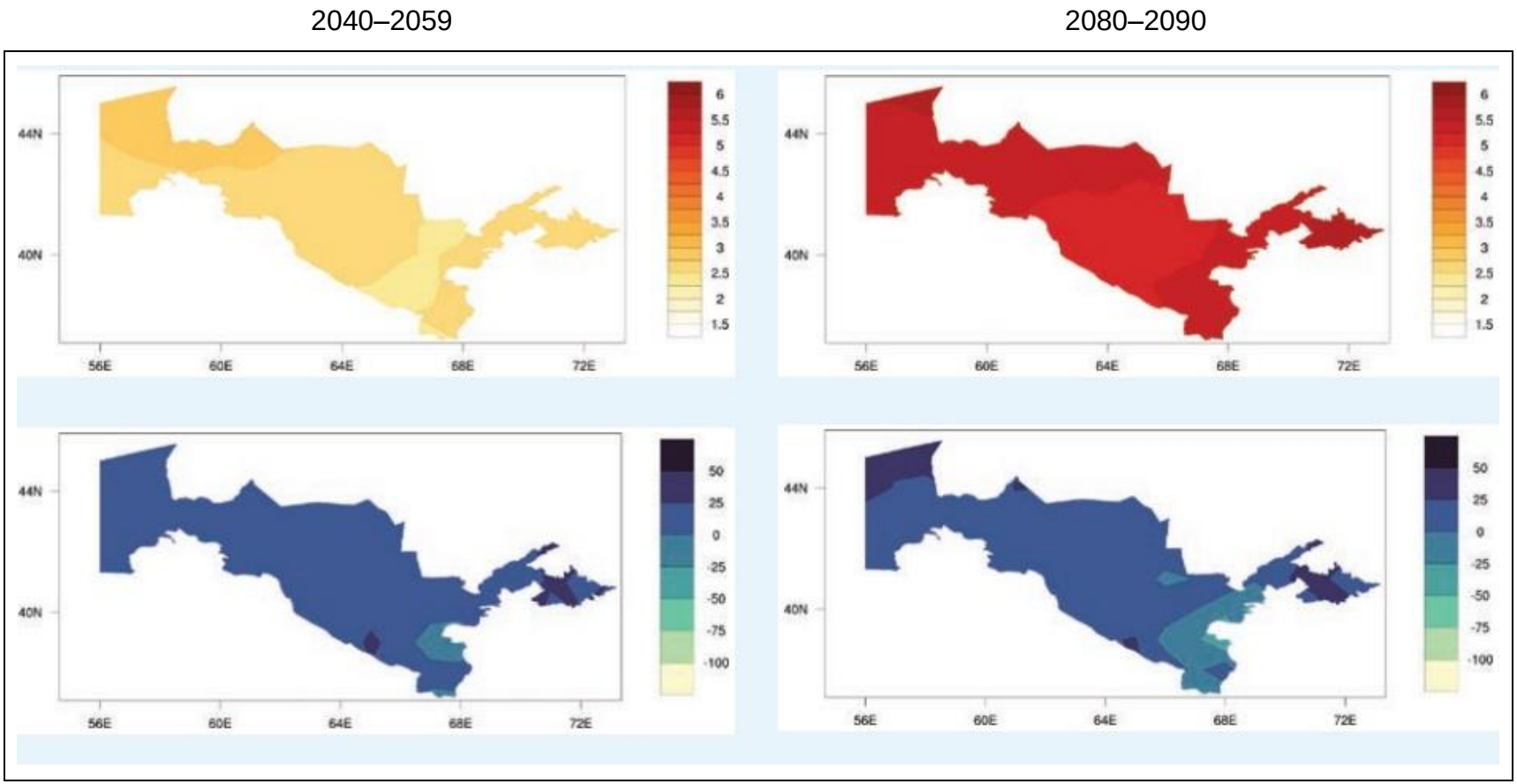

Figure 9.2.3 CMIP5 ensemble projected change in annual temperature and precipitation relative to 1986–2005 baseline under RCP8.5 [15]

As was noted above, the model ensemble does not tell a consistent story regarding changes in average annual precipitation over Uzbekistan. This uncertainty even in the sign of the change is evident across all four emissions pathways and at different time horizons (see Figure 9.2.4 below).

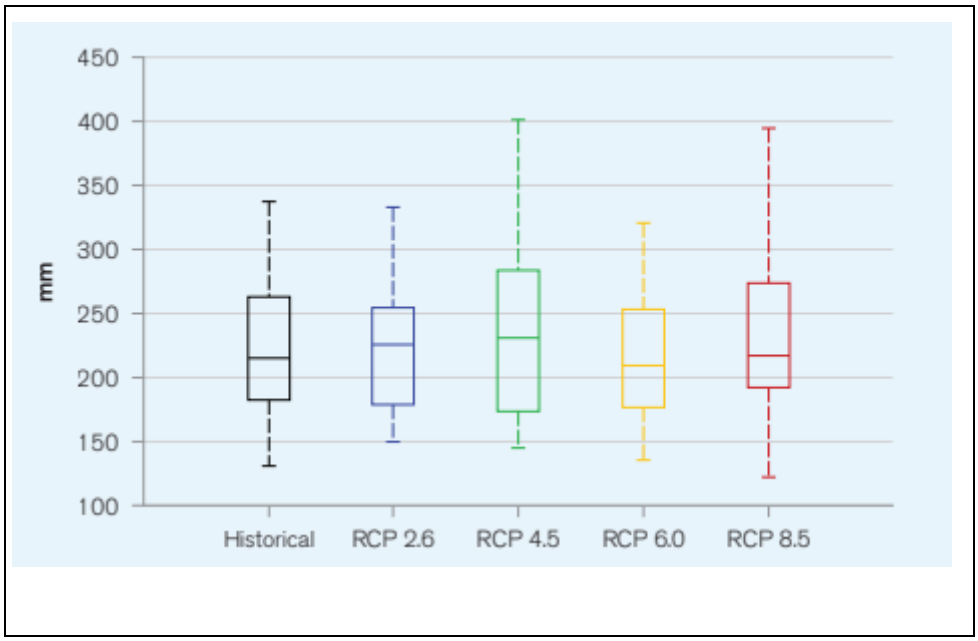

Figure 9.2.4 Projected annual average precipitation for Uzbekistan in the period 2080–2099 for different RCPs [16]

The intensity of sub-daily extreme rainfall events appears to be increasing with temperature.

The CCKP model ensemble also suggests that the total precipitation deposited during an extreme 5-day event in Uzbekistan could increase slightly (0%–20% depending on the emissions pathway). However, this phenomenon is highly dependent on local geographical contexts [14].

In addition to general climate changes associated with GHG emissions as described above, natural risks that depend on climate conditions should also be considered.

In general, Uzbekistan is close to the global median in disaster risk rating, with a ranking of 112 out of 191 countries in the INFORM Index. The country's risk score is driven upwards by its very high exposure to earthquakes: with a score of 9.9 out of 10, Uzbekistan ranks joint 2nd highest in the world. However, this factor is not related to climate.

The country also ranks in the top 20 in the world in terms of its exposure to drought. Linked to this Uzbekistan also faces a high hazard from wildfires. Uzbekistan faces above-average levels of flood hazard. These scores are offset by proportionately low levels of vulnerability and moderate levels of coping capacity (Table 9.2.8).

Table 9.2.8 Selected indicators from the INFORM 2019 Index for Risk Management for Uzbekistan

Flood (0–10)	Tropical Cyclone (0–10)	Drought (0–10)	Vulnerability (0–10)	Lack of Coping Capacity (0–10)	Overall Inform Risk Level (0–10)	Rank (1–191)
6.3 (4.5)	0.0 (1.7)	6.6 (3.2)	1.9 (3.6)	4.0 (4.5)	3.1 (3.8)	112

Note: For the sub-categories of risk higher scores represent greater risks. Conversely, the most at-risk country is ranked 1st. Global average scores are shown in brackets.

This assessment also used another electronic resource of the World Bank Group – ThinkHazard! (https://thinkhazard.org/en/).

This web-based tool highlights the natural hazards present in a project area, which can better prepare the project for potential hazards and climate change [17].

The results interface for a selected location shows whether high, medium, low or very low awareness of each hazard is required. ThinkHazard! also provides recommendations and guidance on how to reduce the risk from each hazard within the project area. The hazard rating is based on publically available data and information from a number of private, academic and non-governmental organisations.

For Uzbekistan (Bekabad district), the rating of hazards directly or indirectly determined by climate processes is as follows:

- River flood – high;
- Urban flood – high;
- Wildfire – high;
- Water scarcity – medium;
- Landslide – low.

9.2.2.2 Assessment methodology

Climate risks are systematically identified in the documents of the Task force on Climate-Related Financial Disclosures (TCFD), the Financial Stability Board of the G20, as well as through the work of various associations and regulators. Since 2017, the TCFD Guidelines have become the de facto international standard for climate financial risk disclosure.

In 2021, the TCFD updated the 2017 Information Disclosure Guidelines. The structure of the recommendations was retained, but now organisations have to disclose relevant information regardless of the assessed significance of GHG emissions [1].

The TCFD states that more and more countries are recommending or requiring the use of the organisation's standards for ESG disclosures. In 2021, 2600 companies in the world adhere to the TCFD recommendations (against 1500 a year earlier).

The purpose of implementing the TCFD recommendations is to develop tools (measures) for disclosing information about corporate risks that arise in connection with global climate change, to improve the awareness of stakeholders and increase the transparency of investments, lending and insurance.

The TCFD recommendations help develop an effective and unified system for reporting information on the impact of climate change-related risks on an organisation's business and suggest using the following climate risk categorisation:

- physical risks - risks associated with natural phenomena arising from climate change. Physical risks are divided into:
  - acute risk associated with sudden events;
  - chronic risk associated with long-term climate change;
- transition risks - risks associated with the transition to a low-carbon economy, which are divided into:
  - policy and legal risks;
  - technology risks;

- market risks;
- reputation risks.

Physical risks resulting from damage and/or other losses from physical natural events are associated with both long-term climate trends (e.g. changing weather conditions) and sudden, urgent events (natural disasters, extreme weather conditions).

For the conditions of the UMK region, a physical risk may be associated with abnormal heat, to a lesser extent - with floods, given that the flow of the main water bodies in the UMK region is the river Syrdarya and the connected Dalverzin Channel are regulated by the dam of the Farkhadskaya HPP.

Uninsured losses resulting from physical risks can put an additional financial burden on the plant and potentially lead to adverse consequences in the plant's supply chain and even affect insurers and banks financing UMK projects (in particular, the CRC project).

Transition risks are associated with the movement of economies towards a low-carbon economy, determined by a decrease in the level of use of hydrocarbon raw materials and / or other natural resources, as well as an increase in the share of renewable energy.

The transition to a new economy is shaping political, legal, technological and market changes due to the emergence of requirements for the prevention / minimisation of climate change and adaptation to them.

Examples of transition risks recognized by regulators and the banking community are policy and regulatory reforms for carbon-intensive industries. It is clear that metallurgy, and in particular the activities of UMK, are characterised as significant in terms of carbon footprint, as shown in Section 9.2.1.

Such changes can significantly affect investment processes and insurance. At the same time, civil and public activity aimed at refusing to support the relevant industries can cause reputational damage.

The risk of transition can materialised for UMK in terms of the emergence of new taxes and fees related to hydrocarbon emissions, restrictions on cooperation with companies that do not take into account ESG factors for banks and insurance companies.

It is important to note that the process of transition to green economy is long-term in nature - adverse consequences are unlikely to affect the activities of the plant in a significant way in the short term (especially given the lack of developed regulation of this area at the national level). Nevertheless, banks, investment companies, and the insurance business are taking measures to appropriately adjust the requirements for borrowers, which may also have an impact on UMK's investment plans.

It should be noted that the consequences for the banking and insurance community, investment projects and economic entities themselves are formed not only by these risks - climate change, institutional reforms also create corresponding opportunities, among them:

- benefits from the use of low-carbon energy sources;
- access to new markets;
- the benefits of green finance;
- favourable consequences of production modernisation.

9.2.2.3 Characterisation of climate risks

Implementation of the TCFD methodology [1] involves assessing the impact of climate change on the activities of the UMK as a whole, since the presence of a common

infrastructure excludes the possibility of assessing the corresponding risks solely for the CRC project.

Physical risks

Physical risks are risks directly related to climate change in the region where the plant operates and the resulting natural and man-made phenomena.

Characteristics of the physical climatic risks of UMK are presented in Table 9.2.9.

Table 9.2.9 Physical climate risks

Risk	Description	Period	Optimistic scenario RCP1.9	Balanced scenario RCP2.6	Pessimistic scenario RCP8.5	Impact on financial performance	Possible risk prevention/mitigation measures
Emergency risks							
Droughts and fires	- Lack of water resources needed for production processes - damage to property (equipment) - economic consequences of the drought for the economy of the country as a whole and indirect impact on the plant	Short term, Medium term	Average probability	High probability	High probability	High damage	- Closed water cycle - elimination of water losses - use of groundwater (drainage) water resources - improvement of the fire safety system
Landslides and mudflows	Property damage	Short, medium term	Low probability	Low probability	Low probability	Low damage	Not required
Floods	Damage to the property of the plant - equipment, buildings, structures, infrastructure (power lines, road network)	Short, medium term	Low probability	Average probability	Average probability	High damage	- Short-term monitoring of the level regime of the river Syrdarya and Dalverzin Channel - medium- and long-term forecasts of the level regime - timely response to unfavourable forecasts, in particular, the implementation of engineering protective measures (if necessary)
Systematic risks							
Rise in air temperature	Changing modes (conditions) of equipment operation, potentially - disruption of equipment operation	Medium-term, Long-term	Low probability	Low probability	Low probability	Low damage	Not required

Risk	Description	Period	Optimistic scenario RCP1.9	Balanced scenario RCP2.6	Pessimistic scenario RCP8.5	Impact on financial performance	Possible risk prevention/mitigation measures
Rise in air temperature	Adverse impact on staff health	Medium-term, Long-term	Low probability	Average probability	High probability	High damage	The use of technologies (systems) that ensure the working conditions of personnel that meet sanitary standards
Reducing the runoff (water content) of the river Syrdarya	Deficit of water resources for industrial water supply	Long term	Low probability	Low probability	Average probability	Average damage	- Diversification of water supply sources - reduction of water intensity of the main production and auxiliary processes - elimination of water resource losses
Shortage (availability) of fuel and energy resources	Downsizing and/or shutting down production	Long term	Low probability	Low probability	Average probability	High damage	- Diversification of sources of heat and energy supply, in particular - transition to alternative sources (in the long term) - increasing the energy efficiency of production

Transition risks

Transition risks are the legal, technology, market and reputational risks associated with the transition to a low-carbon economy. As a rule, these risks are usually associated with a decrease in the level of use of hydrocarbon raw materials and other natural resources, as well as with the transition of the economy to renewable energy sources.

Possible transitional climate risks of UMK and the CRC project are discussed in Table 9.2.10.

Table 9.2.10 Transition climate risks of the plant

Risk	Characteristic	Effects
Regulatory risks (carbon taxation and other regulatory changes)	According to the World Bank forecast, by 2050, half of the greenhouse gases generated by carbon-intensive industries will fall under local and global regulatory reforms, including mandatory reporting and carbon taxation	• Loss of competitive advantage due to the introduction of low-carbon technologies by competitors - difficulties in marketing products • regulatory, pricing, tax restrictions - an increase in the cost of production • decrease in the financial result of product exports due to the cross-border tax on the plant's products • an increase in prices for raw materials purchased in other countries and / or a decrease in the availability of such raw materials
Technology risks	The impossibility of adequate restructuring (modernisation) of production technology, taking into account the increased interest of stakeholders (the state, financial organisations) in the problems of climate change	The lack of a workable financial model that ensures timely modernisation of production, taking into account current requirements, as a result - a decrease in the competitiveness of products
Market risks	Introduction of market mechanisms for trading in carbon units	• Increase in operating costs, growth of costs in connection with the preparation and verification of climate reports (including those on GHG emissions) • increase in the cost of attracting financing and / or / limiting opportunities for growth - an increase in the cost of debt financing
Reputational risks	In the global investment climate, there is a trend towards an increased attention of investors and financial institutions to the environmental and social responsibility of organisations	• Decreased investment attractiveness • reduced demand for high-carbon goods

9.2.2.4 Assessment of climate opportunities

Along with risks, the TCFD methodology also considers climate opportunities for proposed activities.

As a rule, opportunities are associated with:

- introduction of low-carbon / renewable energy sources;
- use of green financing mechanisms (for example, green bonds);
- access to new markets;
- modernisation of production.

Cost optimisation

By reducing the consumption of fuel and energy resources, as well as using secondary raw materials in the technological process in order to reduce the generation of greenhouse gases, the plant can significantly reduce the cost of products.

It is important to note the opportunities associated with the high potential of RES (solar and wind energy) in the area of the proposed activity. However, it must be taken into account that the energy needs of metallurgical production cannot be met solely by renewable energy for the reasons indicated in Section 9.2.1.

Increasing competitiveness

Contribution to the development of low-carbon technologies and products can increase the competitiveness of a business. As a result, a positive reputation of UMK as a more environmentally friendly business will be formed, and there is also an additional opportunity to improve financial performance by promptly meeting the growing demand for products of made using low-carbon technologies.

Access to new markets and funding sources

Regulatory changes associated with climate change can include not only a carbon tax and other financial costs, but also opportunities associated with investments (e.g. green bonds) in projects related to climate resilience. It is assumed that almost all UMK projects (including CRC) have a high potential for the implementation of such mechanisms.

It is recommended to consider attraction of investments based on green financing principles, for example, for construction of an in-house waste landfill.

Resistance

Preparing a plant for climate risks can help it anticipate, adapt, absorb, or recover from natural disasters caused by global climate change in a timely and efficient manner.

9.2.2.5 *Recommendations for adaptation to climate change*[20]

9.2.2.5.1 Main directions of adaptation

At the moment, UMK is at the initial stage of developing a climate strategy; detailed recommendations for responding to climate change should be worked out in the relevant documentation, and if possible should be based on the development (expansion) of the CRC Environmental and Social Management System.

The TCFD methodology recommends the following main areas:

- Organisation. The role of UMK's board of directors and management in climate risk management should be defined.
- Strategy. Disclosure of the actual and potential impact of risks and opportunities associated with climate change on the business processes of the plant (development projects).
- Management of risks. Methodology for identification, assessment and management of climate risks.
- Goals. Definition and disclosure of indicators and targets used to assess and manage climate risks and opportunities.

[20] See also Table 9.2.3.

9.2.2.5.2 Approaches to managing climate risks and opportunities

Involvement of UMK's executive team in climate strategy management

Climate change is of global importance for all sectors of the economy, so this external context of UMK's activities should be taken into account by the company's development goals and long-term strategy for creating additional value.

The involvement of UMK's board of directors and top management in decision-making on the climate agenda of the plant's activities, demonstrates a reflection of the company's long-term and systematic attitude to the problem of climate change, including taking into account important aspects in the daily activities of the plant.

Climate risks in the management system of UMK

A timely assessment of climate risks will make it possible to ensure in advance the adaptation of UMK to the consequences of climate change, in particular, to provide for the allocation of the necessary resources to prevent and / or minimise the adverse impact of climate change, or, on the contrary, to make the most of changes that can positively affect the activities of the plant, in particular to have an impact on its financial position in the future.

Identification and assessment of climate risks should be carried out in accordance with applicable requirements:

- standards:
  - ISO 14090:2019 Adaptation to climate change - Principles, requirements and guidelines;
  - ISO 14080:2018 Greenhouse gas management and related activities – Framework and principles for methodologies on climate actions;
- TCFD Guidelines.

Development of a corporate climate strategy for UMK and setting climate goals

The definition of reasonable goals and the implementation of appropriate metrics will clearly demonstrate to the personnel of the plant, stakeholders how much and how exactly the plant operates in the field of regulation of greenhouse gas emissions, and also implements measures to minimise the adverse effects of climate change. Setting specific, measurable goals creates the basis for effectively achieving emission reductions within a specific time frame.

The development of a climate strategy and policy for UMK should be based on a study (assessment) of the organisation's context, production processes and risk factors.

Key elements of UMK climate strategy:

- risks associated with climate change;
- requirements to reduce the carbon footprint;
- monitoring and evaluation of the effectiveness of implemented measures;
- reporting and external communications.

Monitoring and reporting

On a regular (annual) basis, it is recommended to assess UMK's Scope 1-3 GHG emissions in accordance with the GHG Protocol, Carbon Disclosure Project and IPCC to monitor the achievement of relevant targets.

9.2.2.5.3 Management of climate risks and reduction of carbon footprint

As the forecast in Section 9.2.1 showed that UMK's annual GHG emissions after commissioning of the CRC would exceed 100,000 tonnes of CO2 equivalent, the lender's consultant recommended, following a review of the preliminary ESIA Report, to analyse alternative options that would reduce the plant's carbon footprint (Requirements 9.2 of the Equator Principles 4). The ESIA authors performed the requested analysis of alternatives and presented their findings and recommendations in Section 9.2.1.3 of this report.

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9.3 Acoustic and vibration impacts

At the preliminary assessment stage, the vibration impact on the population is considered as insignificant (see 128-0948-SR, Section 7.10). The preliminary conclusions on the provision of sanitary standards for the level of vibration impact in the residential development area are confirmed by the measurement data, given in Report 128-0948-BLS-Noise.

Hereinafter, only acoustic effects are considered.

9.3.1 Assessment method

The calculations were made using the method from GOST 31295.2-2005, applicable in the Republic of Uzbekistan [1]. The standard is fully harmonised with ISO 9613-2:1996 Acoustics - Attention of sound during propagation outdoors - Part 2: General method of calculation.

The programme "Ecologist-Noise" implements the methodology set out in GOST 31295.2-2005 [1] (ISO 9613-2:1996); in this regard, the noise propagation calculations were made using the programme "Ecologist-Noise 2.4.4.6".

The calculated noise values and their comparison with the permissible levels, determined by SanPiN 0267-09 [2] for daytime and night-time, are accepted as a criterion for assessment of the noise impact area, which complies completely with the WHO Guidelines for Community Noise, World Health Organisation (WHO), 1999 [3].

The calculation results were also compared with the criteria set out in IFC EHS Guidelines - Environment. 1.7 Noise. 2007 [4].

The noise level for areas, adjacent to the residential development area and the official training premises:

- shall not exceed 55 dBA for daytime (from 07.00 a.m. to 11.00 p.m.) and 45 dBA for night-time (from 11.00 p.m. to 07.00 a.m.), in accordance with Table 1.7.1 of IFC EHS Guidelines [4];

  or

- shall not exceed the background values by more than 3 dB.

9.3.2 Construction stage

The main sources of noise at the CRC construction stage will be construction machinery, auxiliary mechanisms and vehicles.

The specific feature of the considered noise sources is their operation outdoors with constant movement on the construction site, while each piece of equipment may operate in different operating modes, which causes the variability, both in time and in space, of the sound energy emitted into the environment. Thus, the noise during the operation of machinery and mechanisms will be characterised by non-constant sound levels in time.

The external noise sources include:

- earthmovers (bulldozers, excavators);
- mounting equipment (truck cranes, crawler cranes);
- mobile air compressors;
- construction machines and vehicles, forklifts;

- road and railway transport (delivery of construction materials, equipment and construction wastes).

To assess the impact of noise, the simulation of noise level from the construction machinery and mechanisms' noise sources was made. The solutions for the similar facility, the construction stage of the Electrometallurgical Complex of VMZ JSC (Russian Federation), were used as initial data.

The characteristics of noise sources are presented in Tables 1.1-1.2 of Appendix 9.3.4. The location of noise sources is shown on the map in Appendix 9.3.2.

The choice of the similar facility is due to the fact that the Electrometallurgical Complex consists of the same facilities as those of UMK under designing (Electric Steelmaking Shop, Continuous Casting Machine, Rolling Mill, Oxygen Compressor Station, Distribution Substations, etc.). The equipment at VMZ as well as at UMK is supplied by Danieli (Italy).

The reference site measuring 4,760 m by 6,450 m, covering the adjacent residential development area, was assumed with the grid spacing of 50 m and the height of 1.5 m.

Taking into consideration the location of the noise sources, their acoustic characteristics, radiation directivity as well as the planning situation and regulatory requirements, the reference points RT-001 – RT-033, 050, 051, located in the residential areas adjacent to the industrial site, railway tracks and the new automobile road, were selected. In addition, 4 reference points (Appendix 9.3.3) are located within the area adjacent to the residential premises of the contractor's construction camp. The characteristics of the reference points are given in Table 2.1 of Appendix 9.3.4. The location of the reference points is shown on the map in Appendix 9.3.3.

The results of the calculation assessment (Table 3.1 of Appendix 9.3.4) show that the noise level at the reference points and at the border of UMK's SPZ at the construction stage complies with the national sanitary standards SanPiN 0267-09 [2] and WHO Recommendations [3], which fact is indicative of compliance with the requirements of IFC [4].

The table shows the comparative characteristics of the total noise level at the reference points for the current situation and the expected noise levels during the construction period, as well as the contribution into the total noise level at the reference points from the equipment during the construction works.

Table 9.3.1 Noise levels at the reference points at the construction stage

Reference point No.	Noise level (current situation), dBA	Predicted noise level, dBA	Contribution of construction machinery and mechanisms to the acoustic impact on the area adjacent to the plant, dB
1	33.60	33.70	0.1
2	32.00	34.80	2.8
3	32.70	34.60	1.9
4	32.30	34.50	2.2
5	33.60	34.30	0.7
6	33.20	33.30	0.1
7	32.30	32.30	0
8	35.90	36.40	0.5
9	29.00	29.10	0.1
10	24.40	25.20	0.8
11	37.50	37.80	0.3
12	39.30	39.40	0.1
13	31.60	31.60	0
14	36.70	39.20	2.5

Reference point No.	Noise level (current situation), dBA	Predicted noise level, dBA	Contribution of construction machinery and mechanisms to the acoustic impact on the area adjacent to the plant, dB
15	36.10	39.00	2.9
16	34.50	37.20	2.7
17	35.00	35.40	0.4
18	40.10	40.10	0
19	36.50	36.50	0
20	41.10	41.10	0
21	38.10	38.30	0.2
22	42.20	42.30	0.1
23	35.50	38.00	2.5
24	35.70	35.80	2.1
25	40.10	40.20	0.1
26	35.50	35.50	0
27	30.20	30.30	0.1
28	33.70	34.40	0.7
29	42.80	43.00	0.2
30	39.10	40.40	1.3
31	41.90	45.00	3.1
32	38.00	40.50	2.5
33	37.50	37.50	0
46	–*	38.70	–*
47	–*	40.60	–*
48	–*	41.00	–*
49	–*	38.40	–*
50	30.60	31.20	0.6
51	47.70	50.80	3.1

* Note: The calculation for the construction camp with the current situation was not made.

Based on the results, given in the table (Table 9.3.1), it may be concluded that the noise level within the period of construction works will exceed the existing noise level by 0.1 to 3.1 dB (at one point). The predicted noise level at the reference points does not exceed the regulatory values of the national [2] and IFC requirements [4]. The works at the CRC construction stage and the increase in the intensity of railway and motor transport traffic will not change much the acoustic situation within the area adjacent to the plant.

9.3.3 Operation stage

Now, the following significant noise sources, which are taken into account when predicting the acoustic situation, are located on UMK's industrial site:

- sources of technological noise penetrating from the premises to the site;
- sources of ventilation noise emitted by the open ends of air ducts;
- sources of traffic noise, determined by the movement of automobile and railway transport throughout the plan, as well as at the railroad section in the town of Bekabad and at the section of the new access motor road.

The significant noise sources, the radiation of which forms an acoustic environment in the nearest residential area and at the boundary of SPZ, have been taken into consideration.

It is assumed that after the commissioning of CRC, the noise from the enclosing structures of buildings where the equipment is installed will have a significant acoustic impact.

The noise sources are also air intake from supply ventilation systems and air discharge at exhaust systems (Appendix 9.3.1).

It is planned to increase the traffic intensity at existing railways and motor roads.

The calculation conditions and the reference points are the same as for the construction stage. The location of the reference points is shown in Appendix 9.3.3.

The results of the calculated assessment (Table 3.1 of Appendix 9.3.5) show that the noise level at the reference points and at the boundary of UML's SPZ at the CRC operation stage meets the selected criteria: national sanitary standards (SanPiN 0267-09 [2]) and WHO Recommendations [3], which fact is indicative of the compliance with the requirements of IFC [4], taking into consideration the implementation of the noise control measures.

(Table 9.3.2) presents comparative characteristics of the total noise level at the reference points for the current situation and the expected noise levels after the CRC commissioning, as well as the contribution into the total noise level at the reference points from the operation of CRC's equipment and the increase in noise caused by the increase in road and railway traffic intensity.

Table 9.3.2 Noise levels at the reference points at the operation stage

Reference point No.	Noise level (current situation), dBA	Predicted noise level, dBA	Contribution of CRC into the acoustic impact on the adjacent area, dB
1.	33.60	33.60	0
2.	32.00	32.00	0
3.	32.70	32.90	0.2
4.	32.30	32.40	0.1
5.	33.60	33.70	0.1
6.	33.20	33.30	0.1
7.	32.30	32.40	0.1
8.	35.90	35.90	0
9.	29.00	29.00	0
10.	24.40	24.80	0.4
11.	37.50	37.50	0
12.	39.30	39.30	0
13.	31.60	31.60	0
14.	36.70	36.90	0.2
15.	36.10	36.10	0
16.	34.50	34.50	0
17.	35.00	35.10	0.1
18.	40.10	40.20	0.1
19.	36.50	36.50	0
20.	41.10	41.10	0
21.	38.10	38.10	0
22.	42.20	42.20	0
23.	35.50	35.50	0
24.	35.70	35.70	0
25.	40.10	40.10	0
26.	35.50	35.50	0
27.	30.20	30.30	0.1
28.	33.70	33.80	0.1
29.	42.80	43.00	0.2
30.	39.10	40.00	0.9
31.	41.90	41.90	0
32.	38.00	38.00	0
33.	37.50	37.90	0.4
50.	30.60	31.20	0.6
51.	47.70	49.60	1.9

Based on the results, given in (Table 9.3.2), it may be concluded that the noise level after the CRC commissioning, taking into consideration the implementation of the noise control measures (see Section 9.3.4) will change the noise level in the adjacent areas by not more than 0.9 dB.

The national sanitary standards [2] as well as the WHO Recommendations [3] and the IFC requirements [4] for daytime and night-time will be ensured at all the reference points, except for areas adjacent to the railway tracks (RT 051).

The implementation of the noise control measures, provided for the noise sources of CRC, railway transport, as well as the implementation of the compensatory measures for UMK's existing noise sources are a prerequisite for the implementation of the planned activity.

9.3.4 Recommendations

9.3.4.1 Measures to prevent and mitigate impacts

Construction stage

To prevent the acoustic impact at the construction stage, the following is used:

- planning solutions. The CRC construction site is distant from the residential areas;
- restriction of movement along the railway track, at the section in Bekabad during the daytime (from 07.00 a.m. to 11.00 p.m.). The night-time traffic shall be only used if absolutely necessary.

To mitigate the acoustic impact, the following organisational and technical noise control measures are recommended:

- arrangement of construction in strict accordance with the planning, technological and technical solutions of the design;
- performance of works in accordance with good practice, compliance with the work rules, involvement of skilled personnel for the performance of works;
- monitoring of the technical state of engines of bulldozers, excavators in order to prohibit the operation of equipment emitting increased noise;
- avoidance of parking of vehicles, bulldozers and excavators with running engines at the time when works are not performed;
- reducing speed limit on the access road to 40 km/h.

As compensatory measures at the construction stage, it is suggested that silencers be installed on the fans of the supply systems of Section Rolling Shop No. 2, TUU area, and the fan of the exhaust system of the CLC, the X-ray Spectral Laboratory, sample preparation room, of UMK.

Operation stage

To prevent the acoustic impact at the operation stage, the following is used:

- planning solutions. The construction site is distant from the residential areas;
- restriction of movement along the railway track, at the section in Bekabad during the daytime (from 07.00 a.m. to 11.00 p.m.). The night-time traffic shall be only used if absolutely necessary.

At the operation stage, the following noise control measures are recommended to mitigate the impact:

- installation of silencers on the ventilation systems of the gas treatment system of CRC's Electric Steelmaking Shop, the exhaust system of the Ferroalloy Warehouse, the exhaust system of the car dumper, the exhaust system of the tunnel furnace;
- cladding with noise-absorbing materials of a part of the Electric Steelmaking Shop's building (furnace department);
- reduction of speed limit on the access road to 40 km/h.

The following noise protection activities are recommended for the operation stage:

- Installation of dampers on ventilation systems of the gas treatment system of ESMS at CRC, on the aspiration system at the ferroalloy warehouse, on the aspiration system of the car dumper, and on the exhaust system of the tunnel furnace;
- Cladding of a part of the ESMS building (furnace area) with sound-absorbing materials.

As compensation measures at the operation stage, the same measures are suggested as at the construction stage.

The suggested measures comply with the Recommendations [4].

9.3.4.2 *Monitoring and reporting*

To confirm the compliance with the national and international standards of acoustic impact, the measurements of noise levels at the points, which meet simultaneously the following conditions, are provided:

- the closest approach to SPZ's boundary;
- the closest approach to the main sources of noise of the plant;
- prevention of the influence of other sources of noise not related to UMK and associated facilities (if possible).

To measure the noise impact of the plant, the reference points, located at the boundary of the estimated SPZ of UMK, at the height of 1.2 m, with the microphone in the direction of UMK's site, are suggested.

Noise from traffic moving along the access road will be measured at Noise Control Point 7, which is the nearest point of the noise source to the residential area.

Table 9.3.3 Characteristics of the reference points for noise and vibration levels

Point No.	Address	Distance to UMK's industrial site, m
Noise control point 1	No. 3 15th midrodistrict, Buyuk Ipak Uyli str.	1463
Noise control point 2	Opposite the greenhouse farm, No. 11 Gulistan str.	365
Noise control point 3	No. 25 Beruniy str., the settlement of Kirovsky	90
Noise control point 4	Tinchlik str.. the settlement of Kirovsky	103
Noise control point 5	Opposite the Metallurg Stadium	284
Noise	No. 2 Tinchlik str., Finnish settlement	233

Point No.	Address	Distance to UMK's
control point 6		
Noise control point 7	Dalvarzin Block 8, the nearest residential house to the right of way of an associated facility (the access road)	138

The location of the noise control points is shown on the schematic map Appendix 9.1.4.

The noise control is planned to be carried out by two indicators:

- sound pressure levels in octave bands with mean geometric frequencies of 31.5-8,000 Hz;
- equivalent sound level (sound level), adjusted by scale "A".

Taking into consideration the constant work of a number of UMK's subdivisions, the noise levels are measured in the daytime and night-time, during the operation of the maximum number of facilities that determines the noise emission with the highest levels.

The duration of measurements is taken according to [24] in order to determine all the necessary normalised noise parameters.

The periodicity is at least 4 days of measurements.

If the excess impact of noise from UMK's sources on the residential areas is determined, the corrective actions shall be taken:

- identification of sources that cause excess of regulatory noise levels;
- development and implementation of additional noise control measures.

The suggestions for monitoring and reporting are given in Table 9.3.4 (Table 9.3.4).

In addition to measurement of noise levels, it is necessary to inspect the construction site (at the operation stage at the industrial site) in order to monitor the implementation of organisational and technical measures. The list of activities is given in Section 9.3.4.1.

9.3.5 Assessment results

The matrix of results of the acoustic impact assessment (characterisation of acoustic impact) is given in (Table 9.3.5).

It is established that the impact of the planned activity on the acoustic environment is assessed as follows[21]:

- at the construction stage – negligible;
- at the operation stage – low.

[21] Residual effects after the implementation of measures.

Table 9.3.4 Measures to prevent and mitigate acoustic effects

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
4.	• Construction works (earthwork, general construction works) • Transportation and logistics (delivery of raw materials, fuels and lubricants, other transportations)	• Prevention of acoustic effects on the population • Mitigation of the impact of noise exposure levels on the population • Compensation for the acoustic impact on the population	• Planning solutions (distance from the residential areas) • restriction of movement of railway trains within Bekabad • reduction of speed limit on the access road to 40 kph • arrangement of construction in strict accordance with the planning, technological and technical solutions of the design • performance of works in accordance with good practice, compliance with the work rules, involvement of skilled personnel for the performance of works • monitoring of the technical state of engines of bulldozers, excavators in order to prohibit the operation of equipment emitting increased noise • avoidance of parking of vehicles, bulldozers and excavators with running engines at the time when works are not performed • installation of silencers on UMK's existing ventilation systems	- IFC General EHS Guidelines, Section 1.7 Noise - SanPiN 0267-09 - GOST 23337-2014 (ISO 1996-1:2016, ISO 1996-1:2017)	• Measurement of noise levels in adjacent residential areas in accordance with the suggested schedule • inspections of the construction site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • training of construction contractors' personnel and maintaining their awareness • reporting on the results of noise measurement • reporting on inspection results
II.	**Operation stage**					
5.	• Primary production process • Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations)	• Prevention of acoustic effects on the population • Mitigation of the impact of noise exposure levels on the population • Compensation for the acoustic impact on the population	• Planning solutions (distance from the residential areas) • restriction of movement of railway trains within Bekabad • reduction of speed limit on the access road to 40 kph • installation of silencers on the ventilation systems of the gas treatment system of CRC's Electric Steelmaking Shop, the exhaust system of the Ferroalloy Warehouse, the exhaust system of the car dumper, the exhaust system of the tunnel furnace • cladding with noise-absorbing material of a part of the Electric Steelmaking Shop's building (furnace department) • installation of silencers on UMK's existing ventilation systems	- IFC General EHS Guidelines, Section 1.7 Noise - SanPiN 0267-09 - GOST 23337-2014 (ISO 1996-1:2016, ISO 1996-1:2017)	• Measurement of noise levels in adjacent residential areas in accordance with the suggested schedule • inspections at the industrial site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • reporting on the results of noise measurement • Reporting on inspection results

Table 9.3.5 Matrix of acoustic impact assessment results

Life cycle stage: construction

Recipient: population

Recipient's sensitivity: medium

Impact characteristics

Impact	Acoustic impact on areas with specified environmental quality parameters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Disturbance of the living conditions of the population (impact on the central nervous system and mental health)				
Measures	• Planning solutions (distance from the residential areas) • restriction of movement of railway trains within Bekabad • arrangement of construction in strict accordance with the planning, technological and technical solutions of the design • performance of works in accordance with good practice; compliance with the work rules; involvement of personnel, having necessary skills, for the performance of works • monitoring of the technical condition of engines and exhaust systems of vehicles, bulldozers, excavators in order to prevent the operation of equipment emitting increased noise • prevention of parking of automotive equipment and vehicles with running engines as well as bulldozers and excavators at the time when the work is not performed • operation of vehicles allowing them to move without unnecessary loads on the engine and vibrations of the body and cargo. • installation of silencers on UMK's existing ventilation systems				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Negligible

Life cycle stage: operation

Recipient: population

Recipient's sensitivity: medium

Impact characteristics

Impact	Acoustic impact on areas with specified environmental quality parameters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Disturbance of the living conditions of the population (impact on the central nervous system and mental health)				
Measures	• Planning solutions (distance from the residential areas) • restriction of movement of railway trains within Bekabad • installation of silencers on the ventilation systems of the gas treatment system of CRC's Electric Steelmaking Shop, the exhaust system of the Ferroalloy Warehouse, the aspiration system of the car dumper, the exhaust system of the tunnel furnace • cladding with noise-absorbing material of a part of the Electric Steelmaking Shop's building (furnace department) • installation of silencers on UMK's existing ventilation systems				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Reversible	Low	Low

References

1. GOST 31295.2-2005 (ISO 9613-2:1996) "Noise. Attenuation of sound during propagation outdoors. Part 2. General method of calculation".
2. SanPiN 0267-09 "Sanitary Rules and Regulations for Ensuring of Allowable Noise in Residential, Public Buildings and Within the Residential Development Area".
3. Guidelines for Community Noise, World Health Organisation, 1999.
4. IFC. General Environmental, Health, and Safety Guidelines.

9.4 Impacts related to waste generation

The section presents an analysis of the waste management system at the stages of construction and operation of UMK's CRC as well as recommendations in this aspect.

The section has been prepared taking into consideration the requirements of the technical assignment, the national requirements in the laws of the Republic of Uzbekistan and the requirements of IFC [1-5].

The recommendations for mitigation of impacts have been developed in accordance with the requirements of IFC [3-5].

9.4.1 Analysis of the existing waste management system

In 2020, UMK developed a design of environmental standards for generation and disposal of wastes, which obtained a positive opinion from the State Environmental Expert Board.

According to the design of environmental standards for generation and disposal of wastes, 48 types of wastes are generated at the plant, of which: 1 type of wastes of class 1 (highly hazardous) is formed, 4 types of wastes of class 2 (hazardous), 12 types of wastes of class 3 (moderately hazardous), 18 types of wastes of class 4 (low-hazard), 13 types of wastes of hazard class 5 (almost not hazardous).

The total amount of wastes, generated at the plant, is 297,816.737 t/y, of which: industrial wastes - 285,671.994 t/y (95.9%); household wastes [22]- 12,144.743 t/y (4.1%).

According to the inventory, wastes of hazard class 1 and 2 are temporarily placed on dedicated sites.

Then the wastes are transferred to dedicated organisations for disposal under contracts. The practice, accepted at UMK, does not provide for further monitoring of the waste management procedure after transfer of wastes, which fact creates risks of inadequate waste management by the receiver and may result in an adverse impact on the environment.

At the industrial site of the works, 20 temporary waste disposal sites and one dedicated site for disposal of slag wastes are arranged within the "old" area of UMK, on the left bank of the Dalverzin Channel.

In terms of their parameters and waste storage periods, the temporary production and household waste disposal sites generally comply with the established standards and requirements of the environmental laws of the Republic of Uzbekistan (except for the site for disposal of slag wastes)[23].

The datasheets have been prepared for all types of waste stating their properties, hazard class and generation standard.

The plant developed Planned Measures to Improve Temporary Waste Disposal Sites and Waste Disposal Methods, which consider solutions for each type of waste, assess their efficiency and identify waste disposal methods.

The design of environmental standards for generation and disposal of wastes identifies risks of toxic and fire-hazardous wastes, approves actions with wastes that are potentially required for emergency response.

The plant controls the storage conditions and the terms of waste accumulation and has determined an appropriate fire protection regime.

The integrity damage of mercury-containing lamps is considered as an emergency situation. It is planned to localise and eliminate mercury using a demercurisation kit.

[22] Name based on the design of environmental standards for generation and disposal of wastes.

[23] Section 9.4.5 gives recommendations for arrangement of the site in accordance with the requirements [5].

In its own production, UMK disposes fully of 21 types (~65% of the total list) of generated wastes or 98,155 t/y (~33% of the gross volume of generated wastes), which is estimated as a high indicator.

9.4.1.1 Waste management system

The main raw materials for the production process at UMK are:

- hot-briquetted iron (HBI) coming from the Russian Federation;
- ferrous scrap, which is supplied from Kazakhstan, Kyrgyzstan, Tajikistan as well as from scrap collection points located within Uzbekistan.

The suppliers are obliged to supply scrap and HBI (hereinafter referred to as raw materials) in accordance with UMK's Specification, which, in particular, does not allow the supply of radioactive scrap.

Each delivered scrap lot undergoes an incoming dosimetric control.

Since 2013, the developed in-plant standard, which contains requirements for ensuring of radiation safety during acceptance, processing, and use of scrap metal at the plant and at subsidiary companies, has been effective as part of the quality management system.

Slag dumps within UMK's site were formed in the period 1950-2013 and include slags from the Electric Steelmaking and Open-Hearth Shops.

Since the open-hearth production plant was shutdown in 2014, only ESMS steelmaking slag is sent to the dumps now.

As on July 01, 2020 (date of waste inventory for the design of environmental standards for generation and disposal of wastes), the area, occupied by the slag dumps, was estimated as 18.9 hectares.

The total volume of slag, placed in the dumps was estimated as ~6.5 million tonnes, which is consistent with the information obtained during interviews with the plant's personnel.

According to the results of surveying of the dumps, made at the request of the consultant in December 2021 [6], the volume and mass of slag, accumulated in the dumps, turned out to be much lower, by more than 2 times: 1,581,995 m^3 or 2,689,392 tonnes.

The site of the Slag Dump Processing Shop (SDPS) is located directly within the area of the slag dumps and occupies ~ 2.0 hectares.

The composition of the equipment, used in SDPS, and the flow diagram for processing of the slag dumps are shown in (Figure 9.4.1).

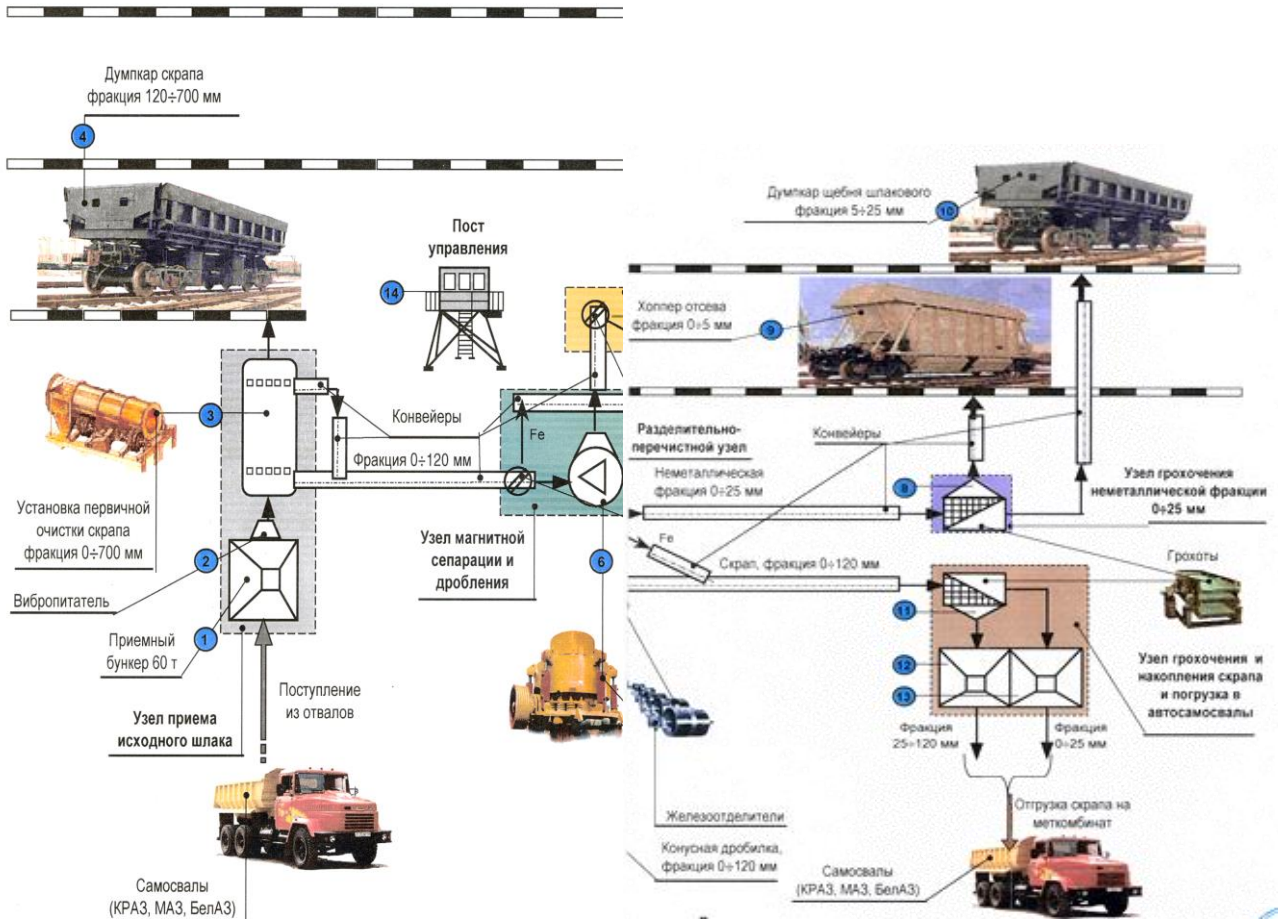

Figure 9.4.1 Equipment composition and flow diagram for processing of the slag dumps

According to the design of environmental standards for generation and disposal of wastes, the productivity of SDPS is 150,000 t/y, which is lower than the volume of steelmaking slag formation (180,500 t/y) from the current production activity of UMK, but not sufficient for slag disposal, taking into account the prospect of at least doubling the volume of steelmaking slag formation after the commissioning of CRC.

The increase in the productivity of SDPS by 20% during the planned upgrading of equipment (according to UMK's data) will not solve the problem.

In addition to SDPS, which is a structural subdivision of UMK, the slag processing is carried out by Alpha Mining, the site of which is located at the plant to the south of the site of SDPS.

According to the information, obtained during an interview with UMK's employees, the installed capacity of Alpha Mining's crushing and screening equipment after completion of the planned work to increase the productivity of this site will be ~ 1,000,000 t/y.

Thus, the total productivity of the crushing and screening equipment of SDPS and Alpha Mining ensures the processing of metallurgical slags of both current and prospective production activities of UMK (taking into account CRC) as well as the processing of the entire volume of stale (accumulated) slags in the short run.

According to the results of analyses, made regularly by the Works Central Laboratory (WCL), iron-containing slag, sold to third-party consumers (cement plants), has the following chemical composition:

CaO	SiO_2	Fe_2O_3	MgO	Al_2O_3	MnO	SO_3	P_2O_5	Moisture
28.1	23.1	14.3	8.9	5.5	3.7	0.10	0.2	0.5

The slag from ESMS is sent to the slag dumps (Figure 9.4.2, Appendix 9.4.1) with subsequent processing at SDPS. Up to 20% of the total volume in the form of metal scrap is returned to production (addition to the metal charge during steel smelting at ESMS).

Up to 80% of wastes in the form of iron-containing slag is sold to third-party organisations. Up to 0.5% (on average) of foreign inclusions that are not subject to processing and sale to third-party organisations are allowed to be removed to landfills that have an appropriate arrangement. Section 9.4.5 provides recommendations for creation of an own waste disposal facility (landfill) for industrial and solid household wastes.

Figure 9.4.2 UMK's slag dump

In accordance with Resolution of the Bekabad Interdistrict Economic Court No. 4-1106-2002,389-sonli dated September 30, 2020, the slag wastes of UMK, accumulated in the slag dumps, are secondary raw materials that need to be disposed of, including by means of their disposal in the existing process flow scheme of the plant.

Slags are a subject of purchase and sale, export-import operations, which, in accordance with Article 19 of the Law of the Republic of Uzbekistan No. 362-II dated April 05, 2002 "On Wastes", are subject to environmental certification for compliance with the sanitary rules and regulations, environmental regulations on waste management. As a result of the environmental certification of UMK, the following permits were obtained:

- Environmental Compliance Certificate dated October 28, 2019, valid until October 28, 2022;
- Hygiene Certificate No. 307073 dated November 20, 2020, valid until October 20, 2023.

In 2019-2020, the plant entered into several strategically advantageous contracts for the sale of unprocessed slag in the total volume of up to 175 thou tonnes per month over 10 years. The implementation of this programme also allows to free up completely the areas, occupied by the slag dumps, within several years.

The elimination of the dumps of stale slag and the reduction of the area for temporary storage of slag from the current production activities will contribute to improvement of the environmental situation in UMK's district.

It should be noted that the above treatment procedure (transfer of unprocessed slag to external contractors), in addition to the obvious positive ones, may also have adverse consequences, discussed in Section 9.4.2.

The Thermal Insulation Materials Shop's waste storage site does not affect the CRC project, but the investment project is inextricably linked with the current activities of UMK; therefore, as part of ESIA, it is suggested that the appropriate risk and measures to prevent/minimise it be considered.

As a result of the production activity of the Thermal Insulation Materials Shop (hereinafter referred to as TIMS), basalt fibre wastes are formed, which include:

- wet wastes of thermal insulation material based on basalt fibre (Figure 9.4.3);
- dry waste of thermal insulation material based on basalt fibre (Figure 9.4.3);
- prills of mineral composition from the forming chamber (hereinafter referred to as FC) of TIMS.

In the design of environmental standards for generation and disposal of wastes, these process wastes are mentioned as "Basalt fibre wastes of TIMS".

Figure 9.4.3 Generation and accumulation of wet wastes of thermal insulation material based on basalt fibre

Figure 9.4.4 Generation and accumulation of dry wastes of thermal insulation material based on basalt fibre

UML has developed a programme of pilot tests "Use of wastes from TIMS and ESMS as a charge material for smelting of mineral melt in the RCG–2,5B-ET furnace".

During the implementation of this program, wet wastes of thermal insulation material based on basalt fibre are used: they are placed on a dewatering site; then wet wastes are collected into big bags and transferred to the Welding Electrode Production Area of site for the production of Consumer Goods Production (CGP) for briquetting.

At the Welding Electrode Production Area, the materials are mixed, and the produced mixture is briquetted and dried. The works under the pilot testing programme are ongoing now (Figure 9.4.5).

Figure 9.4.5 Samples of experimental works on the use of wastes of thermal insulation materials

Dry wastes of thermal insulation material based on basalt fibre are defective thermal insulation products generated in the existing process train.

Currently, dry wastes of thermal insulation material based on basalt fibre are stored in bulk (Figure 9.4.4).

UMK plans to purchase equipment for recycling of the process wastes from TIMS. The recycling of process dumps, generated at TIMS, will ensure the return of thermal insulation wastes to the production scheme.

The deliveries of batches of basic raw materials (ferrous scrap and HBI) for the implementation of the production activities at UMK are performed by rail. The raw materials, mixed with garbage of variable composition, which includes sand and other non-metallic impurities, are delivered in railcars.

The wastes from sorting of incoming scrap metal, generated as a result of cleaning of railway freight railcars, have been accumulating on UMK's site since 1985 (Figure 9.4.6).

According to the results of the surveying (2021) in 1985-2021, 96,222 m^3 (144,333 tonnes with the average density of 1.5 t/m^3 in the dump body) of wastes from sorting of incoming scrap metal was accumulated.

Taking into consideration that, according to the company's data, this type of wastes was not exported previously to the landfill, the estimated annual formation of this type of wastes is 3,900 t/y.

According to the design of environmental standards for generation and disposal of wastes, with the specific indicator of wastes generation from cleaning of scrap railcars (0.0012 t /t) and the amount of received raw materials (steel scrap) of 1,040,700 t/y, the volume of waste generation is 1,272.84 t/y, which is almost 3 times less than the estimate.

At the same time, these indicators of waste generation do not correspond to the data of similar facilities: the specific indicator of waste generation from railcars cleaning is a sequence higher, the annual volume of generation is 10,000-17,000 thou tonnes per year.

According to the pre-design studies at CRC, which has a capacity, comparable with the current production at UMK, the generation of wastes from railcars cleaning is predicted at the level of 12,000 t/y.

Based on the above, it seems appropriate to assume the volume of waste generation from railcars cleaning at the existing facilities of UMK in the amount of 12,000 t/y.

Figure 9.4.6 Site for temporary disposal of railcar cleaning wastes

When unloading the gas treatment system's bag filters at ESMS, wastes in the form of scale dust from the bag filters are generated (Figure 9.4.7). According to the information, obtained during interviews with UMK's staff, scale dust has been accumulating since 1973.

Figure 9.4.7 Site for temporary disposal of dust from the gas treatment system's bag filters at ESMS

There is one landfill for disposal of solid household wastes within the Bekabad District; the arrangement of the landfill does not meet the environmental requirements (see 128-0948-ESIA-PE-1), and, actually, it is a garbage heap.

Contract for provision of services for wastes disposal at landfill No. 17, Bekabad District, Tashkent Region No. 2-54-59/2022 dated January 07, 2022 with the period of validity until December 31, 2022 was entered into between UMK and TOZA HUDUD.

Based on UMK's data, the capacity of the landfill is close to exhaustion and it may be closed in the near future.

Due to the fact that wastes are stored on UMK's site without the prospect of their disposal and transfer for disposal/neutralisation, for example, wastes from sorting of incoming scrap metal, UMK needs to consider the possibility of designing and building of its own landfill of industrial and solid household wastes.

As the first option, it is necessary to consider the possibility of designing and building of an own landfill for industrial and municipal wastes or a new municipal landfill, meeting the environmental requirements, with the participation interest of UMK, at least, at the stage of funding of design and survey works.

If this option is implemented, UMK, as an investor, may provide the required characteristics of the landfill and solve the problem of disposing its own solid household wastes and other wastes of hazard classes 4 and 5, allowed for joint disposal with solid household wastes, for many years.

The second option to meet the current and future needs of UMK is to study the possibility of using the potential of existing landfills for solid household wastes, located outside the boundaries of the Bekabad District. However, the implementation of this option has the following restrictions:

- unacceptable value of a distance for waste transportation;
- probable discrepancy between the range of wastes, allowed for disposal at the landfill, with the list of UMK's wastes, shipped for disposal;
- lack of a necessary capacity reserve.

Based on the above, the first solution to the problem of disposal of UMK's wastes, which are not subject to reclamation and neutralisation, seems preferable.

9.4.1.2 *Dedicated waste disposal facility*

In 2010, the territorial Centre of the State Sanitary and Epidemiological Supervision conducted a radiation survey of the Scale Dust Warehouse, as a result of which it was found that a part of stacks contained dust with a high content of cesium-137.

In this regard, it was decided to build a burial point for scale dust with a high content of caesium-137 (bunker) on UMK's site. The project was implemented, the dust with a high content of caesium-137 was moved to the bunker (Figure 9.4.8).

Figure 9.4.8 Dust storage bunker with a high content of caesium-137

According to the results in the reports of radiometric measurements (dd October 22,2021 and October 26, 2021), made in the presence of the Head of the Department for Emergency Situations and Radiation Safety of UMK and the public health doctor of the Radiation Safety Division at the Department of Sanitary and Epidemiological Surveillance and Public Health of the Tashkent Region, in the central, northern, eastern, western, southern parts of the warehouse (a total of 10 measurements), in cages measuring 4x4 m, at the height of 1 m, the gamma radiation power ranged from 0.19 μSv/hour to 0.24 μSv/h, which does not exceed the standards established by SanPiN No. 0193-06. No man-caused changes in the radiation background were detected.

This issue is covered in more details in Report 128-0948-SR.

Based on the recommendation of the consultant of the CRC project lender, the action plans for environmental monitoring and protection were supplemented with proposals for radiological monitoring around the bunker (see Table 9.4.2 and also Appendix 1.6 in Book 128-0948-ESMP-2).

It is also recommended to erect a permanent fence around a specialised waste disposal facility.

9.4.1.3 *Slag dumps within the Republic of Tajikistan*

There are several slag storage sites, located in the border zone of the Republic of Tajikistan, which were formed before 1991 (i.e. before the breakup of the Soviet Union) and contain open-hearth production wastes of UMK.

In June 2021, the memorandum of understanding was signed between UMK and Tochikcement, according to which UMK undertakes:

- to deliver slag, accumulated within Tajikistan, for processing at the plant;
- to make its processing and transfer the produced rolled products to the Tajik partner;
- to dispose (bury) the wastes from such processing.

This intention is not directly related to the CRC project and does not have a detailed design study at the moment. This issue is covered in more details in Report 128-0948-SR.

9.4.1.4 Conceptual approach to waste management at UMK's existing facilities

1. Disposal of wastes as raw materials in the process cycles of the plant:

- the steel scrap, extracted from slag at SDPS, is used as a raw materials for steel smelting at ESMS;
- the scrap of ferrous metals (any, except for scrap, extracted from slag at SDPS) is disposed of as raw materials during steel smelting at ESMS;
- the spent filter cloth, spent rubber products are disposed of at the enterprise by using as various seals, gaskets or shelters for process equipment;
- the limestone fines of the lime burning furnace's site is disposed of at the enterprise by using it as an additive in the manufacture of concrete mortar at the Concrete Batching Area of the Construction and Installation Department;
- the process dust of ferrosilicon and ferrosilicon manganese is partially disposed of at the plant by secondary use as ferroalloys during steel smelting at ESMS;
- the furnace slag of ferrosilicon and ferrosilicon manganese is disposed of at the plant by adding to the slag mixture during steel smelting at ESMS;
- the quartzite fines, the wastes of the raw materials charge at TIMS, the dust from the gas treatment system of the furnace department of TIMS, the sediment from the settling tanks of the treatment facilities are disposed of at the plant by using as an additive in the manufacture of concrete mortar at the Concrete Batching Area of the Construction and Installation Department;
- the coal fines, the spent cleaning rags are disposed of at the plant by burning in various industrial furnaces;
- the furnace slag of the Non-Ferrous Metal Production (NFMP), the scrap of non-ferrous metals are disposed of at the enterprise by recycling (by addition to the metal charge) during smelting of copper and copper alloys at NFMP;
- the wastes of the basalt fibre of TIMS are disposed of at the production itself by returning to the melting stage of the raw material charge;
- the wastes of electrode paste for welding electrodes at CGP are disposed of at the plant by grinding and recycling in the preparation of the electrode mass;
- the furnace slag of the Casting and Mechanical Shop (CMS) is recycled at SDPS;
- the spent moulding compound at CMS, the substandard asphalt mixture are disposed of at the plant for repairs of roads, sidewalks;
- the wood wastes are disposed of at the plant by using as coverings for green planting or for minor repairs for household purposes;
- the oil sludge from tanks cleaning, the sand and oil sludge are disposed of at the plant by using as an additive in the production of asphalt mixtures at the Asphalt Concrete Mixing Area of the Construction and Installation Department.

2. Transfer of large-tonnage industrial wastes, which include furnace slag, dust from the gas treatment system of the furnace department at ESMS, metallised scale, for which there is no possibility of processing/disposal at the plant, to another category (by-products) by timely preparation of relevant documentation, performance of examinations, obtaining of environmental certificates, sanitary and epidemiological opinions, search of reliable contractors for arrangement of sustainable marketing of these by-products.

9.4.2 Analysis of the future waste management system

Currently and in the near future, taking into consideration the commissioning of CRC, UMK is reliably provided with raw materials and energy resources.

By the decision of the Government, UMK has an exclusive right to collect scrap metal in the Republic of Uzbekistan. The receipt of other types of iron-containing raw materials (metallised iron ore pellets, pig iron, scale, HBI) is made on the basis of long-term agreements with suppliers.

As an alternative option for supply of primary raw materials, the possibility of switching to the use of a new type of iron-containing raw materials in the long term is under consideration.

The alternative procedure for management of large-tonnage process wastes of the main production (steelmaking slag) is the sale of unprocessed slag to external contractors in volumes that enable not to accumulate slags and free up gradually the areas, occupied by the slag dumps accumulated over decades of operation of the metallurgical production at UMK.

The plant has taken practical steps, the contracts for supply of unprocessed slag have been entered into with a number of contractors (see Section 9.4.1), which, theoretically, makes it possible to eliminate the dumps of UMK's stale metallurgical slags within several years.

In the event of implementation of this solution for management of metallurgical slag, it is possible to reduce much the operating costs of the plant for processing of slags at SDPS by transferring the slag to consumers.

The significant disadvantages of this solution include:

- loss of a part of the raw material potential of UMK due to the deletion of returnable materials (steel scrap extracted from slag and mineral components used for production of thermal insulation materials) from the process flow;
- loss of capital costs for creation of a production complex at SDPS as well as for the development and testing of ladle slag processing technology;
- image loss caused by risks of inadequate management of unprocessed slag, which will be made by the purchaser of the material outside UMK's management and control system (see the assessment of impacts of the supply chain).

Based on the concept of efficient use of resources and maximum use of industrial wastes in processing, the solutions for processing of furnace slag, provided for in the feasibility study, are preferable, as compared with the sale of unprocessed slag to third-party consumers.

9.4.3 Construction stage

Previously, the construction camp of companies, engaged in the construction of the complex, was located on the CRC site. According to the provided information, all the old buildings, warehouses, located at the place of construction of CRC's facilities, were decommissioned and dismantled by UMK in 2019-2020. Special platforms are equipped for storage of construction materials.

Now, the zero cycle construction works have been completed on the CRC site, the temporary utility systems for construction (electricity, water supply, etc.) have been prepared. The areas, free from construction, are asphalted and equipped with means of drainage of surface run-offs into UMK's existing storm sewerage system.

The access road with the length of 1.2 km and the power transmission line with the

length of 23 km have been built, the road has been commissioned.

During the construction period, the generation of the following wastes is predicted at the CRC construction site and at the construction camp site:

- waste of construction materials (concrete and reinforced concrete products, building bricks, crushed stone, cement, wood, bitumen, insulation materials, paint and varnish materials);
- wastes of soils, including possibly contaminated (with petroleum products);
- waste oils;
- ferrous metal scrap;
- LED bulbs;
- solid household wastes.

9.4.4 Operation stage

According to the Draft Environmental Impact Statement for Restructuring and Expansion of the Production Facilities of UMK with the Construction of the Casting and Rolling Complex, in total, 28 types of wastes are expected to be generated during the operation of CRC's facilities; wastes of the first hazard class are not generated, due to the planned use of energy-saving lamps that do not contain mercury.

The generation of four types of wastes of hazard class 2 is possible:

- waste lubricants (waste lubricants based on petroleum oils);
- waste oils (waste mineral hydraulic oils, halogen-free);
- waste compressor oils (waste compressor mineral oils);
- petroleum products caught by circulating water supply systems (other waste mineral oils).

It is assumed that these wastes will be transferred to regional waste oil collection points, with further processing, in accordance with the requirements of the laws of the Republic of Uzbekistan [7].

In general, at the CRC operation stage, an increase in the volume of waste generation is expected; despite the total volume of waste generation at UMK will be increased by more than twice, the range of wastes will not change much.

The comparative analysis of the waste generation at UMK for the current situation and for the future, taking into consideration the CRC commissioning, is given in Table 9.4.1.

Table 9.4.1 Comparative analysis of waste generation taking into consideration the CRC commissioning

Indicators	UMK's current situation, t/y	CRC operation, t/y	UMK's future with CRC, t/y	Contribution of CRC, %
Total	**297,817**	**318,620**	**616,437**	**52**
Waste of hazard class 1	2	0	2	0
Waste of hazard class 2	146	766	912	84
Waste of hazard class 3	44,276	26,661	70,938	38
Waste of hazard class 4	191,313	256,238	447,551	57
Waste of hazard class 5	62,079	35,026	97,105	36
Including:				
Furnace slag	180,500	228,986	409,486	56
Dust from the gas treatment system of the furnace	12,217	26,660	38,877	69

Indicators	UMK's current situation, t/y	CRC operation, t/y	UMK's future with CRC, t/y	Contribution of CRC, %
department of ESMS				
Metallised scale	22,690	7,695	30,385	25
Wastes of basalt fibre at TIMS	1,128	0	1,128	0
Waste from sorting of incoming scrap metal	12,000	12,000	24,000	50

The significant increase in the volume of generation of wastes of the second hazard class is associated with wastes from treatment facilities "petroleum products caught by circulating water supply systems (other waste mineral oils)"[24].

A significant part of the production wastes in terms of range and volume of formation is planned to be disposed of according to existing flow diagrams by using them in processes at the plant itself.

The rest of wastes will be sold to dedicated organisations for use as secondary raw materials or for neutralisation according to UMK's agreements.

The waste management operations include:

- disposal of wastes in own production through reuse in existing processes;
- sale to interested parties;
- transfer for disposal (recycling);
- burial.

The specific features of generation and management of certain types of wastes at UMK are considered below.

Slag

To solve the problem of accumulated slag, discussed in Section 9.4.1, there are two ways: processing in its own subdivision (SDPS) and sale to interested parties.

Initially, the design productivity of SDPS was 150,000 t/y; as a result of the measures, provided for in the Minutes of Technical Meetings dated February 01,2007 and April 04, 2007, the design productivity was increased by 20% and amounted to 180,000 t/y in terms of raw materials. According to UMK's information, the shipment of processed slag from SDPS was 86,151.03 tonnes in 2021.

To solve the problem of accumulated slag dumps, in addition to the use of SDPS, which is a subdivision of UMK, in 2018-2021 the unprocessed slag in the amount of 354,475.68 tonnes was shipped to Chinese companies SHENGLI STEEL LLC and SHUN DA STEEL LLC, as well as the unprocessed slag was shipped to the Russian company ALPHA MINING GROUP ASIA (from April to December 2021 - 133,098.64 tonnes).

According to the information, obtained during interviews with employees of UMK, the volume of slag, processed by ALPHA MINING GROUP ASIA, amounts potentially to ~ 1,000,000 t/y.

At the moment, ALPHA MINING GROUP ASIA LLC has developed a roadmap for implementation of the project, a preliminary industrial scheme for slag processing has been drawn up, the fundamental works have been completed and the auxiliary equipment has been purchased. The technical assignment for supply of iron-containing slag has been developed and approved. The contract for supply of metal-containing concentrate and the invoice contract for purchase of steelmaking slag have been entered into.

[24] Not taken into account earlier.

Thus, as a result of implementation of the roadmap, the total productivity of the crushing and screening equipment at SDPS and ALPHA MINING GROUP ASIA LLC ensures more than enough the processing of metallurgical slags from the current and prospective (taking into account CRC) production activities of UMK as well as the processing of the entire volume of stale (accumulated) slags, including the use of the slag dump, accumulated within the Republic of Tajikistan (if necessary) for several years.

Dust from the gas treatment system of the furnace department of ESMS

When unloading the gas treatment system's bag filters at ESMS, wastes are generated: dust from the gas treatment surface of the furnace department at ESMS. According to the information, obtained as a result if interviews with UMK's staff, scale dust has been accumulating since 1973.

According to the results of the surveying, the volume of process dust from ESMS, accumulated at the warehouse as on the end of 2021, amounts to 26,018 cubic meters or 33,823 tonnes.

At the moment, industrial wastes, stored at the unsheltered warehouse for collection of process dust and iron powder, are supplied for processing to enterprises and organisations on a contractual basis.

In 2021, the contracts for supply of process dust during the year were entered into with INVEST METALL GOLD - 10,000 tonnes, KyzylkUMKement - 10,000 tonnes, ECO PLAZMA COMPANY - 4,000 tonnes, EXCELLENT FEATURES - 5,000 tonnes, MIRKOMIL EURO BIZNESS - 5,000 tonnes, BEKOBOD-SARMOYA - 5,000 tonnes, PROFITABLE-JOE - 1,000 tonnes, XUMORAXON BAROKAT - 5,000 tonnes.

Under the above contracts, the volume of dust from the gas treatment system of the furnace department at ESMS, sold in 2021, amounted to 45,000 tonnes, which exceeds the annual generation of dust from the gas treatment system of the furnace department at ESMS.

Thus, the processing of the previously accumulated dust from the gas treatment system of the furnace department at ESMS is provided before the CRC commissioning.

Metallised scale

Metallized scale is formed at the Continuous Casting Machines Department as a result of the descaling of the surface of a metal slab and peeling of scale from the surface of a heated metal slab, leaving the heating and roller-hearth furnace and discharged on the roller table of the rolling mill.

According to the surveying results, the volume of accumulated scale is estimated as 2,420 cubic meters or 7,260 tonnes.

During the CRC operation, the annual formation of metallised scale will increase by 25% to about 30,385 t/y.

Metallised scale is collected at the Scale Warehouse and sold to third-party organisations (mainly, domestic cement plants).

In 2021, the contracts for supply of metallised scale during the year were entered with INVEST METALL GOLD - 1,000 tonnes, KyzylkUMKement - 20,000 tonnes, MIRKOMIL EURO BIZNESS - 1,000 tonnes, Bekabadcement - 4,000 tonnes.

The volume of metallised scale, sold under the above contracts, exceeds the annual generation of metallised scale.

Thus, the processing of previously accumulated metallised scale is possible even before the CRC commissioning.

Wastes from sorting of incoming scrap metal

As a result of sorting of incoming scrap, waste from cleaning of railway freight railcars (“waste from sorting of incoming scrap metal”) is generated.

According to the surveying results, 96,222 cubic meters or 144,333 tonnes of such wastes were accumulated within the railcar cleaning area.

Taking into consideration the CRC commissioning, the annual generation of wastes will be about 24,000 t/y.

To date, a waste sorting line has been installed and is put into pilot operation in the railcar cleaning area of UMK; it is planned to use this line to to extract components classified as secondary material resources.

The line's productivity is 30 tph (50,400 tpa); it is manned by 11 employees and can process all waste coming with scrap metal including the proposed development of UMK.

After the components to be processed are extracted from the wastes, there will be a fraction that is to be deposited at the landfill without prospects for disposal in the own production and/or sale to interested parties. It is proposed to consider the possibility of designing and construction of a new landfill for industrial and solid household wastes that meets international environmental requirements including [5].

Solid household wastes

The strategy for management of Solid household Wastes in the Republic of Uzbekistan for the period 2019-2028 is aimed at planning, identification of goals and objectives, ways to achieve them efficiently, priority areas as well as stages of implementation of the state policy in the area of generation and development of a sustainable system of solid household waste management for the long term.

The strategy provided for a gradual transition from outdated methods, used for solid household waste management, to best practices.

13 state unitary enterprises "Toza Hudud" with 172 branches in districts and cities, attached to the Committee of the Karakalpak Republic for Ecology and Environmental Protection and the departments for ecology and environmental protection of the regions, have been created.

Contract for provision of services for wastes disposal at landfill No. 17, Bekabad District, Tashkent Region No. 2-54-59/2022 dated January 07, 2022 with the period of validity until December 31, 2022 was entered into between UMK and TOZA HUDUD.

Due to the reasons, described in Clause 9.4.1, the possibility of designing and building of an own landfill of industrial and solid household wastes shall be considered.

The plant should consider the possibility of designing and construction of a new landfill for industrial and solid household wastes that meets the environmental requirements.

If this option is implemented, UMK may provide the required characteristics of the landfill and solve the problem of disposing its own solid household wastes and other wastes of hazard classes 4 and 5 (allowed for joint disposal with solid household wastes, including wastes from sorting of incoming scrap metal) for many years.

Sludge of wastewater treatment facilities

Sludge from wastewater treatment may contain metals as well as oils and lubricants.

Petroleum products, caught by circulating water supply systems (other waste mineral oils) will be transferred to regional waste oil collection points, with further processing, in accordance with the requirements of the laws of the Republic of Uzbekistan [7].

The wastewater treatment sludge may be recycled at the plant in accordance with the existing scheme; in particular, it may be disposed of as an additive for production of concrete mortar at the Concrete Batching Area of the Construction and Installation Department.

9.4.5 Recommendations

9.4.5.1 Measures to prevent and mitigate impacts

Construction stage

At the construction stage, the organisational and technical measures are suggested to prevent and mitigate adverse effects (Table 9.4.2).

Operation stage

At the operation stage, the hierarchy of waste management measures includes the following solutions:

- prevention of waste generation;
- reduction of generation volumes;
- recycling;
- waste recovery;
- processing;
- removal and final destruction.

It is reasonable to use for CRC the impact prevention approaches, which have been implemented successfully and have shown their efficiency at UMK's existing facilities (see Section 9.4.1).

The measures to mitigate (minimise) the impact of wastes also include:

- arrangement of production and consumer wastes storage sites;
- arrangement of sites cleaned from slag. From the construction and planning point of view, the Slag Warehouse should be removed from the Dalverzin Channel. It is reasonable to start removal if slag from sites, located closer to the eastern boundary of UMK, while providing slopes in the direction opposite the Dalverzin Channel. The surface, levelled after removal of slag, should be covered with a waterproofing coating. The wastewater, collected from the slag storage sites, should be directed to newly designed treatment facilities, which should ensure wastewater treatment up to the maximum permissible concentration or up to the requirements of process standards (if used in water circulation);
- cleaning of the site from the wastes dust from the gas treatment system of the furnace department at ESMS and subsequent reclamation of the site. Isolation of wastes from the environment;
- cleaning of the site from waste metallised scale and subsequent reclamation of the site. Isolation of wastes from the environment;
- release of the site from garbage from wastes from sorting of incoming scrap metal and subsequent reclamation of the site. Isolation of wastes from the environment.

The list of mitigation measures at the operation stage is given in (Table 9.4.2).

The compensatory measures include processing of industrial wastes, accumulated in large volumes at UMK, and/or transfer of such wastes for disposal, neutralisation, disposal (taking into consideration the necessary environmental protection measures) to organisations having appropriate technologies and permits for the activity.

These measures are applicable to the following wastes:

- furnace slag;
- dust from the gas treatment system of the furnace department of ESMS;
- metallised scale;
- wastes of basalt fibre at TIMS;

- wastes from sorting of incoming scrap metal.

As organisational and technical measures, it is advisable to develop and implement at the plant the practice of monitoring of the waste management after transfer of wastes to the receiving organisation.

As was stated abode, there are currently no disposal areas around UMK that are equipped in line with current environmental requirements and are able to accept UMK's waste that can be diverted from disposal for recycling etc.

Given that the country is implementing measures dictated by Decree of the President of Uzbekistan dated 17 April 2019 No PP-4291 "On the approval of a strategy for management of solid domestic waste in Uzbekistan for 2019-2028", the EHS action plans will include a mechanism for regular identification and evaluation of waste disposal areas in terms of their compliance with applicable environmental requirements.

9.4.5.2 *Monitoring and reporting*

The measures and monitoring of waste management processes are given in Table 9.4.2.

9.4.6 Assessment results

The matrix of the results of the plant's activities impact assessment, related to waste generation, is given in Table 9.4.3.

The assessment shows that the project's impact associated with waste management is rated as negligible during the construction phase and low during the operation phase[25].

References

1. Law of the Republic of Uzbekistan No 754-XII dated 9 December 1992 (On environmental protection".
2. Law of the Republic of Uzbekistan No. 362-II dated 5 April 2002 "On wastes".
3. General EHS Guidelines, IFC 2007.
4. EHS Guidelines for Integrated Steel Mills, IFC 2007.
5. EHS Guidelines for Waste Management. IFC, 2007.
6. Technical report on geodetic and mapping activities: supervision of work scope accounting at the allocated lands of UMK JSC. Drone-assisted aerial survey on a 1:500 scale to estimate bulk mass. UzAeroSpace LLC, 2021.
7. Decree No 78 of the Council of Ministers of Uzbekistan dated 14 February 2017.

[25] Residual impacts after implementation of mitigation measures.

Table 9.4.2 Measures to prevent and mitigate effects related to waste management

o.	Activity/process	Tasks	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
1.	Construction works (construction site; construction camp site)	• Prevention of irregular waste storage • prevention of secondary pollution of soils, surface and underground water • protection of soils, surface and underground waters from leaks and/or spillage of liquid wastes	• Arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes, installation of waterproof coating on the sites for storage of construction and solid household wastes; • meeting with the waste accumulation limits; • regular removal of construction wastes and other wastes by authorised contractors; • separate collection of hazardous wastes; • storage of wastes of hazard classes 2-3 (oiled rags, paints and varnishes, oils and lubricants, etc.) using a secondary protective shell (pallets) that prevents leaks; • storage of solid household wastes and food wastes in containers with lids and in storage areas equipped with a canopy or roof to prevent them from getting wet • arrangement of a special reversing area for temporary storage of excess soil with a hard waterproof coating • collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • equipping with consumables and equipment for prompt elimination of consequences of spills or leaks	IFC General EHS Guidelines IFC. Environmental, Health, and Safety Guidelines for Waste Management IFC Performance Standard 1 IFC Performance Standard 3 Federal Law "On Wastes" Sanitary Rules of the Republic of Uzbekistan No. 0068-96 dated November 04, 1996 Sanitary Rules of the Republic of Uzbekistan, No. 0127-02 dated July 29, 2002	• Regular visual inspections of all the sites, storage facilities and containers for collection and temporary storage of wastes: – correct marking of storage devices and containers; – inspection of storage tanks for leaks or other signs of loss – detection of cracks, corrosion of or damage to storage devices and containers – inspection of the condition of the site coverage – recording of the condition inspections – recording of any changes at sites and/or storage facilities as well as significant changes in the amount of stored wastes • Regular inspection of waste sorting and collection activities • Classification of wastes and regular recording of their properties as well as proper handling of wastes, primarily, hazardous ones • Recording of information about the location of all the hazardous waste on the site as well as data on their quantity at each of such places	Development and implementation of health, safety and environment management plans (pollution prevention and control plan at the construction stage, Waste Management Plan)

o.	Activity/process	Tasks	Measures	Applicable requirements	Monitoring	Implementation method/reporting
II.	**Operation stage**					
2..1.	Main production activity (steel smelting, manufacture of rolled metal and other metallurgical products) Support of the core production activities: repair works, water supply, drainage, drawdown, cleaning of the area and industrial premises Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations, storage of hazardous materials)	• Prevention of the adverse impact of wastes on the health of the population and personnel • prevention of irregular waste storage • prevention of secondary pollution of soils, surface and underground water • protection of soils, surface and underground waters from leaks and/or spillage of liquid wastes • reduction of burden on waste disposal facilities • elimination of items of accumulated harm caused by past activities (slag, dust, scale, wastes from railcars cleaning)	• Minimisation of waste generation; • creation of an own waste disposal facility (landfill) and/or participation interest in its creation; • disposal of wastes as raw materials in the process cycles of UMK • creation and implementation of a system for selection of consumers of secondary resources; • creation and implementation of a system for selection of contractors for waste management; • meeting with the waste accumulation limits; • regular waste removal by authorised contractors • separate collection of hazardous wastes • storage of wastes of hazard classes 2-3 with the use of a secondary protective shell (pallet) that prevents leakage • storage of solid household wastes and food wastes in containers with lids and in storage areas equipped with a canopy or roof to prevent them from getting wet • processing of accumulated wastes at the own enterprise or transfer of such wastes for disposal, neutralisation, disposal (taking into consideration the necessary environmental protection measures) to contractors having with appropriate technologies and permits for the activity • arrangement of temporary storage sites for slag, dust, scale, wastes from railcars cleaning, equipped in accordance with environmental requirements (waterproofing of foundations, drainage of storm water and meltwater, dedusting, etc.) • reclamation of sites cleaned from accumulated wastes from past activities	IFC General EHS Guidelines IFC. EHS Guidelines for Integrated Steel Mills IFC. Environmental, Health, and Safety Guidelines for Waste Management IFC Performance Standard 1 IFC Performance Standard 3 Federal Law "On Wastes" Sanitary Rules of the Republic of Uzbekistan No. 0068-96 dated November 04, 1996 Sanitary Rules of the Republic of Uzbekistan, No. 0127-02 dated July 29, 2002	• Regular visual inspections of all the sites, storage facilities and containers for collection and temporary storage of wastes: – correct marking of storage devices and containers; – inspection of storage tanks for leaks or other signs of loss – detection of cracks, corrosion of or damage to storage devices and containers – inspection of the condition of the site coverage – recording of the condition inspections – recording of any changes at sites and/or storage facilities as well as significant changes in the amount of stored wastes • Regular inspection of waste sorting and collection activities • Regular analysis of waste generation trends by their type and quantity, taking into consideration the process of wastes generation at individual facilities of the plant • Classification of wastes and regular recording of their properties as well as proper handling of wastes, primarily, hazardous ones • Regular inspections of waste management and disposal services, provided by third-party organisations, including inspections of operation of facilities, where wastes are recycled and processed (in the instances where the works with significant volumes of hazardous wastes are performed by third-party organisations). If possible, such inspections should include visits to wastes processing, storage and disposal sites • Monitoring of underground water quality (see Section 9.7) • The recorded data of monitoring of the processes of collection, storage and transportation of hazardous wastes should include the following details: – Name and identification No. of the waste; – physical state; – quantity; – shipping documentation containing information about the quantity and type of wastes, the date of shipment, the date of departure and the date of receipt, as well as data about the shipper, consignee and carrier; – information about methods and terms of storage, repackaging or destruction on the plant's site • Recording of information about the location of all the hazardous waste on the site as well as data on their quantity at each of such places	• Designs for arrangement of temporary storage sites for slag, dust, scale, wastes from railcars cleaning • reclamation designs • reports on results of all types of monitoring • waste accounting • statistical reporting • documented procedure for selection and inspections of contractors engaged in management of UMK's wastes
2.2.	Operation of a specialised waste disposal facility	• Radiation safety of environmental components, personnel and local communities	• Construction of a permanent fence • Introduction of radiological monitoring	SanPiN 0193-06 “Radiation safety standards (NRB-2006)	• Dosimetric measurements at the ground level and at 1 m	• Radiological monitoring reports

o.	Activity/process	Tasks	Measures	Applicable requirements	Monitoring	Implementation method/reporting
				and basic sanitary rules for radiation safety (OSPORB-2006)", approved by the Chief Public Health Doctor of the Republic of Uzbekistan. Tashkent, 2006. International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. Safety Series 115. Vienna, Austria: International Atomic Energy Agency. WORLD HEALTH ORGANIZATION, Guidelines for Drinking-water Quality, 3rd ed., Vol. 1: Recommendations, WHO, Geneva (2004).	above ground level at three 10x10 m test sites located along the prevailing wind direction • Group sampling of soils to the depth of 0.2 m at three 10x10 m test sites located along the prevailing wind direction • Laboratory analysis of samples for the specific activity of natural radionuclides (Radium-226, Thorium-232, Potassium-40) and technogenic Cesium-137 • Sampling of underground water from observation wells located along the underground flow direction • Measurement of the specific total alpha and beta activity of groundwater	

Table 9.4.3 Matrix of results of the assessment of effects related to waste generation

Life cycle stage: construction

Recipients: soil-forming rocks, surface and underground (ground) waters

Recipient's sensitivity: low, medium[26]

Impact characteristics

Impact	Pollution of soil-forming materials, surface and underground (ground) waters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Minor	Low
Consequences	Indirect effects on the personnel, population, flora and fauna				
Measures	• Arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes, installation of waterproof coating on the sites for storage of construction and solid household wastes • meeting with the waste accumulation limits • regular removal of construction wastes and other wastes by authorised contractors • separate collection of hazardous wastes • storage of wastes of hazard classes 2-3 (oiled rags, paints and varnishes, oils and lubricants, etc.) using a secondary protective shell (pallets) that prevents leaks • storage of solid household wastes and food wastes in containers with lids and in storage areas equipped with a canopy or roof to prevent them from getting wet • arrangement of a special reversing area for temporary storage of excess soil with a hard waterproof coating • collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • equipping with consumables and equipment for prompt elimination of consequences of spills or leaks				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Minor	Negligible

Life cycle stage: operation

Recipients: soil-forming rocks, surface and underground (ground) waters, atmospheric air

Recipient's sensitivity: low, medium, high[27]

Impact characteristics

Impact	Pollution of soil-forming materials, surface and underground (ground) waters		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on the personnel, population, flora and fauna				
Measures	• Minimisation of waste generation • creation of an own waste disposal facility (landfill) and/or participation interest • disposal of wastes as raw materials in the process cycles of UMK • creation and implementation of a system for selection of consumers of secondary resources • creation and implementation of a system for selection of contractors for waste management • meeting with the waste accumulation limits • regular removal of construction wastes and other wastes by authorised contractors • separate collection of hazardous wastes • storage of wastes of hazard classes 2-3 with the use of a secondary protective shell (pallet) that prevents leakage • storage of solid household wastes and food wastes in containers with lids and in storage areas equipped with a canopy or roof to prevent them from getting wet • processing of accumulated wastes at the own enterprise or transfer of such wastes for disposal, neutralisation, disposal (taking into consideration the necessary environmental protection measures) to contractors having with appropriate technologies and permits for the activity • arrangement of temporary storage sites for slag, dust, scale, wastes from railcars cleaning, equipped in accordance with environmental requirements (waterproofing of foundations, drainage of storm water and meltwater, dedusting, etc.) • reclamation of sites cleaned from accumulated wastes from past activities				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Minor	Low

[26] The assessment is made based on the most sensitive recipient.

[27] The assessment is made based on the most sensitive recipient.

9.5 Impact on surface waters

9.5.1 Assessment method

The assessment of the impact of the planned activity on water bodies was made taking into consideration the national requirements and IFC requirements in the area of protection and use of surface waters.

The schematic map of the plant district with the designation of water bodies, wastewater discharges from UMK into water bodies, and water intake facilities is given in Appendix 9.5.1.

The main water bodies in UMK's district are the Syrdarya River and the Dalverzin Channel, the section of which crosses UMK's industrial site.

The Dalverzin Channel originates from the Syrdarya River, its water is used for irrigation of agricultural lands in Uzbekistan and Tajikistan; the water of the channel is also used for water supply to the population and industrial plants and for the needs of fisheries.

The Syrdarya River is located at a considerable distance from the plant (more than 600 m).

The criteria and requirements in the following documents were used for the assessment:

- IFC Guidelines:
  - General Environmental, Health, and Safety (EHS) Guidelines;
  - EHS Guidelines for Integrated Steel Mills;
  - EHS Guidelines for Water and Sanitation;
- Regulatory legal and technical documents of the Republic of Uzbekistan:
  - O'z DSt 951:2011 "Sources of Centralised Drinking Water Supply. Hygienic, Technical Requirements and Selection Rules";
  - SanPiN RUz No. 0318-15 "Hygienic and Anti-Epidemic Requirements for Protection of Water Bodies Within the Republic of Uzbekistan";
  - Construction Regulations KMK 2.04.01-98 "Internal Water Supply Pipelines and Sewerage System of Buildings";
  - Construction Standards KMK 2.04.03-97 "Sewerage System. Outdoor Networks and Structures";
  - Regulation on the Procedure for Approval of Water Protection Zones and Sanitary Protection Zones of Water Bodies in the Republic of Uzbekistan (approved by Resolution of the Cabinet of Ministers No. 981 dated December 11, 2019);
  - Regulation on the Procedure for Development and Approval of Environmental Standards (approved by Resolution of the Cabinet of Ministers No. 14 dated 14.01.2014).

According to IFC EHS Guidelines, discharges of process wastewater, sanitary wastewater, wastewater from utility operations or stormwater to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria [8].

[8] also requires that additional considerations be included in the setting of project-specific performance levels for wastewater effluents:

- Process wastewater treatment standards consistent with applicable Industry Sector EHS Guidelines [9];
- Compliance with national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges shown in [8];
- Temperature of wastewater prior to discharge does not result in an increase greater than 3 °C of ambient temperature at the edge of a mixing zone.

Given that UMK's sanitary wastewater is discharged to the municipal sewerage of Bekabad (see Section 9.5.2 below) without direct discharges into surface water, the recommendations of [8] for this type of effluents are not applicable as an assessment criterion.

The following ambient water and wastewater quality standards were used to assess and project the condition of surface water bodies:

- Indicative standards given in the Reference Book for Environmental Experts (issued by the State Committee of Uzbekistan for Environmental Protection and the State Environmental Expert Review Board, Tashkent, 2009, page 141[28]);
- Assessment criteria given in the industry sector guidelines [8] (the permissible concentrations of pollutants in wastewater prior to discharge into surface waters, which should be achieved without dilution at least 95% of the time that the plant is operating).

The quality standards for fishery-value water bodies given in the Reference Book for Environmental Experts [10] match the Maximum Permissible Concentrations given in the Reference Book of the Russian Research Institute of Fishery and Oceanography (1999) that was previously applied in Russia [1].

The possibility of using this list and MPC in Uzbekistan to assess the water quality of fishery reservoirs by 1204 indicators [1] is confirmed by Letter of the State Committee for Ecology No. 03-02/3-250 dated January 26, 2022 (Appendix 9.5.2).

The document also confirms that the Syrdarya River and the Dalverzin Channel, taking into consideration the use of their water resources for various needs, belong to the category of fishery importance.

For this reason, quality standards for fishery-value water bodies were used as local water quality criteria.

A comparison of national and international requirements to quality of wastewater discharged into surface waters is given in Table 9.5.1. The table indicates quality criteria for pollutants and wastewater parameters specific for steel plants (see Section 9.5.2.).

Table 9.5.1 National and international requirements to steel plants' wastewater discharged into water bodies

No	Pollutant and wastewater parameter[1]	Indicative values as per local requirements	Permissible value as per specific EHS Guidelines [9]	Target value
1.	Temperature, ^{0}C	Not regulated	Increase in the temperature in water body is not greater than 3 ^{0}C[3]	Increase in the temperature in water body is not greater than 3 ^{0}C[3]
2.	pH	6.5-8.5	6.0-9.0	6.5-8.5
3.	Dissolved oxygen, mg/dm3	4 and higher	Not regulated	4 and higher
4.	Phosphates, mg/dm3	0.2	2.0	
5.	Sulphates, mg/dm3	100	Not regulated	
6.	Chlorides, mg/dm3	300	Not regulated	
7.	Ammonium nitrogen, mg/dm3	0.4	5.0	0.4
8.	Nitrate nitrogen, mg/dm3	9.3	Sum of nitrate and nitrite nitrogen – 25 mg/dm3[29]	
9.	Nitrite nitrogen, mg/dm3	0.03		
10.	Iron, mg/dm3	0.1	5.0	0.1
11.	Chromium, mg/dm3	0.07	0.1	0.07
12.	Manganese, mg/dm3	0.01	Not regulated	0.01
13.	Calcium, mg/dm3	180	Not regulated	180
14.	Magnesium, mg/dm3	40	Not regulated	40
15.	Suspended particles, mg/dm3	Not regulated	35	35
16.	Cyanides, mg/dm3	0.05	0.5	0.05
17.	Fluorides, mg/dm3	0.32	5	0.32
18.	Total petroleum hydrocarbons, mg/dm3	0.05	10	0.05
19.	Phenol, mg/dm3	0.001	Not regulated	0.001
20.	Total salts, mg/dm3	1000	Not regulated	1000
21.	Copper, mg/dm3	0.001	0.5	0.001
22.	Synthetic surfactants, mg/dm3	0.1	Not regulated	0.1

Based on the requirements in [8] to ensure local quality criteria for ambient water during wastewater discharges, indicative standards for fishery-value bodies of water set by national legislation were used as wastewater quality criteria as they are stricter than IFC requirements [9] in all aspects except for suspended particles and temperature.

For these two parameters, requirements of the industry specific EHS Guidelines were used (Table 9.5.1).

Thus, taking into consideration the explanation of the national regulatory institution for assessment of water quality in the water bodies, used for drainage of wastewater from UMK and planned for drainage of wastewater from CRC, the fisheries quality standards (MPC), contained in the List of the Russian Federation Research Institute of Fishery and Oceanography (1999), were adopted.

Given the absence of permissible values in the list of MPCs and the industry specific EHS Guidelines [9], the criteria for fishery-value water bodies as per the Reference Book for Environmental Experts [10] were used as the standard for salt level.

9.5.2 Analysis of the existing scheme of water supply and sanitation systems at UMK

The production water supply at UMK is arranged based on the repeated use of water in the water circulation systems of the plant.

To replenish the water circulation cycles of the plant, the following is used:

- fresh water, coming from surface water intake facility No. 1 from the Dalverzin Channel;
- production and storm water wastewater formed at UMK;
- underground (drainage/ground) water, pumped from unwatering holes located on the plant's site.

Surface water intake facility No. 1 maintains the household water supply.

Wastewater and underground (ground) water, not used at the plant, are diverted to water bodies: outlet No. 1 for treated industrial and storm water into the Syrdarya River, points for ground water discharge into the Dalverzin Channel.

In details, the scheme of water consumption and sanitation at UMK is considered in Sections 4.2.3 and 4.2.4 of Report 128-0948-ESIA-PE-1.

The water balance of UMK for the current situation and for the future after the CRC commissioning, agreed upon by the plant, is given in Appendix 9.5.3.

According to the water balance, the volume of use of fresh and recycled water at the plant is:

- recycled water 205,202.0 m^3/day, 67,717.640 thou m^3/y;
- the total volume of use of fresh water (from water intake facility No. 1), treated production and storm water and ground water is 55,784.0 m^3/day, 19,884.555 thou m^3/y.

The loss in water circulation systems amounts to 28,875.0 m^3/day, 8,328.600 thou m^3/y.

The volumes of wastewater drainage during the operation of the existing production facilities are determined based on the data of UMK's water balance (Appendix 9.5.3) and are given in (Table 9.5.2).

Table 9.5.2 Main characteristics of sanitation at UMK (current situation

Item No.	Name of wastewater	Total water drainage volume (for use in production and into a water body)		Water drainage conditions
		m^3/day	thou m^3/y	
1.	Domestic wastewater	4,362.498	4,252.800	To the municipal sewer and to the treatment facilities in Bekabad
2.	Production and storm water	22,911.745	7,437.638	To the treatment facilities of UMK with further discharge into the Syrdarya River (40% of the total volume); use of treated

				wastewater in production (60% of the total volume)
2.1	Including: surface (storm) wastewater	365.600	133.444	Similar to Item 2
3.	Discharge of effluent (ground) waters into the Dalverzin Channel	13,544.986	4,943.920	Drainage into the Dalverzin Channel (40% of the total volume); partial use of wastewater in production (60% of the total volume)
Total		40,819.229	16,634.358	
Including: wastewater after the use of consumed fresh water (production and domestic wastewater)*		26,908.643	11,556.994	
Effluent and storm water wastewater		13,910.586	5,077.364	

* Note: the volume of production and domestic wastewater corresponds to the difference between the shown volumes of fresh water consumption and production loss.

The domestic wastewater of UMK are discharged under the contract with Bekabad Suvakova to the municipal sewer of Bekabad for cleaning at municipal treatment facilities.

The composition of wastewater is similar to municipal wastewater, entering the municipal treatment facilities; the main pollutants are BOD, nitrates, nitrites, ammonium nitrogen, phosphates, synthetic surfactants.

According to the ESIA papers, prepared during the development of the General Layout of Bekabad, the treatment facilities of Bekabad include stages of mechanical and biological treatment.

The treated wastewater after the municipal treatment facilities is discharged into the Syrdarya River in the same area where the production and storm water is discharged from UMK.

Due to wear and tear, the municipal treatment facilities do not provide effective wastewater treatment from organic compounds (TBOD and BOD5) and nitrogen compounds down to concentrations that meet the targets for water bodies.

The municipal treatment facilities require restructuring and partial replacement of equipment. The existing gravity and pressure sewerage pipelines are also worn out and require a major restructuring. The restructuring of the existing pumping stations with replacement of equipment by up-to-date energy-saving equipment is required.

At the same time, the main source of pollution of the river section near Bekabad for almost all the substances (including specific substances of household wastewater, except for nitrates) is the inflow of pollution from the sections of the Syrdarya River located upstream.

The production and storm water is discharged to UMK's treatment facilities; then a part of the treated water is used in production to compensate for loss of recycled water and for other production purposes.

The waste water, not used in production after treatment, is discharged into the Syrdarya River (UMK's outlet No. 1).

The existing treatment facilities for production and storm water of UMK consist of two horizontal two-section settling tanks with the volume of 7,000 m^3 each (see 128-0948-ESIA-PE-1, Section 4.3).

The maximum capacity of UMK's treatment facilities is 30,000 m^3/day and corresponds to the incoming flow burden on them – 22,911.745 m^3/day (Table 9.5.1).

The target pollutants, from which the production and storm water is treated, are suspended solids and petroleum products.

The volume of discharge of the plant's treated wastewater into water bodies is determined on the basis of the plant's water balance, taking into consideration the data of the draft environmental standards for the maximum allowable discharge [2].

The volume of discharge of UMK's wastewater into water bodies is 21,745 m^3/day, 7,937.032 thou m^3/y:

- discharge of treated production and storm water into the Syrdarya River (outlet No. 1) – 8,200 m^3/day, 2,993.112 thou m^3/y;
- discharge of effluent (underground/ground) waters into the Dalverzin Channel (without treatment) – 13,545 m^3/day, 4,943.920 thou m^3/y, including: outlet No. 2 – 8,804 m^3/day, 3,213.548 thou m^3/y; outlet No. 3 - 2,438 m^3/day, 889,906 thou m^3/y; outlet No. 4 [30]- 2,303 m^3/day, 840.466 thou m^3/y.

The production and storm water is partially used to compensate for loss of circulating water. The share of production and storm water, discharged into the Syrdarya River, is 41% of the total volume of the company's wastewater.

In addition to production and storm water, the effluent (underground/ground) waters, removed by unwatering holes of UMK, are used to replenish the loss of circulating water.

The total amount of waste and effluent waters, used at the plant, as well as the total amount of wastewater and fresh water, used for UMK's production needs, was assumed according to the water balance and is given in (Table 9.5.3).

Table 9.5.3 Volumes of waste and effluent waters used at UMK currently

Item No.	Wastewater type	Amount of wastewater used	
		m^3/day	**thou m^3/y**
1.	Production and storm water	12,176.785	4,444.526
2.	Ground (effluent) water*	19,145.972	6,988.280
TOTAL		1788,321	817,432
Use of wastewater and fresh water for the production needs of the plant**)		22,187.850	15,607.89

Notes:

*) Volumes that are not taken into account in the volumes of discharge into the Dalverzin Channel.

**) The total volume of water use for process and auxiliary production needs, exclusive of consumers located outside the plant's site (the production needs of which are satisfied with drinking water).

In the total volume of consumption of treated wastewater and fresh water (from the water intake at the Dalverzin channel) for production, the share of wastewater, used at the plant is 73% (11,433.0 thou m^3/y).

At the moment, the company does not make controlled drainage and treatment of wastewater from UMK's area, located to the south of the Dalverzin Channel, including from the slag dump areas (Report 128-0948-ESIA-PE-1, Section 4.5.3). The volumes of surface run-offs from that area is not taken into account in the above characteristics of wastewater drainage (Table 9.5.2).

[30] Outlet 4 is located at the section of the Dalverzin Channel, along which the border between Uzbekistan and Tajikistan runs.

The composition of wastewater, discharged into water bodies, was assumed based on the results of background studies, performed during the development of ESIA papers [3].

The characteristics of production and storm water of the plant, discharged to the treatment facilities, as well as the composition of production and storm water and effluents entering water bodies are given in Table 9.5.4.

Table 9.5.4 The composition of the company's wastewater discharged to UMK's treatment facilities and to water bodies

Item No.	Pollutants and indicators of wastewater properties[1)]	Target	Values			
			Input flow to UMK's treatment facilities	Discharge into water bodies		
				treated wastewater to the Syrdarya River, outlet No. 1	effluents into the Dalverzin Channel outlet No. 2[2)]	effluents into the Dalverzin Channel outlet No. 3[2)]
1.	Temperature, ^{0}C	Temperature increase in a water body by maximum 3 ^{0}C[3)]	25.7	17.5	10.6	10.6
2.	pH	6.5-8.5	8.9	8.57	9.05	8.6
3.	Dissolved oxygen, mg/dm^3	4 and over	6.8	7.6	9.30	8.30
4.	Phosphates, mg/dm^3	0.2	<0.07	<0.07	<0.07	<0.07
5.	Sulphates, mg/dm^3	100	670.00	419.0	433.00	401.00
6.	Chlorides, mg/dm^3	300	174.00	131.5	75.00	65.00
7.	Ammonium nitrogen, mg/dm^3	0.4	0.05	0.03	0.08	0.09
8.	Nitrate nitrogen, mg/dm^3	9.3	3.1	5.25	10.45	9.20
9.	Nitrite nitrogen, mg/dm^3	0.03	0.005	0.37	0.15	0.35
10.	Iron, mg/dm^3	0.1	0.031	0.02	0.02	0.01
11.	Chromium, mg/dm^3	0.07	<0.0025	<0.0025	<0.0025	<0.0025
12.	Chromium, mg/dm^3	0.01	0.001	<0.001	<0.001	<0.001
13.	Calcium, mg/dm^3	180	146.3	98.2	94.2	119.2
14.	Magnesium, mg/dm^3	40	75.4	49.9	54.09	41.33
15.	Suspended particles, mg/dm^3	35	0.040	0.04	0.016	0.013
16.	Cyanides, mg/dm^3	0.05	<0.001	<0.001	<0.001	<0.001
17.	Fluorides, mg/dm^3	0.32	0.05	0.18	0.25	0.32
18.	Total content of petroleum hydrocarbons (petroleum products), mg/dm^3	0.05	0.12	0.15	0.046	0.09
19.	Phenol, mg/dm^3	0.001	0.0065	0.0025	0.0009	0.0008
20.	Total salinity, mg/dm^3	1,000	1,005.7	648.55	696.3	595.4
21.	Copper, mg/dm^3	0.001	<0.002	<0.002	<0.002	<0.002
22.	Synthetic surfactants, mg/dm ^{3}	0.1	0.18	0.21	0.16	0.19

Notes:

1 - The table includes pollutants and indicators of wastewater properties, for which targets for fishery water bodies are set;

2 - The composition of effluents for outlet No. 4 is similar to the characteristics of the composition for outlets No. 2, No. 3;

3 - Assumed based on the IFC Guidelines (Table 9.5.5).

The assessment of the quality of wastewater, entering treatment facilities and water bodies, was made on the basis of target indicators for fishery water bodies, given in the List of the Russian Federation Research Institute of Fishery and Oceanography (1999) (Section 9.5.1). Based on these indicators, the environmental standards of maximum allowable discharge for existing outlets of the plant have been established [2].

The targets for the content of sulphates, petroleum products, phenol and synthetic surfactants were exceeded in the input stream of treatment facilities and in the treated production and storm water of UMK.

In the plant's effluents, discharged into the Dalverzin Channel, the targets for nitrates and nitrites, magnesium, petroleum products, synthetic surfactants, pH were exceeded.

There is also a risk of copper excess where the treated production and storm water and effluents of the plant are discharged into water bodies.

The analysis of compliance of UMK's existing activities with the requirements of IFC in the area of sanitation and treatment of wastewater is given in (Table 9.5.5).

Table 9.5.5 Analysis of compliance of UMK's existing activities with the requirements of IFC in the area of sanitation and treatment of wastewater

Document title	**Content of requirements**	**Analysis of the current situation/conclusion regarding compliance or non-compliance with IFC requirements**
General Environmental, Health, and Safety Guidelines	Assess compliance of their wastewater discharges with the applicable: (i) discharge standard (if the wastewater is discharged to a surface water or sewer), and (ii) water quality standard for a specific reuse.	Generally, the activity meets partially IFC requirements: the wastewater is regularly monitored by target figures for fishery water bodies (at the plant's outlets) and for water intended for recycling (treated production and storm water, circulating water). *The monitoring of effluents directed for use in production is not made (Section 9.5.6)*
	When wastewater treatment is required prior to discharge, the level of treatment should be based on: ● in the event of discharge into a water body: assimilative capacity of such a water body in relation to the discharged volumes of pollutants; ● Intended use of the receiving water body	Generally, the activity meets IFC requirements: the environmental standards are set in accordance with the targets for fishery water bodies. The assimilative capacity of water bodies is not taken into account, since, for most pollutants in the sections of the Syrdarya River and the Dalverzin Channel, into which wastewater is discharged by UMK, the targets have already been exceeded (due to the receipt of pollutants from upstream areas).

Document title	Content of requirements	Analysis of the current situation/conclusion regarding compliance or non-compliance with IFC requirements
	Discharges of process wastewater, sanitary wastewater, wastewater from utility operations or storm water to surface water should not result in pollutant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality	Generally, the activity meets IFC requirements. Due to the absence of established criteria for the quality of natural water in Uzbekistan, the standards of the Russian Federation are used as targets (Section 9.5.1)
	Temperature of wastewater prior to discharge does not result in an increase greater than 3°C of ambient temperature at the edge of a mixing zone.	Generally, the activity meets IFC requirements: the water temperature in the sections of the Syrdarya River and the Dalverzin Channel, used for discharge of the company's effluents, increases within the recommended limits
	Be discharged into municipal or centralized wastewater treatment systems that have adequate capacity to meet local regulatory requirements for treatment of wastewater generated from the project. Pretreatment of wastewater to meet regulatory requirements before discharge from the project site is required if the municipal or centralized wastewater treatment system receiving wastewater from the project does not have adequate capacity to maintain regulatory compliance.	The activity does not meet IFC requirements: preliminary cleaning of household wastewater is not made at the plant, and wastewater after treatment at existing municipal treatment facilities does not meet the target figures
Water and Sanitation EHS Guidelines	Treatment or pre-treatment to neutralize or remove toxic chemicals should ideally take place at the industrial facility itself, prior to discharge of the effluent to the sewer or water body.	The activity complies partially with IFC requirements: only production and storm water is treated at the plant; effluents and household wastewater is not treated.
	Consider collaboration with public authorities in the implementation of a source control programme for industrial and commercial users to ensure that any wastewater discharged to the sewer system can be effectively treated.	The activity does not meet IFC requirements: the systematic monitoring of the composition of household wastewater, discharged into the sewerage system of Bekabad, is not made. Measures for possible treatment of the plant's household wastewater before draining to the sewer were not discussed with governmental authorities.
	Conduct surveillance monitoring of the influent to the wastewater treatment facilities	Generally, the activity meets IFC requirements: the monitoring of wastewater entering the treatment facilities for production and storm water is made regularly (Section 9.5.6.2)

Document title	Content of requirements	Analysis of the current situation/conclusion regarding compliance or non-compliance with IFC requirements
	Investigate upstream sources of pollutants causing treatment plant upsets or interference	The activity does not meet IFC requirements: the regular inspection of pollution sources, influent to UMK's treatment facilities, leading to exceeding the targets for output, are not made
EHS Guidelines for Integrated Steel Mills	Prepare a plant wide water recycling plan to maximize efficiency of water use. More than 95 percent recycling of water is normally achievable	Generally, the activity meets partially IFC requirements: drainage waters and treated wastewater is returned to the production process; at the same time, the share of water recycling in production is 73%.
	Dry techniques for removal of dust from plant equipment and premises should be used where possible, and rinse water should be collected and treated before discharge or reuse	Generally, the activity meets IFC requirements: rinse water is discharged to the treatment facilities for production and storm water
	Collect spillages and leakages (e.g. using safety pits and drainage systems)	The activity meets partially IFC requirements: there is no storm sewer in a part of the site; therefore it is not possible to arrange the collection of spills and leaks from the entire site of the plant.

The measures to prevent and/or mitigate the adverse impact, caused by the current production activity of the plant, are given in Section 9.5.6.

When justifying the measures, the results of the analysis of compliance of the company's current production activities with IFC requirements were taken into consideration (Table 9.5.4).

The measures to prevent or mitigate adverse effects, caused by UMK's current production activities, include:

1. Achievement of the quality of treated production and storm water at the level of target figures (not higher than target figures). This may be achieved both by upgrading the facilities (achievement of the target figure for petroleum products) and by implementing the measures to prevent the entry of pollutants from pollution sources (elimination of the slag dump, arrangement of a temporary slag accumulation site, arrangement of local treatment facilities). Particular solutions for upgrading of the treatment facilities and, possibly, their retrofitting with the expansion of the existing list of target pollutants should be taken based on results of monitoring of water bodies and control over the composition of the plant's wastewater.
2. To mitigate the impact, associated with drainage of effluents into the Dalverzin Channel, it is recommended to reduce the volume of drainage of effluents into the channel by increasing their use at the plant, with the achievement of the target figures specified in IFC Guidelines (EHS/Integrated Steel Mills).
3. Regular monitoring of household effluents, discharged into the municipal sewer; if necessary, implementation of corrective actions to avoid the

discharge into the sewer of effluents, containing substances not inherent in household wastewater (local treatment and/or prevention of entry of such substances from pollution sources). Given that the existing municipal treatment facilities cannot ensure the required quality of effluents in terms of typical pollutant, UMK intends to co-finance a project to modernise the municipal treatment facilities to achieve the target concentrations of specific pollutants (BOD total, BOD5 and nitrogen compounds). The timing of the project will be determined by municipal authorities.

4. Arrangement of a storm sewerage system for collection of wastewater, generated on the "old" site of the plant on the left bank of the Dalverzin Channel (including the slag dump located in the water protection zone of the channel), and their drainage to UMK's treatment facilities. The calculation of the volume of generated surface run-offs (rainwater and meltwater) from the southern part of the plant's site is given in Appendix 9.5.4. The additional inflow of wastewater to the treatment facilities during the arrangement of the sewerage system in the southern part of the plant's site will amount to 318.28 m^3/day, 116.173 thou m^3/y. Taking into consideration the fact that the volume of wastewater drainage to the treatment facilities is 22,911.745 m^3/day, with the capacity of the treatment facilities of 30,000 m^3/day, theincrease in productivity of the treatment facilities for implementation of this measure will not be required.

It is reasonable to implement the measures for prevention and mitigation of the adverse effect, caused by the current production activities of the plant, before the CRC commissioning (see Section 9.5.5).

9.5.3 Analysis of the designed scheme of water supply and sanitation systems at CRC

As a source of household water supply for CRC, the existing networks of the plant, the inflow to which is provided by UMK's water intake facility at the Dalverzin Channel (water intake facility No. 1), are considered, see 128-0948-ESIA-PE-1, Section 4.2.3.

The CRC wastewater is planned to be discharged to the production and storm water sewerage system of the plant and to the existing treatment facilities (see 128-0948-ESIA-PE-1, Section 4.2.4).

The main characteristics of water consumption and sanitation of CRC were assumed based on a feasibility study of the facility for the planned activity [4] and shown in the water balance of the plant, taking into account the CRC commissioning (Appendix 9.5.3).

In the production water supply for CRC, it is planned to reuse recycled water in water circulation systems. The replenishment of water circulation systems is planned using water from unwatering holes, arranged on the plant's site.

According to UMK's water management balance, the volume of used fresh and recycled water during the operation of the facility for the planned activity is:

- recycled water 20,012.25 m^3/day, 6,604.04 thou m^3/y;
- fresh water used for process needs (replenishment of circulating water loss) - 10,248.00 m^3/day, 3,381.840 thou m^3/y;
- fresh water used for household needs (from the company's networks) – 124.922 m^3/day or by 41.100 thou m^3/y.

The facility's need for industrial water to compensate for loss (427 m^3/h) is planned to be satisfied through the operation of two unwatering holes, located on the CRC site.

According to the Opinion of the State Unitary Enterprise "Uzbekhydrogeology" "On the Possibility of Using Underground Water for Water Drawdown and Industrial Water Supply for UMK's Casting and Rolling Complex", the debit of holes is 250 m^3/h (Appendix 9.5.5).

The use of the existing water supply and water intake facility at the Dalverzin Channel is considered as a backup source of industrial water.

To ensure the requirements for the quality of water for replenishment of water circulation systems, the pre-design solutions of CRC provide for a water treatment unit, which uses the reverse osmosis method.

The circulating water systems of CRC are planned to be filled using the industrial water from the existing water intake facility No. 1, the capacity of which (30 thou m^3/day) provides the possibility of accumulating the necessary reserve of circulating water in one day.

After the implementation of the CRC project, the volume of water consumption at the plant will be:

- fresh water for process needs - 63,193.453 m^3/day, 22,307.113 thou m^3/y (an increase of the existing consumption by 26.1%);
- fresh water for household needs - 2,962.705 m^3/day, 1,000.382 thou m^3/y (an increase of the existing consumption by 4.4%).

Since the unwatering holes of CRC are planned to be used as the main source of water for industrial needs, the water supply from the existing water intake facility for household needs will increase by only 4.4% at the operation stage.

According to the water management balance, loss in the water circulation systems of CRC amount to 1,488.00 m^3/day, 491.04 thou m^3/y. After the implementation of the CRC project, the total water loss at the plant will amount to 30,363 m^3/day, 8,818.600 thou m^3/y and will increase by 6% as compared with the existing level (Appendix 9.5.3).

This indicator is indicative of the high efficiency of water saving at the facility under designing, since a very slight increase in water loss accompanies an almost twofold increase in the output of products at UMK: the capacity of CRC in terms of hot-rolled coils is 1.04 million tonnes per year, with the existing volume of production at UMK in terms of rolled products is 0.9 million tonnes per year [4].

The assessment of solutions for water supply and sanitation at CRC against the requirements of the EU BAT [5], [6] is given in Appendix 9.5.6.

In order to save water resources, the available design solutions include:

- cooling water consumption 130 m^3/t of steel, which meets the requirements [5];
- refusal to use drinking (in quality) water for the production lines;
- use of contactless cooling circuits of the main process and auxiliary equipment (heating furnaces, electric motors, compressors, etc.) ;
- reuse of water for contact cooling of the rolling equipment (rolls, roller tables, etc.), as well as heated metal products, billets and residues;
- treatment of water, sent for reuse in the contact cooling circuits, to ensure the prescribed content of components, specific for the contact cooling circuits (scale, suspended solids, petroleum products).

Generally, the pre-design solutions for water supply and sanitation at the planned facility (including the functioning of CRC's water circulation cycles) comply with the requirements of the EU BAT.

The volumes of discharged wastewater from UMK, taking into consideration the implementation of the CRC project, are determined based on the data of UMK's water management balance, agreed upon with the plant (Appendix 9.5.3) and given in (Table 9.5.6).

The volumes of the company's wastewater discharge take into account the surface run-offs (storm water and meltwater) from the CRC site as well as surface run-offs from the area where the construction of storm sewers is recommended (the area to the south of the Dalverzin Channel).

The calculation of the volume of surface run-offs discharge for the current situation and for the period of implementation of the CRC project is given in Appendix 9.5.4.

Table 9.5.6 Main characteristics of water consumption and sanitation at the enterprise for the future implementation of the CRC project

Item No.	Wastewater type	Drainage volume				Water drainage conditions
		from CRC		total at the plant (taking into account the wastewater from CRC)		
		m^3/day	thou m^3/y	m^3/day	thou m^3/y	
1.	Domestic wastewater	124.922	41.100	4,487.420	4,293.900	To the municipal sewer and to the treatment facilities in Bekabad
2.	Production and storm water	8,793.80	2,903.14	31,306.145	10,194.995	To UMK's treatment facilities; then discharge into the Syrdarya River and use of a part of treated wastewater in production
3.	Surface (storm) run-offs from the site	33.798	12.336	399.398	145.780	Similar to Item 2
4.	Increase in the intake of surface run-offs as a result of the expansion of the storm water sewer of the plant	318.283	116.173	318.283	116.173	Similar to Item 2
5.	Discharge of effluent (ground) waters into the Dalverzin Channel	not provided		13,544.986	4,943.920	Discharge into the Dalverzin Channel; partial use of wastewater in production
TOTAL		9,237.003	3,060.410	2998,337	4048,43	
Including: wastewater after the use of consumed fresh water (production and domestic wastewater)[1]		8,884.922	2,931.900	35,793.565	14,488.895	
Production and storm water				14,262.667	5,205.873	

*__Note:__ the volume of production and household wastewater corresponds to the difference between the above volumes of fresh water consumption and production loss.

The domestic wastewater is planned to be discharged to the municipal sewer of the town of Bekabad together with similar wastewater from UMK. The volume of wastewater intake during UMK's operation will increase by 4.4% as compared with the existing volumes, up to 125 m^3/day, 41.100 thou m^3/y(Table 9.5.7).

The composition of wastewater as well as the treatment of wastewater after discharge to the municipal sewer are similar to those discussed above for domestic wastewater of UMK (see Section 9.5.2).

The measures to mitigate the adverse impact on the water body will also provide mitigation of the adverse impact on the municipal sewer when discharging the domestic wastewater from UMK to the municipal sewer (Section 9.5.6).

The production and storm water is planned to be discharged through the production and storm sewerage system to UMK's treatment facilities; after cleaning, it is reasonable to use some of the wastewater in production (in the general flow of treated production and storm water of the plant). A part of the facility's wastewater, not used in production, is planned to be discharged into the Syrdarya River through UMK's existing outlet No. 1.

After the CRC commissioning, the flow of wastewater, entering UMK's treatment facilities (31,306.145 m^3/day), will exceed the maximum capacity of the treatment facilities, which is 30,000 m^3/day. The increase in the influent surface wastewater (in the amount of 318.283 m^3/day) will also occur as a result of expansion of the storm sewerage system (Table 9.5.7).

For this reason, it is necessary to provide for the restructuring of UMK's existing treatment facilities with an increase in their productivity (Section 9.5.6).

The excess effluent water, generated after using a part of water for process needs is planned to be discharged into the Dalverzin Channel together with similar wastewater from UMK.

UMK's existing outlets No. 2 and/or No. 3 will be used to discharge the effluents from the facility. At the stage of implementation of the CRC project, it is planned to eliminate UMK's existing outlet No. 4, located in the border area with the Republic of Tajikistan. The elimination of this outlet is possible due to the increase in the use of ground water for the production needs of the plant (Section 9.5.5).

According to UMK's water balance, the volume of wastewater, used for the needs of CRC, is 10,248.00 m^3/day, 3,381.840 thou m^3/y. The volume of reuse of production and storm water in production at UMK during the implementation of this measure is determined in such a way as to ensure the share of using the effluents and wastewater at the level of 90% of the total volume of water, used for production purposes, which, primarily, complies with IFC recommendations.

In terms of composition, wastewater may be used to replenish CRC's water circulation systems after treatment n accordance with the quality criteria for the make-up water of the facility (Appendix 9.5.7). The available pre-design solutions provide for a water treatment cycle for the water used to replenish the systems [4].

The total amount of effluents and wastewater that is planned to be used at the plant (taking into consideration the planned use at CRC), assumed based on UMK's water balance, is given in Table 9.5.6.

Table 9.5.7 Volumes of effluents and wastewater, used at the plant (taking into account the use of effluents from the CRC site for the needs of the plant)

Item No.	Type of wastewater	Amount of wastewater used	
		m^3/day	**thou m^3/y**
1.	Production and storm water	18,412.710	6,720.639
1.1.	Including: production and storm water of CRC	**8,793.80**	**2,903.14**
2.	Ground (effluent) water*	28,411.287	10,370.120
TOTAL		46,823.999	792,993
Use of wastewater and fresh water for the production needs of the plant[**)]		52,026.665	18,989.733

Notes:

* - volumes that are not taken into account in the volumes of discharges into the Dalverzin Channel.

** – taking into consideration the use for CRC's production needs.

In the total volume of consumption of treated wastewater and fresh water (from the water intake facility at the Dalverzin Channel), the share of wastewater used at the plant (taking into account the effluents and the total volume of production and storm water of CRC) will be about 90.0% (17,090.759 thou m^3/y).

The composition of CRC's production water, discharged into water bodies, was assumed based on the feasibility study [4]; when determining the composition of wastewater, the data from a similar facility were also used [7].

For wastewater that will be supplied for treatment during the operation of CRC, the composition of wastewater, formed as a result of mixing the wastewater of CRC itself and the production and storm water of UMK, was determined.

The concentrations, achieved as a result of mixing of wastewater, are determined by the material balance method, taking into account the predicted concentrations of pollutants in the production water of CRC [31] and the content of pollutants in the production and storm water of UMK (Section 9.5.2,Table 9.5.5), as well as the volumes of drainage of the plant's wastewater for treatment (currently) and the planned volumes of production and storm water of CRC.

The characteristics of the composition of CRC's production water as well as the wastewater of the plant, discharged to UMK's treatment facilities [32] during the operation of the facility, are given in Table 9.5.8.

[31] The concentrations of substances in CRC's storm water were not considered when determining concentrations after mixing, since the storm water of the facility are generated inside the plant's site and, for this reason, are identical in composition to storm water from the other areas of UMK.

[32] Table 9.5.8 only gives the main characteristics of the composition of wastewater, discharged to the treatment facilities; by other characteristics, the composition of CRC's wastewater will be similar to the existing characteristics of the production and storm water, since these concentrations are determined by the composition of the water, which is used, or by the influent storm water.

Table 9.5.8 Composition of the plant's wastewater, discharged to UMK's treatment facilities and to water bodies (taking into consideration the influent wastewater from CRC)

Item No.	Name of substances/properties of wastewater	Target	Concentrations, mg/dm^3			
			Inflow of production and storm water to the treatment facilities (current situation)[1]	Wastewater of CRC[2]	Inflow of storm water to the treatment facilities (taking into account CRC's wastewater)[3]	Wastewater after UMK's treatment facilities
1.	Sulphates	100	670.00	500.0	623.0	419.0
2.	Chlorides	300	174.00	300.0	208.8	131.5
3.	Iron	0.1	0.031	2.0	0.6	0.02
4.	Manganese	0.01	0.001	0.2	0.1	<0.001
5.	Suspended particles **)	15.0	20.0	50.0	24.7	0.04
6.	Petroleum products	0.05	0.12	5.0	1.5	0.15
7.	Total salinity (mineralisation)	1,000	1,005.7	750.0	935.0	648.55
8.	Copper	0.001	<0.002	0.1	0.03	<0.002

Note

[1] - the characteristics of the diluted flow of production and storm water, generated in mixing the wastewater from UMK's core and auxiliary production facilities and the wastewater entering the storm sewerage system from the plant's site, are given;

[2] - the planned composition of CRC's concentrated wastewater is given;

[3] - to calculate the concentrations of CRC's wastewater mixed with the existing wastewater of the plant, the maximum concentrations for suspended particles were assumed based on the production monitoring of UMK's wastewater.

After the commissioning of UMK, an increase in the pollutants content of the wastewater, entering for treatment, is predicted for 5 substances (iron, manganese, suspended particles, petroleum products, copper). These substances are considered as a potential source of additional pollution for the Syrdarya River.

Now, when discharging wastewater through outlet No. 1, as for the substances that create the risk of additional pollution for the Syrdarya River, the maximum allowable discharge standards and targets for the water body have been exceeded for sulphates and petroleum, with the existing risk of exceeding these standards for copper (Section 9.5.2.).

In order to prevent the adverse impact, associated with the entry of the substances under consideration into the water body, it is planned to upgrade the existing treatment facilities as well as to eliminate the existing sources of wastewater pollution (for example: reclamation of the slag dump area, arrangement of local treatment for the workwear laundry's wastewater).

Thus, the CRC commissioning requires the implementation of measures to clean wastewater from iron, manganese, suspended particles and copper. The available pre-design solutions for treatment of water from CRC's circulating water systems do not provide for cleaning from these substances (Appendix 9.5.5).

The analysis of compliance of the planned activity during the CRC operation with IFC requirements as to sanitation and treatment of wastewater is given in (Table 9.5.9[33]).

Table 9.5.9 Analysis of compliance of the planned CRC activity with the requirements of IFC as to sanitation and treatment of wastewater

Document title	Content of requirements	Analysis of the current situation/conclusion regarding compliance or non-compliance with IFC requirements
Water and Sanitation EHS Guidelines	Conduct surveillance monitoring of the influent to the wastewater treatment facilities	The possibility of construction of own treatment facilities for the production water from the facility requires additional consideration
EHS Guidelines for Integrated Steel Mills	Prepare a plant wide water recycling plan to maximize efficiency of water use. More than 95 percent recycling of water is normally achievable	Generally, the planned situation meets IFC requirements: the production needs of CRC in water will be fully met by using the effluents; at the same time, the share of recycled water in UMK's production is predicted at the level of 90.0%
	Dry techniques for removal of dust from plant equipment and premises should be used where possible, and rinse water should be collected and treated before discharge or reuse	The solutions on collection and drainage of rinse water require additional consideration
	Collect spillages and leakages (e.g. using safety pits and drainage systems)	The planned situation meets IFC requirements: it is planned to equip the facility's site with a storm sewerage system and connect it with the existing production and storm sewerage system of UMK; it is possible to arrange the collection of spills and leaks from the entire area of CRC

The measures to prevent or mitigate adverse effects are presented in Section 9.5.6.

When planning the measures, the results of the analysis of compliance of the existing activities (UMK) and the planned activity (UMK+CRC) with IFC requirements were taken into consideration (Table 9.5.8).

The measures to prevent or mitigate adverse effects are connected with the current production activities: Basic measures:

- Treatment of production water from pollutants, which might exceed the environmental allowable discharge standards when discharging UMK's wastewater into a water body[34]. The solutions for treatment of UMK's production water should be included in the Action Plan. A priority option is to upgrade the existing treatment facilities of UMK. The modernisation needs to achieve the quality of wastewater in terms of sulphates and petroleum products (Section 9.5.6), as their excessive concentrations in surface waters is reported already at present time (Section 9.5.2).
- Increase in the volume of using the wastewater and effluents at the plant up to 90% of the total volume of fresh and recycled water, consumed for UMK's production needs.

[33] The compliance analysis was only made using the applicable criteria. The conclusions on the compliance of the existing activities, related to the drainage and treatment of UMK's wastewater, are discussed above in Section 9.5.2.

[34] An increase in the content of iron, manganese, suspended particles and copper is predicted in the wastewater entering the treatment facilities of the plant during operation.

- Collection and drainage of rinse water into the local production sewerage system of CRC (if the method of hydraulic treatment is adopted).

9.5.4 Construction stage

At the construction stage, the water supply is provided by connecting the designed networks to UMK's existing water supply networks (the characteristics of the networks are given in Section 4.2.3).

The wastewater is planned to be discharged to the production and storm, household sewerage systems of the plant and to the existing treatment facilities (see Report 128-0948-ESIA-PE-1, Section 4.2.4 and Section 9.5.2 of this Report).

At the construction stage, a minor impact on the water body (Syrdarya River), caused by the drainage of storm water, generated on the construction site, as part of the flow of UMK's treated production and storm water (outlet No. 1), is predicted.

Within the construction period, the domestic wastewater is generated in the administrative building as well as in the construction camp (staff dormitories, canteens and other necessary facilities for servicing of builders). The building is located on the area adjacent to the CRC construction site; the construction camp is located on the area adjacent to UMK's industrial site.

The domestic wastewater, generated in the administrative building, will be discharged to the municipal sewer and to the treatment facilities of Bekabad in the general flow of UMK's domestic wastewater (it is planned to connect this facility to the household sewerage system of the plant, which has a discharge into the municipal system); the direct connection of this facility to the municipal sewer for drainage of wastewater from the construction camp is planned.

The volume of wastewater discharged to the municipal sewer and to the treatment facilities is predicted at the level not much above the period of the facility operation (the increase by maximum 5.0% as compared with the existing volumes). The exact volume of generated domestic wastewater will be determined during the development of the CRC construction design. The composition of wastewater as well as the treatment of wastewater after discharge to the municipal sewer are similar to those discussed above for domestic wastewater of UMK (see Section 9.5.2).

The measures to mitigate the adverse effects on the water body when draining the domestic wastewater of UMK into the municipal sewer will minimise the effects during the construction of the facility.

The storm water from the construction site are planned to be discharged through the production and storm sewerage system of the plant to UMK's treatment facilities.

Within the construction period, the maximum volume of storm water will be generated at its final stage, since at this stage the catchment areas, where the wastewater is generated most intensively (waterproof coatings, roofs of buildings), will reach maximum values: the maximum volume of storm water was assumed at the same level as for the facility operation period: 33.798 m^3/day (Section 9.5.2).

The existing volume of the production and storm water to the treatment facilities of the plant is 22,911.745 m^3 /day, with the maximum capacity of the treatment facilities of 30,000 m^3/day; for this reason, the expansion of the available capacity of the production and storm water treatment facilities will not be required for the construction period.

The composition of the storm water, generated on the CRC construction site, will include pollutants, inherent in production and storm water (Section 9.5.2); at the same time, during the initial period of construction, the wastewater will differ in higher concentrations of

suspended particles and petroleum products, which is caused by the nature of the works (excavation of pits, levelling of the site, dusting of building materials).

Based on the data for similar facilities, the maximum concentrations of specific pollutants in storm water for the construction period are:

- suspended particles - 1,000 mg/dm^3,
- petroleum products (total content) - 20 mg/dm^3.

When draining to UMK's treatment facilities, the concentrations of these substances will decrease due to mixing with the production and storm water of the company, which are characterised by lower concentrations (Section 9.5.2).

The predicted composition of the wastewater is determined by the balance method, taking into account the planned concentrations in the storm water from the CRC construction site and the concentrations in the production and storm water from UMK (Section 9.5.2,Table 9.5.5), as well as the volumes of the plant's wastewater, discharged to the treatment facilities now, and the planned volumes of the storm water during the construction period.

During the construction of the facility, the following concentrations of specific substances are predicted in the production and storm water of the plant, entering the treatment facilities:

- suspended particles – 21.4 mg/dm^3,
- petroleum products - 0.14 mg/dm^3.

These concentrations do not differ much from the predicted concentrations for the CRC operation period; therefore, the special measures to ensure the quality of treated wastewater within the construction period are not required.

Thus, the additional volumes of wastewater within the construction period (from the CRC construction site) may be discharged to the existing treatment facilities without increasing their actual productivity (30,000 m^3/day).

At the construction stage of the facility, the following measures are also suggested to prevent uncontrolled entry of pollutants (petroleum products, etc.) into water bodies:

- Use of specially equipped areas for refuelling of vehicles and machinery;
- Regular technical inspections of vehicles and machinery;
- Equipment of the construction site with consumables and spill response kits;
- Development of a (petroleum product) spill response plan for construction contractors and training of their personnel;
- To prevent flooding of construction sites and pollution of water bodies, the following measures will be put in place:
- Equipment of construction pits with dewatering and water disposal systems (to be implemented by the construction contractor);
- Diversion of pit water into UMK’s industrial and stormwater sewerage (to be implemented by the construction contractor).

The measures to monitor quality of water bodies (the Syrdarya and Dalverzin Channel) described in Section 9.5.6.2 will be used to monitor quality of water during the CRC construction phase.

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9.5.5 Operation stage

At the operation stage, the impact on the water body (Syrdarya River), caused by the drainage of production and storm water from the facility as part of the flow of UMK's treated production and storm water (outlet No. 1), is predicted.

The impact of the planned activity on the Dalverzin Channel is not predicted, since the entire volume of effluents (underground/ground waters), generated on the CRC site, is planned to be used for production water supply (Section 9.5.3).

The analysis of the influence of UMK's on water bodies was carried out on the basis of data ofthe background studies [2], see Appendix 9.5.8.

The primary influence on the water quality of the section of the Syrdarya River, where UMK's wastewater is discharged, is exerted by water coming from the upstream section of the river.

A significant deterioration in quality at the final station of the section (500 m below UMK's outlet No. 1), as compared with the initial station, was only recorded for nitrates.

The effect is most likely caused by the entry into the water body of insufficiently treated municipal wastewater from Bekabad, since no excess of quality standards for nitrates was recorded in the plant's wastewater, discharged to the Syrdarya River.

The water quality in the Dalverzin Channel is affected much by the discharge of effluents from UMK: an increase in nitrites and magnesium concentrations at the final station of the section correlates with exceeding the target figures for these substances in the effluents entering the channel at outlets Nos. 2, 3.

In order to mitigate and, in the future, prevent the adverse impact on the Syrdarya River, it is necessary to implement measures in order to achieve the environmental standards for all the specific substances, entering the water body with the plant's production and storm water now, as well as to prevent deterioration of the quality of treated wastewater as a result of an increase in the concentrations of a number of pollutants in the wastewater after the CRC commissioning.

The feasibility of the measures is given in Sections 9.5.2, 9.5.3.

An increase in the level of impact on the water quality in the Dalverzin Channel is not predicted at the facility operation stage, since the entire volume of additional effluents, generated during this period, is used for UMK's production water supply.

The mitigation of the adverse impact from the existing flow of wastewater into the Dalverzin Channel is achieved by increasing the share of using the wastewater and effluents at the plant up to 90% of the total volume of fresh and recycled water in accordance with IFC recommendations (Section 9.5.3).

With the planned volume of recycled wastewater and effluents of 17,090.759 thou m^3/y, the total amount of wastewater that needs to be discharged into the water bodies at the CRC operation stage, will be:

- production and storm water – 3,620.135 thou m^3/y;
- effluents – 1,562.080 thou m^3/y.

Thus, during the operation period, it is planned to reduce much (to 68%) the discharge of effluents into the Dalverzin Channel, as compared with the existing volumes (4,943.920 thou m^3/y). A slight increase in the volume of drainage of the production and storm water, treated to the level of environmental standards, is also supposed: by 20%, as compared with the existing level (2,993.112 thou m^3/y).

The distribution of effluents among UMK's existing outlets at the Dalverzin Channel is determined based on the total planned discharge of the volume of effluents into the channel (1,562.080 thou m^3/y), while maintaining the existing proportion of the distribution of effluents between outlets Nos. 2 and 3.

The planned volumes of effluents discharge into the Dalverzin Channel after the implementation of measures to increase their use in production will be:

- at outlet No. 2 - 1,148.126 thou m^3/y;
- at outlet No. 3 - 413.948 thou m^3/y.

It is planned to stop the discharge of effluents at UMK's outlet No. 4 at the section of the Dalverzin Channel, along which the state border with the Republic of Tajikistan passes, and to restructure the existing effluents discharge system in order to distribute the volumes of effluents, which were discharged at that outlet, among outlets Nos. 2 and 3.

The calculation of the masses of pollutants, entering the water bodies with wastewater today and after implementation of the planned measures to prevent and mitigate the impact on the water bodies at the CRC operation stage (upgrading of UMK's existing treatment facilities and/or construction of CRC's local treatment facilities, reduction of effluents discharge volumes after the CRC commissioning – for more details, see Table 9.5.10), was made using the material balance method, taking into account the planned volumes of wastewater discharge for outlets Nos. 1-3

When calculating the masses of pollutants, entering the water bodies, the following factors were taken into consideration[35]:

- existing concentrations of pollutants in UMK's wastewater (Section 9.5.2, Table 9.5.3);
- concentrations, achieved after implementation of the planned measures at the CRC operation stage (Section 9.5.3, Table 9.5.7);
- target figures of quality for water bodies, which the production and storm water will meet after implementation of the measures (Section 9.5.2,Table 9.5.5).

The concentrations of pollutants, entering the Dalverzin Channel, were assumed at the existing level, since the planned mitigation measure provides for achievement of a positive effect by reducing the volume of effluents, discharged into the channel.

If, according to the results of monitoring, the insufficiency of the suggested measure is found, an additional measure may be implemented in the future to clean effluents to be charged into the Dalverzin Channel (Section 9.5.6, Table 9.5.10).

The calculation of the mass of pollutants, entering the water bodies with wastewater now and after implementation of the suggested measures, is given in Appendix 9.5.10.

The evaluation of efficiency of the water protection measures is shown in Table 9.5.9.[36]

[35] The concentrations of pollutants in wastewater, entering the water bodies now, were assumed according to the data given in Section 9.5.2 (Table 9.5.4). The concentrations of substances in treated production and storm water after implementation of the measures were assumed at the level of target figures for water bodies.

[36] The list of substances includes substances, which are discharged into the water bodies now in excess of target figures.

The substances, the risk of pollution for which is only associated with CRC's wastewater, are not considered, since this risk is eliminated by implementation of the local treatment of facility's wastewater.

Table 9.5.10 Assessment of efficiency of the planned water protection measures

Item No.	Name of pollutants	Reduction of the volume of pollutants as a result of implementation of the water protection measures					
		when discharging into the Syrdarya River		when discharging into the Dalverzin Channel		for the entire UMK	
		t/y	%	t/y	%	t/y	%
1.	Sulphates	0.892	71.1	1.449	75.7	2.341	69.5
2.	Petroleum products	0.0003	59.7	0.0002	80.8	0.0005	64.1
3.	Phenol	0.000004	51.6	0.000003	76.2	0.00001	57.7
4.	Synthetic surfactants	0.0003	42.4	0.001	72.9	0.001	56.8
5.	Magnesium	0.004	2.9	0.177	77.7	0.181	44.7
6.	Nitrate nitrogen	0.00	0.0	0.035	76.2	0.035	67.9
7.	Nitrite nitrogen	0.00	0.0	0.0005	73.5	0.0005	7.9

In order to prevent the adverse impact of the existing production activities at the operation stage, it is reasonable to implement the recommended measures for upgrading of the existing treatment facilities for production and storm water (Section 9.5.6, Table 9.5.10) as well as to prevent uncontrolled inflow of wastewater from the "old" (southern) part from UMK's site, not equipped now with a storm sewerage system, into the Dalverzin Channel (Section 9.5.2).

To prevent uncontrolled discharge of wastewater into the Dalverzin Channel from the surface of the slag dump and a part of the plant's site where there is not a storm sewerage system, it is recommended to provide equipment for a storm sewerage system on these catchment surfaces.

The wastewater, entering the storm sewerage system from the "old" (southern) part of UMK's site, are planned to be discharged to the existing treatment facilities of UMK.

As a result of implementation of this measure, the volume of drainage of the storm water to the treatment facilities will increase by 318 m^3/day.

The total flow of wastewater to UMK's treatment facilities, taking into consideration the additional volume of wastewater from new sources (production water from CRC, storm water from the facility, storm water coming for treatment from the slag dump and a part of the plant's site where it is planned to equip a new storm sewerage system) will be 32,024 m^3/day or 10,456.948 thou m^3/y (Section 9.5.3).

Since the existing capacity of production and storm water treatment facilities is maximum 30,000 m^3/day, it is reasonable to provide for expansion of the treatment facilities.

The capacity of the treatment facilities after expansion should be approximately at least 33,000 thou m^3/day.

The composition of the wastewater, entering the treatment facilities through the planned storm sewerage system from the plan's site where the production buildings and structures are located, is similar to the wastewater entering the treatment facilities now; so any additional measures to ensure the quality of treatment when the additional volumes are received at the treatment facilities will not be required.

The composition of wastewater, generated in the slag dump area, is similar to the composition of existing production and storm water; but it differs in a higher content of suspended particles (up to 4,000 - 5,000 mg/dm^3). A higher content of dissolved substances (calcium, magnesium, iron, chromium, manganese, sulphates, chlorides) is also predicted in wastewater from the slag dump.

The composition of wastewater, wastewater to the existing treatment facilities, should be determined when developing a storm sewerage system design for the area where this system is currently absent (the "old" area of UML on the left bank of the Dalverzin Channel).

When upgrading the existing treatment facilities, it is necessary to take into consideration the additional intake of pollutants from the slag dump area.

In order to prevent disruption of the treatment facilities, it is recommended to provide for the primary treatment of wastewater, discharged from the slag dump area into the planned sewerage system (settling tanks).

In order to maintain the regulation of using the water protection zone of the Dalverzin Channel, it is suggested that the slags, accumulated in the dump, be processed (see Section 9.4).

In such a way, the section of the channel's water protection zone will be cleaned from the accumulated wastes (see Section 9.4).

In order to drain the surface run-offs from the slag dump area to the planned storm sewerage system, it is necessary to provide for processing of the dump with benches, oriented in the direction opposite to the direction of uncontrolled discharge of wastewater into the channel.

Upon completion of the slag dump processing, it is advisable to lay waterproofing on the cleaned areas, which will ensure the protection of pollutants from the surface.

9.5.6 Recommendations

9.5.6.1 Measures to prevent and mitigate impacts

The feasibility of the measures to prevent and mitigate impacts from the current production activities of UMK and from the planned activity during the CRC construction and operation is given in Sections 9.5.2-9.5.4.

The measures to prevent and mitigate impacts are presented in Table 9.5.10.

9.5.6.2 Monitoring and reporting

At the CRC construction and operation stages, it is recommended to perform the monitoring of water quality:

- in the Syrdarya River – at the initial and final stations of the river section in the area of outlet No. 1 of UMK, in accordance with the environmental standards of the maximum allowable discharge for outlet No. 1;
- in the Dalverzin Channel - at the initial and final stations of its section, passing through the plant's site (the station under the road bridge over the channel near the boundary of UMK and the final station near the state border with the Republic of Tajikistan).

When monitoring the water bodies, the monitored criteria are the target figures for outlets Nos. 1-3, specified in Section 9.5.2 (Table 9.5.4).

At the CRC construction stage, the monitoring is recommended for:

- wastewater entering the water bodies through outlets Nos. 1-4 (as for outlet No. 4, the measures are conducted until the elimination of this outlet);
- production and storm water at the entry to UMK's treatment facilities and after treatment;

At the CRC operation stage, the monitoring is recommended for:

- wastewater entering the water bodies through outlets Nos. 1-3 (as for outlet No. 4, the measures are conducted until the elimination of this outlet);
- production and storm water at the entry to UMK's treatment facilities and after treatment;
- domestic wastewater discharged from the plant to the municipal sewer of Bekabad;
- wastewater from the slag dump area entering the storm sewerage system (the measure should be taken after implementation of the measure for introduction of the storm sewerage system in the plant's area located to the south of the Dalverzin Channel).

When monitoring the wastewater, entering the water bodies through the existing outlets as well as entering the existing treatment facilities, the achievement of the target figures for such outlets is monitored (Section 9.5.2,Table 9.5.5).

The monitoring of the domestic wastewater includes determination of the content of pollutants, which might reduce the efficiency of wastewater treatment at the municipal treatment facilities in Bekabad.

The monitored indicators in the wastewater from the slag dump area are substances, the concentrations of which might exceed their content in production and storm water (suspended particles, petroleum products, calcium, magnesium, iron, chromium, manganese, sulphates, chlorides).

At the CRC construction and operation stages, it is recommended to provide for the monitoring of the production water from the facility (the monitored parameters are compliance of the wastewater composition with the characteristics specified in Section 9.5.3,Table 9.5.9).

If a solution on construction of treatment facilities for CRC's production water is made, it is necessary to provide for a measure for monitoring of the wastewater at the outlet of such facilities (the criterion is achievement of the design characteristics of treatment).

9.5.7 Assessment results

The matrix of results of the assessment of effects (characterisation of impact) on underground water is given in Table 9.5.11.

It is found that the impact of the planned activity on surface waters is estimated as follows[37]:

- Syrdarya River:
  - at the construction and operation stages – low;
- Dalverzin Channel:
  - at the construction stage – no significant impacts are anticipated;
  - at the operation stage – low.

References

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[37] Residual effects, taking into consideration the implementation of the measures.

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10. Reference Book for Environmental Experts. State Committee of Environment of Uzbekistan, 2009.

Table 9.5.11 Measures to prevent and mitigate the effects on surface waters

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
1.	Construction works (earthwork, general construction works)	• Prevention of water body pollution	• Collection and diversion of all types of wastewater (including storm and melt water) from CRC construction sites into the existing sewerage of UMK and their subsequent treatment at the plant's treatment facilities; • Diversion of sanitary wastewater into the existing sewerage of UMK and then to municipal treatment facilities of Bekabad; • Use of specially equipped areas for refuelling of vehicles and machinery; • Regular technical inspections of vehicles and machinery; • Equipment of the construction site with consumables and spill response kits; • Development of a (petroleum product) spill response plan for construction contractors and training of their personnel; • Equipment of construction pits with dewatering and water disposal systems (to be implemented by the construction contractor); • Diversion of pit water into UMK's industrial and stormwater sewerage (to be implemented by the construction contractor). • Implementation of measures to monitor quality of water bodies (the Syrdarya and Dalverzin Channel) described in Section 9.5.6.2.	IFC General EHS Guidelines IFC Performance Standard 3 National requirements	• Quality monitoring of water bodies (Syrdarya River and Dalverzin Channel) at the plant's outlets • monitoring of wastewater entering the water bodies through outlets Nos. 1-4; monitoring of production and storm water at the entry to UMK's treatment facilities and after treatment • inspections of the construction site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • Monitoring programme for the construction period • Spill Response Plan • reporting on monitoring results • reporting on inspection results
II.	**Operation stage**					

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
2.	Maintenance of the core production activities: water supply, drainage, drawdown	• Mitigation of the effect caused by taking of natural waters for use for the production needs of CRC and the existing facilities • mitigation of the effect caused by discharge of effluents into the Dalverzin Channel (without treatment) • prevention of water body pollution	• Increase in the volume of wastewater and effluents, used at the plant, up to 90% (of the total volume of water for production needs) • wastewater drainage to the existing sewerage systems of the plant • upgrading of the existing treatment facilities with the achievement of wastewater quality not higher than the established target figures • arrangement of a storm sewerage system for collection of wastewater, generated in a part of the plant's site to the south of the Dalverzin Channel (including the slag dump), and their drainage to UMK's treatment facilities • elimination of the slag dump with the transfer of the wastes for processing (cleaning of the Dalverzin Channel's water protection zone from accumulated wastes) • prevention of uncontrolled inflow of wastewater into the Dalverzin Channel during the removal and processing of the accumulated slag • waterproofing of the slag dump area after the completion of slag processing • treatment of effluents, discharged into the Dalverzin Channel (the measure should be implemented if its necessity is found based on the monitoring results; see more details in Section 9.5.5) • treatment of CRC's production water (option - achievement of the target figures fir treated wastewater by upgrading of the existing treatment facilities; see more details in Section 9.5.3) • increase in the productivity of the existing treatment facilities at the plant, taking into consideration the increase in the volume of wastewater during the CRC operation (CRC's wastewater and wastewater coming for treatment after implementation of the measure for expansion of UMK's storm sewerage system) • collection and transfer for treatment of all the types of wastewater, generated during the CRC operation (including storm water and meltwater; wastewater from cleaning of industrial premises and adjacent area) • prevention of uncontrolled inflow of wastewater into the Dalverzin Channel during the removal and processing of the accumulated slag • Modernisation of Bekabad municipal treatment facilities to achieve the target concentrations of specific pollutants (BOD total, BOD5 and nitrogen compounds). UMK may co-finance the project	IFC EHS Guidelines for Water and Sanitation IFC EHS Guidelines for Integrated Steel Mills Environmental standards of allowable discharge for UMK (for discharge of effluents)	• Quality monitoring of water bodies (Syrdarya River and Dalverzin Channel) at the plant's outlets • monitoring of: - wastewater entering the water bodies through outlets Nos. 1-3; - production and storm water at the entry to UMK's treatment facilities and after treatment; - domestic wastewater discharged from the plant to the municipal sewer of Bekabad; wastewater from the slag dump area entering the storm sewerage system (recommended after implementation of the measure for introduction of the storm sewerage system in the plant's area located to the south of the Dalverzin Channel) • on-site inspections	• Implementation of environmental measures in accordance with the design documentation • compliance with the requirements of the national laws in the area of environmental protection • Monitoring programme for the operation period • reporting on monitoring results • reporting on inspection results

Table 9.5.12 Matrix of results of the assessment of effects on surface waters

Life cycle stage: construction

Recipient: Syrdarya River

Recipient's sensitivity: medium

Impact characteristics

Impact	Chemical water pollution		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Low	Moderate
Consequences	Indirect effects on the public health, aquatic ecosystems, economic entities				
Measures	• Collection, drainage and treatment of all the types of wastewater, including storm water and meltwater, from the construction sites • wastewater drainage into the existing sewerage systems and treatment facilities in Bekabad • preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training • preparation of specially equipped places for refuelling of machinery and mechanisms • monitoring of condition of all the types of motor vehicles, machinery and mechanisms				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Life cycle stage: operation

Recipient: Dalverzin Channel

Recipient's sensitivity: medium

Impact characteristics

Impact	Water intake		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on the population, economic entities				
Measures	• Increase in the volume of using the wastewater and effluents at the plant up to 90% of the total volume of fresh and recycled water, consumed for UMK's production needs				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Minor	Low

Life cycle stage: operation

Recipient: Dalverzin Channel

Recipient's sensitivity: medium

Impact characteristics

Impact	Chemical water pollution		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on the public health, economic entities				
Measures	• Wastewater drainage to the existing sewerage systems of the plant • arrangement of a storm sewerage system for collection of wastewater, generated on the site of the plant to the south of the Dalverzin Channel (including the slag dump located in the water protection zone of the channel), and their drainage to UMK's treatment facilities • elimination of the slag dump with removal of the wastes for processing outside the water protection zone of the Dalverzin Channel • prevention of uncontrolled inflow of wastewater into the Dalverzin Channel during removal and processing of the accumulated slag, waterproofing of the slag dump site upon completion of slag processing • treatment of effluents, discharged into the Dalverzin Channel (the measure should be implemented if its necessity is found based on the monitoring results; see more details in Section 9.5.5) • increase in the productivity of the plant's existing treatment facilities, taking into account the increase in the inflow of wastewater during the CRC operation as well as coming storm water				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Minor	Low

Life cycle stage: operation

Recipient: Syrdarya River

Recipient's sensitivity: medium

Impact characteristics

Impact	Chemical water pollution		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on the public health, economic entities				
Measures	• upgrading of the existing treatment facilities with the achievement of wastewater quality at the level not higher than the established target figures (option: achievement of wastewater target figures for individual substances by reducing their inflow to the treatment facilities) • treatment of CRC's production water (option - achievement of the target figures fir treated wastewater by upgrading of the existing treatment facilities; see more details in Section 9.5.3) • increase in the productivity of the plant's existing treatment facilities, taking into account the increase in the inflow of wastewater during the CRC operation as well as coming storm water • collection and transfer for treatment of all the types of wastewater, generated during the CRC operation (including storm water and meltwater; wastewater from cleaning of industrial premises and adjacent area)				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

9.6 Impact on underground waters

The characteristics of the hydrogeological conditions of the planned activity area are given in 128-0948-ESIA-PE-2.

According to the survey data, underground (ground) waters are developed on the CRC site in alluvial-proluvial deposits, represented by pebble bed with sand-gravel aggregate with inclusions of gibbers. There are differences on the site: small differences in depth of occurrence and in chemical composition.

In general, the maximum ground water level is predicted at the depth of 4.0-4.5 m below the surface, the minimum depth of underground (ground) water is 4.82-1.75 m below the surface. The waters are characterised as non-aggressive or mildly aggressive to portland cement concrete of grade W4 [1, 3].

To lower the level of underground (ground) water, on UMK's site there is a network of 36 unwatering holes. Underground (ground) waters are partially used to replenish the water balance of the plant; the rest of the volume is discharged into the Dalverzin Channel.

In 2019, the State Unitary Enterprise "Uzbekhydrogeology" studied the possibility of water drawdown on the CRC construction site; as a result, the recommendations on the equipment for the unwatering holes, equipped with pumping equipment of the required capacity, were given [2].

9.6.1 Construction stage

According to [1], the CRC project provides for construction of the following buildings (structures):

- production, auxiliary and warehouse buildings, with cast-in-place concrete foundations on a natural subgrade;
- production, warehouse and auxiliary buildings, with cast-in-place concrete foundations on a natural subgrade;
- administrative and household buildings, canteen, with cast-in-place concrete foundations on a natural subgrade, pier and girder foundations;
- built-in and attached heated buildings and structures for energy purposes (electrical substations, powerhouses, etc.), with cast-in-place concrete foundations on a natural subgrade, pier, girder and slab foundations;
- buildings and structures for water management, with cast-in-place concrete foundations on a natural subgrade.

The walls of basements, the walls of communication ducts and pathways: cast-in-place concrete foundations.

Now, the construction works are underway on the CRC site (Figure 9.6.1).

Figure 9.6.1 General view of the CRC construction site, October 2021 At the left of the photo there is accumulation of groundwater and storm water in the excavation *Figure 9.6.1 General view of the CRC construction site, October 2021 At the left of the photo there is accumulation of groundwater and storm water in the excavation*

Storm water (meltwater – in winter and spring) as well as underground (ground) water inevitably accumulate in pits for buildings and structures, see Figure 9.6.1.

At the construction stage, a direct impact on underground water is predicted, in particular, a change in the regime of the underground reservoir in alluvial-proluvial deposits, caused by exposing of horison by construction works, further pumping of accumulated water using pumping equipment and their drainage to the plant's network.

Considering that, in general, flooding processes are inherent in the territory of the town of Bekabad and the industrial site of UMK, solutions for construction water drawdown ensure safe conditions for construction works and absence of adverse effects on the underground reservoir in alluvial-proluvial deposits.

The indirect impact, pollution of this underground water horizon, may be caused by improper practices of temporary accumulation of wastes, storage and handling of fuels and lubricants, spills of fuels and lubricants, use of malfunctioning construction machinery, equipment and vehicles.

The measures to eliminate contamination of the construction site with wastes, the solutions to prevent fuel and lubricants spills, the use of serviceable construction machinery, equipment and vehicles prevent the underground water pollution and related consequences (for example, migration of pollutants along the underground water flow, their unloading in the supply area of water sources, etc.).

9.6.2 Operation stage

At the operation stage, the impact on the underground reservoir in alluvial-proluvial deposits is also predicted.

The State Unitary Enterprise "Uzbekhydrogeology" has developed recommendations for decrease in the level of underground water on the CRC site; for this purpose, equipping the unwatering holes with pumping equipment of the required capacity is provided [1, 2].

Direct impact on underground waters:

- possible flooding of the CRC site and subsequent occurrence of a damming effect.

Indirect impact on underground waters:

- underground water pollution as a result of:
  - disposal of slag on sites for its temporary accumulation ("old" area of UMK to the south of the Dalverzin Channel);
  - emergency situations (spills of fuels and lubricants, process fluids);
  - operation (use) of malfunctioning vehicles and/or equipment and mechanisms.

9.6.3 Recommendations

9.6.3.1 Measures to prevent and mitigate impacts

As a result of consideration of impacts on underground water and related consequences, it is recommended to implement the following preventive measures.

- Construction stage:

- equipping the excavations with water drawdown and drainage systems;
- collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme);
- preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training;
- preparation of specially equipped places for refuelling of machinery and mechanisms (if their refuelling is necessary on the construction site);
- monitoring of condition of all the types of motor vehicles, machinery and mechanisms;
- arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes;
- providing the construction contractors with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids.

- Operation stage:
  - installation and operation of a water drawdown system (drain holes) with the transfer of effluents for production water supply;
  - arrangement of temporary slag accumulation sites that prevent from pollution of surface and underground waters;
  - arrangement of a storm sewerage system on the CRC site;
  - collection, disposal and treatment of all the types of wastewater;
  - preparation of a Spill Response Plan (for petroleum products), staff training;
  - monitoring of condition of water-carrying utility systems;
  - arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes;
  - monitoring of condition of all the types of motor vehicles, machinery and equipment;
  - providing CRC's subdivisions with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids.

9.6.3.2 Monitoring and reporting

In order to avoid adverse effects, caused by the impact on underground water, it is recommended to provide for:

- prompt monitoring of hydrochemical parameters of the alluvial-proluvial underground reservoir (selection from drain holes) - only for the construction stage in the event of spills;
- regular monitoring of the hydrochemical indicators and the level regime of the alluvial-proluvial underground reservoir (arrangement of profiles of observation holes oriented along the flow of underground water on the CRC site and on the temporary slag accumulation site) - only for the operation stage;
- monitoring of condition of water-carrying utility systems – only for the operation stage;
- inspections of the construction site (only for the construction stage).

The suggestions for monitoring and reporting are given in Table 9.6.1.

9.6.4 Assessment results

The matrix of results of the assessment of effects (characterisation of impact) on underground water is given in Table 9.6.2.

It is established that the impact of the planned activity on underground water is estimated as low, both at the construction stage and at the operation stage[38].

References

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2. Information Report on the Study of Possibility of Water Drawdown on the Site "Construction of a Casting and Rolling Complex" of UMK in the Bekabad District of the Tashkent Region. State Unitary Enterprise "UZBEKHYDROGEOLOGY", 2019
3. Draft Environmental Impact Statement for Restructuring and Expansion of the Production Facilities of UMK with the Construction of the Casting and Rolling Complex (design correction) in Bekabad, Tashkent region, EKOLAB AUDIT, 2020.

[38] Residual effects, taking into consideration the measures.

Table 9.6.1 Measures to prevent and mitigate the effects on underground waters

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
6.	• Construction works (earthwork, general construction works) • Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations, storage of hazardous materials) • Meeting the demands of the staff	• Prevention of flooding of the construction site and excavations • prevention of underground water pollution	• Equipping the excavations with water drawdown and drainage systems • collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training • preparation of specially equipped places for refuelling of machinery and mechanisms • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • monitoring of condition of all the types of motor vehicles, machinery and mechanisms • providing the construction contractors with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids	- IFC General EHS Guidelines - IFC Performance Standard 3 - "Temporary Recommendations for Monitoring of Underground Water Protection in the Republic of Uzbekistan". State Committee for Natural Resources and Hydrogeology of the Republic of Uzbekistan, Tashkent, 1991	• Prompt monitoring of underground water quality (in the event of spills) • inspections of the construction site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • Spill Response Plan (for petroleum products) • training of construction contractors' personnel and maintaining their awareness • reporting on inspection results
II.	**Operation stage**					
7.	• Support of the core production activities: repair works, water supply, drainage, drawdown, cleaning of the area and industrial premises • Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations, storage of hazardous materials)	• Prevention of flooding of the CRC site • prevention of underground water pollution	• Installation and operation of a water drawdown system (drain holes) with the transfer of effluents for production water supply • arrangement of temporary slag accumulation sites that prevent from pollution of surface and underground waters • arrangement of a storm sewerage system on the CRC site • collection, disposal and treatment of all the types of wastewater; • preparation of a Spill Response Plan (for petroleum products), staff training • monitoring of condition of water-carrying utility systems • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • monitoring of condition of all the types of motor vehicles, machinery and equipment • providing CRC's subdivisions with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids	- IFC General EHS Guidelines - IFC Performance Standard 3 - "Temporary Recommendations for Monitoring of Underground Water Protection in the Republic of Uzbekistan". State Committee for Natural Resources and Hydrogeology of the Republic of Uzbekistan, Tashkent, 1991	• Monitoring of the hydrochemical indicators and the level regime of the alluvial-proluvial underground reservoir on the CRC site and on the temporary slag accumulation site • monitoring of condition of water-carrying utility systems • prompt monitoring of underground water quality (in the event of spills) • inspections on the CRC site	• Reports on results of underground water monitoring • Implementation of environmental measures in accordance with the design documentation • compliance with the requirements of the national laws in the area of environmental protection • Spill Response Plan (for petroleum products) • training of personnel and maintaining their awareness • reporting on inspection results

Table 9.6.2 Matrix of results of the assessment of effects on underground waters

Life cycle stage: construction

Recipient: underground water

Recipient's sensitivity: medium

Impact characteristics

Impact	Changes in the groundwater regime of the alluvial-proluvial underground reservoir		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Local lowering of the level of the alluvial-proluvial underground reservoir				
Measures	Not required				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low

Impact	Changes in the hydrochemical regime of the alluvial-proluvial underground reservoir		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Pollution of the alluvial-proluvial underground reservoir				
Measures	• Collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training • preparation of specially equipped places for refuelling of machinery and mechanisms • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • monitoring of condition of all the types of motor vehicles, machinery and mechanisms • providing the construction contractors with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low

Life cycle stage: operation

Recipient: underground water

Recipient's sensitivity: medium

Impact characteristics

Impact	Flooding of the CRC site		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative (taking into consideration the effects due to operation of UMK's drainage network)
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Medium-term	Reversible	Low	Moderate
Consequences	Occurrence of a damming effect, development of man-caused subsoil erosion				
Measures	• Installation and operation of a water drawdown system (drain holes) with the transfer of effluents for production water supply • monitoring of condition of water-carrying utility systems				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Medium-term	Reversible	Low	Low

Impact	Pollution of the alluvial-proluvial underground reservoir		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative (taking into consideration the effects due to operation of UMK's drainage network)
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Medium-term	Reversible	Low	Moderate
Consequences	Changes in the hydrochemical regime of the alluvial-proluvial underground reservoir				
Measures	• arrangement of a storm sewerage system on the CRC site • arrangement of temporary slag accumulation sites that prevent from pollution of surface and underground waters • collection, disposal and treatment of all the types of wastewater • preparation of a Spill Response Plan (for petroleum products), staff training • monitoring of condition of water-carrying utility systems • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • monitoring of condition of all the types of motor vehicles, machinery and equipment; • providing CRC's subdivisions with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Medium-term	Reversible	Low	Low

9.7 Impact on topsoil

The characteristics of topsoil in the planned activity area are given in 128-0948-ESIA-PE-2.

There is no natural topsoil throughout the entire industrial site of UMK (Figure 9.6.1).

The exception is irrigated landscaping spaces (lawns, squares), where anthropogenic substrates, the characteristics of which are determined by agritechnical measures implemented during landscaping, have been formed (Figure 9.7.1).

Figure 9.7.1 Landscaping space on UMK's industrial site

According to [1, 2], the CRC site in the top-down section is formed by the following soils:

- fill soils with the thickness of 1.5 m, loams of disturbed structure with the inclusion of construction and household wastes; they cannot serve as a subgrade for foundations and are subject to excavation[39];
- macrofragmental pebble gravels;
- macrofragmental gruss-rock and coarse medium gravels with sand-loam aggregate, uncovered from the depth of 10.5 m below the surface.

The results of soil testing (see 128-0948-BLS-GW, Section 1) show that the content of almost all analysed trace elements and hydrocarbons (benzo(a)pyrene and petroleum products) in the soil-forming materials and fill soils of the site exceeds the concentrations for provisionally background sites and, in most cases, exceeds also MPC, established in the Republic of Uzbekistan for mobile forms of metals (except for mercury) and gross forms of arsenic and mercury.

It should be noted that the soil quality indicators for mobile forms of metals in the Republic of Uzbekistan (MPC of soils) are Natureed on assessment of pollutants that form the risks of translocation effects (first of all, risks in the production of agricultural products used for nutrition); therefore, the use of MPC for assessment is of reference nature.

From this point of view, as well as taking into consideration the production purpose of UMK's industrial site, the recommendations on the levels of interference as per Soil

[39] See also Section 9.4.3.

Remediation Circular (2013), there are no restrictions for the CRC project related to historical soil contamination.

9.7.1 Construction stage

The impact on topsoil of the CRC site is not predicted due to its absence on the construction sites (Figure 9.6.1).

Any significant indirect impact (aerogenic pollution of soils of the areas adjacent to UMK) is also not predicted due to the incomparable levels of exposure to natural factors (natural transfer of suspended substances with wind flows), the existing sources of pollution (UMK's facilities, including slag dumps, other municipal and industrial facilities, transport) and the levels of exposure to sources related to the construction works (excavation of soils, earthworks, etc.).

The pollution of soil-forming materials may be only caused by improper practices of temporary accumulation of wastes, storage and handling of fuels and lubricants, spills of fuels and lubricants, use of malfunctioning construction machinery, equipment and vehicles.

9.7.2 Operation stage

The impact on topsoil of the CRC site is not predicted due to its absence.

The only type of impact on topsoil, inherent in the CRC operation stage, is aerogenic pollution of the area adjacent to UMK.

The intensity of this indirect impact is determined by aerogenic soil pollution, associated not so much with the CRC operation as with the contribution of the existing facilities of UMK, dusting of the slag dumps, the influence of other municipal and industrial facilities and transport and the influence of natural transfer of suspended particles with wind flows.

Similar to the construction stage, the pollution of soil-forming materials at the operation stage may be only caused by improper practices of temporary accumulation of wastes, storage and handling of fuels and lubricants, spills of fuels and lubricants, use of malfunctioning machinery, equipment and vehicles.

9.7.3 Recommendations

9.7.3.1 Measures to prevent and mitigate impacts

The preventive measures to eliminate contamination of the construction site with wastes, the solutions to prevent fuel and lubricants spills, the use of serviceable machinery, equipment and vehicles prevent pollution of soil-forming materials and related consequences (for example, pollution of surface waters, migration of pollutants along the underground water flow, etc.) both at the construction stage and at the operation stage.

The minimisation of the level of aerogenic pollution of topsoil in the areas adjacent to UMK's industrial site is ensured by implementation of measures for protection of the air from chemical pollution.

As a result of consideration of impacts on topsoil and related consequences, it is recommended to implement the following preventive measures.

- Construction stage:
  - collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme);

- preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training;
- preparation of specially equipped places for refuelling of machinery and mechanisms (if their refuelling is necessary on the construction site);
- monitoring of condition of all the types of motor vehicles, machinery and mechanisms;
- arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes;
- providing the construction contractors with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids.

- Operation stage:
  - implementation of a package of measures to protect the air from chemical pollution;
  - arrangement of a storm sewerage system on the CRC site;
  - collection, disposal and treatment of all the types of wastewater;
  - preparation of a Spill Response Plan (for petroleum products), staff training;
  - arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes;
  - monitoring of condition of all the types of motor vehicles, machinery and equipment;
  - providing CRC's subdivisions with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids.

9.7.3.2 *Monitoring and reporting*

In order to avoid adverse effects, caused by the impact on topsoil, it is recommended to provide for:

- monitoring of topsoil chemical pollution in the territorial scientific and industrial complex (for example, recreational areas, sports grounds) - only for the operation stage;
- in the event of spills – prompt monitoring of the state of substrates;
- inspections of the construction site (only for the construction stage).

The suggestions for monitoring and reporting are given in Table (

Table 9.7.1).

9.7.4 Assessment results

The matrix of results of the assessment of effects (characterisation of impact) on topsoil is given in Table 9.7.2 .

It is found that the impact of the planned activity on surface waters is estimated as follows[40]:

- at the construction stage – negligible;
- at the operation stage – low.

References

1. Technical Report "Construction of a Casting and Rolling Complex. Feasibility study". State enterprise "UkrGIPROMEZ". 2020.
2. Technical report on geotechnical and geophysical surveys at the facility "Restructuring and Placement of Production Facilities of UMK with the Construction of a Casting and Rolling complex (CRC) on the basis of UMK". "O'zGASHKLITI" DUK, 2019.

[40] Residual effects, taking into consideration the measures.

Table 9.7.1 Measures to prevent and mitigate the effects on topsoil

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**					
8.	Construction works (earthwork, general construction works)	• Prevention of pollution of soil-forming materials and related consequences (pollution of underground water, etc.)	• Collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • preparation of a Spill Response Plan (for petroleum products) for construction contractors; staff training • preparation of specially equipped places for refuelling of machinery and mechanisms (if their refuelling is necessary on the construction site) • monitoring of condition of all the types of motor vehicles, machinery and mechanisms • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • providing the construction contractors with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids	- IFC General EHS Guidelines - IFC Performance Standard 3 - SanPiN No. 0183-05 Hygienic requirements for soil quality of populated areas in specific natural and climatic conditions of Uzbekistan - SanPiN No. 0191-05 Maximum permissible concentrations (MPC) and tentative permissible concentration (TAC) of exogenous harmful substances in the soil - SanPiN No. 0212-06. Sanitary rules and regulations of hygienic assessment of the degree of soil pollution for different types of land use in specific conditions of Uzbekistan	• Prompt monitoring of the state of substrates (in the event of spills) • inspections of the construction site	• Implementation of environmental measures in accordance with the design documentation and the construction management plan • compliance with the requirements of the national laws in the area of environmental protection • Spill Response Plan (for petroleum products) • training of construction contractors' personnel and maintaining their awareness • reporting on inspection results
II.	**Operation stage**					
9.	• Main production activity (steel smelting, manufacture of rolled metal and other metallurgical products) • Support of the core production activities: repair works, water supply, drainage, drawdown, cleaning of the area and industrial premises • Transportation and logistics (delivery of raw materials, fuels and lubricants, shipment of products, other transportations, storage of hazardous materials)	• Prevention of pollution of soil-forming materials and related consequences (pollution of underground water, etc.) • minimisation of topsoil aerogenic pollution in the areas adjacent to UMK	• implementation of a package of measures to protect the air from chemical pollution • arrangement of a storm sewerage system on the CRC site • collection, disposal and treatment of all the types of wastewater • preparation of a Spill Response Plan (for petroleum products), staff training • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • monitoring of condition of all the types of motor vehicles, machinery and equipment • providing CRC's subdivisions with consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids	IFC General EHS Guidelines IFC Performance Standard 3 - SanPiN No. 0183-05 Hygienic requirements for soil quality of populated areas in specific natural and climatic conditions of Uzbekistan - SanPiN No. 0191-05 Maximum permissible concentrations (MPC) and tentative permissible concentration (TAC) of exogenous harmful substances in the soil - SanPiN No. 0212-06. Sanitary rules and regulations of hygienic assessment of the degree of soil pollution for different types of land use in specific conditions of Uzbekistan	• monitoring of topsoil chemical pollution in the territorial scientific and industrial complex (for example, recreational areas, sports grounds) • prompt monitoring of the state of substrates (in the event of spills)	• Reports on results of soil monitoring • Implementation of environmental measures in accordance with the design documentation • compliance with the requirements of the national laws in the area of environmental protection • Spill Response Plan (for petroleum products) • training of personnel and maintaining their awareness • reporting on inspection results

Table 9.7.2 Matrix of results of the assessment of effects on topsoil

Life cycle stages: construction, operation

Recipient: soil-forming materials

Recipient's sensitivity: low

Impact characteristics

Impact	Pollution of soil-forming materials		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Minor	Low
Consequences	Underground water pollution				
Measures	• collection, drainage and treatment of all the types of wastewater, including storm water and meltwater (for example, according to a temporary scheme) • preparation of a Spill Response Plan (for petroleum products), staff training • preparation of specially equipped places for refuelling of machinery and mechanisms (only for the construction stage) • monitoring of condition of all the types of motor vehicles, machinery and mechanisms • arrangement of specially equipped sites for safe temporary storage (accumulation) of wastes • provision of consumables and equipment for prompt elimination of consequences of spills of fuel and/or other liquids				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Minor	Negligible

Life cycle stage: operation

Recipient: soils

Recipient's sensitivity: medium

Impact characteristics

Impact	Aerogenic pollution of topsoil in the area adjacent to UMK		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Medium-term	Reversible	Low	Moderate
Consequences	Indirect effects on flora and fauna				
Measures	● Package of measures to protect the air from chemical pollution				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Medium-term	Reversible	Low	Low

9.8 Impact on flora

In accordance with the requirements of IFC Performance Standards 1 and 6 and the provisions of the Laws of the Republic of Uzbekistan "On Nature Protection", "On Environmental Expert Review", the main objectives of the botanical studies within ESIA are defined as follows:

- to analyse the initial state of flora in the area of the planned activity (based on field surveys and analysis of published and file materials);
- to identify critical habitats and vulnerable rare and endemic species that could potentially be adversely affected;
- to assess the effects on flora (including critical habitats and protected plant species) at the stages of construction of power transmission lines and access roads;
- to give a forecast and assessment of the planned activity's effects on flora.

As a result of the botanical studies, it has been determined that the landscapes and vegetation cover of the area of the planned activity have been largely transformed as a result of economic activity; and, primarily, transformed habitats (agricultural irrigated lands, settlements, industrial enterprises, infrastructure facilities) with communities of cultivated and weed synanthropic vegetation are represented.

Natural biotopes with tugai and salt-tolerant vegetation, identified in the design area, have been preserved in small areas in the floodplain of the Syrdarya River, on the lands of state forestries. The survey shows that there are no critical natural and/or transformed habitats in the area of the planned activity that meet the criteria specified in IFC Performance Standard 6.

It has been determined that the existing adverse impact on flora of the area is caused by the population growth, expansion of settlements, agriculture as well as by the control of the flow of the Syrdarya River and changes in the hydrological regime. No signs of an adverse impact on biotopes in UMK's discharge area have been identified.

65,000 ornamental trees and shrubs grow within UMK site. As of 30 March 2022, 29,046 seedlings of various types of ornamental trees were planted at the site:

1. Paulonia - 4300 trees;
2. Oak - 600 trees;
3. Hibiscus - 500 trees;
4. Eastern spruce - 7000 trees;
5. Juniper - 200 trees;
6. Maple - 2000 trees;
7. Poplar - 2000 trees;
8. Pine - 8646 trees;
9. Ash - 300 trees;
10. Katsura - 500 trees;
11. Karagach (elm) - 2000 trees;
12. Magnolia - 1000 trees;

There is no tree and shrub vegetation at the proposed location of CRC.

9.8.1 Construction stage

Since the CRC site is an industrial landscape where there is no vegetation cover (see Figure 9.6.1), any direct impact on vegetation is impossible.

The wastewater discharge area of UMK is located in the floodplain of the Syrdarya River within the town of Bekabad, where a combination of natural and transformed biotopes (fragments of herbaceous and shrubby tugai vegetation among the residential urban landscape) is presented. There are no protected plant species in this area. It has been found that the vegetation cover in this area is similar to that in the background point located in the floodplain of the Syrdarya River above the outlets and water intake facilities of UMK, about 1 km to the west of the border with Tajikistan. No signs of any adverse impact have been identified in this area.

The access road is laid through residential landscapes and an agricultural landscape with cultivated (cotton and wheat fields, a young orchard) and weed synanthropic vegetation, where there are no natural plant communities, rare plant species, protected plant species and critical habitats. There is no adverse impact on flora at the construction stage.

The power transmission line for the most part (22.1 km) also passes through residential landscapes and an agricultural landscape with cultivated (cotton and wheat fields, gardens) and weed synanthropic vegetation, and only in a section about 900 m long affects the natural biotope in the floodplain of the Syrdarya River with shrubby and herbaceous tugai vegetation and fragments of salt-tolerant vegetation.

At this site, 300 m to the west of the power transmission line, during the field studies, a population of Climacoptera amblyostegia, a subendemic plant species entered in the Red List of Uzbekistan with status 2 (rare), was identified. Another population of this species was found among the weed synanthropic vegetation near the town of Shirin, in the area of the Syrdarya State District Power Station, at the section of the power transmission line near the last 2 towers.

The study showed that the construction of the power transmission line did not damage the habitats of the area, including tugai communities and populations of Climacoptera amblyostegia.

The analysis, made in accordance with Clause 16 of IFC Performance Standard 6, shows that the habitats of Climacoptera amblyostegia in the area of the planned activity cannot be assessed as critical. Nevertheless, in the course of further studies, it is reasonable to provide for monitoring of populations of this species.

It has been determined that the spread of the identified adventitious species is not related to the design at the construction stage; all the noted strangers naturalised in Uzbekistan many years ago and are widely distributed in anthropogenic landscapes throughout the country.

9.8.2 Operation stage

Any adverse impact, caused by operation of the power transmission line and access roads on vegetation cover (including the population of Climacoptera amblyostegia), has neither been detected nor is predicted in the future.

The increase in UMK's capacity with the CRC commissioning should also not have a significant impact on flora in the area of the planned activity (including its most vulnerable components – tugai communities and populations of Climacoptera amblyostegia), since the main risks are controlled by the measures for protection of the air and other components of the environment, provided for in accordance with the national laws and IFC Performance Standards (see Sections 9.1, 9.4). There are practically no risks of appearance and spread of

adventitious species caused by the operation of CRC, the power transmission line and the motor road.

9.8.3 Recommendations

9.8.3.1 Measures to prevent and mitigate impacts

Any special measures for prevention and/or mitigation of effects on flora, compensation in addition to the already provided measures for protection of the air and other components of the natural environment are not required.

9.8.3.2 Monitoring and reporting

Since the background geobotanical studies have been made in the late autumn season, it is recommended to conduct a geobotanical study in spring in order to clarify the composition of flora and the state of vegetation cover.

It is also reasonable:

- to conduct a phytopathological examination of the plant's SPZ during the vegetative season and create fixed sites for geobotanical and phytopathological monitoring in UMK's SPZ;
- to provide monitoring of populations of Climacoptera amblyostegia in the area of the power transmission line.

9.8.4 Assessment results

In the course of field works in the area of the planned activity, the representative sections of natural and transformed biotopes in the zone of direct and indirect impact of the CRC project were examined.

There are no critical natural and/or transformed habitats of vegetation in the area of the planned activity that meet the criteria specified in IFC Performance Standard 6.

Any threatened plant species, entered in the IUCN Red List, were not found in the area. As a result of the survey, 2 locations of Climacoptera amblyostegia, entered in the Red List of Uzbekistan with status 2 (rare), were identified. The both populations grow in transformed biotopes; the both populations, although small, are represented by normally developed, flowering and fruiting specimens. It was found that the construction of the power transmission line did not have an adverse impact on the populations and habitats of the species. Based on results of the assessment, the habitat of Climacoptera amblyostegia in the area of the planned activity cannot be assessed as critical.

Another species, entered in the Red List of Uzbekistan with status 3 (decreasing), Platanus orientalis, grows in the area of the planned activity only in cultivated vegetation (as part of landscaping of settlements and in wood lines). The status of the species in the IUCN Red List is dated (Data Deficient). The presence of cultivated vegetation of Platanus orientalis in the area of the planned activity does not meet the criteria of critical habitats, specified in Clause 16 of IFC Performance Standard 6.

Despite the fact that transformed biotopes predominate in the area, primarily, local species dominate both in natural and anthropogenic plant communities (not taking into account agricultural plantations).

It has been determined that the main anthropogenic factors, affecting adversely the vegetation in the area under consideration, are agriculture, expansion of settlements, extraction of gravel, clay and sand, control of the flow of the Syrdarya River, unauthorised landfills, spread of adventitious species. No signs of an adverse impact from UMK's

discharges, construction of the power transmission line and the access roads on flora have been identified.

Any special measures for prevention and/or mitigation of effects on flora, compensation in addition to the already provided measures for protection of the air and other components of the natural environment are not required.

The matrix of results of the assessment of effects (characterisation of impact) on flora is given in Table 9.8.1.

The impact of the planned activity on vegetation is estimated as negligible at all its stages.

Table 9.8.1 Matrix of results of the assessment of effects on flora

Life cycle stage: construction

Recipient: plant communities and individual species of vegetation

Recipient's sensitivity: minor

Impact characteristics

Impact	Removal of natural habitats		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Negligible
Consequences	Absent				
Measures	Not provided: there are no natural habitats on the CRC site; the construction of the power transmission line and the access road have been completed, no adverse consequences have been identified				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Negligible

Life cycle stage: operation

Recipient: plant communities and individual species of vegetation

Recipient's sensitivity: minor

Impact characteristics

Impact	Impacts on habitats caused by aerogenic pollution		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Reversible	Minor	Negligible
Consequences	Absent				
Measures	Any special measures for prevention and/or mitigation of effects on flora, compensation in addition to the already provided measures for protection of the air and other components of the natural environment are not required.				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Reversible	Minor	Negligible

9.9 Impact on ground fauna

In accordance with the requirements of IFC Performance Standards 1 and 6 and the provisions of the Laws of the Republic of Uzbekistan "On Nature Protection", "On Environmental Expert Review", the main objectives of the zoological studies within ESIA are defined as follows:

- to analyse the initial state of ground fauna in the area of the planned activity (based on field surveys and analysis of published and file materials);
- to identify critical habitats and vulnerable rare and endemic species that could potentially be adversely affected;
- to assess the effects on ground fauna (including critical habitats and protected animal species) at the stages of construction of power transmission lines and access roads;
- to give a forecast and assessment of the planned activity's effects on fauna.

As a result of the zoological studies, it has been found that transformed habitats (agricultural irrigated lands, settlements, industrial plants, infrastructure facilities) prevail in the area of the planned activity.

The fauna of terrestrial vertebrate species has undergone significant changes and is currently represented by a rather meagre variety and, mainly, by species capable of coexisting with humans: synanthropic species such as house mouse, brown rat, common bat, myna, magpie, etc.

Birds are represented by a wide variety due to the proximity of the design area to the Syrdarya River, which attracts a large number of birds both during migration and for wintering. The natural biotopes of tugai vegetation and the coastal zone of the Syrdarya River as well as its inundations and channels, identified in the area of UMK, have been preserved in small areas in the floodplain of the Syrdarya River, on the lands of state forestries.

It has been determined that the existing impact on fauna of the area is caused, mainly, by the population growth, expansion of settlements, agriculture as well as by the control of the flow of the Syrdarya River and changes in the hydrological regime.

No signs of an adverse impact of UMK on fauns in the area of the plant's location, including in the wastewater discharge area, have been identified.

9.9.1 Construction stage

Since the CRC site is an industrial landscape where there are no natural biotopes, a direct adverse impact on fauna is prevented at the construction stage.

The access road is laid through a residential and agricultural landscape with cultivated vegetation (cotton and wheat fields, a young orchard), no rare animal species were identified during the field trip. Also, it is worth noting that there are no natural biotopes, protected animal species and critical habitats in this territory. There is no adverse impact on the biodiversity of fauna at the construction stage of the road in this section.

The power transmission line for the most part passes through a residential landscape and an agricultural landscape with cultivated vegetation (cotton and wheat fields, gardens) and only in a section about 900 m long affects the natural biotope in the floodplain of the Syrdarya River with shrubby and herbaceous tugai vegetation and fragments of salt-tolerant vegetation.

During the field survey of the areas where the power transmission line passes through an agricultural landscape, no rare animal species were identified. Based on literary sources,

a great bustard and a little bustard migrate through this territory, and they often feed and rest in the fields.

A number of species, entered in the Red List of the Republic of Uzbekistan, such as pygmy cormorant, white stork, great black-headed gull, white-tailed eagle and imperial eagle, were noted at the section of the power transmission line crossing the Syrdarya River. The latter is also entered in the IUCN Red List with the status of VU (vulnerable). However, the survey showed that the construction of the power transmission line did not cause damage to fauna of the area under consideration.

It has been determined that the spread of the identified invasive species (muskrat and brown rat) is not associated with activities at the construction stage; all the noted strangers naturalised in Uzbekistan many years ago and are widely distributed in anthropogenic and natural landscapes.

9.9.2 Operation stage

Since the CRC site is an industrial landscape where there are no natural biotopes, a direct adverse impact on fauna is prevented at the construction stage.

The access road is laid through a residential and agricultural landscape with cultivated vegetation (cotton and wheat fields, a young orchard), no rare animal species were identified during the field trip. Also, it is worth noting that there are no natural biotopes, protected animal species and critical habitats in UMK's SPZ. There is no adverse impact on the biodiversity of fauna at the construction stage of the road in this section.

The power transmission line for the most part passes through a residential landscape and an agricultural landscape with cultivated vegetation (cotton and wheat fields, gardens) and only in a section about 900 m long crosses the natural biotope in the floodplain of the Syrdarya River with shrubby and herbaceous tugai vegetation and fragments of salt-tolerant vegetation.

During the field survey of the areas where the power transmission line passes through an agricultural landscape, no rare animal species were identified. Based on literary sources, a great bustard and a little bustard migrate through this territory, and they often feed and rest in the fields.

A number of species, entered in the Red List of the Republic of Uzbekistan, such as pygmy cormorant, white stork, great black-headed gull, white-tailed eagle and imperial eagle, were noted at the section of the power transmission line crossing the Syrdarya River and the areas with tugai vegetation. The imperial eagle is also entered in the IUCN Red List with the status of VU (vulnerable).

The survey showed that the construction of the power transmission line did not cause damage to fauna of the area. The analysis, made in accordance with the requirements of Clause 16 of IFC Performance Standard 6, has shown that the habitats of a number of rare animal species (mainly birds) in the area of the planned activity are not classified as critical.

It has been determined that the spread of the identified invasive species (muskrat and brown rat) is not associated with activities at the construction stage; all the noted strangers naturalised in Uzbekistan many years ago and are widely distributed in anthropogenic and natural landscapes.

9.9.3 Recommendations

9.9.3.1 Measures to prevent and mitigate impacts

The arrangement of protection of birds at the power transmission lines is a priority task in wildlife protection under the CRC project.

To protect the birds of prey, cranes, bustards from electric shock or from collision with power transmission towers, such facilities should be protected and equipped (reflectors, visors, bird flappers, etc.), insulated in accordance with generally accepted best practices and standards (see, for example, recommendations on preventing or mitigating the adverse impact of power supply networks on migratory birds in Afro-Eurasia. KMV Technical Series No. XX, AEWA Technical Series No. XX, Bonn, Germany, 2011, Risk Assessment Report for Birds: Probability of Collision and Death from Electric Shock Due to Implementation of the Project "Construction of a 500 kV High-Voltage Power Line at the Talimarjan TPP", Uzbekistan, Pandion Systems, Inc. 2010).

9.9.3.2 Monitoring and reporting

The zoological survey of the area of the planned activity was performed in the late autumn season; in order to identify the actual composition of the entomofauna and herpetofauna of the design area, it is recommended to conduct an additional survey in spring. It is also advisable to conduct a verification survey of the composition and magnitude of population of mammals, since most species were also in the state of hibernation.

The annual monitoring of waterfowl and near-water birds is suggested, with an emphasis on the study of wintering, in order to clarify the relationship of birds with the design area. The study will show the most frequent directions, chosen by birds during the daily activity, and will identify the design's vulnerabilities for birds. A similar work should be provided for birds of prey.

After connecting the power supply to the power transmission line, the regular monitoring of this line should be performed to assess the efficiency of markers and birdscarers. Such monitoring can also show other sections of the line that have a higher collision rate than the expected one. Such sections may be identified by the nature of the collision risk.

For additional marking and birdscarers, the additional recommendations may also be provided. Since the main use of the area, located along the line, by migratory birds occurs in spring and autumn, it is recommended to conduct observations during these seasons.

Habitats potentially meeting the criteria of critical ones (IFC Performance Standard 6), have been found in the district of UMK and associated facilities: floodplain complexes of the Syrdarya River (tugais) along the Syrdarya riverbed. In order to establish unambiguously their status, it is suggested that a special package of biological studies be performed within suitable seasons.

The suggestions for monitoring and reporting are given in Table 9.9.1.

9.9.4 Assessment results

The zoological studies as part of ESIA were performed in accordance with the requirements of IFC Performance Standards 1 and 6.

According to the results of field studies at 11 representative sites in the area of the planned activity, 50 species of birds were identified in total, 5 species of which are entered in the Red List of the Republic of Uzbekistan: pygmy cormorant, white stork, great black-headed gull, white-tailed eagle and imperial eagle, which amount to 10% of the species encountered. Only the imperial eagle is entered in the IUCN Red List with the status of VU (vulnerable). The total number of bird species encountered is 32.9% of the noted species according to literature data.

Also, one amphibian species was encountered, which is more an exception to the rule, since most amphibians and reptiles are in the state of hibernation during this season of the year.

The habitat of three species of mammals was identified: Zaisan mole vole, Aral yellow souslik and Asiatic jackal. These types of mammals are widespread and even dominant within the Republic of Uzbekistan. The indicator of species diversity in some areas ranged from 4 to 25 species.

The state of the habitats in the area under consideration has been significantly affected by human activity; at the moment, there are no habitats, suitable, for example, for nesting of species included in the Red List of Uzbekistan (2019) or the IUCN Red List with the statuses of NT, VU or EN.

It has been determined that the main anthropogenic factors, affecting adversely the fauna in UMK's district, are agriculture, expansion of settlements, extraction of gravel, clay and sand, control of the flow of the Syrdarya River, unauthorised landfills, existing extensive networks of power transmission lines.

There are no signs of an adverse impact of UMK's discharges, the construction of CRC, the power transmission line and the access road on the wildlife in the area of the planned activity.

The field survey has shown that in the area of the planned activity there are no critical habitats, meeting fully the criteria given in IFC Performance Standards 6. However, habitats, potentially meeting these criteria, have been found in the district of UMK and associated facilities: floodplain complexes of the Syrdarya River (tugai) along the Syrdarya riverbed. In order to establish unambiguously their status, it is reasonable to perform a special package of studies within suitable seasons.

The territory under consideration is important for waterfowl and near-water birds, as well as for birds of prey during migrations and wintering. Since the connection of this territory with IBA areas may be deeper and ambiguous, it is reasonable to perform additional studies in the future.

Due to the existing power transmission lines, crossing the Syrdarya River and its surroundings, as well as due to the fact that a part of the Central Asian Flyway passes along this river, a number of bird species are wintering, it is reasonable to conduct observations during bird migrations (in spring, autumn) and bird wintering in the Syrdarya River valley.

The matrix of results of the assessment of effects (characterisation of impact) on flora is given inTable 9.9.2.

It is found that the significance of impact of the planned activity on topsoil is estimated as follows:

- at the construction stage – negligible (CRC) and low (power transmission line, road);
- at the operation stage – low.

Table 9.9.1 Measures to prevent and mitigate the effects on ground fauna

Item No.	Activity/process	Objective	Measures	Applicable requirements	Monitoring	Implementation method/reporting
I.	**Construction stage**	**No measures required**				
II.	**Operation stage**					
10.	• Maintenance of the core production activity - power supply (power transmission line)	• Prevention of injuries and death of avifauna	• To protect avifauna (birds of prey, cranes, bustards) from electric shock or from collision with power transmission towers, such facilities should be equipped with appropriate devices (reflectors, visors, bird flappers, etc.) and insulated	IFC General EHS Guidelines IFC Performance Standard 6 National requirements	• One-time additional zoological survey of the area of planned activity in spring • performance of a special package of biological studies of tugais within suitable seasons • after the CRC commissioning – annual monitoring of waterfowl, near-water birds and birds of prey • after connecting the power supply to the power transmission line - assessment of the efficiency of markers and birdscarers (regular monitoring of the line)	• Reports on results of the additional zoological examination and studies of tugais • Report on results of annual monitoring of waterfowl, near-water birds and birds of prey • Implementation of environmental measures in accordance with the design documentation • reporting on results of inspections of efficiency of markers and birdscarers on the power transmission line

Table 9.9.2 Matrix of results of the assessment of effects on ground fauna

Life cycle stage: construction

Recipient: habitats of terrestrial wildlife and individual species of terrestrial wildlife

Recipient's sensitivity: medium

Impact characteristics

Impact	Habitat removal and related indirect consequences of the power transmission line and motor road		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Absent				
Measures	Not provided: there are no natural habitats on the CRC site; the construction of the power transmission line and the access road have been completed, no adverse consequences have been identified				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low

Impact	Habitat removal and related indirect consequences of CRC		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Not applicable	Minor	Negligible
Consequences	Absent				
Measures	Not provided: there are no natural habitats on the CRC site; the construction of the power transmission line and the access road have been completed, no adverse consequences have been identified				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Not applicable	Minor	Negligible

Life cycle stage: operation

Recipient: habitats of terrestrial wildlife and individual species of terrestrial wildlife

Recipient's sensitivity: medium

Impact characteristics

Impact	Impact of the power transmission line of avifauna		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low
Consequences	Death and injuries of avifauna				
Measures	• Equipment of power transmission towers with appropriate devices (reflectors, visors, bird flappers, etc.), insulation				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Impact	Impact of UMK on avifauna: migratory and near-aquatic species		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Reversible	Low	Low
Consequences	Changes in migration routes, habitat transformation				
Measures	Any special measures for prevention and/or mitigation of effects on ground fauna, compensation in addition to the already provided measures for protection of the air and other components of the natural environment are not required.				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

9.10 Impact on ichthyofauna

The main objectives of ichthyological studies and assessment as part of ESIA are:

- analysis of the initial state of ichthyofauna in the area of the planned activity, including the study of critical habitats (biotopes), rare and declining fish species (see 128-0948-BS-Bio-2, 2128-0948-ESIA-PE-2);
- forecast of a potential impact of the planned activity on ichthyofauna, including the study of the effects of UMK's wastewater outlets and in the area of location of the power transmission line and the access road.

Currently, the state of ichthyofauna in the middle reaches of the Syrdarya River is determined by the impact of the Kairakum, Farkhad (upstream from the design area) and Chardarya (downstream) reservoirs, the dams of which created physical barriers to the movement of fish and divided the populations, which were unified in the past.

The area of the planned activity does not affect the spawning grounds of the populations of the Chardarya reservoir. After spawning, with a drop in the water level throughout the year, a small number of dominant fish species, forming slow-growing residential forms, remain in the river.

The design does not contain solutions that have a direct impact on the ecosystem of water bodies (removal of riverbeds, control of flow, etc.), but provides for the discharge of treated wastewater into the Syrdarya River and the Dalverzin Channel; therefore, the conformity of the wastewater indicators with the quality standards for fishery reservoirs is a fundamental issue.

As a result of the ichthyological studies, it has been found that fish, widely distributed in the flat zone of the Aral Sea basin, live in the district of UMK; there are no rare and declining fish species.

Aquatic biotopes have been largely transformed by the irrigation construction and the current economic activities of industrial, municipal and agricultural plants in the town of Bekabad and in the Bekabad District.

There are no critical natural and/or transformed habitats in the area of the planned activity that meet the criteria of IFC Performance Standard 6.

9.10.1 Construction stage

The CRC facilities are located on the developed site of UMK, the planned activity on which will not have a direct impact on ichthyofauna owing to:

- the significant distance of UMK's construction site from the water bodies;
- the presence of a storm sewerage system on the CRC site.

The solutions for protection of surface waters from pollution will ensure that there is no adverse impact on ichthyofauna of the Syrdarya River and the Dalverzin Channel (see Section 9.5).

The access road and the power transmission line are laid along agricultural landscapes and do not affect the water bodies[41]. Based on results of the on-site survey in November 2021, any signs of an adverse impact of the completed construction of the power transmission line and the access road on ichthyofauna were not found.

[41] The power transmission line crosses the Syrdarya River, the towers are installed outside the riverbed.

9.10.2 Operation stage

The impact on ichthyofauna is potentially associated with the discharge of treated wastewater into the Syrdarya River (outlet 1) and the discharge of clean water (effluents) through outlets 2 and 3 into the Dalverzin Channel.

The wastewater discharge area of UMK is located in the floodplain of the Syrdarya River within the town of Bekabad. Any rare and declining species of fish or critical habitats of ichthyofauna are absent.

The increase in the capacity of UMK with the CRC commissioning should not have an impact on the residential forms of fish populations. The habitats of local fish populations cover the entire section of the Syrdarya River from the dam of the Farkhad Hydroelectric Power Station to the Chardarya reservoir inclusive, including the Dalverzin lakes.

The spawning of most fish of local populations in the locality is associated with flooding, in which the amount of water is not determined by the quality of water in the Syrdarya River and the irrigation system channels.

According to the adopted solutions, the risks are controlled by measures for protection of water resources and other components of the natural environment, provided for in accordance with national laws and the requirements of IFC Performance Standards.

The access road and the power transmission line are laid along agricultural landscapes and do not affect the water bodies. Any adverse impact on ichthyofauna of these water bodies is not predicted.

9.10.3 Recommendations

9.10.3.1 Measures to prevent and mitigate impacts

The development of special measures to prevent and/or mitigate impacts on ichthyofauna (fish populations), compensations in addition to the measures for protection of the water bodies, discussed in Sections 9.5, 9.12, is unreasonable.

9.10.3.2 Monitoring and reporting

Since the on-site survey of UMK's area for wastewater discharges into the Syrdarya River and the Dalverzin Channel was made in the late autumn season, it is recommended to conduct an ichthyological study in spring in order to clarify the composition of ichthyofauna.

9.10.4 Assessment results

The aquatic biotopes of the area of the planned activity are largely formed as a result of large-scale irrigation construction and acclimatization works in the second half of the twentieth century.

Very few preserved areas of natural biotopes are experiencing significant anthropogenic impact of agriculture and utilities in Bekabad.

Any critical biotopes (natural and/or transformed habitats that meet the criteria of IFC Performance Standard 6) have not been identified in UMK's district; any rare or declining fish species have not been noted.

The main anthropogenic factors, affecting ichthyofauna, are the irrigation regime of using the main riverbed and all the channels of the irrigation and drainage networks, the expansion of settlements.

The influence of the anthropogenic factors is not unambiguously adverse, because the populations of endemic fish have formed in the middle reaches of the Syr-Barya River, and they determine the current fishery use of the water resources in the Tashkent Region.

Based on results of the on-site survey in November 2021, any signs of an adverse impact of the completed construction of the power transmission line and the access road on ichthyofauna were not found.

The matrix of the assessment of effects (characterisation of impact) on ichthyofauna is given in Table 9.10.1 (Table 9.10.1).

The significance of the impact of the planned activity on ichthyofauna is estimated as low at all its stages.

Table 9.10.1 Matrix of results of the assessment of effects on ichthyofauna

Life cycle stages: construction, operation

Recipient: Ichthyofauna of the Syrdarya River

Recipient's sensitivity: medium

Impact characteristics

Impact	Change in the biotopic conditions of aquatic ecosystems		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect impacts on the aquatic ecosystem and the economic entities				
Measures	• Measures for protection of surface waters provided for the CRC construction and operation stages (Section 9.5)				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible\	Low	Low

Recipient: Ichthyofauna of the Dalverzin Channel

Recipient's sensitivity: medium

Impact characteristics

Impact	Change in the biotopic conditions of aquatic ecosystems		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on the economic entities				
Measures	• Measures for protection of surface waters provided for the CRC operation stage (Section 9.5)				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible\	Low	Low

9.11 Impact on organisms of aquatic ecosystems

The main objectives of hydrobiological studies and assessment as part of ESIA are:

- analysis of the initial state of aquatic invertebrates fauna in the area of planned activity (see 128-0948-BS-Bio-3, 2128-0948-ESIA-PE-2);
- forecast of a potential impact of the planned activity on aquatic invertebrates in the middle reaches of the Syrdarya River, including the study of the effects of UMK's wastewater outlets and in the area of location of the power transmission line and the access road.

As a result of the hydrobiological studies of sections in the middle reaches of the Syrdarya River in the district of UMK, it has been found that the anthropogenic factors (excess flow control, water intake for irrigation of farmlands, discharge of insufficiently treated and/or untreated wastewater, etc.) cause changes in the composition, structure and ecological state of aquatic biocommunities, varying in depth.

To the greatest extent, biocommunities change downstream the major sources of pollution and the settlements; for example, in the section of the river downstream the town of Bekabad, the changes in the composition and structure of aquatic communities, expressed in the change in dominant complexes of organisms, the simplification of the ecological structure, the appearance of highly saprobic species of invertebrates in the dominants, have been recorded. That is the change in the hydrological and hydrochemical conditions of the river affects directly the biological response of aquatic organisms.

It has been found that the visual indicators also represent water pollution (detrital products, cattle grazing, household waste residues and other garbage).

The survey shows that there are no critical natural and/or transformed habitats in the area of the planned activity that meet the criteria specified in IFC Performance Standard 6.

No signs of an adverse impact on biotopes in UMK's wastewater discharge area have been identified.

9.11.1 Construction stage

UMK's area for wastewater discharges into the Syrdarya River is located within the town of Bekabad; in the coastal zone and along the riverbed there is abundant development of aquatic higher plants.

The influence of mineralised wastewater has been noted in this area, which is expressed in a change in the initial structure of aquatic biocommunities, in particular, the qualitative and quantitative development of aquatic communities is simplified, and the specific ratio of halophilic species of organisms increases, which is indicative of an increase in water mineralisation.

Any rare or protected species of organisms of aquatic ecosystems in UMK's area for wastewater discharges into the Syrdarya River have not been identified in this habitat.

The CRC facilities are located on the developed site of UMK, the planned activity on which will not have a direct impact on organisms of aquatic ecosystems owing to:

- the significant distance of UMK's construction site from the water bodies;
- the presence of a storm sewerage system on the CRC site.

The solutions for protection of surface waters from pollution will ensure that there is no adverse impact on organisms of aquatic ecosystems (see Section 9.5).

The access road and the power transmission line are laid along agricultural landscapes and do not affect the water bodies[42]. Based on results of the on-site survey in November 2021, any signs of an adverse impact of the completed construction of the power transmission line and the access road on organisms of aquatic ecosystems were not found.

9.11.2 Operation stage

The existing level of anthropogenic load on the Dalverzin Channel and the Syrdarya River exceeds by far the potential impact of the planned activity.

The increase in the capacity of UMK with the CRC commissioning will not have an adverse impact on organisms of aquatic ecosystems.

The access road and the power transmission line are laid along agricultural landscapes and do not affect the water bodies. Any adverse impact on organisms of aquatic ecosystems of these water bodies is not predicted.

9.11.3 Recommendations

9.11.3.1 Measures to prevent and mitigate impacts

The development of special measures to prevent and/or mitigate impacts on organisms of aquatic ecosystems in addition to the measures for protection of the water bodies, discussed in Sections 9.5, 9.12, is unreasonable.

9.11.3.2 Monitoring and reporting

Since the hydrobiological studies were performed in the late autumn season, in order to clarify the qualitative composition and seasonal changes in the state of aquatic organisms communities, to assess the water quality and ecological state by the biological response of aquatic biocommunities, it is recommended to conduct studies of phytoplankton, zooplankton, periphyton and macrozoobenthos in UMK's wastewater discharge area within the spring and summer period.

9.11.4 Assessment results

In November 2021, natural (background) and transformed biotopes of the Syr-Barya River were examined in the area of the planned activity.

There are no critical natural and/or transformed habitats in the area of the planned activity that meet the criteria of IFC Performance Standard 6. In the studied aquatic communities of the Syrdarya River, any threatened, rare and valuable protected species of organisms, including species entered in the IUCN Red List and in the Red List of Uzbekistan, were not found on the site.

It was found that the construction of the power transmission line and the access road did not have an adverse impact on organisms of aquatic biocommunities.

The control of the Syrdarya River's flow has a significant impact on the biological conditions of the river. The main anthropogenic factors, affecting adversely the aquatic biota of the area under consideration, are agriculture, pollution from extraction of gravel, clay and sand, unauthorised landfills.

The matrix of results of the assessment of effects (characterisation of impact) on organisms of aquatic ecosystems is given in Table 9.11.1 (Table 9.11.1).

[42] The power transmission line crosses the Syrdarya River, the towers are installed outside the riverbed.

The significance of the impact of the planned activity on organisms of aquatic ecosystems is estimated as low at all its stages.

Table 9.11.1 Matrix of results of the assessment of effects on ichthyofauna

Life cycle stages: construction, operation

Recipient: Organisms of aquatic ecosystems of the Syrdarya River

Recipient's sensitivity: medium

Impact characteristics

Impact	Change in the biotopic conditions of aquatic ecosystems		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect effects on ichthyofauna				
Measures	• Measures for protection of surface waters provided for the construction and operation stages (Section 9.5)				
Residual effect	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible\	Low	Low

9.12 Cumulative effects

Cumulative impacts are impacts that are generally recognised to be significant based on scientific opinion and/or based on the concerns of the affected communities.

The cumulative impact assessment (hereinafter - CIA) is provided for by the ESIA Terms of Reference.

Various environmental and social impacts of existing facilities/projects and/or natural, natural-anthropogenic environmental factors in combination with additional effects of the planned activity cause the occurrence of cumulative impacts.

Section 3.6 of 128-0948-ESIA-PE-3 outlines methodological approaches to the CIA based on the following requirements:

- IFC PS-1 [1] ;
- IFC Guidelines: Performance Standards on Environmental and Social Sustainability, PS-1, GN37-GN43 [2];
- IFC Good Practice Handbook. Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets [3].

9.12.1 Scoping, Stage 1

9.12.1.1 Identification of VECs[43]

Valued Environmental Components (VECs) are recipients and factors (elements) of the natural environment, whose analysis is deemed practical as part of the CIA.

In accordance with [3] in the CIA includes impacts that are recognised as important based on scientific concepts and/or the concerns of the affected communities.

The CIA does not consider potential impacts that may occur without the project and/or independently of the project.

The VECs are identified based on the:

- Stakeholder consultations (see Section 5 128-0948-ESIA-PE-1);
- Analysis of projected impacts on environmental components (see Section 9).

If the impact on a recipient is found to be negligible or low, then the corresponding recipient is not classified as a VEC.

Based on this approach, the following VECs (components of the natural environment and natural-anthropogenic objects) were considered within the CIA:

- Ambient air (chemical composition and acoustic indicators);
- Surface water bodies;
- Sewer networks and treatment facilities in Bekabad;
- Waste disposal facilities in the Bekabad district.

9.12.1.2 Justification of spatial boundaries

Section 8.1 characterises the area of environmental influence. An analysis shows that its boundaries are determined by:

- UMK’s air emissions;
- Zone of acoustic discomfort created by UMK’s noise sources ;

[43] In this section, VECs related to the natural environment are considered.

- Zone of acoustic discomfort of the access railway to the Zavodskaya station;
- Right-of-way of associated facilities (road, power lines) and associated zones of chemical and acoustic pollution of ambient air.

9.12.1.3 Justification of temporal boundaries

IFC PS-1 requires taking into account ongoing or planned activities that are not directly related to the project and are ongoing, planned or reasonably foreseeable.

In accordance with the recommendations given in [4], it is expedient to consider ongoing/existing projects/facilities, as well as projects that are expected to start within 5 years from the date of completion of the CIA. The rationale for this five-year lag is related to the assumption that beyond its limits, the number of uncertainties decisively worsens the quality of the forecast.

Also, the time frame is determined by the availability and quality of initial data on existing facilities and / or potential projects[44].

According to the recommendations given in [3], it is advisable to use the CRC life cycle stages as the temporal boundary.

Taking into account that the CRC project should be implemented within 5 years, it is proposed to use this period of time as the CIA projection period.

9.12.2 Scoping, Stage 2

Given the incompatibility of the characteristics (scale) of the environmental impacts of the construction and operation stages of the CRC, the CIA covers the operation stage of the CRC.

The CIA process can be formalised as follows:

Cumulative impacts=Impacts [(UMK + CRC) + "External" facilities/projects]

According to the Bekabad Master Plan[45], more than 40 industrial companies operate in the city. The leading industry is ferrous metallurgy, which accounts for about 60% of the city's total output, followed by the building materials industry (about 15% of the output).

The city is home to machine-building, metalworking, light and food industries, construction and installation, procurement and supply and motor transport enterprises.

The city's enterprises are the main sources of emissions, discharges, industrial noise, and waste.

The enterprises are located mainly in industrial districts: Western, Central, Eastern and Northern districts along the railway tracks, which surround the city from three directions and cross residential areas on the left bank of the river Syrdarya in the southern part of Bekabad.

UMK is located in the Eastern industrial district. The following facilities are located within the plant's area of influence of the plant (taking into account the planned activities), which is defined as the CIA boundary:

- UMK's garage ;
- UMK's water intake facilities;
- A clothing factory;

[44]Generally, a CIA can also be performed for projects expected to start after 5 years but only if there are reliable plans supporting that the project will in fact be started..

[45]Here and further in this section, the information of the General Plan of the city of Bekabad is presented.

- “Metallurgmontazh”;
- CJSC “Bekabadspetsmontazh”;
- PMK-16.

Outside UMK’s area of influence, there are construction companies that emit pollutants (mainly suspended solids and dust) from low-rise fugitive sources. The emissions disperse and fall out mainly within the industrial sites and at a small distance from their borders.

The exception here is the large cement plant Bekabadcement JSC, whose emissions in certain weather conditions (wind directions and speeds) can form a joint impact on air quality with UMK.

Bekabadcement is the city’s second largest employer after UMK and specialises in the production of various grades of Portland cement, including general construction cement (PC 400-D20, SPC 400), high-quality cement (PC 400 D0), special cement (SSPC 400-D20, PPC 400-D40). Every year, the enterprise demonstrates a steady increase in production; it is the only enterprise in the republic that combines two cement production technologies (wet and dry methods).

Bekabadcement is located in the Central industrial district, according to the city’s Master Plan. The maximum concentration of cement dust outside the industrial zone was 2.5-3.0xMPC; cement mills are the main source of air pollution. Reconstruction of the plant and application of modern emission treatment methods can significantly reduce the level of the plant's impact on the environment, primarily on ambient air.

During the project consultations, the population of makhallas located within UMK’s area of influence raised numerous complaints about the impact of the cement plant located in Tajikistan. It was noted that a particularly intense impact is usually recorded during the period of seasonal winds from Tajikistan (typically from October to April).

The Bekabad city administration provided official information confirming the complaints of the population about air pollution from this cement plant (for details, see Scoping Report 128-0948-SR, Section 9.4 and project consultation minutes).

The following external sources of atmospheric air pollution are also important for the CIA :

- in terms of chemical pollution:
  - private houses - a significant part of households use stoves for heating in the cold season;
- in terms of chemical and acoustic pollution:
  - motor transport;
  - railway transport.

One of the sources of pollution of water bodies is surface runoffs from the municipal territory, as well as industrial and municipal enterprises.

Storm, melt and irrigation water is polluted with suspended particles of inorganic and organic origin, and are characterised by a high content of petroleum products, suspended solids, and in some cases - bacterial contamination.

These effluents are discharged without treatment into the river Syrdarya and the Dalverzin Channel through a chute network that requires reconstruction and expansion.

UMK’s activities are also associated with the impact on surface water bodies:

- Dalverzin Channel – abstraction of water, organised (Outlets 2-4) and unorganised (runoff from the “old” territory of UMK on the left bank of the channel) diversion of wastewater (drainage water and surface runoffs);

- Syrdarya - organised diversion of wastewater (UMK's Outlet 1).

Bekabad has a centralised (although incomplete) separate sewerage system, which provides for the removal of domestic and polluted industrial wastewater. Surface runoffs and conditionally clean industrial wastewater is not accepted into this system. Wastewater from sewage facilities through gravity and pressure-gravity sewer networks enters the municipal treatment facilities with a capacity of 60 thousand m^3/day .

UMK's domestic wastewater is discharged to the municipal network and further to municipal treatment facilities under an agreement between UMK and the Bekabad Suvakova enterprise.

The composition of domestic wastewater is typical (nitrates, nitrites, ammonium, phosphates); it also contains substances characteristic of the Syrdarya and the Dalverzin Channel (iron, chlorides, fluorides), from which UMK abstracts water for process, domestic and drinking needs.

Although the launch of the CRC is not expected to significantly increase the load on municipal networks and municipal wastewater treatment facilities (see Section 9.5), the low efficiency of the municipal sewerage treatment facilities already has an adverse effect on the condition of the Syrdarya. Therefore, the CIA includes cumulative impacts on municipal wastewater treatment plants.

Waste management is a very pressing issue for the region. A solid waste disposal site located in the Bekabad district is currently closed.

Large organisations dump low hazard wastes at unauthorised disposal sites, which do not follow the proper waste storage technology (e.g. there are no impervious screens and leachate treatment facilities, no layered disposal and compaction of waste, and there is a clear shortage of waste treatment treatment).

Numerous unauthorised dumps were discovered along the banks of channels and collector ditches in the valley of the Syrdarya and on wastelands.

All this adversely affects the sanitary condition of the city, affects quality of air, surface and underground water, and soils.

Section 9.4 discusses the management of waste generated at the plant. Given the projected growth in waste volumes, the cumulative impact of waste management activities on the relevant infrastructure of the Bekabad district is also covered in the CIA.

9.12.3 Baseline condition of VECs

An assessment of chemical pollution of ambient air was conducted as part of ESIA from November 2021 to April 2022. The assessment sought to obtain relevant and accurate information about the level of cumulative chemical pollution of air in the UMK area.

The assessment included *inter alia* the following activities:

- Measurements of concentration of NOx, SO2, CO, PM1, PM2.5 and PM10 using a Zephyr handheld air analyser. Monitoring lasted for 2 months. To determine the impact of the cement plant and other contributors to cumulative pollution of air, which are located in Tajikistan near UMK, identical measurements were taken in Tajikistan.
- Passive measurements of air concentration of NO2 and SO2 (diffusion tubes with one month exposure);
- Measurements of metals and PAH in ambient air and precipitation;
- Measurements of total concentration of particulate matter.

Information about baseline chemical contamination of ambient air taking into account cumulative effects is consolidated in Section 6.10.1 of Report 128-0948-ESIA-PE-2[46].

The condition of water in the river Sardarya and Dalverzin Channel is characterised in Section 6.10.3 of Report 128-0948-ESIA-PE-2 and Section 9.4 of this report.

The following is noted in relation to municipal infrastructure:

- Municipal sewerage and treatment facilities proposed to receive CRC's effluents are worn-out and require reconstruction;
- There is no waste management system in Bekabad and Bekabad district, which would comply with modern requirements, and the existing waste disposal facilities do not meet environmental safety requirements.

9.12.4 Results of the cumulative impact assessment

The matrix of CIA results (characterisation of cumulative impacts on the components of the natural environment) is given in Table 9.12.1.

It was established that cumulative air impacts of the proposed activity are rated moderate. Residual impacts are also rated moderate.

The SPZ document developed by the Consultant (taking into account the commissioning of the CRC) should create a basis for assessing subsequent plans of the plant. It is assumed that all development projects of UMK will be implemented based on the proposed mitigation measures.

According to the results of the first years of air and noise pollution monitoring at the SPZ boundaries of UMK and regulated human habitat quality areas, it is recommended to consider developing a consolidated SPZ document for the Central industrial district.

The consolidated document should contain an assessment of the impact of all industrial and municipal enterprises located in the Central industrial district. The administration of Bekabad, with the participation of interested parties, will need to initiate a decision on the development of such document.

Cumulative impact on the waters of the river Syrdarya and the Dalverzin Channel is associated with water intake (the channel) and wastewater diversion (the river and the channel).

In both cases, the impacts on the Dalverzin Channel and other surface water bodies are rated low.

Mitigation of the consequences associated with water intake from the channel is ensured by the introduction of water recirculation at UMK and the use of drainage water.

The impact on the river Syrdarya is assessed as moderate, and the residual impact as low.

It is proposed to continue the studies of the quality of the water in the river and the channel, which were commenced as part of the ESIA process and provide for:

- production monitoring at wastewater outlets;
- monitoring of pollution at background and reference points.

[46] Full results of monitoring of current chemical pollution of ambient air in the UMK area are given in Report 128-0948-BLS-Air.

Based on the results of water monitoring in the river and the channel, it is recommended to assess the feasibility of developing and implementing a set of additional compensatory water protection measures (if necessary).

To prevent the adverse effects of cumulative impacts on the infrastructure of the district and the city, which provides for the treatment of domestic wastewater and waste management, it is recommended to provide for:

- financial participation of UMK in the reconstruction of municipal sewer networks and treatment facilities;
- construction of own waste disposal facility (landfill).

Table 9.12.1 Matrix of CIA Results

Life cycle stage: operation

Recipient: local communities

Recipient's sensitivity: medium

Impact characteristic

<table>
<tr><td rowspan="2">Impact</td><td colspan="2" rowspan="2">Chemical pollution of atmospheric air</td><td>Nature</td><td>Genesis</td><td>Mechanism</td></tr>
<tr><td>adverse</td><td>direct</td><td>Cumulative</td></tr>
<tr><td rowspan="2">Primary Impact</td><td>Extent</td><td>Duration</td><td>reversibility</td><td>Value</td><td>Significance</td></tr>
<tr><td>transboundary</td><td>Long term</td><td>Reversible</td><td>Medium</td><td>Moderate</td></tr>
<tr><td>Effects</td><td colspan="5">Indirect impacts on public health, flora and fauna, soils</td></tr>
<tr><td>Measures</td><td colspan="5">• development of the SPZ document for the Central industrial district
• production monitoring at emission sources
• monitoring of air pollution at regulated human habitat quality areas
• development and implementation of a set of additional compensatory air protection measures (if necessary)</td></tr>
<tr><td rowspan="2">Residual impact</td><td>Extent</td><td>Duration</td><td>reversibility</td><td>Value</td><td>Significance</td></tr>
<tr><td>Local</td><td>Long term</td><td>reversible</td><td>Medium</td><td>Moderate</td></tr>
</table>

Impact	Acoustic air pollution		Nature	Genesis	Mechanism
			adverse	direct	Cumulative
Primary Impact	Extent	Duration	reversibility	Value	Significance
	transboundary	Long term	reversible	Medium	Moderate
Effects	Indirect effects on public health				
Measures	• development of the SPZ project for the Central Industrial Region • production monitoring at noise sources • noise level monitoring at regulated human habitat quality areas • development and implementation of a set of additional compensatory noise protection measures (if necessary)				
Residual impact	Extent	Duration	reversibility	Value	Significance
	Local	Long term	reversible	Medium	Moderate

Life cycle stage: operation

Recipient: River Syrdarya

Recipient's sensitivity: Medium

Impact characteristic

Impact	Chemical pollution of water		Nature	Genesis	Mechanism
			adverse	direct	Cumulative
Primary Impact	Extent	Duration	reversibility	Value	Significance
	Local	Long term	reversible	Medium	Moderate
Effects	Indirect impacts on the health of the population, hydrobionts				
Measures	• production monitoring at wastewater outlets • monitoring of pollution at background and reference points • development and implementation of a set of additional compensatory water protection measures (if necessary)				
Residual impact	Extent	Duration	reversibility	Value	Significance
	Local	Long term	reversible	Minor	Low

Life cycle stage: operation

Recipient: Dalverzin Channel

Recipient's sensitivity: Medium

Impact characteristic

Impact	Chemical pollution of water		Nature	Genesis	Mechanism
			adverse	direct	Cumulative
Primary Impact	Extent	Duration	reversibility	Value	Significance
	transboundary	Long term	Reversible	Medium	Moderate
Effects	Indirect impacts on community health, hydrobionts				
Measures	• production monitoring at wastewater outlets • monitoring of pollution at background and reference points • development and implementation of a set of additional compensatory water protection measures (if necessary)				
Residual impact	Extent	Duration	reversibility	Value	Significance
	Local	Long term	Reversible	Minor	Low

Life cycle stage: operation

Recipient: Dalverzin Channel

Recipient's sensitivity: Medium

Impact characteristic

Impact	Withdrawal of water resources		Nature	Genesis	Mechanism
			adverse	direct	Cumulative
Primary Impact	Extent	Duration	reversibility	Value	Significance
	transboundary	Long term	Reversible	Medium	Moderate
Effects	Indirect impacts on economic entities, hydrobionts				
Measures	• introduction of water recirculation • use of drainage water				
Residual impact	Extent	Duration	reversibility	Value	Significance
	Local	Long term	reversible	Minor	Low

References

1. Performance standards for environmental and social sustainability. IFC, 2012.
2. Guidance Notes: Performance Standards on Environmental and Social Sustainability. IFC, 2012.
3. Good Practice Handbook. Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, IFC 2013.
4. Guidelines for the Assessment of Indirect and Cumulative Impacts as well Impact Interactions, Report by Hyder for EC DG XI, Brussels, May 1999.

10 SOCIO-ECONOMIC IMPACT ASSESSMENT

Social impact assessment is a special type of cost-benefit analysis that compares the positive economic results of a project with the social consequences associated with adverse impacts.

To assess the potential socio-economic impacts, data and information on relevant baseline characteristics of the social environment have been identified and reviewed. Data are collected and presented at different spatial levels (national, regional, and local, depending on the context).

Primary data on socioeconomic characteristics are acquired in October-December 2021 and January 2022. Due to the lack of a range of official data, measures have been taken to collect the relevant information from all available sources.

Observations were made in local communities, as well as meetings and conversations with local authorities, as well as a study of traffic intensity in the area of the UMK.

In the course of the work:

- basic socioeconomic studies and data collection were conducted;
- interviews were conducted with officials to obtain the description of the socio-economic conditions in the area of the proposed activity, in particular in the areas of local communities and affected farms;
- the condition of roads and other infrastructure that can be used as part of the casting and rolling complex project (128-0948-ESIA-PE-2, Sections 7, 8) has been determined.

The following restrictions apply to the work performed:

- certain data shows changes between years, some aspects have information for 2020, information for 2021 is not available at this time;
- in some cases, it was impossible to obtain observation data for a five-year period;
- data is not always available. In this case, if possible, efforts were made to obtain qualitative data (instead of quantitative data).

Nevertheless, these limitations ensure the integrity of the assessment.

10.1 Impact on the labour market

According to the World Bank's recommendation, jobs should mainly be created through the formation of new enterprises, as well as through the expansion of existing enterprises.

Structural weaknesses in Uzbekistan's labour market, according to the World Bank, include few incentives to work, deficiencies in workers' skills, and inadequate opportunities for technical skills training in enterprises.

It is noted that young people who do not have a job or study represent 24%[47] of all young people aged 16-24 years (26.4% in the group from 16 to 29 years). Unemployment is particularly high among young women - 4 times higher than among young men. This forms a

[47] https://documents.worldbank.org/en/publication/documents-reports/documentdetail/235891634705237783/youth-employment-in-uzbekistan-opportunities-and-challenges

relatively high level of unemployment among young people, a high proportion of the economically inactive population, as well as limited labour mobility.

The persistence of demographic pressure on the labour market and, consequently, the problem of a shortage of jobs, makes it difficult to reduce unemployment.

The World Bank states that the number of jobs created annually in the Uzbek economy must be doubled just to occupy the new workers entering the labour market.

Job creation is a significant positive impact associated with the construction of the casting and rolling complex. The construction phase runs from 2020 to 2023. The search and recruitment of personnel are implemented based on the "Regulations on the selection and recruitment of personnel in Uzmetkobinat JSC in accordance with labour legislation".

Pursuant to the Regulations, a commission is created to select applicants for vacancies by their specialties and to provide the plant with qualified workers, clerks, and specialists.

The Commission is chaired by the Deputy Chairman of the Management Board for HR and Social Affairs.

When selecting applicants for vacant positions, the following have the advantage:

1. Persons who have higher special education (relevant to the job profile) and work experience in their specialty.

2. Graduates of universities with the appropriate profile specialty.

3. Persons with secondary professional education (corresponding to the job profile) and work experience in their specialty.

4. College graduates with the appropriate specialized education who have completed industrial and pre-graduation internships at the mill.

5. Qualified workers of Category 5-6, skilled in the plant field and experienced in the industry.

6. Workers of Category 3-4, skilled in the plant field and experienced in the industry.

Business professional qualities of the applicant are determined in the process of preliminary interview.

The structural unit to which the applicant for the vacant job or position is assigned after the preliminary interview also conducts an interview to assess the professional qualities of the applicant and his/her suitability for the vacancy. Employment is formalized by signing a bilateral employment contract.

10.1.1 Construction stage

In the peak period during the construction phase, the need for labour will be about 1,300 people.

The projected facilities will be built by the personnel, mostly working on a rotational basis and living in the construction camp located near the UMK site.

Renaissance Heavy Industries LLC (Russia), a contractor, will engage the qualified personnel from other regions of Uzbekistan, citizens of the Republic of Uzbekistan who gained the necessary experience and qualifications at previous sites and, possibly, even from other countries.

It is assumed that some of the construction workers, the residents of Bekabad district and Bekabad town, will be unskilled labour.

Given the total number of people employed in the construction industry of the town (about 800 people), the attraction of labour resources to the construction of the casting and rolling complex can cause short-term positive changes in the labour market.

10.1.2 Operation stage

The casting and rolling complex will be commissioned in 2023.

Total manpower requirements of the project for the period of operation is 1 253 people, including 1 091 workers and 162 managers, specialists, and employees, including 51 administrative and managerial personnel. The total number of jobs created by the casting and rolling complex is 406 units, tentatively, more than 200 people out of the production staff.

The maximum number of permanent production personnel will be reached in 2024, when the casting and rolling complex will employ about 1,200 people, including laboratory and product quality control personnel.

It is assumed that, as in the case of construction workers, local residents (i.e. residents of Bekabad district and the town of Bekabad) will mainly be employed as production (with special technical education) and service personnel (up to 200 people of production and service personnel).

Metal production ranks fairly favourably in terms of employee wages compared to many other types of manufacturing industries.

At UMK, as of December 2020, the average monthly wage was 3,900,000 Uzbek sums, which exceeds the average wage in Uzbekistan for all types of economic activity and the average wage at most enterprises in the manufacturing industry.

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

In industry, the average wage in 2020 was 3,524.0 thousand UZS and increased, compared to the corresponding period in 2019, by 36.5%.

It is assumed that due to the implementation of the project, the average nominal level of wages will increase at the regional level and will rise to the level of wages in the Tashkent region.

Due to the implementation of the project, a positive indirect impact on the activities of suppliers of the plant and consumers of UMK products, as well as the formation of the induced effect (consumer spending of employees and companies of suppliers and customers) is predicted.

The effect can be seen in terms of jobs created in related industries, according to international estimates (World Steel Association) indicator for metallurgy is 14.7 jobs. According to other estimates, in the CIS, one job in metallurgy creates from 2 to 3 new jobs in related industries.

This means that the project will create new jobs in related industries for 2,500 people.

Additional jobs will primarily be created for employees of the pipe rolling industry, shops for cutting hot-rolled coils into sheets and strips, manufacturing of various steel structures from hot-rolled coils, rolled products with coatings, as well as for companies in the energy and transport sectors of the economy.

The appearance of jobs at UMK will also create new jobs in the service sector (e.g., catering or retail businesses).

Given that one job in the industry creates, on average, three jobs in the service sector, the projected additional employment of about 7,500 people (Table 10.1.1).

Table 10.1.1 Impact of the project on employment, people

Employment in the casting and rolling complex	1 253
Employment in related industries	2 500
Employment in the service sector	7 500
Total employment as a result of the casting and rolling complex project	11 253

Thus, as a result of the implementation of the casting and rolling complex project, it is expected to provide jobs for at least 11,000 people, which will increase the employment rate of the working-age population.

When comparing the number of unemployed people (6,600 in Bekabad district and almost 6,800 in Bekabad town, see "Number of unemployed people in the Bekabad district" in the report), it is noteworthy that the number of unemployed people in Bekabad town has been decreasing. Table 7.13, 128-0948-ESIA-PE-2) providing jobs could potentially reduce unemployment by 30%.

10.1.3 Recommendations;

10.1.3.1 Measures to prevent and mitigate impacts

A review of labour market impacts identified positive impacts during the construction and operational phases.

It is recommended to stimulate the recruitment of qualified personnel, both at the construction stage and at the operation stage among the able-bodied population of the Bekabad district and Bekabad town to reduce unemployment among the population, improve living standards in the area of planned activities, reduce migration outflow of population and minimize social tensions in the society.

It is necessary to raise the level of skills and competence of both the existing personnel of the plant and the able-bodied population of the Bekabad district and the town of Bekabad. Measures to enhance the positive effects of training and professional development are discussed in 10.3.3.1

10.1.3.2 Monitoring and Reporting

To stimulate the positive effects associated with labour market impacts, it is recommended (Table 10.1.2):

- Develop and implement an HR policy for the casting and rolling complex, which will extend to UMK and ensure compliance with the requirements of IFC and ILO PS-2, including transparent and open recruitment mechanisms, principles against child and forced labour, principles of non-discrimination and equal opportunities based on gender, nationality, ethnicity, race or religion; prohibition of any form of workplace harassment, a grievance mechanism for employees and clear responsibilities with regard to their implementation;
- provide for the implementation and implementation of the social and environmental policy of the casting and rolling complex, including training obligations, and the creation of a transparent recruitment procedure among residents of the region (including women, young people, and representatives of vulnerable groups).

10.1.4 Evaluation results

It was found that the positive impact of the planned activity on the labour market is of moderate importance, both at the construction stage and at the operation stage.

References

1. Feasibility Study "Construction of the Casting and Rolling Complex". Explanatory note, SE "UkrGIPROMEZ", 2020.
2. World Bank Report dd. September 2021 "Employment of Young People in Uzbekistan"

Table 10.1.2 Measures to prevent and mitigate impacts on the labour market

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Prioritize the recruitment of Project personnel among the able-bodied population of the Bekabad district and Bekabad town	Implementation of the personnel policy of the enterprise, including transparent mechanisms and open mechanisms for hiring personnel. implementation and introduction of the socio-ecological policy of the casting and rolling complex. communicating accurate information about activities of the casting and rolling complex in a timely and complete manner to all Stakeholders	- PS-2 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population	- Operational control of the HR department of the casting and rolling complex - Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues	- Grievance redress mechanism (GRM) for Project and enterprise personnel in general, separate GRM for the public - Compliance with the requirements of national legislation in the field of employment - Training program, procedures and conditions for selecting specialists among residents of the region (including women, young people, representatives of vulnerable groups)
II	**Operation stage**					

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)	Initial recruitment of the Project personnel among the able-bodied population of the Bekabad district and Bekabad town	Update the corporate personnel policy to include transparent mechanisms and open mechanisms for hiring personnel. implementation and introduction of the socio-ecological policy of the casting and rolling complex. communicating accurate information about activities of the casting and rolling complex in a timely and complete manner to all Stakeholders	PS-2 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population	- Operational control of the HR department of the casting and rolling complex - Record of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues)	- GRM for Project personnel and the enterprise as a whole - a separate GRM for the population - Compliance with the requirements of national legislation in the field of employment - Training program, procedures and conditions for selecting specialists among residents of the region (including women, young people, representatives of vulnerable groups)

Table 10.1.3 Labour market impact assessment results matrix

Stage of the life cycle: construction

Recipient: able-bodied population

Recipient sensitivity: medium

Impact characteristics

Impact	Job creation		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Regional	Short-term	Reversible	Average	Moderate
Consequences	Absent				
Measures	• Develop and implement an HR policy for the casting and rolling complex, which will be further extended to the UMK and ensure compliance with the requirements of the IFC and ILO PS-2. • Implementation and implementation of the social and environmental policy of the casting and rolling complex				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Regional	Short-term	Reversible	Average	Moderate

Life cycle stage: Operation

Recipient: able-bodied population

Recipient sensitivity: medium

Impact characteristics

Impact	Job creation		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	Moderate
Consequences	Absent				
Measures	• Develop and implement the casting and rolling complex personnel policy, which will be further extended to UMK and ensure compliance with the requirements of IFC and ILO BOD-2 • Implementation and implementation of the social and environmental policy of the casting and rolling complex				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	Moderate

10.2 Impact on economic development

The key benefits of the casting and rolling complex project related to economic growth include the following aspects:

- reduction in the outflow of foreign exchange resources from the Republic of Uzbekistan in the amount of 300 million EUR, subject to the replacement of imports of rolled sheets from Russia, Ukraine, and Kazakhstan;
- increase in the inflow of foreign currency due to the export of finished products in the amount of 52.9 million EUR per year;
- increase in the industrial potential of the republic by 511.5 million EUR;
- increase in the revenue part of the country's budget each year in the amount of. 29.7 million EUR;
- an increase in the country's gross domestic product by 282 million EUR or 0.6% of GDP in 2019;
- Bekabad town budget will increase due to the growth of tax revenues associated with the commissioning of the casting and rolling complex (VAT - 15%, profit tax - 15%, property tax - 1.5%, social tax - 12%), as well as the indirect impact of the project on the development of the local economy;

A general decrease in the dependence of the metallurgical industry of Uzbekistan on imports of one of the basic products of ferrous metallurgy is projected.

10.2.1 Construction stage

The scale of the project will provide orders for specialized enterprises in Uzbekistan.

Construction companies and subcontractors, transport and service organizations will be involved in the construction, construction materials, ready-made reinforced concrete products and structures will be purchased on the local market, etc.

Participation in the project will provide additional income, the preservation of existing or the creation of new jobs, and tax payments to the budgets (VAT, income tax, etc.).

Income growth will stimulate subsequent consumption of goods and services.

10.2.2 Operation stage

The main factors contributing to the growth of GDP (gross domestic product per employee) are the growth of labour productivity and employment growth. The project is expected to simultaneously increase employment and productivity.

The average labour productivity for the project will be 39,600 USD. The average labour productivity in Uzbekistan is 4,000 to 5,000 USD.

Increased productivity will ensure the creation of more efficient and therefore higher-paying jobs.

During the operation period, the design calculations provide for contributions to regional social development/charity in the amount of 2% of net profit. The average annual deductions will be 2.6 million UZS or 26.3 billion UZS.

The implementation of the project will also create an opportunity for socially significant investments and charity. Improving the infrastructure of Bekabad town and the Republic of Uzbekistan by carrying out major repairs, reconstruction and construction of new roads and railway access roads, as well as the construction of additional facilities to provide electricity.

Additional tax revenues to the budget during the operation of the casting and rolling complex will increase budget funding for education, health, culture, social policy, including state benefits and compensation payments to the population at the local, regional, and national levels.

Thus, the salaries of those employed in the budget sector increase, new jobs are created in the social sphere, which affects the level and quality of life of the population: the situation in the labour market improves and the income from employment and social transfers to the population increase, the availability and quality of social services increase.

The average amount of the net increase in deductions to the state budget (less VAT) in 2023-2057 for the project will be 35 mln USD or 357.7 bln UZS per year.

Thus, the implementation of the project will increase funding for education by 1% or funding for general health care by 2%. If the amount of the increase in tax revenues from the implementation of the project is directed to social support - such support will increase by 5% across the country and will increase funding for the construction, reconstruction and major repairs of educational institutions across the country by 9% or funding for the construction, reconstruction and major repairs of medical institutions by 33%.

The activities of the casting and rolling complex will make a significant contribution to increasing the income and the level of domestic solvency of the population of Bekabad town and Bekabad district, as well as the Republic of Uzbekistan as a whole. The growth of the population's income and the expansion of effective demand are the result of remuneration of labour of those employed at the jobs created at the projected facilities and the development of current production.

At the operation stage it is also expected to reduce the outflow of foreign exchange resources by import substitution and reducing the dependence of the metallurgical industry of Uzbekistan on imported metal products. In connection with the development of the machine-building and construction industries of the national economy in the medium and long term growth in consumption of sheet metal is projected

The development of the construction industry, car building, metallurgical and machine building industries as a result of localization of sheet metal production will also allow the Republic of Uzbekistan to increase the level of self-sufficiency in a wide range of products of ferrous metallurgy and machine building industry.

Implementation of the project will give an additional impetus to the development of the metallurgical industry of Uzbekistan, creating a base for the development of production of steel structures, welded pipes, hot-rolled sheet in sheets, strips, thin-sheet cold-rolled hot-galvanized rolled steel, cold-rolled hot-galvanized sheet with polymer coating, cut-and-drawn sheet and other demanded products. The commissioning of the casting and rolling complex will make it possible to provide JV Tashkent Metallurgical Plant LLC with raw materials in hot-rolled sheets in coils and enterprises in the republic that use hot-rolled steel sheets in production.

10.2.3 Recommendations;

10.2.3.1 *Measures to prevent and mitigate impacts*

A review of economic development impacts identified positive impacts during the construction and operational phases.

The implementation and implementation of a socio-environmental policy of the casting and rolling complex are recommended, especially in terms of a system that includes a training program, and a transparent recruitment procedure among the residents of the region (including women, and young people, representatives of vulnerable groups).

10.2.4 Evaluation results

It was found that the impact of planned activities on economic development is assessed as moderate at the stages of construction and operation.

Table 10.2.1 Matrix of results of the assessment of the impact on economic development

Stage of the life cycle: construction

Recipient: Economics

Recipient sensitivity: high

Impact characteristics

Impact	Impacts on economic development		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Average	Moderate
Consequences	Provision of production orders to specialized enterprises Additional income, tax payments to budgets Reducing the economy's dependence on imports				

Life cycle stage: Operation

Recipient: Economics

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts on economic development		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Regional	Long-term	Irreversible	Average	Moderate
Consequences	Provision of production orders to specialized enterprises Additional income, tax payments to budgets Reducing the economy's dependence on imports				

10.3 Impacts related to training, professional development

The development of personnel skills is important for product quality, operational safety, and, ultimately, the economic efficiency of production.

UMK's management pays attention to hiring educated and qualified personnel. As part of the personnel work, the Company developed and approved the Regulations on rotation, management traineeship, and the personnel reserve. The plant has a system of retraining and advanced training for its workforce.

Training is provided by experienced professionals at the training centre of the plant. The Training Centre arranges training for retraining and professional development of managers, professionals, and employees on separately approved programmes with the involvement of teaching staff of universities of the Republic of Uzbekistan and the Moscow Institute of Steel and Alloys. Qualified specialists and necessary manuals are available to arrange training processes.

Professional development of specialists and heads of subdivisions is carried out by sending them to educational institutions of retraining and advanced training system, as well as directly at the training centre of the plant, according to separately approved programmes with the involvement of teaching staff of universities of the Republic of Uzbekistan.

The lack of experienced and qualified personnel can create difficulties for the operation of the casting and rolling complex, so UMK together with Danieli have developed and are planning to implement training programmes.

10.3.1 Construction stage

During the construction phase, contractors will engage construction professionals based on the requirements and qualifications necessary to implement the construction process.

Professional development and training will be carried out in health and safety at construction sites.

Awareness-raising activities and training will also be conducted on the risks of socially-caused diseases and how to control them, interaction with the population of the project area and the Contractor's Employee Code of Conduct.

Already at the construction stage, training of the project staff for the operation phase will also begin.

According to the contract with Danieli & C. Officine Meccaniche S.P.A., in order to form a team of Uzmetkombinat specialists, Danieli has to train the plant's personnel.

Such training will be provided at the pre-production stage, at similar enterprises, and in special educational institutions. The total cost of training will be 373,000 EUR.

Providing training is required not only to start production but also in the future, as skill development, management improvement, and replenishment of staff (e.g., due to retirement and resignation of employees) is a continuous process.

The training programme provides:

- classroom internship;
- internship at a similar company;
- internship at the casting and rolling complex.

Theoretical training will be held at the Danieli head office in Italy to familiarise Uzmetkombinat personnel with the designs and characteristics of the new machines, transfer

of knowledge on operation, basic metallurgical process, and maintenance of the supplied equipment.

Hands-on internship at the Danieli workshop and/or at a plant of similar characteristics selected by Danieli for the trainee with practical operation of the equipment and its mechanisms.

The third stage will involve familiarisation at the casting and rolling complex site with the supplied equipment during installation or commissioning. The data of the trainees who have satisfactorily completed Steps 1 and 2 will be handed over to the Danieli consulting personnel in charge of the commissioning activities.

At the final stage of installation and during the period of commissioning, the UMK personnel will undergo practical training on the equipment designed and supplied by Danieli.

A positive impact on existing UMK staff is expected due to advanced training and the adoption of new technologies. Newly hired project staff selected from the residents of the Bekabad district and Bekabad town will also be positively affected by training and professional development.

Implementation of the project will create demand for skilled labour. This means that the implementation of the project, presenting a demand for a highly skilled workforce, will increase the educational and qualification level of the workforce and reduce the use of unskilled labour in the region.

Increasing the professional qualification requirements for workers is a stimulus for the development of the system of vocational education at the level of the region and the republic as a whole.

10.3.2 Operation stage

The plant has a system of retraining and advanced training for its workforce. Training is provided by experienced professionals at the training centre of the plant.

The Training Centre of UMK carries out organizational and methodical management of the current system of professional development and retraining, takes measures to strengthen the training and material base, and ensures that the level of professional training of staff increases the efficiency of production, social development of the team.

During the operation phase, advanced training will be required for managerial administrative, production personnel, as well as for workers. The introduction of new production equipment and the need to market new types of products in a highly competitive environment will require appropriate personnel to maintain high standards of professionalism and productivity.

The table shows a list of specialties required for the implementation of the casting and rolling complex:

Table 10.3.1 List of specialties and qualification requirements

Title	Qualifying requirements
Production Director	3 years of experience in the management of technological processes and metallurgical structures at a similar enterprise
Production Operations Manager	3 years of experience with the technological process in a similar production
Shift Foreman	Vocational training in college in the field of operation and 2 years of experience as a shift foreman at a similar production facility
Main operators	Qualified senior operator, with 5 years of prior experience in similar production.

Title	Qualifying requirements
Maintenance work manager	3 years of management experience in the maintenance and organization of production at a similar facility
Maintenance Scheduler	3 years of experience in maintenance planning at a similar facility
Specialists on mechanics/hydraulics	Qualified senior mechanic/hydraulic technician with 5 years of prior experience in a similar production facility.
Automation Engineer	A graduate of a university or technical school.
Head of Automation Department	Technical school (diploma), lower management course with final exam
Specialists on the process and systems	High school education, with at least two years of work experience at the company
Electrical Engineer	Higher technical education (diploma) with 5 years of work experience at a similar company
Mechanical Engineer	Higher technical education (diploma) with 5 years of work experience at a similar company
Erection supervisors	Vocational school or a master's course at a technical school with a final exam
Mechanical/hydraulic/electrical/electronic technicians	College education with an exam
Process Engineer	Higher technical education (diploma) with 5 years of work experience at a similar company
Furnace Operator	High school education, with at least two years of work experience at the company
Measuring Instrument Specialist	High school education, with at least two years of work experience at the company
Hydraulics Technician	High school education, with at least two years of work experience at the company

Additional in-service training is also needed to improve management, replenish personnel due to retirements and resignations.

Specialists employed at the plant are annually referred to the Research Institute of Standardization, Metrology and Certification, the Scientific and Technical Centre Kontehnazorat Ukuv under the State Committee for Industrial Safety, the Centre for professional development and retraining at Turin Polytechnic University, the Corporate Training Centre under the Academy of State and Social Construction under the President of Uzbekistan, the Republican Higher School of Business and Management and other educational institutions for professional development.

Training during the operation phase will have a positive impact on the qualification of the UMK personnel, as well as on the development and competitiveness of the enterprise as a whole.

10.3.3 Recommendations;

10.3.3.1 Measures to enhance the positive effects

As a result of the consideration of impacts associated with training, positive impacts during the construction and operational phases are identified.

Given that the implementation of the project will create a demand for skilled labour UMK together with Danieli is recommended to introduce training programmes as part of the CRC project process.

To enhance the positive effects, it is recommended to provide the introduction of testing and qualification examinations for project personnel.

10.3.3.2 Monitoring and Reporting

Suggestions for monitoring and reporting are presented in Table 10.3.2 .

10.3.4 Evaluation results

It was established that the proposed activity is likely to have a moderate positive effect associated with training and professional development.

Table 10.3.2 Measures to enhance the positive effects of training, professional development

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Operation stage**					
1	Construction work (earthworks, general construction work)	Provide timely improvement of educational and qualification level of existing personnel and initiate training of new personnel	Introduce personnel training programmes as part of the casting and rolling complex construction project implementation process and ensure that the educational and qualification level of existing personnel and the training of new personnel are raised in a timely manner. Provide for the implementation of the social and environmental policy of the casting and rolling complex, especially in relation to the training of residents of the region (including women, young people, representatives of vulnerable groups)	PS-1 IFC PS-2 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Law "On Labour Protection", 2016	- Records of complaints and suggestions from the public and staff with monthly reporting - testing and qualifying exams	- GRM for Project personnel and the enterprise as a whole - a separate GRM for the population - Compliance with the requirements of national legislation in the field of employment and labour protection - Training program, procedures and conditions for selecting specialists among residents of the region (including women, young people, representatives of vulnerable groups)

Table 10.3.3 Matrix of results of the assessment of the impact associated with training and professional development

Life cycle stage: Operation

Recipient: Personnel

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts related to training and professional development		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Irreversible	Average	Moderate
Consequences	There are no adverse consequences				
Measures	• Improvement of educational and qualification levels of existing personnel and training of new personnel • Implementation and implementation of the socio-environmental policy of the CRC, especially in the part of the system that includes a training programme among the residents of the region (including women, young people, representatives of vulnerable groups)				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Irreversible	Average	Moderate

10.4 Land acquisition, economic displacement

Based on the results of a survey of the right-of-way of associated projects - the route of the power line and the access road to UMK - it was found that a significant part of their territory affects the plots of farms used mainly for planting fruit trees, growing corn, cotton, moonbeam, wheat and other crops.

Access road (built and commissioned, Bekabad district and Bekabad town), power transmission line (under construction, Bekabad district and Bekabad town, Tashkent region, and Shirin town and Bayaut district, Syrdarya region) are laid through the irrigated farmland.

The Land Code of the RUz provides for the possibility of withdrawal of land plots for state and public needs. In this context, it means the withdrawal of land from private possession for public needs, by the decision of the government, with the consent of the landowner in compliance with the provisions of the legislation on the right of the state to compulsory alienation of property, which provides for immediate and adequate compensation.

According to the results of the survey at the stage of determining the research programme of the ESIA, the need for resettlement in connection with the implementation of the project is not identified: the nearest residential buildings are remote from the boundaries of power lines and roads at a distance of 30 to 500 meters.

The construction of the casting and rolling complex infrastructure led to the economic displacement of land users, the survey found that compensation payments were partially made.

In December 2021-January 2022, a social audit will be conducted. It initiated consultations with district khokimiyats, local farmers' associations, and in-depth interviews with project-affected farmers to obtain information about owners and land plots allocated on a permanent or temporary basis (separately for each farm), verification of assessment reports and correctness of the implementation of national legislative procedures, analysis of compliance with IFC PS-5 requirements.

10.4.1 Construction stage

According to the preliminary data of the cadastral bodies of Bayaut and Bekabad districts, the project affected 38 land plots, of which 7 are lands of state enterprises and UMK, 31 plots are lands of farms (19 - Bekabad district, 12 - Bayaut district).

According to the results of the social audit, 19 farms were identified for which an independent assessment was conducted during the construction period. Compensation under the independent evaluation was paid to 12 farms, and a number of farms in this list were not satisfied with the result of the evaluation in relation to the damage caused.

For the remaining 12 farms damage assessment was not made for various reasons (lack of information about the affected farms, changes in the route of power lines, etc.).

Thus, the construction of associated facilities of the casting and rolling complex - power lines and roads, had impacts associated with the alienation of land (temporary and permanent), the consequences of which are expressed in the loss of crops, crop areas, and fruit trees, damage to drainage and irrigation structures.

10.4.2 Operation stage

There is no additional land acquisition and/or economic displacement during the operational phase of the project. Production activities of casting and rolling complex are implemented in the territory of UMK without expanding the boundaries of the enterprise.

10.4.3 Recommendations

10.4.3.1 Measures to prevent and mitigate impacts

Measures to prevent and mitigate impacts during the construction phase are not considered, since the impact has already taken place and the alienation of land has taken place in connection with the practical completion of construction.

Impacts on land users are not predicted during the operational phase.

Given the current status of work with farms affected by the project, it is recommended:

- to update the list of affected farms and assets;
- Re-evaluate farms that remain unsatisfied with the results of the initial evaluation and/or farms that have not been impacted in accordance with national legislation and the requirements of IFC PS-5;
- Consult with affected farms to familiarise them with the results of the assessment, to provide information about GRM;
- payment of compensation based on the results of an independent assessment with written confirmation from the farms that there are no claims related to compensation;
- conducting a social audit, to determine the residual impacts and verify the procedures for implementing the measures discussed above.

10.4.3.2 *Monitoring and Reporting*

In order to avoid adverse effects associated with the acquisition of land for the casting and rolling complex, it is recommended to conduct a second social audit and issue an appropriate report.

10.4.4 Evaluation results

It was found that the significance of the impacts of planned activities related to the acquisition of land is assessed as low.

References

1. Data from cadastral authorities of Bekabad and Bayaut districts (list of affected farms).
2. Decisions of the Khokims of Bekabad and Bayaut districts on land allotments related to the construction of power lines and an access road.

Table 10.4.1 Measures to prevent and mitigate impacts associated with land acquisition and economic displacement

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Ensuring payment of compensation and reimbursement of damages to affected farms	- Complete census of affected farms and assets - Re-evaluation of farms that were unsatisfied with the results of the initial evaluation in accordance with national legislation and PS-5 - Conducting an initial independent assessment in accordance with national legislation and PS-5, for affected farms whose impacts had not previously been assessed; - Consultations with affected farms to familiarise them with the results of the assessment, to provide information about the project's GRM - payment of compensation based on the results of an independent assessment with a written confirmation of no claims related to compensation conducting a second social audit, to determine the residual impacts and verify the procedures for implementing the activities described above	PS-5 IFC National requirements: - Land Code of the RUz, 1998 -Decree of the Cabinet Council No. 911 (16.11.2019) - Decree of the President of the Republic of Uzbekistan No. UP-6243 08.06.2021 -Decree of the Cabinet Council № 146 (25.05.2011)	- Record of complaints and suggestions from farms with monthly reporting on the resolution of issues - social re-audit	- GRM for affected households - Compliance with national laws on land alienation and livelihood restoration - social audit report

Table 10.4.2 Impact assessment matrix from land acquisition, economic displacement

Stage of the life cycle: construction

Recipient: Farms

Recipient sensitivity: medium

Impact characteristics

<table>
<tr><td rowspan="2">Impact</td><td colspan="2" rowspan="2">Impacts associated with the alienation of land plots</td><td>Nature</td><td>Genesis</td><td>Mechanism</td></tr>
<tr><td>Adverse</td><td>Direct</td><td>–</td></tr>
<tr><td rowspan="2">Primary impact</td><td>Extent</td><td>Duration</td><td>Reversibility</td><td>Value</td><td>Significance</td></tr>
<tr><td>Local</td><td>Long-term</td><td>Irreversible</td><td>Minor</td><td>Low</td></tr>
<tr><td>Consequences</td><td colspan="5">Loss of crops, crop areas and fruit trees, damage to drainage and irrigation structures</td></tr>
<tr><td>Measures</td><td colspan="5">• Inventory of affected farms and assets
• Re-evaluate farms that remain unsatisfied with the initial evaluation and/or farms that have not been impacted in accordance with national legislation and IFC PS-5 requirements
• Consult with affected farms to familiarise them with the results of the assessment, to provide information about GRM
• Payment of compensation based on the results of an independent evaluation, with written confirmation from the farms that there are no claims related to compensation
• conducting a social audit, to determine the residual impacts and verify the procedures for implementing activities</td></tr>
</table>

10.5 Labour Force Inflow and Population Change

The implementation of the planned activities will be associated with the influx of a significant number of personnel, which will be especially characteristic of the construction phase.

In addition to workers hired directly by UMK, workers will also be hired by (sub)contractors, including, with a high probability, from outside the Tashkent region, with accommodation in construction camps.

When considering living conditions for project personnel, it is first important to consider the relevant international and national legal and regulatory framework[48]. Several international instruments recognize the right to an adequate standard of living for every worker as part of respect for human rights. For workers, recognition of such a right is included in ILO Recommendation 115, "Workers' Conditions of Residence" (1961).

10.5.1 Construction stage

The well-being of local communities and their social context may be degraded by the influx of outside labour. The lack of qualified labour resources will contribute to labour migration from other regions of Uzbekistan, unlikely, but possibly from abroad.

The potential beneficial impact of such migration could be an increase in demand for locally produced products and services, which could create benefits for small businesses and farms in Bekabad town and Bekabad district.

The decision to establish a construction camp for workers was made in accordance with the IFC/EBRD Guidance Note for Worker's Accommodation after studying the local housing and labour markets.

It is certainly preferable to use local labour, as it has many advantages; not only in terms of reducing the need for housing, but also because it increases the direct and indirect benefits to the local population, an approach supported in all aspects by the EBRD and IFC. However, the qualification requirements of the personnel, the timetable of the construction phase made it necessary to use the option with the predominant use of shift workers.

The initial phase of the project addressed the question of whether worker housing is needed at all. In this regard, labour needs, including skills and probable numbers during the project cycle, have been analysed, and the ability of the local population to meet these labour needs has been assessed.

The workforce flow can lead to conflicts between newcomers and locals. It is very likely that these conflicts will be local in nature and will not lead to a significant decrease in the level of security of the population.

An increase in the incidence of socio-conditioned diseases is also possible due to the influx of the labour force. The risk of this exposure can be reduced by implementing the Project's own health screening programme and health management system for employees, as well as by conducting systematic outreach to inform employees about the risks of contracting socially-caused diseases and how to control these risks.

[48] https://www.ifc.org/wps/wcm/connect/60593977-91c6-4140-84d3-737d0e203475/workers_accomodation.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-60593977-91c6-4140-84d3-737d0e203475-jqetNIh

It is necessary to provide for mitigating measures in the form of the development and implementation of social assistance programmes for vulnerable groups of people. The implementation of these programmes will significantly reduce the likelihood of adverse effects.

10.5.2 Operation stage

During the operation phase, the total number of new jobs under the project will be 1,253 people, including 1,091 people (87% of workers). (87%) workers and 162 (13%) managers, specialists, and employees, including 51 people (0,5%) referred to as administrative and managerial personnel.

The total number of jobs created by the project is 406, which is three times less than the influx of labour during the construction phase. It is assumed that the residents of epy Bekabad district and the town of Bekabad will mainly be involved as production and service personnel, (presumably - 200 people of production personnel).

Regime of work and rest of the main workers, duty personnel, managers and specialists employed in shifts, adopted in accordance with the mode of operation of the main process equipment - continuous, two-shift, 12-hour, four-brigade; for managers, specialists not engaged in shifts, as well as for part of the maintenance staff - single shift work schedule with two days off.

The inflow of labour due to the project will lead to increased pressure on social infrastructure, such as hospitals and other medical facilities, schools, recreational facilities, housing, public transportation, and others.

Analysis conducted at the stage of basic socio-economic research showed insufficient provision of the population of Bekabad with hospitals.

Despite the fact that in the short term the influx of labour will lead to some increase in the burden on social infrastructure, we can expect that growth in demand will lead to the development of infrastructure, which will provide additional positive effect.

The enterprise will be recommended to develop and implement a programme for the development of local infrastructure (construction/expansion of medical facilities, schools, and pre-schools) to reduce the burden associated with the additional migration inflow.

Based on the assessment provided in 128-0948-ESIA-PE-2, Sections 7.4 and 7.5, it is determined that the average fill rate of schools in Bekabad town is 912 students, which shows an insufficient number of schools in the town and overcrowded classes (on average 40 students per class),

Also, the assessment showed insufficient provision of Bekabad town with hospitals. Bekabad hospitals in Bekabad town on the basis of 96 thousand people amounted to 62.5%. When the data are compared to population growth, the inflow of the labour force is assumed to produce 200 new casting and rolling complex employees, for a total of 1,200 households (an average of 6 family members). To provide these households with social infrastructure, it is necessary to build at least one school and kindergarten and to open a medical unit or hospital.

It is unlikely that the increased burden on social infrastructure due to the implementation of the project will lead to a decrease in the welfare of the population. Helping potentially vulnerable groups of people who may be directly affected by adverse impacts will be key.

Increases in inflation, particularly food and housing prices, can also be caused by an influx of labour and a change in the level of demand. It is unlikely that this impact will lead to an actual decrease in the overall well-being of people, since demand will stimulate additional

production and increase the number of services provided to the population, but it should be understood that this impact may affect vulnerable groups.

During the operation phase, there may be unmet employment expectations of the able-bodied population, as well as dissatisfaction of the local population - those employed by the project, and those whose applications were unsuccessful.

10.5.3 Recommendations;

10.5.4 Measures to prevent and mitigate impacts

As a result of consideration of the impacts associated with the inflow of labour and population change and the consequences of these impacts, it is recommended to implement the following measures.

- Construction stage:
  - The hiring goals for local residents will be agreed upon between the contractor and UMK. Hiring conditions will be identified to manage employment expectations, and community outreach (number and type of positions) will be conducted with the help of the Community Outreach Specialist. The unskilled labour force will preferably be hired from the local population affected by the project;
  - social requirements will be incorporated into the project's procurement process. Taking into account relevant considerations to increase the welfare of the population of Bekabad town and Bekabad district, as necessary, conditions will be created for the procurement of goods and services from economic entities of the district and the town;
  - A policy to eliminate alcohol consumption on work sites and in the construction camp will be enforced by the Contractor. An employee code of conduct will be prepared and communicated to staff for review, signature, and implementation. The project will conduct regular reviews of public health and safety mitigation measures and consult with mahalla chairs every six months. The consultation will seek to inform the progress and results of the project and include discussion of any changes;
  - The code of conduct will also include a ban on the use of illegal drugs, bribery and corruption;
  - recreational facilities (recreation areas, sports fields, etc.) must be created in the territory of the construction camp;
  - design and implement a programme for the development of local infrastructure (construction of hospitals and schools) to reduce the burden of additional labour inflow;
  - Providing assistance to potentially vulnerable groups of people who may be directly affected by adverse impacts associated with increased pressure on infrastructure;
  - Development and implementation of a programme of medical examinations and management system in the field of personnel health protection, awareness-raising work on the risks of socially-conditioned diseases and ways to control them.
- Operation stage:
  - With the help of the Community Outreach Specialist, provide access to employment information by explaining the number and type of opportunities to the local community in advance;

- Creating transparent hiring procedures - with respect to ethnicity, religion, disability, or gender. Clear job descriptions explaining the skills required for each position will be provided before hiring. Vacancies will be advertised in local communities through publicly available media.

10.5.5 Monitoring and Reporting

- Record of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues.
- Health screening programme and health management systems for employees.
- Development of personnel policies and transparent recruitment procedures.

10.5.6 Evaluation results

It was found that the significance of the adverse impacts of planned activities in connection with the inflow of labour is assessed as low.

Table 10.5.1 Measures to prevent and mitigate impacts associated with labour inflows and population changes

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Preventing and mitigating population and infrastructure impacts due to labour influx and population growth	- A policy to eliminate alcohol consumption on worksites and at construction camps will be enforced by the Contractor. An employee code of conduct will be prepared and communicated to staff for review, signature, and implementation. The project will conduct regular reviews of public health and safety mitigation measures and consult with makhalla chairs every six months. The consultation will seek to inform the progress and results of the project and include discussion of any changes; - The code of conduct will also include a ban on the use of illegal drugs, bribery, and corruption - Recreational facilities (playgrounds, sports fields, etc.) must be created in the construction camp area. - Providing assistance to potentially vulnerable groups of people who may be directly affected by adverse impacts associated with increased pressure on infrastructure - Development and implementation of a programme of medical examinations and management system in the field of personnel health protection, awareness-raising work on the risks of socially-conditioned diseases and ways to control them	PS-1 IFC PS-2 IFC PS-4 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016 - Law "On protection of citizens' health" from 29.08.1996.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues - the results of medical examinations of the personnel	- GRM for project staff and the public - Public Health and Safety Plan
II	**Operation stage**					
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)	Management of local employment expectations and implementation of transparent selection procedures	- Creating transparent hiring procedures - with respect to ethnicity, religion, disability, or gender - Clear job descriptions explaining the skills needed for each position will be presented before hiring - Jobs will be advertised in local communities through publicly available media - Design and implement a programme to develop local infrastructure (construction of hospitals and schools) to reduce the burden of additional labour inflow	PS-1 IFC PS-2 IFC PS-4 IFC National requirements: -Labour Code of the Republic of Uzbekistan,1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016 - Law "On protection of citizens' health" from 29.08.1996.	Record of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues	GRM for project staff and the public Compliance with national labour laws

Table 10.5.2 Matrix of the results of the assessment of the impact of the inflow of labour force and changes in population

Stage of the life cycle: construction

Recipient: Population

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts of the influx of labour		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Medium	Moderate
Consequences	• The emergence of conflicts with local residents • Increased incidence of socio-conditioned diseases • Increased pressure on social infrastructure facilities				
Measures	• Development and implementation of the Project's own programme of medical examinations and health management system for employees • Conducting systematic awareness-raising work to inform staff about the risks of contracting socially-caused diseases and ways to control them • Development and implementation of social assistance programmes for vulnerable groups • Development and implementation of the Personnel Code of Conduct				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Low	Low

Life cycle stage: Operation

Recipient: Population

Recipient sensitivity: medium

Impact characteristics

Impact	Effects of labour inflows and population changes		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low
Consequences	Increased pressure on social infrastructure facilities				
Measures	• Participation of UMK in the shared development of infrastructure of Bekabad town and Bekabad district • Development and implementation of social assistance programmes for vulnerable groups				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

10.6 Child and forced labour

The goal of the project is to prevent all forms of child and forced labour, including in the supply chain and project activities.

Uzbekistan has ratified eight fundamental ILO conventions that address "core labour standards," including provisions on child and forced labour (see 128-948-ESIA-PE-1, Section 2 for details).

Constant large-scale seasonal employment in construction and agriculture creates a risk of child and forced labour for the project. According to reports by NGOs and human rights activists, there is also information that forced labour is still a problem in Uzbekistan.

Migrants, seasonal workers, public sector workers and subcontractors, and children are considered highly sensitive because they are at risk.

Given current efforts by the government, civil society, and the international community to eradicate the problem of child and forced labour in Uzbekistan, the significance of this potential impact is projected to be relatively low.

10.6.1 Construction stage

The main impacts of planned activities in the construction phase are related to the provision of services by contractors and the supply of products by suppliers using child and forced labour.

To prevent all forms of child and forced labour during the construction phase of the UMK, it is necessary to develop procedures for screening contractors and include child and forced labour provisions in contracts with suppliers and contractors and determine penalties for their violation.

10.6.2 Operation stage

The risk and impact of any form of child and forced labour is unlikely during the operational phase of the casting and rolling complex, as the HR Policy will ensure that child or forced labour is excluded from the casting and rolling complex project and the enterprise as a whole, and that the policy reflects national and international requirements for non-employee personnel and supply chain workers.

A grievance mechanism available to all project workers, including contract and subcontract workers and supply chain workers (discussed in Section 10.8) will also minimize this risk.

10.6.3 Recommendations;

10.6.3.1 Measures to prevent and mitigate impacts

As a result of reviewing the impacts associated with child and forced labour and the consequences of these impacts, it is recommended that the following preventive measures be implemented.

- Construction stage:
  - Include in the Personnel Policy the principles of equal working conditions, excluding discrimination, child and forced labour, and violation of personnel rights;
  - Require contractors and subcontractors to adhere to the Project Personnel Policy through contract provisions;

- Develop a Contractor's Code of Conduct and make it available to employees and contractors;
- contracts with suppliers and contractors must contain child and forced labour provisions and specify penalties for violations;
- Establish an employee grievance mechanism that is accessible to all employees, including contract and subcontract employees and supply chain personnel;
- Create a system of identity cards for all project employees and keep an up-to-date (daily) record of persons working at the project sites at any given time;
- Appoint at least two labour and social affairs officers, who will be responsible for monitoring contractors and their subcontractors (during the construction phase), in ensuring compliance with personnel management policies;
- Report cases of child and forced labour or any suspicion thereof to local authorities and relevant authorities
- report to international creditors on the results of monitoring during the construction period with respect to child and forced labour as part of the mandatory reporting on loan agreements.

- Operation stage:
  - The Personnel Policy should exclude the use of child or forced labour in the project and in the enterprise as a whole, and the policy should reflect national and international requirements for non-employee and supply chain workers;
  - Creation and implementation of an employee grievance mechanism available to all project employees, including contract and subcontract employees and supply chain employees. In addition, workers should not be restricted from joining or forming labour organizations or negotiating collective bargaining agreements.

10.6.3.2 *Monitoring and Reporting*

- Record of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues;
- Monthly social monitoring reports, including an evaluation of the effectiveness of measures to prevent forced and child labour.

10.6.4 Evaluation results

It was found that the significance of the impact of planned activities related to child and forced labour is assessed as low.

Table 10.6.1 Measures to Prevent and Mitigate the Impacts of Child and Forced Labour

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Preventing Child and Forced Labour	- Introducing the principles of equal working conditions in Personnel Policy, excluding discrimination, child and forced labour, violation of personnel rights - requirements for contractors to adhere to the project's personnel policy through contract provisions - Develop a Contractor's Code of Conduct and make it available to all employees and contractors Contracts with suppliers and contractors must contain child and forced labour provisions and define penalties for violations - Establish a grievance mechanism that is accessible to project personnel, including contract and subcontract employees and supply chain employees - Create a system of identity cards for all project workers and keep an up-to-date (daily) record of the persons working at the project sites; - Appoint at least two labour and social affairs officers, who will be responsible for monitoring the activities of contractors and their subcontractors (during the construction phase) with respect to personnel management policies - Report cases of child and forced labour or any suspicion thereof to local authorities and relevant authorities - Report to creditors the results of monitoring during construction with respect to child and forced labour as part of mandatory reporting	PS-1 IFC PS-2 IFC - Convention 29 on Forced Labour (1930) - 2014 Protocol to the Forced Labour Convention (1930) - Convention No. 105 on Abolition of Forced Labour (1957) - Convention No. 182 concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (1999) - Convention No. 138, "Minimum Age for Admission to Employment" (1973) National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues - Monthly social monitoring reports, including the implementation of measures to prevent forced and child labour	- GRM for project staff and the public - Compliance with the requirements of national legislation on labour activities - Personnel policy - Contractor Code of Conduct;
II	**Operation stage**					
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)	Preventing Child and Forced Labour	- The Personnel Policy should exclude the use of child or forced labour in the project and in the enterprise as a whole, and this policy should reflect national and international requirements for non-employee and supply chain workers - Creation and implementation of an employee grievance mechanism available to all project employees, including contract and subcontract employees and supply chain employees. In addition, workers should not be restricted from joining or forming labour organizations or from negotiating collective bargaining agreements	PS-1 IFC PS-2 IFC - Convention 29 on Forced Labour (1930) - 2014 Protocol to the Forced Labour Convention (1930) - Convention No. 105 on Abolition of Forced Labour (1957) - Convention No. 182 concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (1999) - Convention No. 138, "Minimum Age for Admission to Employment" (1973) National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues	- GRM for project staff and the public - Compliance with the requirements of national legislation on labour activities

Table 10.6.2 Impact Evaluation Matrix for Child and Forced Labour

Stage of the life cycle: construction

Recipient: personnel

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts related to child and forced labour		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Low	Low
Consequences	Violations of the principles of equal working conditions, discrimination, violations of staff rights				
Measures	• Include in Personnel Policy principles of equal working conditions, excluding discrimination, child and forced labour, violation of personnel rights • Develop a Contractor's Code of Conduct and communicate it to employees and contractors • Contracts with suppliers and contractors must contain child and forced labour provisions and specify penalties for violations • Establish an employee grievance mechanism available to all employees, including contract and subcontract employees and supply chain personnel				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Life cycle stage: Operation

Recipient: personnel

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts related to child and forced labour		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Low	Low
Consequences	Violations of the principles of equal working conditions, discrimination, violations of staff rights				
Measures	• Include in the Personnel Policy the principles of equal working conditions, excluding discrimination, child and forced labour, and violation of personnel rights; • Contracts with suppliers and contractors must contain child and forced labour provisions and specify penalties for violations; • Establish an employee grievance mechanism that is accessible to all employees, including contract and subcontract employees and supply chain personnel;				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

10.7 Impacts on access to transportation infrastructure

The following aspects of the project have the potential to impact social facilities and transportation infrastructure:

- earth moving/groundworks, transportation of large-size equipment may inadvertently damage the existing infrastructure.

10.7.1 Construction stage

To increase the accessibility of the UMK territory, taking into account future cargo flows of the casting and rolling complex and existing production, the plant completed the construction of an access road from the Tashkent-Bekabad R-26 highway, which will reduce the cargo flows that previously passed through the makhalla of Bekabad town.

During the peak periods of construction and commissioning of the facility in 2023-2024, traffic is projected to increase by approximately 30% of the current traffic (see. Table 10.710.7.1, 128-0948-ESIA-PE-2).

The construction of a new road crossing with the installation of two weighing structures to control the volume of cargo and loads on the road surface was also completed.

Potential impacts:

- deterioration/degradation of the pavement - when using the urban road network to access the project area;
- Traffic jams and delays (road closures), especially during periods of oversized and/or heavy deliveries.

10.7.2 Operation stage

No meaningful impact on access to infrastructure in the operational phase is projected.

The main mode of transport for delivering raw materials to UMK is rail transport; the volume of scrap delivered to the plant in 2020 amounted to 810.9 thousand tonnes.

The supply of products to the domestic market will be 90%, and exports will be 10%, respectively.

Transportation of finished products for export (to the border of neighbouring countries) is provided by rail (up to 10% of total production).

Transportation of finished products in the regions of the country is carried out by road transport (to the nearest consuming enterprises, for example, to the Tashkent Metallurgical Plant 51.7% of the production volume)

38.3% of production is sent by rail to remote areas of the country.

10.7.3 Recommendations;

10.7.3.1 Measures to prevent and mitigate impacts

As a result of the consideration of the impacts associated with access to the infrastructure, as well as the consequences of these impacts are recommended to implement the following measures.

- Construction stage:

- the contractor will ensure the preparation and implementation of a Traffic Management Plan (TMP), which will be approved by the casting and rolling complex and the relevant regulatory authority in Uzbekistan for traffic control;
- Ensuring safe movement of traffic through bypasses or temporary access roads (if necessary);
- Proper road signs, lighting, well-designed traffic safety signs, traffic control signallers.
- periodic inspection and restoration of worn-out road surface at the expense of the share of UMK.

10.7.3.2 Monitoring and Reporting

- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues;
- report on the implementation of the Traffic Management Plan

10.7.4 Evaluation results

It was found that the significance of the impact of planned activities on access to transport infrastructure is assessed as low, both at the construction stage and at the operation stage.

Table 10.7.1 Measures to prevent and mitigate impacts associated with access to transportation infrastructure

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Prevention and mitigation of impacts on transportation infrastructure	- The contractor will ensure the preparation and implementation of a Traffic Management Plan (TMP), which will be approved by the casting and rolling complex and the relevant regulatory authority in Uzbekistan to control traffic -Ensuring unobstructed and safe movement of transport through bypasses or temporary access roads (if necessary) - Proper road signs, lighting, elaborate traffic safety signs, traffic control signallers	PS-1 IFC PS-4 IFC National requirements: - Law "On protection of citizens' health" from 29.08.1996.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues - Results of medical examinations of employees.	-Recording of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues; -Report on the implementation of the Traffic Management Plan
II	**Operation stage**					
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product	Prevention and mitigation of impacts on transportation infrastructure	Preparation and implementation of optimal logistical schemes and traffic management plan for the transportation of heavy goods	PS-1 IFC PS-4 IFC National requirements: - Law "On protection of citizens' health" from 29.08.1996.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues	-Recording of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues; -Report on the implementation of the Traffic Management Plan

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
	shipment, other transportation, storage of hazardous materials)					

Table 10.7.2 Matrix of results of the assessment of the impact on access to transport infrastructure

Stage of the life cycle: construction

Recipient: municipal infrastructure

Recipient sensitivity: high

Impact characteristics

Impact	Impacts on access to infrastructure		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Low	Moderate
Consequences	• Impact on road infrastructure • Impact on traffic				
Measures	• Preparation and implementation of the Traffic Management Plan (TMP) • Ensuring unobstructed and safe movement of traffic through bypasses or temporary access roads (if necessary); • Proper road signs, lighting, well-designed traffic safety signs, barriers, and traffic control signallers				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Minor	Low

Life cycle stage: Operation

Recipient: municipal infrastructure

Recipient sensitivity: high

Impact characteristics

Impact	Impacts on access to infrastructure		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Moderate
Consequences	• Impact on road infrastructure • Impact on traffic				

Measures	• Preparation and implementation of the Traffic Management Plan (TMP) • Preparation and implementation of optimal logistic schemes				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Minor	Low

10.8 Supply chain-related impacts

The social and environmental risks and supply chain impacts of the project relate to the suppliers of goods and services needed to implement the project. One of the goals of IFC PS-2 is to protect workers, including vulnerable categories such as children, migrant workers, workers hired by third parties, and workers in the client's supply chain.

The supply chain extends to materials, components, goods, or products used in ongoing operations.

The goods supply chain may include suppliers of raw materials and suppliers of parts and components for assembly and production.

The term "primary supplier" refers to those suppliers who provide goods and materials necessary for the basic business processes of the project.

The Project supply chain can be complex, consisting of a large number of suppliers of different levels. It is difficult to assess the full chain of suppliers of the project, usually identifying areas of risk and impact.

Vendor control should be integrated into the overall project management system. This will help determine if procedures and mitigation measures are being implemented correctly and provide feedback on new risk and hazard areas.

10.8.1 Construction stage

IFC PS-2's supply chain requirements do not apply to materials and components used during the construction phase of the project.

The main social and environmental impacts and risks associated with the supply chain during the construction phase may be a child and forced labour in the provision of services by contractors and the delivery of products by suppliers, in addition, if there is a high level of risk to the safety of supply chain workers. UMK must put in place procedures and risk mitigation measures to ensure that key suppliers, and contractors take steps to prevent or remedy life-threatening situations.

The ability to completely eliminate these risks will depend on the level of administrative control or the degree of influence over major suppliers and contractors. Where corrective actions are difficult to implement, CMS should, over time, redirect the chain to suppliers and contractors who can demonstrate that they are capable of meeting the requirements of the IFC PS-2.

The table below looks at the casting and rolling complex/UMK's basic environmental requirements for contractors and suppliers.

Table 10.8.1 Environmental requirements for suppliers of UMK (casting and rolling complex)

Requirements groups	Requirements for contractors
Requirements for contractors and suppliers of raw materials, equipment and services	
General requirements	- Availability of a certified environmental management system and/or a certified integrated management system (environmental protection, occupational health and safety) - Availability of environmental management system and/or integrated management system (environmental protection, occupational health and safety) - Availability of environmental, health and safety standards and procedures

Requirements groups	Requirements for contractors
Requirements for building contractors	- Maximum possible use of local raw materials for construction works - emergency preparedness - Availability of a system for handling hazardous materials and substances (if necessary) - liquidation of temporary infrastructure facilities, taking into account the possibility of reuse
Preventing climate change	- Existence of GHG control system - Accounting of fuel and energy consumption, transmitting this data to UMK for climate reporting purposes on a regular basis - the use of renewable energy technologies, equipment, and practices - Use of electric, hybrid, biofuel, and/or gas-powered vehicles
Resource Conservation	Use of measures to reduce water consumption in the activities of contractors/suppliers (reducing water consumption and saving water resources, for example, by using rainwater harvesting and use, as well as the implementation of recycled water supply systems)
Waste management	- Availability of a management system for waste management - the use of technologies and materials that involve the use of recycled materials - use of solid domestic and biological waste recycling complexes - Use of waste-free and low-waste technologies in construction - separate waste collection system - availability of composting solutions - Waste management in domestic service, catering, and cleaning - liquidation of temporary infrastructure facilities, taking into account the possibility of reuse - availability of equipment (technologies) for waste processing that meet environmental requirements.[49] - availability of vehicles for transporting waste that meet environmental requirements.[50] - Availability of waste disposal facilities that meet environmental requirements.[51]
Requirements for equipment, materials and raw materials	
Use of hazardous/toxic substances	- Radiometric control of raw materials for foundries - Avoiding the use of materials/raw materials deemed hazardous or toxic to humans or contaminating the environment (where reasonable alternatives exist) - not to use ozone-depleting substances
Energy efficiency and resource conservation	- Use of certified technologies (equipment) in the field of energy, heat and water conservation

As defined by the IFC PS-2, the plant must conduct a due diligence review of the supply chain to avoid benefiting or financially profiting from these practices.

The project should make a special effort and conduct additional due diligence when such practices are widespread or known to exist at certain levels of the supply chain in specific industries or regions.

The financial gain from child and forced labour is a specific risk when the cost of labour is a factor in the competitiveness of the project.

The project must maximize its influence to eradicate child and forced labour from its supply chain. Measures must also be taken to prevent or eliminate life-threatening situations in the supply chain.

[49] For contractors engaged in waste recycling.
[50] For contractors engaged in waste transportation.
[51] For contractors engaged in waste disposal.

Implementation procedures, such as procurement procedures, will ensure that child and forced labour requirements and workplace safety issues are included in orders and contracts with suppliers.

10.8.2 Operation stage

The same risks and impacts are considered during the operational phase as during the construction phase.

10.8.3 Recommendations;

10.8.3.1 Measures to prevent and mitigate impacts

As a result of the consideration of supply chain-related impacts and the consequences of these impacts, it is recommended that the following measures be implemented.

- Construction stage:
  - Develop and implement environmental and social criteria for selecting suppliers/contractors;
  - Include in the Personnel Policy the principles of equal working conditions excluding discrimination, child and forced labour;
  - Require that contractors, subcontractors, and suppliers of the Project adhere to the Project's personnel policy through contract provisions;
  - Contracts with suppliers and contractors must contain provisions on child and forced labour, workplace safety, and define penalties for violations;
  - Establishment of a publicly available mechanism for handling staff grievances, including contract and subcontract employees and supply chain employees;
  - inform creditors about the results of monitoring during the construction period with respect to the child and forced labour as part of the mandatory reporting on loan agreements;
  - Take measures to prevent or remedy situations in the supply chain that pose a risk to the health and life of personnel.
- Operation stage:

The same measures are considered for the operational phase as for the construction phase.

10.8.3.2 Monitoring and Reporting

- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues;
- Monthly social monitoring reports, including the implementation of measures to prevent forced and child labour.

10.8.4 Evaluation results

It was found that the significance of the impacts of planned activities related to the supply chain is assessed as moderate at the construction stage and low at the operation stage.

Table 10.8.2 Measures to prevent and mitigate supply chain-related impacts

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Stages of construction and operation**					
1.	Construction work (earthworks, general construction work)	Exclusion of child and forced labour from the supply chain	- Develop and implement environmental and social criteria for selecting suppliers/contractors; - Include in the Personnel Policy the principles of equal working conditions excluding discrimination, child and forced labour; - Require that contractors, subcontractors, and suppliers of the Project comply with the Project's personnel policy through contract provisions; - Contracts with suppliers and contractors must contain provisions on child and forced labour, workplace safety, and define penalties for violations; - Establishment of a publicly available mechanism for handling staff grievances, including contract and subcontract employees and supply chain employees; - Informing creditors on the results of monitoring during the construction period with respect to the child and forced labour as part of the mandatory reporting on loan agreements; - Taking measures to prevent or remedy situations in the supply chain that pose a risk to the health and life of personnel. - Development and implementation of environmental requirements for suppliers in accordance with Table 10.8.1 - Taking measures to prevent or remedy situations in the supply chain that pose a risk to the health and life of personnel.	PS-1 IFC PS-2 IFC - Convention 29 on Forced Labour (1930) - 2014 Protocol to the Forced Labour Convention (1930) - Convention No. 105 on Abolition of Forced Labour (1957) - Convention No. 182 concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (1999) - Convention No. 138, "Minimum Age for Admission to Employment" (1973) National requirements: - Labour Code of the Republic of Uzbekistan, 1996 - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016.	- Records of complaints and suggestions from the public and staff with monthly reporting on the resolution of issues - Monthly social monitoring reports, including the implementation of measures to prevent forced and child labour	- GRM for project staff and the public - Compliance with the requirements of national legislation on labour activities - Personnel policy - Contractor Code of Conduct;
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)					

Table 10.8.3 Results matrix for evaluating supply chain-related impacts

Life cycle stages: construction, operation

Recipients: business entities, personnel

Recipient sensitivity: medium

Impact characteristics

<table>
<tr><td rowspan="2">Impact</td><td colspan="2" rowspan="2">Supply chain-related impacts</td><td>Nature</td><td>Genesis</td><td>Mechanism</td></tr>
<tr><td>Adverse</td><td>Indirect</td><td>–</td></tr>
<tr><td rowspan="2">Primary impact</td><td>Extent</td><td>Duration</td><td>Reversibility</td><td>Value</td><td>Significance</td></tr>
<tr><td>Regional</td><td>Short-term and long-term</td><td>Reversible</td><td>Average</td><td>Moderate</td></tr>
<tr><td>Consequences</td><td colspan="5">Indirect effects from violations of the principles of equal working conditions excluding discrimination, child and forced labour, violations of personnel rights in the supply chain, indirect effects on components of the natural environment</td></tr>
<tr><td>Measures</td><td colspan="5">• Develop and implement environmental and social criteria for selecting suppliers/contractors;
• Include the principles of equal working conditions that exclude discrimination, child labour and forced labour in the Personnel Policy
• Require that contractors, subcontractors, and suppliers of the Project comply with the Project's personnel policy through contract provisions
• Contracts with suppliers and contractors should contain provisions on child and forced labour, workplace safety, and define penalties for violations;
• Establishment of a publicly available mechanism for handling staff grievances, including contract and subcontract employees and supply chain employees;
• Informing creditors on the results of monitoring during the construction period with respect to the child and forced labour as part of the mandatory reporting on loan agreements;
• Taking measures to prevent or remedy situations in the supply chain that pose a risk to the health and life of personnel.</td></tr>
<tr><td rowspan="2">Residual impact</td><td>Extent</td><td>Duration</td><td>Reversibility</td><td>Value</td><td>Significance</td></tr>
<tr><td>Regional</td><td>Short-term and long-term</td><td>Reversible</td><td>Low</td><td>Low</td></tr>
</table>

10.9 Cultural Heritage

The impact associated with the completed construction of associated facilities of the casting and rolling complex - 23 km power line and 1.2 km access road - is considered.

Since the casting and rolling complex site is located on the industrial territory of UMK, developed over many decades and, given the peculiarities of engineering and geological conditions of the plant site, the impact on the archaeological and cultural heritage in the CRC area is not considered.

10.9.1 Construction stage

When studying the documentation for the power line and access road projects, the Tashkent Oblast Agency for Cultural Heritage received a response about the significant objects of cultural and archaeological heritage located in their area.

It was found that the pylon of the power line #24 is located in the protected area of the Uchtepa archaeological monument dating back to 12^{th}-14^{th} centuries, registered in the national list of immovable cultural heritage sites in the territory of the Khos makhalla (Bekabad district).

As a result of a joint visit of specialists of the UMK and the Agency of Cultural Heritage of the Tashkent region, a visual inspection of the monument and its protected area was conducted.

According to the results of the survey, it was found that the placement of the power line tower did not have a adverse impact on the monument, currently, a letter is being prepared with the Agency's prescriptions for further action by UMK.

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

10.9.2 Operation stage

Impacts on cultural heritage during the operational phase are not predicted (excluded).

10.9.3 Recommendations;

10.9.3.1 *Measures to prevent and mitigate impacts*

Based on the data presented above, in accordance with PS-8, it is appropriate to include an Chance Find Procedure as part of the Environmental and Social Management Plan.

10.9.3.2 *Monitoring and Reporting*

Provide for reporting on the implementation of the Chance Find Procedure.

10.9.4 Evaluation results

It was found that the impact of the planned activity on the cultural heritage is assessed as negligible.

10.10 Employee rights, occupational safety, and health

Occupational health and safety in the industry remain a serious problem in Uzbekistan. The practice of compliance with occupational safety and health requirements by contractors and subcontractors in Uzbekistan is assessed as insufficiently effective. These issues should not only be considered for staff, UMK, but also for contractors.

10.10.1 Construction stage

The project is expected to create at least 1,300 jobs during the peak construction period, the duration of which is directly related to the timing of the CRC construction. Most of the workers will be hired by the Contractor and will consist of unskilled and skilled labour.

Expected impacts are associated with the operation of heavy machinery and transport, working at heights, construction work, use of electrical equipment, loading and unloading of hazardous materials, and other hazardous activities.

Due to the nature of the activities involved in the construction phase, personnel safety is a key risk with the potential for accidents that can lead to injury and death as well as lost work time.

A Health and Safety Plan (H&S) will be prepared by the Contractor, Renaissance Heavy Industries, LLC.

The Contractor shall ensure strict implementation of the HSE Plan through its Health and Safety Officer.

In addition, the Contractor will conduct a series of training courses and safety meetings.

The Contractor will regularly inspect, test, and maintain all safety equipment (including fire protection equipment), scaffolding, guardrails, working platforms, hoists, ladders, and other means of access, hoisting, lighting, marking, and security equipment

Employees will be provided with appropriate PPE suitable for electrical work, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection, free of charge (before work begins).

With regard to the rights of workers and personnel, the Contractor shall ensure that the following measures are implemented:

- provisions in the Contractors' contract should include, to the extent practicable, clauses to address collective bargaining, downsizing, worker placement and worker shortages, to ensure compliance with ILO and IFC requirements;
- development and implementation by the Contractor of a Personnel Policy for the recruitment, training, evaluation and remuneration of the project workforce;
- the policy must prevent all forms of discrimination in the workplace and ensure that all employees are treated fairly and equally;
- creating a grievance mechanism so that employees can raise valid workplace concerns. The Contractor will inform workers about the hiring grievance mechanism and make it easily accessible to them;
- employees will not be restricted from joining or forming labour organizations or negotiating collective bargaining agreements, and the Contractor will not discriminate against employees who form or join collectives or bargain collectively;
- preparation of an employee reduction plan to reduce the impact of abrupt termination of employment contracts, including, for example, and where appropriate, implementation of a transparent redundancy process and consultation mechanisms with the workforce. The Contractor will explain the temporary nature of jobs during the hiring process and explain to employees the need to prepare for job loss and manage their income wisely while employed.

All employees will have contracts with job descriptions and working conditions, as well as an explanation of their content. The Contractor will hire a team of health and safety specialists to implement and manage the above tasks.

All project subcontractors will be provided with copies of the Contractor's ESMP (Environmental and Social Management Plan). All subcontracts will include provisions to ensure compliance with the ESMP at all levels of subcontracting.

All subcontractors will be required to designate a safety representative who will be present at the Construction Site for the duration of the applicable subcontract. The Contractor will assign the qualified environmental, health and safety personnel to implement the above items.

10.10.2 Operation stage

Health and safety will be managed in accordance with national regulations and during the operational phase of the project.

The process of improving working conditions must be carried out systematically. In seeking to implement sound TB conditions, it is necessary to fund permanent mechanisms for their review, planning, implementation, evaluation, and related activities.

This should be done through the establishment of occupational safety and health management systems. These systems must be adapted to the UMK given its scope and the nature of its activities.

The choice and implementation of specific measures to prevent occupational injuries and illnesses among workers in the iron and steel industry depends on the main hazards and expected injuries and illnesses.

The electric steelmaking shops are the most dangerous places for injuries. In them, about 50% of all accidents occur during basic technological operations, about 20% during repair and adjustment of equipment, and almost the same amount during lifting and transporting work.

The main hazardous production factors are:

- molten metal and slag;
- moving and rotating machines and mechanisms;
- weights moved by hoisting machines;
- electric current;
- flame;
- location of workplaces and equipment at height.

Harmful factors of the production process in their prolonged and intensive impact on the person can lead to the emergence of occupational diseases of the worker. These factors include:

- thermal, ultraviolet, ionizing and other radiations;
- electromagnetic fields;
- bright blinding light radiation;
- dust and gas emitted into the atmosphere of the production facility;
- high noise and vibration level, ultrasound.

The casting and rolling complex personnel will be exposed to all of the above factors. Work at the main workplaces of the furnace area, finishing, and casting area of the CRC is unfavourable, in varying degrees for each factor of the working environment.

Of all the above-mentioned harmful production factors present in the shop, the most significant are noise, thermal radiation/and high temperature.

The probability of exposure to each hazard must be evaluated according to the provisions of the International Labour Organization guidelines "Safety at Work with Chemicals" and "Environmental Factors in the Workplace," or other provisions of equal or greater importance.

Activities to assess the effects of hazardous factors are carried out by competent persons in the process of certification and inspection of workplaces with the provision of information to staff about the results of the assessment.

Ensuring safe working conditions includes timely staff training and periodic monitoring of staff knowledge, first aid training, regular medical examinations of personnel, primarily those employed in hot shops.

The development and implementation of a long-term HSE training programme provided by experts in the relevant HSE field is recommended.

During the operations phase, activities will also include operating heavy equipment and trucks, using electrical equipment, handling hazardous materials, and other potentially hazardous activities.

The expected impact on the health, safety and security of personnel during the operational phase is as follows:

- risks to workers due to hazardous work;
- impact on personnel health due to hazardous and harmful production factors
- violation of workers' rights.

The proposed mitigation measures described should help reduce the risk of incidents.

10.10.3 Recommendations;

10.10.3.1 *Measures to prevent and mitigate impacts*

As a result of the review of health, safety, and HSE-related impacts and the consequences of these impacts, it is recommended that the following measures be implemented.

- Construction stage:
  - A Health and Safety Plan (H&S) will be prepared by the Contractor;
  - The Contractor will conduct a series of safety training courses;
  - Regular inspection, testing and maintenance of all safety equipment (including firefighting equipment), scaffolding, guardrails, working platforms, hoists, ladders and other means of access, lifting, lighting, marking and security equipment;
  - Workers will be provided with appropriate PPE suitable for the job, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection;
  - Maintaining logs of briefings, training records, safety incidents, including near misses;

- Development and implementation by the contractor of a Personnel Policy for hiring, training, evaluating, and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees;
- Mechanism of complain processing so that workers can initiate workplace issues;
- Possibility of joining or establishing working organizations, as well as negotiating collective bargaining agreements.

- Operation stage:
  - An Occupational Health and Safety (OHS) Plan will be prepared;
  - Conducting safety training courses and meetings on an ongoing basis;
  - periodic monitoring of personnel knowledge, first aid training, and regular medical examinations of personnel, primarily those employed in hot shops.
  - providing appropriate PPE suitable for basic types of work, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection;
  - equipping hot shops with manuals to monitor the level of body dehydration and sufficient sources of drinking quality water;
  - developing and implementing a Personnel Policy for hiring, training, evaluating and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees;
  - the mechanism of complaint processing; informing workers on the employment complaint processing mechanism.
  - training in the rules of first aid,
  - regular medical examinations of personnel, primarily those employed in hot shops.

10.10.3.2 *Monitoring and Reporting*

- Record of complaints and staff suggestions with monthly reporting on the resolution of issues;
- Monthly reports on the implementation of the Health and Safety Plan (HSE).
- Enterprise Incident Analysis
- Occupational health and safety (OHS) training, followed by knowledge testing

Proposals for monitoring and reporting are shown in Table 10.10.1

10.10.4 Evaluation results

The significance of residual impacts on the rights, health, safety, and security of personnel has been found to be assessed as follows:

- at the construction stage – negligible;
- at the operation stage – low.

Table 10.10.1 Measures to prevent and mitigate impacts related to workers' rights, health and safety issues

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Ensuring the safety and health of personnel, implementation of OHS measures	- Contractor prepares an Occupational Health and Safety Plan (OHS Plan) - Conducting safety training courses - Regular inspection, testing, and maintenance of all safety equipment (including firefighting equipment), scaffolding, guardrails, working platforms, hoists, ladders, and other means of access, lifting, lighting, marking, and security equipment - Providing personnel with appropriate PPE suitable for their work, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses, and ear defenders; - Maintaining logs of briefings, training records, safety incidents, including near misses - Development and implementation by the contractor of a Personnel Policy for hiring, training, evaluating, and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees - mechanism of complaint processing so that workers can initiate workplace issues - possibility of joining or establishing working organizations, as well as negotiating collective bargaining agreements	- PS-1 IFC - PS-2 IFC - PS-4 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996. - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016.	- Record of staff complaints and suggestions with monthly reporting on the resolution of issues - Monthly reports on the implementation of the Health and Safety Plan (HSE) Enterprise Incident Analysis - Occupational health and safety (OHS) training, followed by knowledge testing	- GRM for project staff - Compliance with the requirements of national legislation on labour activities - Personnel policy - Contractor Code of Conduct; - Occupational Health and Safety (OHS)
II	**Operation stage**					
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)	Ensuring the safety and health of personnel, implementation of OHS measures	- Preparation of the Occupational Health and Safety Plan (OHS Plan) - Conducting safety training courses and meetings on an ongoing basis - Regular monitoring of personnel knowledge, first aid training, and regular medical examinations of personnel, primarily those employed in hot shops. - Providing appropriate PPE suitable for basic types of work, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection; - Equipping hot shops with manuals to monitor the level of body dehydration and sufficient sources of drinking quality water; - Developing and implementing a Personnel Policy for hiring, training, evaluating and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees; - Mechanism of complaint processing; informing workers on the employment complaint processing mechanism. - Training in the rules of first aid, - Regular medical examinations of personnel, primarily those employed in hot shops.	- PS-1 IFC - PS-2 IFC - PS-4 IFC National requirements: - Labour Code of the Republic of Uzbekistan, 1996. - Law No. 510-XII dd. 13.01.1992 of the Republic of Uzbekistan "On Employment of Population - Occupational Safety and Health Act, 2016. Annex 1 to the Decree No. 263 of the CC of RUz dd. 15.09.2014. of the Regulations on the Procedure for Certification of Workplaces for Working Conditions and Equipment Injuries	- Record of staff complaints and suggestions with monthly reporting on the resolution of issues - Monthly reports on the implementation of the Health and Safety Plan (HSE) - Enterprise incident analysis - Occupational health and safety (OHS) training, followed by knowledge testing	GRM for project staff and the public Compliance with national labour laws - Occupational Health and Safety (OHS)

Table 10.10.2 Matrix for assessing impacts related to workers' rights, health and safety issues

Stage of the life cycle: construction

Recipient: personnel

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts related to workers' rights, safety and labour protection issues		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Inapplicable	Low	Low
Consequences	Impacts on personnel health				
Measures	• A Health and Safety Plan (H&S) will be prepared by the Contractor • The Contractor will conduct a series of safety training courses • - regular inspection, testing, and maintenance of all safety equipment (including firefighting equipment), scaffolding, guardrails, working platforms, hoists, ladders, and other means of access, lifting, lighting, marking, and security equipment • - employees will be provided with appropriate PPE suitable for the job, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection • maintaining logs of briefings, training records, safety incidents, including near misses • development and implementation by the contractor of a Personnel Policy for hiring, training, evaluating, and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees • mechanism of complaint processing so that workers can initiate workplace issues • possibility of joining or establishing working organizations, as well as negotiating collective bargaining agreements				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Inapplicable	Minor	Negligible

Life cycle stage: Operation

Recipient: personnel

Recipient sensitivity: medium

Impact characteristics

Impact	Impacts related to workers' rights, safety and labour protection issues		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Inapplicable	Low	Moderate
Consequences	Impacts on personnel health				
Measures	• Preparation of the Occupational Health and Safety Plan (OHS Plan) • conducting safety training courses on an ongoing basis • regular monitoring of personnel knowledge, first aid training, and regular medical examinations of personnel, primarily those employed in hot shops. • providing appropriate PPE suitable for basic types of work, such as safety boots, harnesses, helmets, gloves, protective clothing, safety glasses and ear protection; • developing and implementing a Personnel Policy for hiring, training, evaluating and remunerating the project workforce that prevents any form of discrimination in the workplace and ensures fair and equitable treatment of all employees • mechanism of complaint processing • informing employees of the employment complaint mechanism				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Long-term	Inapplicable	Minor	Low

10.11 Public health, safety and welfare

This section discusses the project's impacts on public health, safety, and welfare and the appropriate measures to prevent/mitigate them.

Aspects of the project that are potentially related to impacts on public health and safety:

- increased vehicular traffic, especially heavy vehicles and machinery;
- increased capacity of railway station intake/outbound tracks and volume of railway traffic;
- chemical and acoustic pollution of atmospheric air;
- actions of the Contractor's personnel and security service.

10.11.1 Construction stage

Probable impacts on public safety:

- conflicts between construction camp safety and security personnel, workers, and local residents (risk of injury);
- increased traffic flows on roads used by the public - increased risk of traffic accidents resulting in accidents and potentially injuries or fatalities.

Potential impacts on public health:

- increased number of disease vectors such as rodents (if food/beverages are not stored properly and solid/liquid waste is not managed properly), with a concomitant increase in the incidence of vector-borne diseases;
- increased incidence of communicable diseases as a result of interactions between workers living in construction camps and the local population. With a potential peak population of 1,300 (mostly men) living in construction camps, there is a risk of the spread of communicable diseases (e.g., tuberculosis and sexually transmitted diseases such as HIV, etc.);
- the risk of waterborne diseases in case of ineffective waste management;
- the increase in pollution levels due to increased traffic and transportation of construction materials.

10.11.2 Operation stage

Bekabad is crossed by the Khavast-Kokand railroad, to which UMK’s railway line is connected. The railroad is the main way for the plant to deliver metal scrap (the main production raw material), as well as to export finished products.

There are 5 unregulated railway crossings along the entire length of the railway tracks in Bekabad, which causes accidents and accidents at the crossings, as well as a significant source of noise.

Accordingly, measures are required to ensure the health and safety of the population: the installation of barriers at unregulated crossings, in the future - the relocation of railroad tracks according to the decisions of the General Plan of Bekabad.

The following are also recommended:

- laying rails on vibration-damping mats;
- reducing the speed of railway traffic;

- monitoring the noise and vibration levels.

The risk of multi-media exposure due to aerogenic deposition, contamination of drinking water, and food is predicted to a lesser extent.

The health of the population is interconnected with the state of the environment. Ecologically conditioned classes of diseases can particularly clearly indicate the impact of the environment on the health of the population. The most sensitive to the impact of environmental factors are the hematopoietic, cardiovascular, central nervous, urogenital and respiratory systems.

According to baseline studies (see Report 128-0948-ESIA-PE-2), disease classes (respiratory diseases, blood and hematopoietic diseases) are more pronounced in the area of planned activity, which, among other factors, are connected with environmental conditions, in particular, with the level of air pollution and lifestyle of the population.

Consequently, the activities aimed at health monitoring of the population of Bekabad town are of priority importance for the project. The main objectives of health monitoring, are the observation of the health of the population, the factors affecting health (air quality), assessment of the predicted state of health and planning of measures aimed at improving the health of the population.

An assessment of the public health risk associated with air pollution is discussed in Report 128-0948-HRA.

10.11.3 Recommendations;

10.11.3.1 Measures to prevent and mitigate impacts

As a result of the review of health, safety, and HSE-related impacts and the consequences of these impacts, it is recommended that the following measures be implemented.

- Construction stage:
  - conducting work in accordance with safety standards and regulations and national regulations;
  - The Contractor, as part of the environmental and social management plan, will prepare and implement a community health and safety management plan;
  - set forth in the Code of Conduct the rules, ethical obligations, and clear and accessible disciplinary procedures related to security operations;
  - mandatory requirement for security personnel to undergo regular training (specifying the type and frequency of training, as well as the percentage of employees who have received training);
  - policies governing the "use of force" and clear provisions concerning proportionality of risk. When providing security, the use of force by security personnel is permitted only for proactive and defensive purposes and must be proportional to the nature and scale of the risks;
  - GRM implementation;
  - consultation and review of mitigation measures for public health and safety;
  - construction traffic warning signs will be placed at road crossings and other locations identified by the traffic control plan, such as along driveways before they are used by construction traffic;

- in areas where schools are in close proximity to the road, safety awareness activities will be conducted (schools of Mukimiy, Metallurg, Sayhun, Uzbekistan makhallas);
- the traffic of vehicles will be restricted to certain access roads and designated work areas (except in case of emergency);
- developing and implementing training and information programmes for employees regarding the risks and prevention measures associated with sexually transmitted diseases, including HIV and other infectious diseases (e.g., tuberculosis). Information on diseases and prevention measures will be provided to communities near the construction camp.

- Operation stage:
  - installation of barriers at unregulated crossings, in the future - the transfer of railroad tracks ("Southern Bypass");
  - monitoring the health of the population of Bekabad town, the joint work of UMK and the service of sanitary-epidemiological welfare and public health of Bekabad town. Bekabad (funding of works by UMK);
  - measures stipulated by the decisions on protection of atmospheric air from chemical and acoustic impacts (see Sections 9.1, 9.3).

10.11.3.2 Monitoring and Reporting

Activities may include:

- monitoring of factors of harmful effects on humans, and their assessment;
- predicting the state of health of the population;
- identification of urgent and long-term measures to prevent and eliminate the effects of harmful factors on public health;
- elaboration of proposals for decision-making in the field of ensuring sanitary and epidemiological well-being of the population;
- informing government bodies, local authorities, organizations and the public about the results of the monitoring.

Proposals for reporting:

- recording complaints and suggestions from the population with monthly reporting on the resolution of issues;
- monthly reports on the implementation of the Health and Safety Plan.
- monitoring reports on the health of the population of Bekabad.

10.11.4 Evaluation results

It is established that the significance of the impact of planned activities on the health, safety and welfare of the population is assessed as negligible at the construction stage and as lowat the operation stage.

Table 10.11.1 Measures to prevent and mitigate impacts related to public health, safety and welfare

Item	Activity/process	Task	Measures	Applicable requirements	Monitoring	Method of implementation/reporting
I.	**Construction stage**					
1.	Construction work (earthworks, general construction work)	Ensuring the safety, health and welfare of the population	- The Contractor, as part of the environmental and social management plan, will prepare and implement a community health and safety management plan; - GRM implementation; - consultation and review of mitigation measures for public health and safety; - construction traffic warning signs will be placed at road crossings and other locations identified by the traffic control plan, such as along driveways before they are used by construction traffic; - safety awareness activities will be conducted in areas where schools and markets are located in close proximity to the road; - the traffic of vehicles will be restricted to certain access roads and designated work areas (except in case of emergency); - developing and implementing training and information programmes for employees regarding the risks and prevention measures associated with sexually transmitted diseases, including HIV and other infectious diseases (e.g., tuberculosis). Information on diseases and prevention measures will be provided to communities near the construction camp. - set forth in the Code of Conduct the rules, ethical obligations, and clear and accessible disciplinary procedures related to security operations; - mandatory requirement for security personnel to undergo regular training (specifying the type and frequency of training, as well as the percentage of employees who have received training); - policies governing the "use of force" and clear provisions concerning proportionality of risk. When providing security, the use of force by security personnel is permitted only for proactive and defensive purposes and must be proportional to the nature and scale of the risks;	- PS-1 IFC - PS-4 IFC - National requirements: - Law "On protection of citizens' health" from 29.08.1996.	- Recording complaints and suggestions from the population with monthly reporting on the resolution of issues; - Monthly reports on the implementation of the Health and Safety Plan.	- GRM for the population; - Compliance with the requirements of national legislation on the protection of public health; - Contractor Code of Conduct; - Occupational Health And Safety Management Plan
II	**Operation stage**					
2.	Main production activities (steel smelting, manufacturing of rolled metal products, and other metallurgical products) Support of main production activities - repair work, water supply, drainage, wastewater disposal, cleaning of the territory and production facilities Transportation and logistics (delivery of raw materials and supplies, fuel and lubricants, product shipment, other transportation, storage of hazardous materials)	Ensuring the safety, health and welfare of the population	- Installation of barriers at unregulated crossings, in the future - the transfer of railroad tracks ("Southern Bypass"); - Monitoring the health of the population of Bekabad town - measures stipulated by the decisions on protection of atmospheric air from chemical and acoustic impacts (see Sections 9.1, 9.3)	- PS-1 IFC - PS-4 IFC National requirements: - Law "On protection of citizens' health" from 29.08.1996.	Monitoring of factors of harmful effects on humans, and their assessment - predicting the state of health of the population; - identification of urgent and long-term measures to prevent and eliminate the effects of harmful factors on public health; - elaboration of proposals for decision-making in the field of ensuring sanitary and epidemiological well-being of the population; - informing government bodies, local authorities, organizations and the public about the results of the monitoring;	- GRM for the population; - Monitoring reports; - Occupational Health And Safety Management Plan

Table 10.11.2 Matrix of assessment results for the impact on the health, safety and welfare of the population

Stage of the life cycle: construction

Recipient: Population

Recipient sensitivity: medium

Impact characteristics

Impact	Impact on the health, safety and welfare of the population		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Irreversible	Low	Moderate
Consequences	Deterioration of public health, injuries, fatalities				
Measures	• The Contractor, as part of the environmental and social management plan, will prepare and implement a community health and safety management plan; • GRM implementation; • consultation and review of mitigation measures for public health and safety; • construction traffic warning signs will be placed at road crossings and other locations identified by the traffic control plan, such as along driveways before they are used by construction traffic; • safety awareness activities will be conducted in areas where schools and markets are located in close proximity to the road; • the traffic of vehicles will be restricted to certain access roads and designated work areas (except in case of emergency); • developing and implementing training and information programmes for employees regarding the risks and prevention measures associated with sexually transmitted diseases, including HIV and other infectious diseases (e.g., tuberculosis). Information on diseases and prevention measures will be provided to communities near the construction camp. • -set forth in the Code of Conduct the rules, ethical obligations, and clear and accessible disciplinary procedures related to security operations; • -mandatory requirement for security personnel to undergo regular training (specifying the type and frequency of training, as well as the percentage of employees who have received training); • -policies governing the "use of force" and clear provisions concerning proportionality of risk. When providing security, the use of force by security personnel is permitted only for proactive and defensive purposes and must be proportional to the nature and scale of the risks;				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Irreversible	Minor	Negligible

Life cycle stage: Operation

Recipient: Population

Recipient sensitivity: medium

Impact characteristics

Impact	Inhalation and acoustic exposure to different populations.		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	–
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Irreversible	Low	Moderate
Consequences	Deterioration of public health, injuries, fatalities				
Measures	• Installation of barriers at unregulated crossings, in the future - the transfer of railroad tracks ("Southern Bypass"); • Monitoring the health of the population of Bekabad town • measures stipulated by the decisions on protection of atmospheric air from chemical and acoustic impacts (see Sections 9.1, 9.3)				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Irreversible	Minor	Low

10.12 Cumulative impacts

10.12.1 Scoping, Stage 1

10.12.1.1 VEC identification[52]

VECs are recipients and factors (elements) of the social environment that are appropriate to consider as part of the CIA.

According to the Good Practice Guidance on Assessing and Managing Cumulative Impacts: Guidance for the Private Sector in Emerging Markets (IFC, 2013), CIAs include impacts that are deemed important based on scientific concepts and/or concerns of affected communities.

The CIA does not consider potential impacts that may occur without and/or independent of the project.

The VEC identification is based on:

- the results of stakeholder consultation (see Section 5 128-0948-ESIA-PE-1);
- the results of the social impact assessment (see Section 10).

As indicated above, in case the impact is assessed as "negligible" or "low", the recipient is not classified as a VEC.

The main recipients include components of the social environment, such as personnel, population, infrastructure, and socio-economic factors (living conditions of the population, including employment, demographic shifts, social infrastructure, ethnic characteristics, etc.).

As a result of the above approach, the following VEC-components of the social environment are considered in the CIA:

- labour market;
- transport infrastructure;
- social infrastructure.

10.12.1.2 Rationale for the spatial framework

Section 8 describes the zone of influence on the social environment. Localization analysis of the elements that form the zone of influence shows that its boundaries are defined:

- the industrial site of the UMK, including the land plots intended for the construction of casting and rolling complex facilities (contractor's camp);
- Municipal territories - makhallas adjacent to the combine, within the boundaries of the SPZ of UMK;[53]

[52] This section discusses the VECs related to the social environment.

[53] The state border with the Republic of Tajikistan and Bekabad city does not limit the indirect impact zone of the CRC project and also includes two enclaves of Uzbekistan in the territory of the Republic of Tajikistan (Bunyodkor and Jami mahallas, see 128-0948-ESAI-PE-2, Section 7.12).

- zone of indirect influence of the project (includes Bekabad town as a whole, Bekabad and Bayaut districts of Tashkent and Syrdarya regions).

10.12.1.3 Rationale for the timeline

The timeframe of the assessment is taken according to the approach discussed above in Section 9.12.1.

10.12.2 Scoping, Stage 2

The social environment CIA is conducted for the construction and operation phases of the CRC.

It is indicated above that the CRC implementation, in particular the creation of jobs is a significant positive impact on the labour market at the level of Bekabad town and Bekabad district.

It is assumed that during the construction phase, some construction workers will be hired from the residents of Bekabad district and the town of Bekabad, which will provide short-term positive changes in the labour market.

During the operation phase, the appearance of jobs in the timber industry will also create new jobs in the service sector (e.g., catering or retail businesses). Given that one job in the industry creates, on average, three jobs in the service sector, the projected additional employment of about 7,500 people.

Also, the significance of the adverse impacts of planned activities at the operation stage in connection with the inflow of labour on the social infrastructure is assessed as moderate.

The inflow of labour due to the project will lead to increased pressure on social infrastructure, such as hospitals and other medical facilities, schools, recreational facilities, housing, public transportation, and others. The analysis conducted at the stage of basic socio-economic research showed insufficient provision of the population of Bekabad with hospitals and schools.

Such aspects of the project as transportation of bulky equipment and cargo, both during the construction and operation phases, will have an impact on the transport infrastructure, in particular on the road surface (wear/degradation) and traffic intensity (traffic jams, delays). It was found that the significance of the impact of planned activities on access to transport infrastructure is assessed as moderate, both at the construction stage and at the operation stage.

During the peak periods of construction and commissioning of the facility in 2023-2024, traffic is projected to increase by approximately 30% of the current traffic.

As soon as the CRC is commissioned, the region's roads will be used by the vehicles needed to transport the finished products. Significant impact on access to transport infrastructure at the operation stage is not predicted, since the logistics schemes of the CRC also extensively involve rail transport.

To improve the accessibility of the UMK territory, taking into account the future cargo flows of the CRC and existing production, the combine built an access

road from the Tashkent-Bekabad R-20 highway, to reduce the cargo flows that previously passed through the makhalla of Bekabad town.

10.12.3 Determination of the VEC background state

Labour and employment, access to public and social services, and transportation infrastructure are discussed in Section 7 of report 128-0948-ESIA-PE-2 and in Sections 10.1, 10.5, and 10.7 of this report.

10.12.4 Results of cumulative impact assessment

Characteristics of cumulative impacts on components of the social environment are shown in Table 10.12.1 (Table 10.12.1).

It is established that the cumulative impact of the planned activity on the labour market at both stages is assessed as moderate. The remaining impacts are also estimated as moderate, which is associated with changes in the way of life and quality of life of communities on a long-term basis, reducing unemployment.

Environmental and social policy of the CRC[54], creates the basis for the implementation of the company's subsequent plans for the priority employment of able-bodied population of Bekabad town and Bekabad district. All development projects at the plant are expected to be implemented with mitigation measures in mind.

The cumulative impact on transport infrastructure is associated with an increase in traffic and freight volume. The residual impacts on transportation infrastructure are estimated as moderate. Mitigation of impacts on traffic and road infrastructure is provided by preparing and implementing a Traffic Management Plan (TMP), ensuring smooth and safe movement of traffic along alternative routes.

The impact on social infrastructure is assessed as moderate, the residual impact as low.

To prevent the adverse effects of cumulative impacts on the social infrastructure of the town, as part of the implementation of the socio-environmental policy of the CRC is recommended to provide:

- Participation of UMK in the shared development of infrastructure of Bekabad town and Bekabad district
- Development and implementation of social assistance programmes for vulnerable groups of population.

[54] This refers to the draft Environmental and Social Policy of the CRC prepared by the Consultant in 2021.

Table 10.12.1 Matrix of results of the assessment of cumulative impacts on the social environment

Stage of the life cycle: construction

Recipient: able-bodied population

Recipient sensitivity: medium

Impact characteristics

Impact	Impact on the labour market		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Average	Moderate
Consequences	Absent				
Measures	• Develop and implement the casting and rolling complex personnel policy, which will be further extended to UMK and ensure compliance with the requirements of IFC and ILO BOD-2 • Implementation and implementation of the social and environmental policy of the casting and rolling complex				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Average	Moderate

Stage of the life cycle: construction

Recipient: transport infrastructure

Recipient sensitivity: high

Impact characteristics

Impact	Impacts on access to infrastructure		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Short-term	Reversible	Average	Moderate
Consequences	• Impacts on road infrastructure and traffic				
Measures	• Preparation and implementation of the Traffic Management Plan (TMP) • Ensuring unobstructed and safe movement of traffic through bypasses or temporary access roads (if necessary); • Proper road signs, lighting, well-designed traffic safety signs, barriers, and traffic control signalers.				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**

	Local	Short-term	Reversible	Low	Moderate

Life cycle stage: Operation

Recipient: able-bodied population

Recipient sensitivity: medium

Impact characteristics

Impact	Impact on the labour market		**Nature**	**Genesis**	**Mechanism**
			Positive	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	Moderate
Consequences	Absent				
Measures	• Develop and implement the casting and rolling complex personnel policy, which will be further extended to UMK and ensure compliance with the requirements of IFC and ILO BOD-2 • Implementation and implementation of the social and environmental policy of the casting and rolling complex				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	Moderate

Life cycle stage: Operation

Recipient: Population

Recipient sensitivity: medium

Impact characteristics

Impact	Access to social infrastructure		**Nature**	**Genesis**	**Mechanism**
			Adverse	Indirect	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	Moderate
Consequences	Increased pressure on social infrastructure facilities				
Measures	• Participation of UMK in the shared development of infrastructure of Bekabad town and Bekabad district • Development and implementation of social assistance programmes for vulnerable groups				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Minor

Life cycle stage: Operation

Recipient: transport infrastructure

Recipient sensitivity: high

Impact characteristics

Impact	Impacts on access to infrastructure		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Average	High
Consequences	• Impacts on road infrastructure and traffic				
Measures	• Preparation and implementation of the Traffic Management Plan (TMP) • Preparation and implementation of optimal logistic schemes				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Moderate

11 TRANSBOUNDARY IMPACTS

The implementation of CRC project solutions according to the preliminary assessment will be accompanied by a transboundary impact on the environment and the social environment.

According to GN 36 of PS-1, a transboundary impact is any impact, not only of a global nature, within the area under the jurisdiction of a party, caused by a planned activity whose physical source is located wholly or partially within the area under the jurisdiction of another party.

The CRC facilities are located on the site of UMK, the boundaries of the plant 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.

In the urban area adjacent to the state border of Tajikistan and Uzbekistan, there are considerable sources of air pollution - UMK, Bekabadcement, enterprises of the construction industry, TPP, boilers, and motor transport.

The source of impact from Tajikistan is a cement plant located 0.7 km southeast of the town.

During the initial project consultations, the population of the mahallas in the project area voiced many complaints about the impact of the cement plant in the territory of 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).

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

One of the documents regulating actions on environmental impact assessment in a transboundary context is the Espoo Convention, adopted in 1991.

According to the convention, the environmental impact assessment procedure (including public discussions) of potentially hazardous projects must be conducted not only within the state, but also in neighbouring countries that may be affected by the impact of these facilities.

As of 2021, of the five Central Asian countries, only Kyrgyzstan and Kazakhstan are Parties to the Convention.

At the same time, at the end of 2018, other countries, in particular Tajikistan and Uzbekistan, with the technical support of the Secretariat of the UN Economic Commission for Europe, launched a legislative reform dedicated to the harmonization of national environmental assessment systems in relation to the provisions of the Convention.

"Revised Guidelines on Environmental Impact Assessment in a Transboundary Context for Central Asian Countries," prepared in 2017 and 2018 as

requested by Central Asian governments, are intended to help their governments consistently apply transboundary environmental impact assessment procedures in a practical manner.

The document sets out the legislative requirements for each of the procedural steps under the Convention, supplemented by recommendations on good practices for their implementation; it also provides suggestions for addressing existing difficulties in the application of the transboundary environmental assessment procedure in the context of the sub-region.

These guidelines will serve as the basis for the ESIA studies in the context of the transboundary impacts of this project.

The main tasks to be implemented by the Consultant in the context of the transboundary impact assessment, taking into account the time frame of the contract and the allocated budget:

1. The drafting of notifications is a formal and mandatory activity for initiating a transboundary environmental impact assessment procedure. The country of origin must notify the affected country or countries as soon as possible and no later than it informs its own public (ECE/MP.EIA/8, para. 41).

2. Air quality monitoring in the territory of Uzbekistan along the perimeter of the UMK SPZ, as well as in the territory of Tajikistan in the enclaves of Jami and Bunyodkor.

3. Development of documentation on environmental and social impact assessment, taking into account certain provisions with the "Guidelines on Environmental Impact Assessment in a Transboundary Context for Central Asian Countries".

4. Public participation - the countries participating in the transboundary environmental impact assessment jointly through their competent authorities ensure the possibility of effective participation of relevant authorities and the public in this process, these processes are implemented with the participation of the Consultant in the Republic of Uzbekistan.

5. Submission of ESIA documentation to the affected parties, including submission of ESIA materials through authorised bodies of the Republic of Uzbekistan to the Tajik party.

6. Conducting public consultations in the territory of the Republic of Uzbekistan.

12 ECOSYSTEM SERVICES

12.1 Introduction

IFC Performance Standard 6 defines ecosystem services as *"the benefits to people and businesses derived from the use of ecosystems,"* which is consistent with the definition in the Millennium Ecosystem Assessment 2001[55] (EA) Work Program.

In 2012, The IFC has adopted revised performance standards for environmental and social sustainability, which include references to ecosystem services mentioned in other performance standards in addition to the requirements outlined in PS-6 (

[55] https://www.millenniumassessment.org/ru/Index-2.html

Table 12.1.1). More recently, the European Commission has put forward a proposal to amend the European EIA Directive, in particular to include a study of ecosystem services.

Since there is no single classification of ecosystem services, the framework outlined in the EA is widely accepted and, as stated in the recommendation note for IFC PS-6 (paragraph 2), is a good starting point for research.

According to the EA, ecosystem services are divided into four types:

- **supporting services** - the products that people receive from ecosystems. These include, among others, (i) crops, livestock and game animals, seafood, wild plant and animal foods, and plants studied by ethnobotany; (ii) drinking water, water used for irrigation and industry; (iii) plant communities that are the source for biopharmaceuticals, construction material and biomass used as renewable energy sources. The products can come from sustainably managed ecosystems, such as agriculture, aquaculture, plantation forestry, natural or semi-natural ecosystems, such as fishing, wild plant collection, and wildlife hunting; genetic resources (genes and genetic information used to breed plants and animals, biotechnology)
- **regulating services** - the benefits derived from regulating ecosystem processes. Among other things, these include regulating climate processes (ecosystems affect climate both locally and globally) and the carbon cycle locally; reducing the adverse effects of natural disasters; purifying water and air; controlling the spread of pests and pathogens; pollination, and others;
- **cultural services** - the cultural, educational, and spiritual benefits people receive from ecosystems. These include, among other things, cultural, spiritual and religious development through cultural-historical, spiritual and religious sites; recreational opportunities such as sports, hunting, fishing, ecotourism; scientific research, education;
- **supporting services** - natural processes necessary to maintain other ecosystem services, such as soil formation, water and nutrient cycling, and primary production.

Supporting services are different from providing, regulating, and cultural services; unlike all of these types of services, which provide a direct benefit. Supporting services affect human conditions indirectly, and usually over a long period of time; soil formation, for example, can take place over tens or even hundreds of years. All other ecosystem services - providing, regulating, and cultural - depend on supporting ones.

Supporting services are associated with specific biophysical structures or ecosystem processes, so, for example, soil, trees, and other plants are involved in maintaining water balance. They also underlie the provision of services of direct value to people, such as reducing surface water runoff, air filtration, water quality, timber supply, wild plant and animal foods. These ecosystem services benefit the people who need them.

IFC PS-6 acknowledges that sustainable development cannot be achieved if biodiversity or ecosystem services are lost or degraded due to development activities and, therefore, requires that "if the risk and impact identification process identifies the potential for adverse impacts of the Project on ecosystem services, the client must identify ecosystem services of primary importance." Since ecosystem services, by their nature, are cross-sectoral, they apply to several IFC performance standards, see

Table 12.1.1.

The benefits of ecosystems are manifested on many levels, and users can also be very different. At the local level, ecosystem services are often the basis for living and subsistence in rural areas, especially for the poor. For example, the collection of plants for folk medicine can replace more expensive pharmaceuticals produced industrially.

Benefits can also occur at the regional level, such as protecting residential areas and businesses from flooding and soil erosion due to tree plantations, or at the national level, such as places that are part of a country's cultural heritage.

Globally, ecosystems regulate the climate and maintain the biodiversity that underlies the creation of biological production. Businesses and projects can also benefit from ecosystem services through direct use of resources (e.g., water) or protection from natural disasters (e.g., floods).

Identifying and defending such services can have additional benefits, namely helping to avoid penalties and adverse media coverage, enhancing the company's reputation, and in some cases allowing the use of effective alternatives to more expensive technical solutions.

IFC PS-6 acknowledges that sustainable development cannot be achieved if biodiversity or ecosystem services are lost or degraded due to proposed activities. The client should identify ecosystem services of primary importance and conduct an appropriate assessment.

Ecosystem services are addressed by several IFC performance standards (

Table 12.1.1).

Table 12.1.1 Ecosystem services in the IFC Performance Standards 2012.

Activity standards	Requirements
PS-1: Assessment and Management of Environmental and Social Risks and Impacts	Where the Project involves specifically involved physical elements, aspects, and facilities that may have adverse impacts, environmental and social risks and impacts are identified in the context of the Project's sphere of influence. This sphere of influence includes, respectively, ...the Project's indirect impacts on biodiversity or ecosystem services that are essential to the existence of the impacted community
PS-4: Community Health and Safety	The Project's direct impact on ecosystem services of high importance may have adverse consequences for the health and safety of affected communities. Within this Performance Standard, only ecosystem support and regulating services, as defined in paragraph 2 of Performance Standard 6, are considered...where possible and appropriate, the client should identify risks and potential impacts on ecosystem services of high value that may be impaired by climate change. Adverse impacts must be avoided, and if this is not possible, the client must take steps to mitigate such impacts in accordance with paragraphs 24 and 25 of Performance Standard 6. With respect to the use and loss of access to ecosystem services that provide ecosystem services, the client must take mitigation measures in accordance with paragraphs 25-29 of Performance Standard 5
PS-5: Land Acquisition and Involuntary Resettlement	This activity standard applies to the physical displacement and/or economic displacement of populations resulting from the following land use activities:...limiting access to land or use of other resources, including public property and natural resources such as marine and other water resources, timber and non-timber forest resources, fresh water, medicinal plants, hunting grounds, watersheds, grazing and croplands (natural resource assets referred to in the Activity Standard 6)

Activity standards	Requirements
PS-6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	If the risk and impact identification process indicates the potential for adverse impacts from the Project on ecosystem services, the client should conduct a systematic review to identify ecosystem services of primary importance...and relevance to affected communities, and in areas where the client has direct management control or significant influence over such ecosystem services. If such impacts are inevitable, the client must minimize them and take mitigation measures to maintain the value and function of the services of primary importance. With respect to impacts on critical ecosystem services on which the Project depends, the client should minimize impacts on them and implement resource efficiency measures in its operations, as outlined in Performance Standard 3. Additional provisions related to ecosystem services are included in Performance Standards 4, 5, 7, and 8
PS-8: Cultural Heritage	In the event that a client discovers tangible cultural heritage items of no particular value, mitigation measures must be applied to avoid exposure to them. In the event that impacts on cultural heritage sites cannot be avoided, the client should apply mitigation measures as follows: minimize adverse impacts and implement on-site restoration measures that ensure that the value and functionality of cultural heritage sites are maintained, including measures to maintain and restore ecosystem processes that require it (as required by Performance Standard 6 relating to ecosystem services and the conservation of biodiversity)

This chapter provides an assessment of the potential impacts of project activities on ecosystem services during the construction and operation phases. In addition, measures are indicated to prevent adverse impacts on ecosystem services of high importance, and in cases where it is impossible to prevent the impact - to minimize it, and if there are residual impacts - to compensate/neutralize such impacts and the risks associated with it.

The purpose of this material:

- Assessment of the impact of proposed activities on ecosystem services in order to manage risks and take advantage of project implementation;
- For unavoidable impacts, taking appropriate mitigation measures that will maintain the value and functionality of priority ecosystem services.

This section summarises research findings to consider them at the ecosystem level and to assess how impacts on one aspect of the environment may affect other aspects.

12.2 Assessment Methods

The ecosystem services assessment methodology used in this chapter is based on the Ecosystem Services Identification, Valuation and Integration (ESIVI) approach. The ESIVI approach is designed to provide an accurate and transparent framework for evaluating ecosystem services, as required by the IFC Activity Standards.

The ESIVI method was developed on a conceptual framework that directly links ecosystem services and human well-being, and on a conceptual framework created by the World Resources Institute (WRI) for analysing ecosystem services for impact assessment purposes.

In the WRI concept, the project is the centre of the relationship between human well-being, ecosystem services, ecosystems, and ecosystem change factors. The concept recognizes that the project can affect all components of the concept and is itself influenced by them. It describes two ways in which the Project connects with ecosystem services in terms of:

- potential impacts on existing relationships between human well-being, ecosystem services, and ecosystems;
- the Project's influence on these relationships to achieve positive results.

The ESIVI method is based on the results obtained in the course of strategy development and implementation of projects aimed at assessing ecosystem services over the past decade, as well as on a number of guidelines summarising good global practices in this area of activity, including:

- Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-Being: A Biodiversity Synthesis.
- IFC Performance Standards 1, 4, 5, 6, 7 and 8 and related guidelines.
- Landsberg et al. (2013), "Integrating ecosystem services into impact assessment: a step-by-step method.

The ecosystem services assessment procedure involves four steps:

- **scoping** - defining the services provided by ecosystems that the Project may affect or depend on;
- **determination of baseline condition** - assessment of ecosystem services for ecosystems that will be affected by the Project (determining the level of ecosystem services in case the Project would not have been implemented), identification of users of ecosystem services and the benefits they can receive from the services provided;
- **impact assessment** - determining the potential impacts of the Project on ecosystem services and their users, the significance of these impacts, and identifying the most significant ecosystem services;
- **assessment of mitigation and residual impacts** - defining a list of measures that can be taken to predict and prevent adverse impacts on the most significant ecosystem services and, in cases where it is impossible to

prevent the impact, measures to minimize it, as well as determining the residual impacts after the application of mitigating measures.

The evaluation procedure and the key sources of information for each step are shown schematically in Figure 12.2.1.

Stage	Steps	Information source
Scoping	- Defining the ecosystem of services that may be affected by the project and (or) the project may depend on them - Defining the potentially affected beneficiaries - Defining the scope of those services that would be, most likely, considerably affected	- Sections of ESIA - Review of literature - Cartography and image obtaining - Site visit
Basic researches	- Elaboration of measures to define the scope of services - Identification of key trends and potentially adverse impacts - Identification of beneficiaries from using the services and assessment of sensitivity to changes	- Sections of ESIA - Consulting with stakeholders - Review of literature - Site visit
Impact assessment	- Assessment of nature and significance of impact on the ecosystem services and consequences for the beneficiaries - Identification of priority services	- Sections of ESIA - Consulting with stakeholders - Interaction with technical specialists responsible for the ESIA development
Reduction of adverse impact	- Defining the measures Natureed on the prevention of adverse consequences or, at least, maintaining the significance and functionality of prioritized services in cases when it is not feasible to prevent the impact	- Sections of ESIA/Review of literature - Consulting with stakeholders - Interaction with technical specialists responsible for the ESIA development

Figure 12.2.1 The evaluation procedure and the key sources of information for each step

12.3 Scoping

The purpose of the scoping stage is to identify the ecosystem services that the proposed activity may affect or be affected by the Project.

Due to the diversity and connectivity of ecosystems, and the uncertainty of how each process in an ecosystem will respond to change, it is a challenge to identify and assess the likely impacts of a project on specific ecosystem services. Furthermore, the wide range of people potentially benefiting from ecosystem services, and the diversity of those benefits, make assessing the project's impact on ecosystem services and the Project's dependence on ecosystem services very challenging.

In this regard, assessing the impact on each ecosystem service, its dependencies, and the economic effect of such interactions are beyond the scope of an FSC project's ESIA. Effective ESIA emphasizes the assessment of services that have the greatest significance; their more detailed assessment is carried out, if necessary, in additional reports.

For instance, it would not be feasible to perform a full socio-economic assessment of each ecosystem service as part of an ESIA, while the assessment of individual services is an important component of livelihood restoration plans that depend on ecosystem services such as fisheries and farming.

Ecosystem Services Identification, Valuation and Integration (ESIVI) method, includes an ecosystem services checklist using guidelines, baseline data lists.

The ESIVI assessment compiled a list of ecosystem services that can be used to systematically define services (Table 12.3.1).

Table 12.3.1 List of ecosystem services in the proposed activity area

Ecosystem Services	Types of services
Supporting services	Provision of water resources (Dalverzin channel, drainage wells) Extraction of aquatic bio-resources (fishery in the Syrdarya River) Diversity of biological species (forestry, tugai)
Regulatory services	Regulation of local climatic processes (emissions of pollutants and carbon dioxide from CRC and UMK) Regulation of atmospheric air quality (emissions of pollutants from CRC and UMK) Water quality regulation (water quality control before discharge into the Syrdarya River)
Cultural services	Cultural values (architectural and cultural heritage) Scientific and educational values (new CRC technologies, training)

Following the list, the potential range of ecosystem services provided by the ecosystems affected by the Project, and the potential users (direct and indirect) of each service, can be identified.

As indicated in PS-1, the initial stage of identification Naturees on the broadest possible scope of service users, including:

- Local users - for example, people who benefit from agricultural activities on the homestead plot near where they live;
- Regional users - e.g. people living near the Syrdarya River who benefit from the use of aquatic bio-resources (fishery in the Syrdarya River)
- National users - e.g. tourists from Uzbekistan visiting the area for cultural/recreational purposes (Syrdarya River, cultural heritage of the region);
- global users - e.g., individuals around the world benefiting from greenhouse gas emission reductions.

Users of ecosystem services are residents, landowners, and businesses that directly or indirectly benefit from or depend on services provided by Project-impacted ecosystems.

Table 12.3.2 Users of ecosystem services

Location of users	Definition
Local users	Bekabad town and Bekabad district
Regional users	The wider Tashkent region (e.g., fisheries)
National users	Republic of Uzbekistan
Global users	Other countries

At this point it is important to determine the type of user, as different types of users are evaluated differently with respect to mitigation requirements.

This assessment includes all clear-cut types of users, since the operation of the CRC will have some impact on air quality and climate by the emission of pollutants and greenhouse gases.

Wastewater discharges of UMK into the Syrdarya River, covers all types of users. Identifying users at this stage identifies specific groups or individuals who currently benefit from each particular ecosystem service.

Once the highest possible range of ecosystem services and their users has been identified, each service is systematically analysed and evaluated according to the criteria specified in the criteria to Table 12.3.2 determine which ecosystem services will be subjected to a more detailed impact assessment and which will not.

The initial step in determining the scope of work establishes the ecosystem services that may be impacted by the project, determines their relevance and how likely those impacts are to occur.

Subsequently, a list of ecosystem services that were studied as part of the baseline information collection was prepared and assessment sections were developed.

Since this task involves determining the scope of work, the potential impact estimates included in Table 12.3.4, should not be regarded as a final determination of the level of impact; rather, they serve as an indicator that there is a possibility of impact on the service, as well as an indicator of the possible level of service.

The potential relevance of ecosystem services to the CRC project is given in Table 12.3.3.

The task of determining the scope of work is performed by analysing the information and data collected for other sections of the ESIA, including site visits and consultations with stakeholders. A review of published literature was also conducted to bolster existing data and to obtain more detailed baseline data if necessary.

The scope of work resulted in the identification of 9 ecosystem services, which were subjected to a more detailed assessment. They include:

- provision of water resources ;
- extraction of aquatic biological resources (fish);
- regulation of atmospheric air quality;

- regulation of water quality;
- diversity of biological species:
- regulation of local climatic processes;
- regulation of global climatic processes;
- regulation of noise impact;
- cultural values (archaeological and cultural heritage)
- scientific and educational values.

Table 12.3.3 Relevance of ecosystem services

Relevance of ecosystem services	Characteristic	Assessment
Negligible	The service does not exist or is unlikely to be affected No additional assessment required	0
Minor	Project may have an insignificant impact on the service / may be insignificantly affected by the service No additional assessment required	1-4
Moderate	The project may have a significant impact on users of the service or may depend on the service Further assessment required	5-8
Strong	The project may have a significant impact on users of the service or may depend on the service Further assessment required	9–10
Benefit	The project can have a favourable impact on service delivery No additional assessment required	>10

A brief overview of the rationale for including or excluding each ecosystem service is provided in the table (Table 12.3.3).

Table 12.3.4 Scoping: a rationale for the consideration of ecosystem services

Ecosystem Services	Relevance	Included in impact assessment	Justification
Supply of water	Moderate	Yes	At the stage of determining the scope of work, it was established that in the area of work there are resources of surface and groundwater, which are used for domestic water supply and industrial purposes, irrigation. The availability of water resources affects the welfare of potential users
Extraction of aquatic biological resources (fish)	Negligible	No	The Syrdarya River is used for fishing. During the scoping phase, it was determined that the Project would not limit access to fishing areas, disrupt fish habitat and thus fisheries productivity, or affect livelihoods and well-being. The project does not contain solutions that have a direct impact on the ecosystem of water bodies (removal of channels, flow regulation, etc.), but provides for the disposal of treated effluents into the Syrdarya River and the minimum discharge of drainage water into the Dalverzin channel, so the fundamental issue is the compliance of waste water indicators with quality standards of fishery water bodies. Implementation of the project will not affect fish resources
Regulation of local climatic processes	Minor	No	Because of the small size of the work area compared to the surrounding ecosystems, the likelihood that the area affected by the Project will play a significant role in the management of local climatic processes, i.e. the regulation of precipitation, cooling, shading, etc. is low
Regulation of global climatic processes	Negligible	No	The impact of the CRC project compared to global greenhouse gas emissions and the effects of those emissions on the well-being of populations affected by climate change is considered insignificant
Regulation of atmospheric air quality	Moderate	Yes	Air quality regulation is an important service to the town's residents. During the scoping phase, it was determined that the project could have an impact on air quality regulation due to emissions from construction activities and equipment, during the construction phase, and during the operation of the CRC
Regulation of water quality	Moderate	Yes	Water quality is important for fisheries, domestic and industrial needs of Uzmetkombinat, the population, as well as the overall functioning of ecosystems. The project may impact surface and groundwater resources due to spills, leaks, wastewater disposal, etc. during the construction phase. Wastewater discharge will not have a significant impact on the quality of water of the Syrdarya River, Dalverzin Channel, and fisheries (the share of wastewater from CRC and UMK in the total volume of wastewater of Bekabad is minimal).
Science and education values	Benefit	No	For the construction of the CRC, scientific and technical studies were carried out to select the optimal technology for the production of rolled steel. The company conducts training, professional development of personnel

Ecosystem Services	Relevance	Included in impact assessment	Justification
Cultural values (archaeological and cultural heritage)	Minor	No	During the construction of the 23 km transmission line, the associated CRC facility installed support in the protective zone of the monument of architectural heritage. During the detailed survey of the territory of the monument the fact of adverse impact was not established. The Agency for Cultural Heritage sent a letter with measures and recommendations for conducting activities in the protected zone
Diversity of biological species	Minor	No	The increased capacity of the UMK with the commissioning of the CRC, power line and road should not have a significant impact on the flora of the planned activity area (including potentially vulnerable recipients - forestry, riparian communities, populations of Climacoptera amblyostegia), because the main risks are controlled by measures to protect the air and other components of the environment, provided in accordance with national legislation and the IFC SD (see Sections 9.1, 9.4)

12.4 Background state

12.4.1 Methodology and data

A baseline analysis is an examination of the current state of the ecosystem and the services it provides in the absence of the Project, taking into account external factors (unrelated to the Project) that may affect future service provision, including, for example, climate change, population growth and land use change. Ultimately, the background information is the baseline against which the nature of the Project's impact can be determined.

The data used for the baseline assessment came from a variety of sources, including published and stock data and data from surveys, field surveys, and stakeholder engagement activities.

12.4.2 Baseline assessment

Additional research has been conducted to confirm and verify data from published and foundational sources and to address gaps.

Initial data on ecosystem services were obtained during the 2021 survey of CRC footprint areas (including associated sites). Surveys of CRC impact areas included meetings with stakeholders, observation of conditions, meetings and negotiations with local authorities, representatives of local businesses, including local land users.

Table 12.4.1 summarises the background of key ecosystem services and their importance to users.

Table 12.4.1 Brief summary of the baseline state of ecosystem services

Service	Characteristic	Relevance	Possible drivers of change	Key users
Supply of water	Ground and surface water use	Moderate	Changes in the UMK production program increase in water consumption by the population	Water consumers
Regulation of atmospheric air quality	Emission quality is regulated by dust and gas treatment plants	Moderate	Industrial emissions, emission control	Population
Regulation of water quality	Water quality is regulated by effluent treatment systems	Moderate	Eutrophication, climate change, legislation, control of pollutants	Water consumers

12.4.3 Ecosystem services impact assessment

The assessment of impacts on ecosystem services is based on the methodological approach outlined in Section 3 of Report 0128-0948-ESIA-PE-1.

The Table 12.4.2 provides an overview of the project's potential impacts on ecosystem services during the construction and operation phases.

Table 12.4.2 Ecosystem services impact assessment

Stage of the life cycle: construction

Recipient: Dalverzin Channel

Recipient sensitivity: medium

Impact characteristics

Impact	Provision of water resources (water supply)		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Negligible	Neglectfully small
Consequences	Indirect impacts on the population, economic entities (water users)				
Measures	• Special measures are inexpedient, application of standard water-saving measures				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Negligible	Neglectfully small

Life cycle stage: Operation

Recipient: Dalverzin Channel

Recipient sensitivity: medium

Impact characteristics

Impact	Provision of water resources (water supply)		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Indirect impacts on the population, economic entities				
Measures	• Increasing the use of wastewater and drainage water at the plant to 90% of the total volume of fresh and reused water used for production needs				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Stage of the life cycle: construction

Recipient: population

Recipient sensitivity: medium

Impact characteristics

Impact	Regulation of air quality		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low
Consequences	Disturbance of living conditions of the population (impact on respiratory organs), indirect impacts on flora and fauna, soils				
Measures	• Planning solutions (removal of the construction site from residential areas) • organization of construction in strict accordance with the planning, technological and technical solutions of the project • carrying out the work in accordance with good practice, compliance with the rules of the work, engaging qualified personnel to carry out the work • control of technical condition of engines and exhaust systems of cars, bulldozers, excavators, cranes to exclude operation of equipment with increased emission of pollutants • excluding the operation of vehicle engines and construction equipment at times when work is not in progress implementation of measures for technical modernization of existing sources of emissions of pollutants into the atmosphere				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Site-limited	Short-term	Reversible	Low	Low

Life cycle stage: Operation

Recipient: population

Recipient sensitivity: medium

Impact characteristics

Impact	Regulation of air quality		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Disturbance of living conditions of the population (impact on respiratory organs), indirect impacts on flora and fauna, soils				
Measures	• Process arrangement with a minimum of re-heating of the workpieces; • increase in the design height of chimneys; • The project provides for gas combustion devices (burners, boilers) with low NOx emissions • reducing the productivity of individual technological processes, shops, sections; • arrangement of the sanitary protection zone. • modernization of gas combustion equipment (burners, boilers) at existing sources of UMK to reduce NOx emissions; • adjustment of the existing dust and gas cleaning devices of UMK; • retrofitting with dust and gas purification devices for those sources of UMK where they are not available; • replacement of dust and gas cleaning devices with more efficient ones; • equipping unorganized emissions with exhaust hoods; • upgrading ventilation systems with increased pipe heights and/or volumetric flow rates				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Life cycle stage: Operation

Recipient: Dalverzin Channel

Recipient sensitivity: medium

Impact characteristics

Impact	Regulation of water quality		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Transboundary	Long-term	Reversible	Medium	Moderate
Consequences	Indirect impacts on public health, business entities				
Measures	• Wastewater disposal to the existing sewage systems of the enterprise • arrangement of a storm drainage system to collect effluents generated on the part of the enterprise territory south of the Dalverzin channel (including the slag dump located in the water protection zone of the channel) and their discharge to the treatment facilities of UMK • liquidation of the slag dump and removal of waste for recycling outside the water protection zone of the Dalverzin channel • prevention of uncontrolled flow of effluents into the Dalverzin channel during removal and processing of accumulated volumes of slag waterproofing of the slag dump area after completion of slag processing • cleaning of drainage effluents discharged into the Dalverzin channel • increasing the capacity of the existing treatment facilities of the company, taking into account the increase in the flow of effluents during the operation of the CRC, as well as stormwater runoff arriving				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Low

Life cycle stage: Operation

Recipient: Syrdarya River

Recipient sensitivity: medium

Impact characteristics

Impact	Regulation of water quality		**Nature**	**Genesis**	**Mechanism**
			Adverse	Direct	Cumulative
Primary impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Medium	Moderate
Consequences	Indirect impacts on public health, business entities				
Measures	• Upgrading existing sewage treatment plants to achieve effluent quality at a level no higher than the established targets (option: achieving the effluent targets for certain substances by reducing their flow to the sewage treatment plant) • treatment of production effluents of the CRC • increasing the capacity of the existing treatment facilities of the company, taking into account the increase in the flow of effluents during the operation of the CRC, as well as stormwater runoff arriving • collection and transfer for treatment of all types of effluents generated during the operation of the wood processing plant (including storm and meltwater; effluents from the cleaning of production facilities and adjacent areas)				
Residual impact	**Extent**	**Duration**	**Reversibility**	**Value**	**Significance**
	Local	Long-term	Reversible	Low	Minor

Measures to prevent and/or mitigate adverse impacts on ecosystem services during the construction and operation phases of the CRC are provided by the solutions justified in Sections 9.1, 9.4, and 9.5.

12.5 Conclusions

A total of ten different ecosystem services were considered in the assessment procedure in this chapter.

According to the level of relevance (Table 12.3.3), ecosystem services are characterised as follows:

- moderate relevance: regulation of water quality; provision of water resources, regulation of atmospheric air quality;
- low relevance: regulation of local climate processes; regulation of global climate processes; species diversity;
- minor relevance: the extraction of aquatic biological resources (fishing), scientific and educational values and cultural values.

The most relevant ones included in the ecosystem services assessment procedure are the following: provision of water resources, regulation of atmospheric air quality; regulation of water quality; the results of the ecosystem services impact assessment are presented in (Table 12.4.2).

It is determined that the level of impact from the project works during the construction phase on water supply (Dalverzin Channel) will be insignificant, after the application of standard water conservation measures the residual impact on the channel will also remain insignificant. The impact during the operation phase on the Dalverzin channel is assessed as low.

The level of impact from project activities during the construction and pre-start-up phase on air quality regulation before mitigation is medium; after mitigation is low. The impact during the operational phase is evaluated as low.

There is no impact on water quality regulation during construction phase (Dalverzin Channel and Syrdarya River). The impact at the operation stage is low.

Measures to prevent and/or mitigate adverse impacts on ecosystem services during the construction and operation phases of the CRC are provided by the solutions justified in Sections 9.1, 9.4, and 9.5.

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13 CONCLUSIONS

UMK is the leading ferrous metallurgy enterprise in the Republic of Uzbekistan and was commissioned in 1944. At present, UMK produces 850 thousand tonnes of steel per year and up to 810 thousand tonnes of ferrous rolled products.

The proposed Casting and Rolling Complex is intended for the production of hot-rolled sheet in coils from low-carbon, low-alloy quality and ordinary quality steels. The infrastructure of the CRC will be integrated with the relevant UMK facilities. The project provides for the construction of off-site facilities.

The capacity of the CRC will be 1.093 million tpa of liquid steel with the production of up to 1040 thousand tpa of finished rolled products. At the same time, the total volume of steel smelted at the plant after expansion will be about 1.94 mtpa.

The Environmental and Social Impact Assessment for the CRC construction project for UMK was carried out in accordance with national requirements and applicable requirements of the International Finance Corporation for project financing purposes.

The ESIA activities were performed by Shaneco Group JSC (Russia) and the subcontractor Ecostandard Expert LLC (Uzbekistan).

The ESIA results indicate that the implementation of the proposed activities is in principle possible and acceptable, taking into account the implementation of the proposed measures and monitoring recommendations.

1. Possible alternatives for the implementation of technical solutions (including the location of the facility, the choice of technologies etc.) do not have fundamental differences in terms of the environmental impact. There are no grounds for rejecting the planned activity.
2. Based on the combination of the considered technical characteristics of CRC’s main equipment (metallurgical) and auxiliary equipment (water supply, treatment of polluted wastewater, introduction of water recirculation), it can be concluded that the planned activity mainly complies with the EU BAT requirements.
3. Following the studies, the characteristics of the expected environmental and social impacts of the planned activity were determined. The impacts mainly have by medium or moderate significance, and local or site-limited scale.
4. Waste management decisions and transboundary impacts are expected to have significant consequences associated with chemical and acoustic pollution of atmospheric air at the CRC operation stage.
5. A review of the results of the impact assessment for the construction and operation stages of the CRC is presented in Table 13.1.1.

Table 13.1 1 Results of the assessment of the proposed activity's environmental and social impacts

No	Impact	Stage	Nature	Extent	Significance
1.	Impact on ambient air quality	C[56]	–	Site-limited	Negligible
		O	–	Local	Low
2.	GHG emission	O	–	Regional	Low
3.	Acoustic and vibration effects	C	–	Site-limited	Negligible
		O	–	Site-limited	Low
4.	Impacts related to waste generation	C	–	Site-limited	Negligible
		O	–	Local	Low
5.	Impact on surface waters	C	–	Local	Low
		O	–	Local	Low
6.	Impact on groundwater	C	–	Site-limited	Low
		O	–	Site-limited	Low
7.	Impact on soil cover	C	–	Site-limited	Low
		O	–	Site-limited	Negligible
8.	Impact on the plant world	C	–	Site-limited	Negligible
		O	–	Site-limited	Negligible
9.	Impact on terrestrial wildlife	C	–	Site-limited	Low
		O	–	Local	Low
10.	Impact on ichthyofauna	C	–	Local	Low
		O	–	Local	Low
11.	Effects on organisms in aquatic ecosystems	C	–	Local	Low
		O	–	Local	Low
12.	Impact on the labour market	C	+	Regional	Moderate
		O	+	Local	Moderate
13.	Impact on economic development	C	+	Local	Moderate
		O	+	Regional	Moderate
14.	Impact related to training, professional development	O	+	Local	Moderate
15.	Land acquisition, economic displacement	C	–	Local	Low
16.	Labour Influx and Population Change	C	–	Local	Low
		O	–	Local	Low
17.	Child and forced labour	C	–	Local	Low
		O	–	Local	Low
18.	Impact on access to transport infrastructure	C	–	Local	Low
		O	–	Local	Low
19.	Supply chain impacts	C	–	Regional	Low
		O	–	Regional	Low
20.	Impact on cultural heritage	C	–	Site-limited	Negligible
21.	Impacts on workers' rights, health and safety	C	–	Site-limited	Negligible
		O	–	Site-limited	Low
22.	Impacts on public health, safety and well-being	C	–	Local	Negligible
		O	–	Local	Low
23.	Impact on ecosystem services: Dalverzin Channel – availability of water resources (water supply)	C	–	Site-limited	Negligible
		O	–	Local	Low
24.	Impact on ecosystem services: population – air quality	C	–	Site-limited	Low
		O	–	Local	Low
25.	Impact on ecosystem services: Dalverzin Channel – quality of water	O	–	Local	Low
26.	Impact on ecosystem services: Syrdarya River - quality of water	O	–	Local	Low

6. The CRC project is classified as a category A project according to the IFC requirements:

- the project is potentially associated with significant adverse impacts on the environment and social conditions, and some impacts are irreversible;
- the area of influence of the CRC project includes territories adjacent to UMK;

[56] C – construction, O – operation

- the implementation of the project will require the implementation of various activities to prevent and/or minimise adverse environmental and social impacts.

7. Most of the greenhouse gases are generated due to the use of natural gas in the production process and energy generation at the Syrdarya TPP, which is the main supplier of electricity for UMK. The ESIA considers ways to reduce the amount of greenhouse gas emissions, such as the use of secondary raw materials for production - both supplied by external suppliers and the scrap in the internal waste (slag). Following a review of resource and energy efficiency measures, it was recommended to consider introducing hot charging for the reheating furnace of the rolling mill at SRS-2 (as this activity provides for a significant improvement of energy efficiency of existing production at UMK). The design of the proposed CRC by Danieli already envisages hot charging of the rolling mill's reheating furnace. It also seems reasonable to take into further development the coke oven gas recovery proposal.

8. Atmospheric air pollution in the residential area does not exceed the permissible levels for any community health risk indicator; the impact of the plant, taking into account the commissioning of the CRC, is permissible.

9. It was established that the cumulative impact of the planned activities on the ambient air is assessed as high. Residual impacts are also assessed as high, which is associated with their inevitably transboundary nature, which is determined by UMK's location on the border with the Republic of Tajikistan. The SPZ document developed by the Consultant (taking into account the commissioning of the CRC) should create a basis for assessing subsequent plans of the plant. It is assumed that all development projects of UMK will be implemented based on the proposed mitigation measures.

10. Cumulative impact on the waters of the river Syrdarya and the Dalverzin Channel is associated with water intake (the channel) and wastewater diversion (the river and the channel). In both cases, the impact on the Dalverzin Channel including residual impact are assessed as high, which is associated with the location of the channel in the border area and the inevitably transboundary nature of the impacts. Mitigation of the consequences associated with water intake from the channel is ensured by the introduction of water recirculation at UMK and the use of drainage water. The cumulative impact on the river Syrdarya is assessed as moderate, and the residual impact as low. To prevent the adverse effects of cumulative impacts on the infrastructure of the district and the city, which provides for the treatment of domestic wastewater and waste management, it is recommended to provide for financial participation of UMK in the reconstruction of municipal sewer networks and treatment facilities and construction of own waste disposal facility (landfill).

11. Also projected are cumulative impacts on the social environment – impacts on employment rates, local economy and infrastructure. The implementation of the Project will have a positive impact at the local level through the creation of jobs, the purchase of goods and services by workers during the construction phase and the improvement of the infrastructure of Bekabad. During the operation phase, positive impacts are expected at the national level (an increase in the country's gross domestic product, an increase in government revenues and taxes). Given that the majority of adverse socio-economic impacts are assessed as moderate or low, the project has a limited contribution to cumulative adverse impacts. To prevent the adverse consequences of cumulative impacts on the social infrastructure of the city, it is recommended to provide for UMK's participation in the shared development of the infrastructure of Bekabad and the Bekabad district, and the development and implementation of social assistance programmes for vulnerable population groups.

12. The assessment considered ten different ecosystem services. The most relevant services included in the assessment procedure are the following: provision of water resources (water supply), regulation of air and water quality. It was determined that during the construction stage the impact on the supply of water resources (Dalverzin Channel) will be insignificant, and after the implementation of standard water saving measures, the residual impact on the channel will also remain insignificant. At the same time, the operation stage impact on the Dalverzin Channel is assessed as high. There will be no significant impact during the construction phase on the regulation of water quality (Dalverzin Channel and the river Syrdarya). The operation stage impact is assessed as high for the Dalverzin Channel and low for the river Syrdarya. Measures to prevent and/or mitigate adverse impacts on ecosystem services during the construction and operation stages of the CRC are supported by decisions justified in the ESIA.
13. The results of the impact assessment provided the basis for the development of prevention/mitigation measures. The justification for the measures is made in accordance with the hierarchy recommended by IFC Performance Standard 1: prevention of impacts, mitigation of impacts, restoration of affected components/ecosystems/communities (if applicable), compensation for affected components/ecosystems/communities (if applicable). Particular attention is paid to the impacts rated “high”; however, measures for other impacts are also considered.
14. The environmental protection solutions proposed in the ESIA provide for:

    - a set of measures for the protection of ambient air (including compensatory measures at pollution sources at UMK);
    - modernisation of UMK’s wastewater treatment facilities and/or creation of new treatment facilities;
    - UMK’s financial participation with the city of Bekabad in the modernisation of municipal sewage treatment facilities;
    - prevention of reduction of waste generation;
    - creation of UMK’s own waste landfill (as an option – co-financing with Bekabad administration);
    - arrangement of storage sites for production and consumption waste in accordance with environmental requirements;
    - separation and reclamation of areas freed from slag disposal;
    - measures to reduce water consumption (use of drainage water in the production cycle).

15. Solutions to ensure a favourable living environment for the population include:

    - organization of a sanitary protection zone[57];
    - a set of planning, organisational and technical solutions to reduce the level of noise exposure.

16. Following the assessment, a set of measures was substantiated in relation to social responsibility, stakeholder engagement, working conditions, and employee and community health and safety including:

    - adoption of the HR Policy;
    - exclusion of child and forced labour;
    - basic and advanced training of personnel;

[57]The consultant has developed and submitted for consideration by competent authorities a draft SPZ documents, taking into account the commissioning of the CRC.

- traffic management plan
- establishment of an effective grievance mechanism.

17. Based on the ESIA results, an Environmental and Social Action Plan (ESAP) will be prepared. The plan will outline technical and management measures to ensure that the CRC project meets national requirements and applicable IFC requirements.

18. The effectiveness and efficiency of the implementation of the proposed measures is determined based on monitoring of the condition of environmental components and/or individual environmental indicators (ambient air, surface and ground water, soils, acoustic conditions), as well as social aspects.

19. The ESAP is an important part of the loan agreement, and so the implementation of the ESAP activities is checked as part of monitoring of the CRC project implementation.

20. The environmental and related socio-economic impacts of the proposed activities are deemed permissible subject to full implementation of the recommendations substantiated by materials of the ESIA studies .

21. As part of the ESIA, a Stakeholder Engagement Plan (SEP) has been prepared. The SEP provides for constant engagement of stakeholders throughout the entire life cycle of the CRC project.

22. Activities include consultations with makhalla representatives, disclosure of information to local communities at key stages of the project (e.g. commencement and end of construction), regular updates of data on the website and social media, SEP updates, and annual project-related reporting.

23. Preliminary results public consultations indicate the absence of public concerns and public preferences that should be taken into account by the client when making decisions regarding the proposed activity. Consultation and discussion processes are continuing.