UE « TURAKURGAN TPP CONSTRUCTION BOARD»

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Environmental Impact Assessment of Connection of Existing 220 kV TL to Turaurgan TPP and Kyzyl-Ravat SS with Reconstruction of Kyzyl-Ravat SS

Stage: DRAFT STATEMENT OF ENVIRONMENTAL IMPACT (DSEI)

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INTRODUCTION

The work objective is to assess the environmental impact of charging of construction of existing OL 220 kV on Turakurgan TPP and Kyzyl Ravat substation with the upgrade of Kyzyl Ravat substation in Namangan region.

Construction of a new TPP with a capacity of 900 MW with two 450 MW CCGT unit in Namangan region aims at reducing the existing electrical shortage in Ferghana Valley, reducing depending on electricity imports from neighbouring republics, optimum employment of fuel resources.

This project was developed within the limits of scheme of Turakurgan TPP power distribution.

The project includes:

- On OL: approach line of OL 220 KV "Kyzyl Ravat" Substation - "Sardor" Substation on TTPP, approach line of OL 220 KV "Crystal" Substation - "Sardor" SS on TTPP, approach to power OL 220 kV "Crystal" SS - "Sardor" SS with TTPP, approach to power OL 220 kV "Kyzyl-Rawat" SS - "Sardor" SS with TTPP, charging OL 220kV "Crystal" SS - "Sardor" SS at "Kyzyl Ravat" SS;

- On SS: expansion and reconstruction of 220/110/10 kV Kyzyl-Rawat SS.

The basis for EIS project generation is the Resolution of the President of the Republic of Uzbekistan No. PR-1943 dated 28.03.2013 "Measures aim at construction planning of the power plant with the capacity of 900 MW in Namangan region", the Board decision SJSC "Uzbekenergo" No. 54 dated 17.05.2013, "On the scheme of Turakurgan TPP power distribution", letters of Directorate of Turakurgan TPP Construction No. 299 dated 11.11.2013 and No. 40 dated 01.17.2014.

The project will provide the reliable performance of the Uzbek power system in Ferghana Valley.

Passage route through an area of an apartment block with high seismicity and high-density, with a dense network of infrastructure makes necessary of analysis of both existing and predicted environmental conditions and, for grouping of construction object into category II environmental impact (average risk), diagnosis of OL sections 220 kV with maximum probability of accident condition evolution and the possibility of adverse environment consequences.

Grouping of the design object into category II of environmental impact was made on the basis of Article 18 of the Annex to the Resolution of Cabinet Council of the Republic of Uzbekistan No. 152 dated 05.06.2009.

All component performance of the environment is given on this work in terms of diagnosis of sections that are most vulnerable during the construction and operation of OL, and was analyzed nature of the environmental impact in these sites, the recommendations were proposed to prevent or reduce the negative impact.

During execution of work were followed the "Regulations on state environmental expertiza in the Republic of Uzbekistan" approved by the Resolution of the Cabinet of Ministers No. 491 dated 31.12.01, and determining the composition and volume of the represented section of environmental impact evaluation, as well as the Resolution of Cabinet Council of the Republic of Uzbekistan No. 152 dated 05.06.2009. "On amendments and additions, as well as invalidation of certain decisions of the government of the Republic of Uzbekistan".

1. DESCRIPTION OF THE EXISTING ENVIRONMENT IN THE AREA OF THE OBJECT ORIENTATION OF CONSTRUCTION

1.1. Physiographic and climatic conditions

Approach lines and approach to power lines existing OL 220 kV Kyzyl Ravat – Sardor and Crystal Sardor at Turakurgan TPP pass through the territory of Kasansay and Turakurgan areas and charging circuit OL 220 kV Crystal – Sardor at Kyzyl Ravat SS on the territory Uychi district of Namangan region (fig.П.1). Redeveloped Kyzyl Ravat SS located in Uychi district of Namangan region, near the village of Kyzyl – Rawat (Fig. П.2).

The total length of approach lines and approach to power lines OL 220 kV Turakurgan TPP is 58.6 km.

The beginning of approach lines and the end of approach to power lines of future charging OL 220 kV are planned from the north-west outskirts of the villages of Namangan on the territory of the beginning of existing right-of-way active OL 110 and 220 kV at 220 kV Sardor SS, located in Namangan.

Throughout approach lines and approach to power lines of OL 220 kV Kyzyl Ravat SS – Sardor SS and Crystal SS – Sardor SS at Turakurgan TPP line crosses: one OL 220 kV, three OL – 110 kV, two OL – 6 kV, light line, one highway Namangan – Kasansay, several field and one asphalt highway, moderate pressure gas pipeline (Ø100mm), Kasansay district, several small conveying channels and reservoirs.

Charging circuit OL 220 kV Crystal SS –Sardor SS at Kyzyl Ravat SS with the length of 0.8 km has no intersections with utilities, passing over farmland in Uychi district.

Bypassing the south of the Guzal village by rout of lines " approach to power lines " from the angles of No. 6, in order to avoid double crossing with the existing OL 220 kV, was made a resolution to demolish one of the unfinished private house and parcelling of new plots under construction and its gardens.

The distance between the road and the residential development in the field of closest approach is 25 m, that is, corresponds to the standard value of the fenced-off area of power lines equal to the height of support.

The territory borders of Kyzyl – Rawat SS in area on all sides of 4.2 ha is agricultural land, the closest residential development of the Kyzyl - Rawat village is located in 200 meters to the east.

The study area is located in the Fergana Valley in the southern foothill of spurs of Chatkalsky ridge. The relief of the territory of line passage OL wavy, in some areas flat, with sharp differences in the valleys of says, the chief of which is Kasansay.

Fergana Valley is surrounded on the north, east and south by mountain ranges and has a length of 370 km and 200 km in width.

Due to the closed position of the valley, its climate is different from the climate of the surrounding areas. Mountain ranges of the Tien Shan and The Pamir-Alay protect the Fergana Valley from the invasion of air masses, bringing moisture and coldness. So here precipitates less than in the foothills and mountains of Western Tien Shan. The mountain ranges, bordering of the Fergana Valley, effecting the circulation of the atmosphere, lead to the development of mountain-valley circulation. Its features is evident in periodic in the daily change of wind directions.

The main features of the climate of the Ferghana Valley is arid and continentality.

Analysis of the climate characteristics of the study area was carried out according to the data of the weather station "Namangan" (Table 1.1.1).

Table 1.1.1.

Climatic characteristics m/s Namangan

Characteristic	*Unit*	*Value*
A factor, which depends on the temperature stratification of the atmosphere and determining terms of the horizontal and vertical dispersion of pollutants in the atmosphere	-	200

Characteristic	*Unit*	*Value*
The average annual atmospheric temperature	°C	15.23
The maximum temperature of the hottest month (July)	°C	28.02
The lowest temperature of the coldest month (January)	°C	0.38
The average annual rainfall	mm	207.32
The average annual frequency of wind directions for the 16 rhumb	%	
N		21.83
NNE		5.57
NE		3.29
ENE		3.45
E		6.72
ESE		4.68
SE		3.80
SSE		4.42
S		6.09
SSW		5.31
SW		5.85
WSW		5.80
W		4.67
WNW		1.93
NW		5.46
NNW		11.15
Lull		10.98
The number of cases by gradations		
0-1	м/сек	33.55
2-3		59.53
4-5		4.74
6-7		1.67
8-9		0.47

10-11		0.04

Characteristic	*Unit*	*Value*
12-15		0.00
≥15		0.00
The maximum wind speed exceeding is 5%, U*	m/sec	4.31

The annual average temperature is 15.23 ° C and the absolute minimum is -17,5 ° C, absolute maximum is +42,5 ° C. The average minimum temperature for the year is -3.56 ° C, the average maximum +35, 73 ° C. The average air temperature in January 0.38 ° C, the average air temperature for July is 28.02 ° C.

The average annual air humidity is - 64.2%.

The rainfall in Ferghana Valley is throughout the year, the average annual rainfall is - 207.32 mm. From October to April the continuous rainfall is dominated, and from May to September shower is observed. The repeatability of shower increases to 63-72 % in the summer months.

The most frequently (66%) winter is observed with snow cover depth of 1-10 cm.

The most frequently (66%) winter is observed with snow cover depth of 1-10 cm.

Dust storms are quite frequent, their greatest repeatability occurs in May, June. The total duration of dust storms per year is 41.7 hours.

Throughout the year (21.83 %) of northward wind is dominated, quite often (11.15 %) north- northwest wind is observed, less often west (4.67 %) and the south wind (6 , 09 %) is observed. For the study area during the year northern (21.83 %) and the north-north -west (11.15%) winds (Figure 1.1.1) are characteristic.

Wind diagram of Namangan

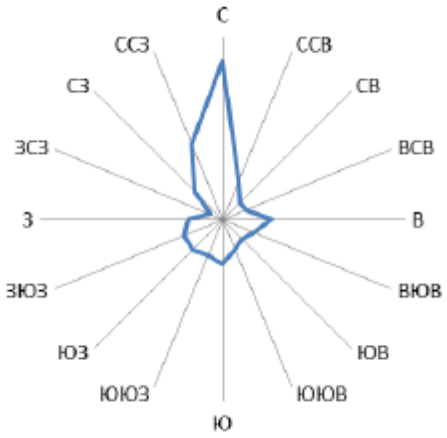

Fig.1.1.1.

One of the meteorological factors determining the dispersal conditions of polluting winds in the atmosphere is the wind speed. In the study area throughout the year low winds are dominated, the average wind speed is 1.95 m/s. In the annual course frequency of winds with 2-3 m/s speed is 59.53 %, frequency of winds with 0-1 m/s speed is 33.55 %, which contributes to the accumulation of pollutants in the atmospheric boundary layer. Strong winds (10 m/s or more) are rather rare (0.04 % repeatability).

Valley closed position causes greater than in other regions of the Republic, weather stability and the absence of thermal shock in winter.

The most common of atmospheric effects is haze (the average 77 days per year). Fogs are rarer: 175.4 hours per year (maximum of repeatability is in December), it is considerably higher than in other regions of Uzbekistan.

The average number of thunderstorm days is 15-25, the average annual duration of thunderstorms is 20-40 hours.

Ground inversions occur more frequently in the early morning and in the evening, their frequency is 40%. Air pollution index (API) is equal to 1.55.

Thus, both physiographic and climatic conditions of the study area contribute to the impurities accumulation from low fugitive emission sources in the active atmosphere shell.

Analysis of physiographic and climatic features of the construction project area in Namangan region shows that high air temperatures, low rainfall , increased solar radiation promote environmental pollution, at the same time high repeatability of low wind speeds does not promote dispersion of emissions from the hot springs and high transport them over long distances.

1.2. Existing impact sources

The area with agro-industrial trend, which is the territory of the construction project, the role of industrial facilities as impact sources, in the creation of ecological state does not take the leading position, such as in the large cities of the Ferghana Valley – Fergana or Andijan.

Here are located mainly agricultural land and rural settlements, only a small part of the land was seized under highways.

The nearest large enterprises are located in Turakurgan (40 companies). Among them are companies that have sources of emissions, discharges of channeled and not channeled industrial and domestic effluents, treated and untreated effluents, and almost all enterprises have sources of industrial storm drains. By the type and ratio of impact source among enterprises of the city can be distinguished three groups:

- Enterprises with sources of industrial storm drains and utility fluids without emission sources and effluent sources (among them are two subgroups with channeled and not channeled runoffs);

- Enterprises with industrial sources, industrial storm drains and utility fluids and emission sources (also distinguished two subgroups with priority sources of organized and unorganized emissions);

- Enterprises with sources of industrial storm drains and utility fluids and sources of fugitive emissions.

The largest enterprises of the city are the complex "Shihrinlik", which produces dried fruits (productivity 5thousand tons per year) and the Joint Stock Company "Ahangar" (former tractor repair plant) Agrospetsremont enterprise, which are repaired tractors. Productivity is low, only 55 units per year.

The average, for the employed population and volume of output products are enterprises of light and food products: sewing workshop for the production of underwear, bread-baking complex, pasta shop, pastry shop, food factory, printing house, where manufactured printed blanks, shop for manufacturing and assembly of furniture, weaving department for manufacturing carpets and satin.

Besides industrial township-forming enterprises, there are a number of industries of serving profile. These include all the boilers, which operate on the territory of large companies, hospitals, schools, transport (ATE, ATE of transselhozhimiya, haulage companies, ATS, bus stations, VSS, MFS), construction companies (IMMD "Agroprom-stroy", "Transspetsstroy" , MD, MMD "Namanganvodstroy", " Namanganstroy") , procuring and supply, storage (zagotkhlopkopunkt , RAIC, Zagotkontora, Rayshyolk , SES, log storage place, HRSUz base) and other organizations (regional vet clinic, Limonar, JTUO IAA, pump stations management).

Emission sources are not available at all listed enterprises. The main stationary sources of emissions are small heating plants equipped with cast-iron sectional boilers "Universal" type. Boilers are located in large enterprises ("Shirinlik" tractor-repair), bread-baking plant, schools, hospitals and one combined boiler for office buildings. Natural gas serves as fuel in boilers. Power boilers are from 0.2 to 1.5 Gcal/hr. All costs of heat are 60 Gcal per hour, so through the tubes emit negligible amounts of nitrogen dioxide, carbon monoxide.

At the enterprises of motor transportation service, including on the tractor-repair plant are found sources of vent and fugitive emission of hydrocarbons, welding aerosol, metal dust. Emission rate is slightly in view of enterprise small capacity. Furthermore, these objects are dispersed in the city. Within the boundaries of construction companies are located sources of vent and fugitive emission and inorganic dust. Emissions of inorganic and cotton dust originate from the territory of commodity point, located in the western sector of the city between the

streets Chust and Isvakhan. Thus, impact of source of emission on the open air and the

surroundings are limited by the size of enterprise industrial sites, and at the same time, insignificantly in strength and intensity.

Along the highways of the city the impact of mobile emission sources is observed. Up the street Namangan-Chust movement intensity makes 3700 vehicles per day, up the street. S. Rakhimov - 2900 vehicles per day. Streets have transit value, so a significant portion of the flow structure belongs to the cargo large vehicles. Impact of the emissions of sulfur dioxide and nitrogen dioxide is significant in the roadside. Weak contamination of air is stored in residential construction, on the territory of hospitals, schools, adjacent to these streets.

Within the industrial, administrative and socio-residential areas are all sources of water consumption and discharge sources of industrial and domestic effluents and soil, and sources of the formation of consumer waste. City's water supply is based on the consumption of groundwater, fresh water from two underground water intakes. The first intake "Rawat" is located in 24 km of the north Turakurgan. Power water intake is 5.5 m3 per day. 7 operated wells. Water is supplied to the city by a gravity system. Second intake "Turakurgan" is located in 3 km of the east of the city. Power intake is 1.0 thousand m^3. Additionally to it comes 0.2 thousand m^3 of water through water conduit from Namangan. Metered water consumption for residents makes 160l l/day. Actual consumption is 282.0 litres per day. The amount of water consumed by enterprises for production purpose is currently unspecified, but it should be noted that the technological features are not water-retaining, and water consumption by industries has host-domestic purposes.

Sources of industrial and domestic effluents in the city belong to major sources of environmental impact, since only a small portion of wastewater discharged into the sewer and sent to treatment facilities of Namangan. Pipe canal was laid down the street Namangan and connected to it all the administrative municipal buildings, schools, kindergarten, hospital and multistoried buildings. On the premises of enterprise "Shirinlik" is located pumping station, which is connected by the pumped sewer to the central collector along the street Namangan.

The actual average wastewater pass is 950m^3, the length of the central pipe canal is 9km. Coverage ratio by centralized sewerage of residential areas and non-governmental foundation is only 11 %. Insignificant part of wastewater is discharged without treatment into the old quarry through the gravity sewer, laid along the right bank of Kasansay district. The main part of industrial and domestic effluents and soil is discharged into cesspools, most part of which is not concreted. Under the conditions of the development of pebble gravels, effluents are filtered into groundwater. This leads to contamination of groundwater by nitrogen compounds. In addition, contaminated water migrates towards the slope of the Syr Darya.

Profile of production work in the city is not associated with the formation of contaminated runoff requiring additional treatment. Runoff of the most production facilities are considered conventionally clean and discharged by gravity sewer, combined sewer or cesspool. Exceptions are storm discharges of motor transport stations, tractor-repair plant and construction industry enterprises, and runoff from car wash. These streams contain the oil, but not cleaned and discharged into the irrigation network and relief.

From the residential development of all enterprises and services, as well as from the streets, there occurs supply solid municipal waste. Food waste is used for a fodder of cattle. Solid waste, sweepings from the streets of the city are taken out to area landfill, which is located 10 kilometres to the north- west of the city on an area of 1.2 hectares. The annual amount of consumer waste is about 30 thousand $m^{3.}$ Production waste is mainly returnable container, scrap metal, petroleum products.

Within the territory of all residential areas as well as between the public, social, civic centre are located large sections of cemeteries, which is mainly due to the withdrawal of land from residential development. Due to the location of cemeteries in an upland area with a deeper position of groundwater impact is absent on them.

The structure of residential areas is subject to an existing road network, radially converging to a place across the river Kasansay. Provision of a total area for 1 person is 9.4 m2/ per person.

Impact of important natural impact source – torrential and flood discharge passing through the bed Kasansay periodically, considered and artificially hold by mudflow collectors, located upstream along the river valley.

Outside the city limits of production facilities in the territory of which are located important sources of environmental impact, the airport should be noted, located 1.5 km to the southeast of the city. Takeoffs and landings are made from the south-eastern part of the site, for which reason, the aircraft do not actually fly over Turakurgan. Due to this emergency situation with aircraft in the city are excluded. From the airport in the south-eastern part of the residential development is exerted the noise impact. Due to the low airport workload (by acceptance rate airport belongs to class 5), and impact noise is periodic and is exerted only in the daytime. Significant noise impact zone of the airport is limited by lane in 750 meters, which does not include residential development.

A warehouse of pesticides of JSC "Kishlokhuzhalikkimyo" of Turagan district is located at 2.0 km to north-west of the city Turakurgan. The activities of this company refer to three categories of environmental impact (Annex 2 of the Regulations Concerning Ecological Appraisal). Its territory is at a safe distance from existing residential areas of the city, because the sanitary protection zone of enterprises of this category has a width of 300 m. Arable land and gardens stretch between the territory of the warehouse and north-western boundaries of the city at a distance of 1.5 km.

1.3. Soil conditions and underground water

1.3.1. Approach lines and approach to power lines of OL 220 kV "Kyzyl Ravat"SS – "Sardor" SS and "Crystal" SS – "Sardor" SS at Turakurgan TPP.

According to a preliminary report on the geological engineering conditions geomorphologically tracks are laid in the northern part of central Fergana basin. This is proluvial- alluvial foothill of Tashkent, Golodnostepsky, cycles of quartenary age.

Type of terrain is erosion-accumulative. Ridged terrain is laid by gray cobblestone with layers of soft sandstones, gravelites, clays and loams capacity of up to 50m.

Wavy, slightly curved proluvial-alluvial plain of Tashkent cycle is laid by conglomerates with sand clay cement. Apparent thickness in the adyr area is up to 11m. On conglomerates are lied down yellow-gray loess loam with a capacity up to 25m.

Flat alluvial, partly alluvial- proluvial plain of Golodnostep cycle, representing III - terrace above flood-plain of Syr Darya, is laid by pebblestones, gravel, sand, sandy loam and loam.

Groundwater in the described area occurs at depths greater than 3 m.

Tracks of approach lines and approach to power lines of OL are laid in the area with seismicity of 8 balls (CSaR-II-7-81, CCM -2.01.03-96 and Change No. 1 to it). Soils on the seismic properties belong to the II- category.

1.3.2. Charging circuit OL 220 kV "Crystal" SS – "Sardor" SS at Kyzyl Ravat SS.

Geomorphologically charging circuit OL 220 kV is laid in the northern foothills of the Fergana basin - within a flat alluvial plain of Golodnostep cycle of denudation of Naryn. This is the right bank of the Naryn, responsible III - terrace above flood-plain of Naryn.

Sub-soils are sand with layers of gravel and pebbles, and covered by their loam capacity more than 5 m at the study area.

According to the research materials of past years groundwater exploration workings to a depth of 7m are not opened in the territory of Kyzyl Ravat SS.

Loamy sand, where capacity will exceed 3 meters has the property of subsidence.

Tracks of charging circuit OL220 kV is laid in the area with seismicity of 8 balls according to CSaR-II-7-81, CCM -2.01.03-96 and Change No. 1 to it.

Soils on the seismic properties belong to the II- category.

1.4. Air condition

Construction of OL 220 kV is assumed in the territory having mainly agricultural orientation, where there are no major sources of environmental impact.

Vehicle emissions are included in the assessment of the baseline conditions of air, as well as emissions from the dusting of land disturbed during construction.

In the study area the concentration of dust in violation of underlying terrain in big wind gut reaches 9.0 MPC. Under the low wind (u * = 3,83m/s) dust content hovers around 2-3 MPC.

Maximum concentrations of pollutants generated by emissions of vehicles on highways exceed sanitary standards for nitrogen dioxide and benzo (a) pyrene in 1.5-2 times. Soot content, carbon monoxide, hydrocarbons and sulfur dioxide below the MPC.

Because of the remoteness of high emissions and hot springs all over the track of air pollution level is insignificant. Concentrations of pollutants do not exceed 0.1 MPC.

Thus, air quality condition in the territory of track pass of OL 220 kV according to Methodological guidelines for ecological and hygienic zoning of the Republic of Uzbekistan on the danger level of population health should be referred to the maximum allowable.

1.5. Surface artificial and natural flow condition.

Water barriers, crossed the highway under construction of OL 220 kV are Kasansay river and several small says and collectors.

In the area of settlements Yartepa and Guzal circuit of OL 220 kV crosses the river Kasansay by single span. Width of the river at the intersection is 50 m.

From the river Kasansay and the Big Namangan Canal and Akhsisay is carried out irrigation of district centre Turakurgan and surrounding villages. Surface water of natural watercourses is completely investigated for irrigation or their water diverted into irrigation networks.

To improve water supply of irrigated land, on the way of runoff of main rivers and says, were built dams and were erected reservoirs.

Totally, within the Namangan region operate 8 off-stream storages, useful capacity of each varies from 5.6 to 155 million m^3.

Kasansay river of ice and snow supply with the peak discharge 250 m^3/s (mudflow on the 1st July, 1965), the low discharge – 0.54 m^3/s was recorded in January 1999.

River flow is regulated by Kasansay reservoir with capacity 165 mln.m^3.

Riverbed in the territory of the district centre has a concrete lining, riverbed width is 120 m, and depth is 4.5 m.

Channel Kumysharyk and Aksyaryk take water from Kasansay river to north of the river Turakurgan. According to the briefing note of Turakurgan regional rural water sector, canal discharge of Kumysh is 2.0 m^3/s, Aksy is 4.0 m^3/s, the channel width is from 3 to 5 m, depth is 1.5 m. Channels pass in a recess in earthen channel. They irrigate the area located westward of the river Kasansay. From Aksysay channel passing through the territory of the district centre in earthen channel, water is deflected to additional channel Chumich at a rate of 2.0 m^3/s and channel Khatanok at a rate of 0.3m^3/s.

Kosh channel passes along the left dam of Kasansay in concrete encasement. Water intake in it from Kasansay (flow of 1 m^3/s) is located in the territory of fire department.

At a time when water in Kasansay is not enough, the channel Kosh fed off from the channel Bulak having water intake on the Big Namangan Canal.

The Big Namangan Canal runs parallel to the North Fergana Canal at a distance of 3-5 km to the north of the latter on the southern slopes of the Namangan and Kasansay adyrs. Basic flow is 61.8m^3/s.

The chemical composition of the channel is formed by the natural composition of rock formations, folding river basin Kasansay. These streams of water are less exposed to anthropogenic impact, except for the effects of agricultural fields and animal husbandry enterprises. Composition of the water in the Big Namangan Canal according to chemical analysis for 2013 is given in table 1.4.1.

Table 1.4.1

Source water quality of the Big Namangan Canal

No.	*Item*	*Unit*	*Index*
1	Suspended substances	mg/dm^3	0.19
2	Oil products	mg/dm^3	-
3	Ammonium	mg/dm^3	1.52
4	Nitrites	mg/dm^3	0.05
5	Nitrates	mg/dm^3	3.1
6	Phosphates (as P)	mg/dm^3	-
7	Mineralization	mg/dm^3	371.2
8	Sulfates	mg/dm^3	144.0
9	Chlorides	mg/dm^3	40.0
10	Total iron	mg/dm^3	0.3
11	Total hardness	mEq/ dm^3	4.8
12	Dissolved oxygen	mg/dm^3	13.8
13	Permanganate oxidizing	mg/dm^3	4.5
14	pH		8.0
15	Silicon	mg/dm3	-
16	Sodium	mg/dm3	47.3
17	Magnesium	mg/dm3	1.6
18	Calcium	mg/dm3	3.2
19	Hydrocarbons	mg/dm3	2.4
20	Transparency (on the cross)	cm	20
21	Copper	mg/dm3	0.017
22	Potassium	mg/dm3	47.3
23	Free carbonic acid	mg/dm3	-
24	Total alkalinity	mEq/ dm3	2.4

Thus, channel water salinity is low (0.37 MPC). Oxygen regime is satisfactory, dissolved oxygen content is at 13.8 mg/dm^3. Petroleum products were not found. Water, by the chemical composition, belongs to the sulfate class, a group of potassium and sodium. Water pollution by ammonium (3.5 MAC), nitrate (0.3 MAC) and nitrite (2.5 MAC) nitrogen is explained by entering runoffs from agricultural fields and livestock enterprises, located upstream channel. By size of PS, water quality in channel belongs to class II clear waters.

Track of the Big Namangan Canal with water discharge 34m^3/s, passes through the side-hill areas of northern border of Turakurgan from the east to the west. At the intersection of the channel with the river Kasansay, head wall of inverted syphon is equipped with a shield and a hole in the side wall for discharge of surpluses water into Kasansay.

The passage territory of the Big Namangan Canal along the northern border of the city distinguishes by particular mudflow danger. Pools of most watercourses, located in a region of adyrs are laid by fragile rocks. Mudflows are of short duration (lasting 2-3 hours) and are rubble flow, which entering the Big Namangan Canal, promotes the rise of water table and overflow canal bed. Therefore, at the intersection of the channel with the river Kasansay in the head wall of inverted syphon was provided emergency discharge of excess water into Kasansay.

1.6. Vegetative ground cover condition

The formation of topsoil of the study area is largely influenced by climatic conditions for which are typical desert soil formation factors. Therefore, the type of soil of construction site was formed in the midst of old-irrigated light sierozems. Since the area is dominated by gravel-pebble deposits, stony soil throughout the profile. Fraction of pebbles and gravel by volume is more than 80 %, and only the upper part of the profile is enriched by pit-run fines.

Feature of soilis is humus poverty. Another feature is in unfavourable hydrophysical properties. Rough mechanical composition and close proximity of loose gravel-pebble rocks cause low moisture content and a strong water permeability. When developing such soils is used mud grouting and maintenance of crop rotation. Stone fruit crop of fruit trees acclimatizes and germinates well on stony soil. Therefore, no wonder that the area is famous for rich peach

orchards, pomegranate and apricot.

Mechanical composition of the soil and the nature of the source rocks are not conducive to the accumulation of toxic substances entering with fertilizers and irrigation waters from irrigation ditches.Due to this, geochemical soil condition on the results of elemental analysis is prosperous and content of toxic elements does not exceed the acceptable values.

Due to the use of the territory for the construction and operation of light industry enterprises, mechanical soil devastation, as well as ground is weak. It does not occur because of the rocky soil. In the boundaries of residential constructions, soils are exposed to moderate agro-irrigation exposure.

A characteristic feature is the dominance of vegetation or a significant part of ephemera and ephemeroids adapted to contrast mode of wetting, characteristic of this area. Among the ephemeras dominated bluegrass viviparous, sedge, bulbous barley.

Very characteristic for the local conditions poplar, elm, plane are becoming more common in the villages, in which there is a bypass route OL, species such as Gleditschia, ailanthus, Sophora, Thuja.

Planting a variety of trees, poplar, sycamore, ash, Sophora, rarely arborvitae along the roads, have spread everywhere.

In consideration specific of district boiler emissions, as well as motor highways, located close to the boilers, can be considered for polluting areas of vegetation as agrocnosises, receiving additional amount of fertilizers in the form of nitrates.

Tree vegetation nearby villages is in satisfactory condition. Habit of plants, their height, and crown shape fit their norm. This is facilitated by watering plants, conducted in residential areas.

Research on the status of the lamina of tree vegetation, by archival materials, revealed the presence of lesions by fungal diseases and insects (80%) of the sycamore, peach, apricot, growing near the district boilers, as well as necrotic phenomenon. However, necrosis area for the total mass of leaves is negligible.

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Analysis of archival materials on the chemical composition of pollutants in the leaves of trees shows that the leaves can accumulate toxicants such as heavy metals, storing them by the end of the growing season. Most metals exist in the form of particles in the atmosphere, represented mainly by metal oxides. In the air, they are in the form of aerosols, in particular, as a result of transport

Track OL 220 kV pass through reclaimed agricultural zone, dominated by irrigated land under crops of cotton, wheat, maize and vegetable, cucurbitaceous and fodder crops. Along collecting canals and field margins grow artificial planting trees, mostly poplars and mulberry. Roadside and shelterbelts include hardwoods as sycamore, elm, ailanthus, ash, and acacia.

Intersections by track of Kasansay River, says and collectors associated with various secondary coenoses. Along surface waters, which cross and near of which passes the track OL, dominated by woody shrub-planting with herbaceous canopy, with thickets of yantak, licorice, rushes, cattails, Cyperus, reed, Johnson grass.

Along the body of road and on the edges is formed by sparse cover of bluegrass, awn, cornflower, Cousinia, caper.

Vegetation within the farm, through the land of which runs track OL 220 kV, around it are presented artificial plantings of technical (cotton) and vegetable crops. Cenoses and Dodartia orientalis are formed on voids, along roadsides, banks of ditches. Old tall trees with lush canopy dominate in the boundaries of old housing estates of settlements, removed to a considerable distance from the lay of line.

In the village territory, which bypass track OL passes, along with old plantings of deciduous trees (eastern plane (Platanus orientalis), European ash (Fraxinus exelcior), catalpa (Catalpa speciosa), white poplar (Populus alba), maple (Acer spp), ordinary thuja), there are young, among of which prevail fruit trees (apricot (Armeniaca vulgaris), common peach (Persica vulgaris).

Along township streets are planted sycamore, poplar, ailanthus, ash, maple, Sophora, rarely thuja.

Due to the fact that the projected track OL 220 kV passes through cultivated countryside, biodiversity of animals here minimally and fauna is represented mainly by rodents (voles, house mouse, rat), avifauna (rooks, jackdaws, hoodie, starlings, various sparrows, mynah, doves, etc.), pets of farmsteads (cattle and small livestock, poultry).

1.7. Health status of the population

Assessment of health status of the population of Namangan region was carried out based according to statistical data from the Ministry of Health of the republic of Uzbekistan with averaged over the last five years for individual nosological data, compared with the average values for the Republic (table 1.7.1).

Table 1.7.1

Morbidity rate of the population, per 100,000 population.

Names of diseases	Namangan reg.	RUZ
1. Neoplasms	**73.6**	**71.0**
2. Diseases of the endocrine system	**3508.4**	**2449.9**
3. Diseases of the blood and blood-forming organs	**9796.8**	**7347.3**
4. Mental disorders	**353.8**	**267.2**
5. Congenital anomalies	**31.9**	**60.8**
6. Circulatory diseases	**972.0**	**1201.9**
7. Diseases of the respiratory system	**10914.0**	**11889.5**
8. Digestive diseases	**6569.3**	**5278.0**
9. Diseases of the genitourinary system	**2689.0**	**2280.3**
10. Diseases of the skin and subcutaneous tissue	**1899.6**	**2335.7**

In Namangan region morbidity rates of children with respiratory diseases is prevailing among the nosological groups, but lower than the average for the Republic. The next are the diseases of the blood and blood-forming organs, digestive, endocrine, genitourinary system.

Diseases of the respiratory, circulatory, digestive, skin and subcutaneous tissue, congenital anomalies are marked in the region, on the average, less than in Uzbekistan.

In the Republic recorded less than in Namangan region neoplasms, diseases of the endocrine system, blood and blood-forming organs. The second place is occupied by diseases of blood and blood-forming organs, followed by digestive diseases, nerves and genitourinary system, skin and subcutaneous tissue.

In general, the morbidity rate dominated by nosological groups in Namangan region similar to Republican indicators.

Thus, in accordance with the "Guidelines for ecological and hygienic zoning of the Republic of Uzbekistan on the danger level of public health" the study area belongs to the area with tight ecological situation in terms of morbidity rate of population.

2. SOCIO-ECONOMIC ENVIRONMENT

Implementation of the project will improve the stability of the Uzbek power system, serve for procurement of energy conservation newly introduced consumers of Ferghana Valley, reduce electricity losses during transportation, improve efficiency and security of supply of industrial and civil objects of eastern regions of Uzbekistan.

In addition, the project will lead to a partial increase in employment in Namangan region, as labour will be involved at the stage of construction works and operation of the track OL 220 kV (emergency repair and routine maintenance by forces of field service team).

Construction of OL 220 kV, generally, is not associated with the demolition of houses, except one unfinished private house, for which reason the change of living conditions of the population of the entire length of highway under construction is not expected. Instead demolished unfinished private house currently is allocated land for construction of new houses and gardens.

3. DESCRIPTION OF THE DESIGN CONSIDERATION, DETECTION SOURCE OF ENVIRONMENTAL IMPACT

3.1. Brief description of OL track.

The beginning of approach lines and the end of approach to power lines of future charging OL 220 kV are planned from the north-west outskirts of the villages of Namangan on the territory of the beginning of existing right-of-way active OL 110 and 220 kV at 220 kV Sardor SS, located in Namangan.

However, the beginning of approach line and the end of approach to power line of OL 220 kV Kyzyl-Ravat-Sardor on Turakurgan TPP scheduled from existing supports No. 19 and No. 15 respectively.

The beginning of approach line OL 220 kV Crystal-Sardor on Turakurgan TPP scheduled from the new support, which will be installed in its site between intermediate supports No.189 – No. 190. The end of approach to power line is the existing anchor and angle tension towers No.192 (pic.P.1).

From the corner No. 1, all four lines go on approach north-westward to the planned No. 3 corners, passing mainly cultivated lands and crossing on this section of OL 110 kV, asphalt road Namangan-Kasansay and moderate pressure gas pipeline (Ø100mm).

Having approached from angles No.1 to angles No.3, all four lines of route of approach lines and approach to power lines to angles No. 4 go west- north-westerly direction (in a roundabout way from the north Semiztepa village) in the same corridor is almost parallel, with a small deviation due to bypass residential buildings in order to avoid their demolition In this part the lines of rout continue on going through arable land, cross gardens, channel, ditches, fields and one asphalt road, two 6 kV OL and light line.

Bypass of Semiztepa village from the north associated with the exception of the intersection projected OL with the existing OL 220 kV Obihayot –Sardor, which passes from its southern side near the existing residential buildings and there is no free corridor for the passage of another four OL.

Next from the angle No. 4 due to built-up areas, the complexity of the intersection of valley Kasansay River at the bottom of which along the highway Turakurgan-Kasansay, go restrained conditions, lines of route "approach line" and "approach to power line" are divided into separate corridors of passing.

From angles No.4 lines of route diverge in pairs:

- Two lines "approach line" in the west-south-westerly direction along the arable land approach the angles No. 5, located from the north of the village Guzalkishlok;

- Two lines "approach to power line" in a southwesterly direction through the angles No. 5, in order to avoid demolition, approach the angles No.6, located in the south of the village Guzalkishlok.

Between angles No.4-5 of route of line "approach line" and angles No. 5-6 of route of line "approach to power line" the border passes between Kasansay and Turakurgan areas. Thus, from the beginning of stroke lines OL 220 kV to the border Kasansay with Turakurgan areas length of route of line "approach line" is 7.2-7.3 km, route of line "approach to power line" is 6, 5-7, 0 km.

After crossing the border areas route of lines "approach line" from angles No.5 by angles No. 6, No.7, No. 8 southward descend into the valley of Kasansay River, bypassing the village Guzal housing estates, cross Kasansay River and to the angle No, 9 go bypassing housing estates of the village Yartepa along the highway Turakurgan-Kasansay. From the angle No. 9 route of lines turn to the southwest and go up the foothills (angle No. 10), crossing the 110 kV overhead line. On a plot angle No. 6 - angle No. 10 the land is mostly cultivated, except small plots in the area of angle No. 6 and angle No. 10.

After crossing the border areas of route of lines "approach to power line" from angles No.6 in the south-westerly direction, bypassing the village Guzal from the south, over cultivated lands and partially over private vegetable gardens. Thus, in order to avoid double crossing with the existing OL 220 kV was made a resolution to demolish one of the unfinished house and

private allocation of new plots for vegetable gardens.

Angles No. 7,8,9 route of lines "approach to power line" cross cultivated valley of Kasansay River and after crossing the existing OL110kV go up the foothills, coming close to the route of lines "approach line".

After convergence all four OL go to the south-south-west direction of switchyard 220 kV of Turakurgan TPP mainly uncultivated sharply rugged terrain, except for the plot between the angles No.9-10 of route of lines "approach to power line".

Angles No.11, 12 of route of lines "approach line" and the angle No. 10 of route of lines "approach to power line" biased by distortion of route of lines from the chemical cemetery and broken ground.

Charging circuit OL 220 kV Crystal–Sardor at Kyzyl Ravat SS passes over Uychi district of Namangan region.

The beginning of charging OL 220 kV - the existing anchor and angle tension towers No. 90 installed at the intersection area of charging OL with existing OL 220 kV Sardo -Kyzyl-Rawat and Crystal-Kyzyl-Rawat.

From the existing anchor and angle tension towers (angle No. 1) route of line with small deviation angle in the north-eastward goes on approach to the existing OL 220 kV corridor entering Kyzyl Ravat SS. Next on the angle No.2) route of line turns to the sout -east and parallel to the corridor approaches Kyzyl Ravat (angle No. 3). Lands along the entire length are cultivated arable land.

Total length of charging OL 220 kV is 0.8 km.

Thus, generally, the route of line passes through farmland and piedmont areas.

3.2. Engineering proposal description

The total length of the route of line Ol220 kV under construction is 58.6 km, including Kasansay district is 28.0 km, Turakurgan is 30.6 km.

Lengths of straight and angles of rotation of the routes are presented in table 3.2.1 -

3.2.5.

Table 3.2.1

Approach line OL 220 kV "Kyzyl Ravat - Sardor" on Turakurgan TPP.

Angle No.	Stationing	Angle of route rotation	Direction of route rotation	Distance, m.	Note
Exist.sup. No.19 Angle	0+00.0	8°16'	right		Kasansay area 7.3 km
				153.3	
Angle 2	1+53.3	49°33'	right		
				1187.0	
Angle 3	13+40.3	3°	left		
				3000.0	
Angle 4	43+40.3	37°07'	left		
				2906.0	
Гр. рн.	72+46.3	-			
				640.0	Turakurgan area 7.8 km
Angle 5	78+86.3	33°02'	left		
				473.0	
Angle 6	83+59.3	37°26'	left		
				378.8	
Angle 7	87+38.1	44°03'	right		
				446.8	
Angle 8	91+84.9	49°26'	left		
				381.0	
Angle 9	95+65.9	67°	right		
				1292.3	
Angle 10	108+58.2	1°	left		
				1036.0	
Angle 11	118+94.2	41°10'	right		
				2512.3	
Angle 12	144+06.5	16°05'	left		
				664.0	
TTPP	150+07.5	65°	right		
Total:				15070.5	

Table 3.2.2

Approach line OL 220 kV "Crystal-Sardor" on Turakurgan TPP.

Angle No.	Stationing	Angle of route rotation	Direction of route rotation	Distance, m.	Note
Exist.sup. No.191-192 Angle 1	0+00.0	72°04'	right		Kasansay area 7.2 km
				173.8	
Angle 2	1+73.8	8°32'	left		
				1098.5	
Angle 3	12+72.3	4°03'	left		
				3001.3	
Angle 4	42+73.6	37°02'	left		
				2892.8	
Area border	71+66.4				
				635.8	Turakurgan area 7.8
Angle 5	78+02.2	33°02'	left		
				447.8	
Angle 6	82+50	37°26'	left		
				381.3	
Angle 7	86+31.3	43°54'	right		
				440.3	
Angle 8	90+71.6	48°54'	left		
				494.8	
Angle 9	95+66.4	70°29'	right		
				1278.8	
Angle 10	108+45.2	6° 17'	left		
				1017.0	
Angle 11	118+62.8	39°09'	left		
				2450.8	
Angle 12	143+13	13°46'	left		
				685.8	
TTPP	149+98.8	67°	right		
Total:				14998.8	

Table 3.2.3

Approach to power line OL 220 kV "Crystal-Sardor" with Turakurgan TPP.

Angle No.	Stationing	Angle of route rotation	Direction of route rotation	Distance, m.	Note
Exist.sup. No.192 Angle	0+00.0	8°24’	left		Kasansay area 7.0 km
				426.8	
Angle 2	4+26.8	78°55’	left		
				1043.5	
Angle 3	14+70.3	33°43’	left		
				3063.8	
Angle 4	45+34.1	54°18’	left		
				2015.3	
Angle 5	65+49.4	22°35’	left		
				438.3	
Area border	69+87.7				
				714.5	Turakurgan area 7.5 km
Angle 6	77+02.2	35°21’	right		
				1019.0	
Angle 7	87+21.2	6°57’	right		
				1588.8	
Angle 8	103+10.0	34°05’	left		
				251.8	
Angle 9	105+61.8	1°50’	left		
				1224.0	
Angle 10	117+85.8	11°33’	left		
				2674.5	
TTPP	144+60.3	00°00’			
					14.5 km
Total:				14460.3	

Table 3.2.4

Approach to power line OL 220 kV "Kyzyl Ravat - Sardor" with Turakurgan TPP.

Angle No.	Stationing	Angle of route rotation	Direction of route rotation	Distance, m.	Note
Exist.sup. No.15 Angle	0+00.0	9°58’	left		Kasansay area 6.5
				142,5	
Angle 2	1+42.5	77°52’	left		
				901,3	
Angle 3	10+43.8	36°04’	left		
				3041.0	
Angle 4	40+84.8	54°08’	left		
				1968.8	
Angle 5	60+53.6	22°36’	left		
				475.8	
Area	65+29.4				
				665.0	
Angle 6	71+94.4	34°29’	right		
				1277.0	
Angle 7	84+71.4	2°00’	right		
				917.3	
Angle 8	93+88.7	23°48’	right		
				453.5	
Angle 9	98+42.2	53°37’	left		
				1481,5	
Angle 10	113+23.7	11°52’	left		
				2664.3	
TTPP	139+88.0	00°00’			
Total:				13988.0	

Table 3.2.5

Charging OL 220 kV "Sardor-Crystal" on Kyzyl-Ravat

Angle No.	Stationing	Angle of route rotation	Direction of route rotation	Distance, m.	Note
Exist.sup. No.90 Angle	0+00.0	10°21’51”	right		Uychi area
				132.9	
Angle 2	1+32.9	69°41’38”	right		
				603.2	
Angle 3	7+36.1	39°48’48”	right		
				36.0	
Kyzyl Ravat SS	7+72.1				
Total:				772.1	

Placing of the route of line in the area of the intersection with engineering constructions made in accordance with existing regulations and agreed with interested organizations.

As the basic material of supports was adopted metal in the project.

Intermediate and angle supports on OL were adopted metallic.

195 supports are set in all on the route of line OL 220 kV.

Load computation for the support is made for wind pressure 50 daN/m^2 and a thickness of rack of slippery surface is10 mm.

Choice of foundations for support was made in compliance with typical projects No.No. 407-4-41, 407-4-42 "Installation Drawings of foundations under standardized steel anchor-angular and intermediate supports OL 35-330 kV.

Concrete grade for structures of vibrated concrete:

1) By resistance to frost F100; 2) By water resistance W4

Structures of vibrated concrete are assumed to make of concrete on sulphate-resisting port land cement.

Concrete grade of centrifuged towers of reinforced concrete support:

1) By resistance to frost F150;

2) By water resistance W6.

Concrete of ferroconcrete centrifuged towers of supports is assumed to produce on sulphate-resisting port land cement.

Metalwork of steel support will be made: welded – from steel, grade B Ст.3 ПС 5, pinned - from steel, grade B Ст.3 ПС 6 according to GOST 380-88."

According to the requirements of CNR 2.01.- 11.96 "Protection of building constructions from corrosion," the foundations installed in moderately aggressive ground coats, are protected by asphalt waterproofing in 2 layers on prime coating.

To prevent corrosion, metalwork is painted in 2 coats of paint.

Due to the fact that the material on the lay of line OL is presented by material of II group, foundations for the metal supports are set in dug lobes.

Soils are cultivated by excavator with bucket capacity of 0.5 m^3 with loading on dumping truck and delivery to the backfill site.

Backfill of lobes is produced by soil of useful excavating manually and by bulldozer.

Earth compaction is made in backfill by air rammer manually.

Metal supports are set using the tractor and falling boom.

Running-off operation is performed by tractor from take-off trolleys.

For bird protection against electric shock, prevention of pollution and flashover insulation at the butts of the traverses of intermediate supports and on the traverses of angle bearings, where is provided dribbling of drag by a suspension string over each supporting string is set bird guard.

In order to prevent theft of items bolted bearings welding of nuts is provided to bolt bodies in 3 places to the height of the lower traverse followed by painting welds.

Due to the fact that construction is planned in an area where the number of storm hours exceeds 20 in a year, OL 220 kV protection from direct lightning strikes is provided.

Supports are equipped with an electrical ground.

Earthing devices are made of round steel 12 mm diameter and are laid on noncropland to a depth of 0.5 m, and the arable is not less than 1 m.

Volume of electricity supply network construction includes the charging of OL 220 kV Crystal - Sardor on Kyzyl-Rawat SS, for connect of which is required the reconstruction and expansion of SS 220/110/10 kV.

As part of the reconstruction and extension of the Kyzyl-Ravat SS is offered:

- reconstruction of switchyard 220 kV with the transition to the scheme "two working and transfer busbars" with the construction of the bypass (BSB) and coupling (CCB) circuit breakers;

- expansion of switchyard 220 kV 1 linear cell;

- replacement of existing autotransformer 2*125 MVA for 2*200 MVA;

- reconstruction of existing autotransformer cells with replacement cells with replacement of 220kV sulphur hexafluoride switch, disconnectors replacement and installation of separate current transformers - 2 cells;

-Switchyard 110 kV. Replacement of equipment of existing transformer cells110 kV.

- replacement of equipment of cells of existing of the bypass (BSB) and coupling (CCB) circuit breakers 110kV.

Felling of trees and demolitions in laying tracks and reconstruction Kyzyl-Rawat SS is not provided with the exception of demolition of one unfinished house on the outskirts of the village Guzal.

3.3. Detection source of environmental impact

Analysis of design consideration revealed no emission sources for pollutants into the atmosphere during operation of OL 220 kV. During operation Kyzyl-Rawat SS after

reconstruction by emission source of oil separation of mineral oil are two 200 MVA

autotransformer on loading and unloading operations. Application of sulphur hexafluoride switch instead of widely used on the existing substation of oil-switch will eliminate emissions of nitrogen dioxide and oil vapors to atmosphere.

Equipment of SS and OL is the source of the noise and electromagnetic impact on the environment.

During construction works, environmental impact is determined by:

- by air pollution by exhaust gases of vehicle and construction equipment used in the delivery of equipment and building materials during the construction and installation work on the construction of supports; by inorganic dust in conducting construction works; by welding aerosol, manganese compounds during welding works; by pairs of organic solvents, aerosol paints and varnishes during painting works. That is emissions, mainly carried out on mobile vehicles and fugitive sources. Stationary source of emissions does not exist;

- by noise and vibration construction mechanisms;

- by the effects of electric and magnetic fields, electric current;

- by withdrawal of land resources for temporary use for accommodation of building structures, storage areas for construction materials and waste generated during construction;

- by withdrawal of land resources for permanent use under support .

According to the list of basic vehicles and mechanisms used in the construction OL (Table 3.3.1) for the construction works related to the emission of air pollutants will be used 13 units of basic vehicles and construction machinery of various hoisting capacity and power, working on diesel fuel and gasoline.

Table 3.3.1

List of basic vehicles and machinery, used in the construction of OL 220 kV and reconstruction Kyzyl-Rawat SS

Item No.	Name of the vehicle (mechanism)	Fuel Type	Carrying capacity (power)
1.	Lorry KAMAZ, 1 pc.	diesel fuel	8 tons
2.	Lorry KRAZ, 1 pc.	diesel fuel	7 tons
3.	Forklift, 1 pc.	diesel fuel	5 tons
4.	Bulldozer, T-100, 1 pc.	diesel fuel	79 kW
5.	Bulldozer, T-130, 1pc	diesel fuel	96 kW
6.	Mobile compressor, ЗИФ-55, 1 pc.	diesel fuel	35 kW
7.	Truck crane, КС-4501, 1 pc.	diesel fuel	10 tons
8.	Tractor, 1 pc.	diesel fuel	16 tons
9.	Watering machine, 1 pc	petrol	6000 l
10.	Drilling machine МРК-750, 1 pc	diesel fuel	79 kW
11.	Truck tractor, 1 pc	diesel fuel	15 tons
12.	Shovel excavator crawler, 1 pc.	diesel fuel	0,5 m^3
13.	Mobile of power station, 1 pc	diesel fuel	

List of raw materials, use of which during construction works will increase the emission of pollutants to atmosphere, represented table 3.3.2.

Table 3.3.2.

List of raw materials used in the construction of OL 220 kV and reconstruction of Kyzyl-Rawat SS

Item No.	Name	Unit	Quantity
	Painting		
1.	Solvent P60	T	0.018
2.	Mastic	T	1.2
3.	Enamel ПФ-115	T	0.03
4.	Paint БТ-177 silver	T	0.182
5.	Oil paint nitrocellulose enamel	T	0.021
	Support erection		
6.	Concrete heavy	m^3	4.2
7.	Sand	m^3	45
8.	Crushed rock	m^3	122.5
9.	Sand-and gravel mixture	m^3	58.8

During the construction of OL, pollutants of 13 items in all, listed in Table П.3.1 go to atmosphere.

During demolition and construction works waste of 7 items are formed from, including:

III class of danger - 1;

IV class of danger – 5.

Sources of waste are:

- dismantling;

- construction work;

- cleaning of temporary offices and construction sites.

Wastes, generated during the demolition and construction works: wastes of metal, concrete, reinforced concrete (IV class of danger), waste of paints, cleaning material contaminated by oil (oil content less than 15 %, III class of danger), waste of heterogeneous mixture solidified plastics (containers of paint, IV), MSW (garbage from temporary welfare spaces, unsorted, except bulky, IV).

Construction organization prime contractor accomplishes collection and temporary storage of MSW and industrial waste generated during demolition and construction, in specially equipped areas with subsequent removal of deposit to specialized organizations under the contract for civil and erection works. Organization prime contractor bears full responsibility for sanitary-epidemiological and environmental setting before the customer and inspection bodies.

Impact on the environment with the use of the measures for the collection and disposal of waste during the demolition and construction works will have a low probability. Construction organization prime contractor accomplishes collection and temporary storage of MSW and industrial waste generated during construction, in specially equipped areas with subsequent removal of deposit to specialized organizations under the contract for execution of civil and erection works. Organization prime contractor bears full responsibility for sanitary-epidemiological and environmental setting before the customer and inspection bodies.

Impact on the environment with organization of collection and disposal of waste during the construction works will have a low probability.

4. ANALYSIS OF THE ENVIRONMENTAL IMPACT

4.1. Pollutants supply

During operation of OL 220 kV air pollution does not occur.

Temporary local air pollution is expected during construction.

Duration of construction works according to the plan of construction organization is 7 months.

Calculation of emissions of pollutants during construction works (Appendix 3) was performed according to requirements of the Regulations for the inventory of pollution sources and standardization of emissions into the atmosphere for enterprises of the Republic of Uzbekistan. (Reg. No.1553 of the Ministry of Justice dared 03.01.2006, Tashkent, 2006).

During the construction of OL 220 kV4, 164 tons/year of pollutants in all go to atmosphere.

The largest contribution to pollutants supply during operation of construction equipment make: carbon monoxide (0.815 tons/year, 19.6 % of the total weight of emissions), hydrocarbons (0.849 tons/year, 20.4 % of the total emissions), carbon dioxide N (0.81 tons/year, 19.5 % of the total emissions). Supply of other 10 ingredients is 40.5 % of the total mass emissions.

To determine the level of exposure of emissions from the construction of OL 220 kV to atmosphere, pollutant concentration have been calculated on the program "Ecologist" on an area of 2.0 x2.0 km in increments of 0.1 km . Technical characteristics of emission sources, meteorological parameters and coefficients, defining the nature of dispersion of chemicals in atmosphere of the area of passing route were used as the initial data.

The results of calculation of dispersion of pollutants in the atmosphere during the construction of OL 220 kV in the form of dispersion maps are shown in Fig. 4.1 – 4.11 (Appendix 4).

Analysis of dispersion calculations showed that the greatest contribution to atmospheric pollution makes emissions of nitrogen dioxide, xylene, iron oxide and manganese compounds (Fig. 4.1 - 4.3, 4.8), the maximum concentrations of which do not exceed the quota approved by State Committee for Nature (Table 4.1).
Maximum concentrations of other pollutants, caused by emissions during the construction of 220 kV HV lines, also do not exceed the quota allowed by State Committee for Nature of the Republic of Uzbekistan for pollutants appropriate hazard class and businesses located in Namangan region.

Table 4.1.

Characteristics of atmospheric pollutants and the level of pollution of the atmosphere

Name of pollutant	MPC or SRLI, mg/m^3	Hazard class (SRLI,)	Established quota (in fractions of MPC)	Maximum concentration (in fractions of MPC)	Compliance with the quota (+,-)
1	2	3	4	5	
Aldehydes	0,02	2	0,20	<0,01	+
Benzapyrene	$1*10^{-6}$	1	0,20	<0,01	+
Nitrogen peroxide	0,085	2	0,20	0,20	+
Sulfur dioxide	0,5	3	0,25	0,01	+
Xylene	0,2	3	0,25	0,22	+
Manganese and its compounds	0,005	2	0,20	0,16	+
Oxides of nitrogen	0,6	3	0,25	0,01	+
Ferrous oxide	0,2	3	0,25	0,18	+
Carbonic oxide	5,0	4	0,33	<0,01	+
Inorganic dust	0,15	3	0,25	0,17	+
Carbon black	0,15	3	0,25	0,01	+
Carbohydrates	1,0	4	0,33	0,01	+
White spirit	0,2	2	0,20	0,04	+

Temporary and local air pollution of atmosphere ин pairs of transformer oil (hydrocarbons) is expected at loading and unloading operations during operation of the “Kyzyl- Ravat” SS. In this case, release of oil vapors will be 0.00012 tons per year. Calculation of emissions (Appendix 4) was performed according to the instructions for the inventory of pollution sources and standardization of emissions into the atmosphere for the enterprises of the Republic of Uzbekistan (Reg. № 1553 of the Ministry of Justice dated 03.01.06., Tashkent, 2006).
It was calculated the concentrations of pollutants on the program "Ecologist" on an area of 3.8 x 2, 8 km with interval of 200m to determine the level of exposure emissions on air during the operation of the “Kyzyl – Ravat” SS. Technical specifications of emission sources,

meteorological characteristics and factors were used as the initial data that determine the nature of dispersion of chemicals in the atmosphere of the SS location.
The results of calculation of dispersion of pollutants in the atmosphere during the operation of the SS in the form of dispersion maps are shown in Figure P-4.12.
Atmospheric pollution by hydrocarbons at oil change will be 0.07 MPC and will not exceed the allowed quota of 0.33 MPC for pollutants 4 hazard class and businesses located in Namangan region.
Maximum concentrations of pollutants in ambient air will remain at the same level after the reconstruction of substations and construction of 220 kV HV lines compared to the existing state as caused concentrations of pollutants are temporary, only for the period of construction.
Drop the above-mentioned ingredients to the soil, plants and surface waters negligibly small and impact on these objects will be marginal.

4.1 Supply of acoustic noise and vibration, impacts of the electric field

Overhead noise is caused by corona discharge on the wires. According to the project, wires were chosen so that the tension on the surface of the wire does not exceed the initial tension of corona discharge. However, irregularities on the surface of the wires lead to an increase in the local electric field intensity due to the mechanical damage (burrs, scratches), dirt (grease droplets, particles), precipitation (rain, dew, snow, etc.). As a result, corona discharge occurs on the lines with a voltage lower than the voltage of self-discharge in pure intact wires. Therefore, the noise of HV lines can be heard in good weather, but it is especially enhanced during the rain.

Permissible noise level is 45 dBA in an area directly adjacent to apartment houses (construction rules and regulations 2.01.08-96. Noise protection).

Expected noise level is 17.70 dBA at a distance of 100 m from the 500 kV HV lines, which is below the allowable 45 dBA.

Measures for noise protection is not required because the noise level at the boundary of the nearest apartment houses does not exceed the permissible level according to Construction rules and regulations 2.01.08-96.

Noise impacts during construction works will take place in three stages:

During mixing of concrete;

During the installation of the supports.

Typical levels of expected noise during the construction phase are shown in the Table 4.1at 15 m from the construction equipment

Table 4.1

Typical noise impact during construction works

Equipment	The maximum level of expected noise at 15 m (dBA)
Cement-mixers	87

Cranes	86
Paint sprayers	89
Excavators	90
Welding machines	73
Trucks	87

All the most noisy construction works on the installation of supports near residential areas, in particular, all works on the movement of soil are limited by daytime hours.

Thus, the noise associated with the construction activities will be temporary and periodic in nature, and will not exceed the noise standards.

Expected impact of the vibrations:
- During soil compaction and pavements;
- During operating of jackhammers;
- When concrete mixtures are compacted;
- During operation of conveyors for moving bulk materials, such as sand.

Vibrations associated with construction works will be temporary and periodic nature, and vibration impacts will not be distributed beyond the boundaries of the working area.
Noise reduction up to the standard in residential areas close to the "Kyzyl – Ravat" SS is achieved by using gas-insulated switches, characterized by lower performance in terms of noise compared to the oil circuit breakers.

4.2. Effect of the magnetic field

Expected level of the maximum intensity of the magnetic field will be 7.76 A / m, which is significantly below acceptable standards. Maximum Acceptable Level of magnetic fields is set depending on the stay of people in it. In accordance with hygiene requirements it is allowed 8 hours of staff standing in a magnetic field up to 80 A / m at a total exposure (the whole body) and up to 800 A/m at a local exposure (on the limb).
Consequently, the impact of HV lines to the environment on the level of the magnetic field is in the normal range, the measures to protect personnel and the population from the magnetic field generated by sources of EMI overhead wires is not required.

4.3. Electric current effect

Construction of 220 kV HV lines is performed so that the effect of the electric voltage and the current is limited by the size of the sanitary protection zone.
The object of the electric current effect can be maintenance staff which is standing along the routes of the HV lines, as well as the people and animals - when setting out to potential grounding devices at currents flowing through them short-circuit and lightning.
Damaging effect of electric current on the human body is characterized by the cessation of the heart, respiratory system, nervous system, and in extreme cases – fatal.
According to GOST 12.1.038 – 82, the rate of electric current passage through the body of the human without adverse health effects - 0.3 mA during the normal operation of electrical equipment and 6 mA - in emergency mode of operation and duration of exposure more than 1.0 sec.

Design supports meet the requirements of safety standards.
Reconstruction of "Kyzyl – Ravat" SS is performed so that the effect of the voltage and the current is limited to the territory of the SS site fence.
It is provided the following measures to ensure the safety of repairs and maintenance of substation and 220 kV HV lines:
- embankment of the current carrying parts;
- necessary insulation distances between conducting parts and the individual connections;
- walkways and driveways;
- electromagnetic and mechanical locks;
- protective earthing connection;
- operating and maintenance lighting.
Design of transformers, electrical devices, switchgear cabinets meets the requirements of safety standards.

4.4. Effects on vegetation and land

Damage to woody vegetation is not expected during the construction of small plants with 220 kV HV lines on Turakurgan TPP and "Kyzyl – Ravat" SS and during reconstruction of "Kyzyl – Ravat" SS, extraction of timbers across the road is not provided. Gardens and ornamental trees are saved in roadside plantings, crossed the highway. It is supposed to conduct high ornamental tree pruning to comply with the necessary conditions on the wire breakages and the trees not less than 4m. Fruit trees are not subject to cutting and uprooting during the project implementation, because support highways are installed at higher elevations of the relief in front of and behind the territories which cross the gardens, and the distance from dwarf varieties of fruit trees to overhead wires meets standards.
Overhead highway does not pass through forested area, the value of which is determined by the stocks of valuable wood and medicinal plants. The highway does not affect the land occupied by valuable agricultural crops, reserves and sanctuaries. Main types of land on which the highway passes - arable land, agricultural land under cotton, grain, vegetable crops, rice crops and vineyards, as well as, to a lesser extent - is inconvenient. Highway direction is chosen along the direction of the treatment fields and field boundaries when laying highways for arable lands in order to minimize damage.
Effects on vegetation are not expected during the reconstruction of the "Kyzyl – Ravat" SS. No green plantings on the territory of the SS.
Thus, damage to woody vegetation during the construction and reconstruction of "Kyzyl – Ravat" SS is not expected.
Indicators on the areas of land allotment for the construction of 220 kV are discussed in the next section when analyzing the extraction of natural resources. Supports will be installed mainly on agricultural land (on the border of arable land), without affecting the private possession of land, and uncultivated land are industrial land, roads, irrigation and drainage network. Free lands between fields and abutment will be used for the installation of equipment, as well as country roads. Construction works are carried out after harvest of crops on irrigated arable land.
The present project provides allotment of land for permanent use under the supports of highways 220 kV HV lines of Turakurgan TPP and the expansion of "Kyzyl – Ravat" SS is 45 times less than for temporary use during the construction period (right of way for 220 kV HV lines at a rate of 15m and for the pits supports (intermediate - 550 m, anchor-angular - 700 m^2).
The project envisages the implementation of measures on rehabilitation of lands seized for temporary use: re-cultivation and restoration of top soil, and backfilling the trench pits, lining turf slopes and slopes.
It is supposed to perform a set of measures for mechanical and biological re-cultivation in order to save the most fertile topsoil prior to launching of construction works. It includes preliminary

removal of the top layer of turf and humus soil, storing it in a small pile of soil along with construction works and at the completion of construction works - laying it on top of the escarpment support HV lines, or mounds of existing roads as re-cultivation layer.
In addition, additional sowing of turf grasses will be done around the pit in loose soil.
Compensation for withdrawn lands at permanent use will be conducted immediately prior to construction works. Costs will be determined on actual works.

4.5. Impact on relief, soils and groundwater

Mechanical disturbance of relief occurs during the construction works on the creation of pits under the foundations, with the device mounting pads and temporary roads.
Impact is assessed as minimal in terms of flat terrain on route of the highways. Temporary pit formation with its subsequent backfilling and compaction of soil eliminates the creation of additional forms of micro and mesorelief. Impact on the relief on the flat part of the territory is estimated as a reversible. Withdrawal of ground is excluded due to full use of soil from excavation at backfilling, leveling and reverses backfilling, leveling and backing of upper humus horizon as re-cultivation layer on the site backfilled pit.
The measures for groundwater drainage system under support of excavation is not required due to the groundwater table on the highways of small plants with 220 kV HV lines on Turakurgan TPP at the level of more than 3 m, and in the area of "Kyzyl – Ravat" SS - 7 m.
It is not expected the sloughing of the soil and reduce the stability of the supports and as a consequence, additional surcharging of foundations and tamping the soil are not provided.
Thus, impact on soils and groundwater is not expected on highways of 220 kV HV lines of Turakurgan TPP.
Deepening pit up to 3 m does not cause undercutting of the aquifer as groundwater lies at more than 3m in the conditions of hilly plains.
Deep groundwater status also excludes landslides at the installation support on a slope, since the height of the inner slope side-hill fill at 1-1.5 m in groundwater level is not trimmed.
The most dangerous negative processes are drawdown and erosion at the construction of a small shelf under the loess ground support. Following measures will contribute to the reduction of the likelihood of beginning the processes of erosion and subsidence at the site under the support:
- Device support sites in the watershed;
- Device support sites obviously eroding slopes and erosion furrows;
- Compaction of soil in the trench during backfill.

Significant action is to preserve the fertile humus horizon and sod. For this work, removal of the top soil horizon 10-15 centimeter is planned before the starting of works on the site is expected to conduct a support, which retains the bulk of the roots and ephemera and ephemerides, turf grasses. Layer is stored in the shaft at the edge of jobsite and after installation of foundations, excavation and backfill tamping backfilling; it is laid on top, as re-cultivation horizon. Planting of turf grasses are conducted around the area of the pit, where maneuvers of equipment are conducted.
Given the wide development of sites along the highways of 220 kV HV lines under irrigation farmland it is provided the diversion of irrigation water, seeping into the top 2-3 meter thickness of the foundation of poles by the construction of drainage ditches.
Implementing measures to ensure water evacuation from areas installation of support, located on the irrigated lands or near them, prevent such dangerous processes like erosion and slump. An important prerequisite for the construction of trenches is to perform trenches across the slope and up the hill from the site with support. The length and direction of tranches are linked to the existing drainage system.

Thus, the impact on the hilly terrain of the piedmont plains loess is expected weak in strength and intensity, but reversible in case of the implementation of measures to strengthen the soil, drainage system in the area of irrigation and prevention of erosion.
In general, the impact on relief, loess soils and groundwater is allowable across the road.
During regular inspections of HV lines equipment on the highways during its operation it is necessary to monitor the stability of the soil on the site above and below the hill, with the aim of early detection of manifestation of the shrinkage, slumping, erosion, and in the case of negative slope processes - immediately carry out works on ground stabilization.

4.6. Impact on surface waters

Riverbed width is 100 m on the highway crossing of a bottom land of 220 kV HV lines and the floodplain of the river Kasansay channel, which excludes intermediate support in the installation on the flood-channel part. Lack of work in floodplain river channel part of the Kasansay River excludes impact on the channel morphology, groundwater and surface water, as well as floodplain biocoenosis and fish fauna.
The device supports of HV lines at levels above the maximum flood discharge will reduce the likelihood of accidental fall supports at the passage of debris flows on the riverbed.
Thus, the design decisions on the sity regarding to surface watercourse crossing of the highway of 220 kV HV lines of Turakurgan TPP will ensure the exclusion of impacts on surface water during the construction works and the safe operation of the road in the coastal zone.

4.7. Impact on wildlife

Impact on some groups of animals and birds is expected on the entire length of the highway during the construction works and operation of HV lines. Intensity, extent and scale of the impact on individual species of fauna will differ because of differences ecology habitat prey, mode of life.
High-voltage effects can occur, mainly for birds, which use supports for leisure and less - to create nests during the operation of 220kV HV lines. In general, supports of HV lines are not a good place for nesting of birds, since the electric field of high voltage causes the violation of some physiological processes.
Negative consequences for the birds using HV lines support for temporary stay arise at the time of take-off and touch the wings of wires and spacers. In this case, the birds are killed by electric discharge. This example is characteristic mainly for lines with a voltage of 35220 kV, where the distance between the wires is too small.
It is provided the installation of special bird-scaring devices as wire brush, spiny tridents three-rods, spring designs, creating temporary vibrating effects to exclude the death and disease of birds that use the overhead support and facilities for recreation nests. These structures are attached to their belts traverse by wire or special metal cuffs before lifting of support. Special barrage colored umbrellas are accepted into operation recently which are installed over garlands. They are not only scaring birds with bright color, but also protect against contamination of garlands by droppings that extends HV lines operation without additional cleansing and emergency shutdowns.
Direct impacts associated with the violation of dwellings and partly to the destruction of prey, may be associated with such species as small birds, rodents, medium and small mammals.
Impacts associated with the destruction of homes of animals will be limited and local because the areas of work on the construction of trenches and road shelves occupy small areas. However, it is necessary to bypass the areas with warrens and other types of animals housing during the conduction of works on construction of grounds for supports and shelf roads.
The construction works should be done in the late summer and autumn in order to reduce the

impact on the rearers at breeding and feeding.
Impact of noise is expected on all groups of fauna during construction. The impact of noise from construction equipment will be periodic, not intense, slightly increasing after delivery of the equipment to the site. Noise as a factor of concern, allows animals to migrate to a safe distance from the construction work with the gradual increasing the volume of works associated with the supply of equipment.
Impact on fish fauna along the highway of HV lines is excluded thanks to the use of single-span transitions without facilities of transitional supports and construction works outside the body of water at a distance of 60-100m from the water's edge.
Impact of agriculture irrigated area on animal is weak by intensity because almost no valuable objects of Wild Fauna amongst the farmland. Construction works are necessary to carry out on the highways of HV lines at the spring, prior to plowing on sites allocated for spring crops and during the autumn, before the agricultural works on sites allocated for winter crops for conservation of animals living near irrigated land and among the fields.
Impacts on wildlife due to location in a densely populated area of the Uzbekistan are not expected during the reconstruction of the "Kyzyl – Ravat" SS and its operation.

5. ASSESSMENT OF IMPACTS DETERMINED BY WITHDRAWN OF NATURAL RESOURCES FROM ENVIRONMENT

Commissioning of 220 kV HV lines of Turakurgan TPP and "Kyzyl – Ravat" SS associated with the withdrawal of land, natural resources in the form of building materials supplied in the amount of ranging from 4.2 to 122.5 m according to Table. 3.3.2, as well as oil products in the form of diesel-oil and petrol for vehicles and construction machinery.
Area of land allotment of various types (arable land,
bogharic lands, and wasteland) for the construction of 220 kV HV lines highways (under the support) and the expansion of "Kyzyl – Ravat" SS for permanent use is 2,277 hectares. In this case, removal of arable land will be 1,122 ha, or 49% of the total allotment of land for permanent use.
Allocation of land for temporary use (for installation of temporary roads and construction base organization) is 101.23 ha. In this case, removal of arable land will be 71.058 ha or 70% of the total allotment of land for temporary use.
Data on the alienation of land for permanent and temporary use are shown in Table 5.1-5.5.
The tables are prepared on the base of the norms of allotment of land for electric networks 0,4-750 kV (Construction norms and rules 2.10.08-97) for 220 kV HV lines. Distance between supports is accepted about 250-300m.
Preliminary allocation of land: 1. In permanent use under support (averaged): intermediate - 60m, anchor-angular-105m.
2. Temporary use during the construction works: easement area for 220 kV HV lines -15m, under the pits supports: intermediate - 550m, anchor-angular - 700m^2.
A security zone in the form of a band width of 1 8 m is provided in the construction of HV lines (9m in each direction from the extreme wires) within which it is prohibited all types of construction works. At the same time, tree - shrub planting is allowed with height of 3-5 m and a width of the operational corridor under the HV lines of 2.5 m. Species of local flora are the basis for these purposes of the developed assortment of woody plants as the most environmentally sustainable soil and climatic conditions of Namangan region (tamarisk) and cultivars of fruit trees and bushes (apricot, peach, plum, apple, quince, Russian olive). Agrotechnics of soil

preparation, planting of fruit trees, care for them on the highway HV lines is similar to the highest in the industrial gardening. Specificity here is only a selection of assortment of fruit trees and their planting density determination.
It is recommended to divide the orchards partition section method of mixing, i.e. in one species trees are planted in certain areas during the mixing of varieties rows. Rows of fruit trees are planted along the HV lines highways, leaving the assembly and maintenance corridors unoccupied in the center, in such a way that the trees on the edges of the corridor it completely are screened.
The distance between the rows of trees and shrubs with small crowns
(Russian olive, blackthorn) is 2m, and the wider (plum, cherry plum, apple) - 3m. The distance between trees and shrubs is 1-1.5 m in the rows, mixing breeds - inline.
Thus, mainly arable lands are allocated for the construction of 220 kV HV lines. Withdrawn lands for the temporary use is subject to re-cultivation: the fertile layer of soil removed during the construction works is used for the device of embankments existing roads or is stacked on top of the escarpment support to fix it.
It is expected withdrawal of natural resources used as building materials (gravel, sand, gravel) at the stage of construction works. Consumption of construction materials is shown in Table 3.3. Delivery of gravel, sand, gravel road is planned by vehicles, mainly for the purchase from commercial organizations.

Table 5.1.

Alienation of land under 220 kV HV lines highway "220 kV HV lines approach of "Kyzyl Ravat-Sardor" on Turakurgan CHP-plant"

Land user		Name and length of cultivated lands, m		Withdrawn, m^2			
				For permanent use		For temporary use (under the strip and pits)	
		cultivated area	non-cultivated area	cultivated area	non-cultivated area	cultivated area	non-cultivated area
Republic of Uzbekistan Namangan region	Kasansay district	7100	200	1500	-	120150	3000
	Total for the district	7300		1500		123150	
	Turakurgan district	300	4800	1000	1150	52900	81400
	Total for the district	7800		2150		134300	
	Total for highway	10100	5000	2500	1150	173050	84400
		15100		3650		257450	

Table 5.2.

Alienation of land under 220 kV HV lines highway "220 kV HV lines approach of "Crystal Sardor" on Turakurgan CHP-plant

Land user		Name and length of cultivated lands, m		Withdrawn, m^2			
				For permanent use		For temporary use (under the strip and pits)	
		cultivated area	non-cultivated area	cultivated area	non-cultivated area	cultivated area	non-cultivated area
Republic of Uzbekistan Namangan region	Kasansay district	6850	350	1540	60	116000	5800
	Total for the district	7200		1600		121800	
	Turakurgan district	2900	4900	1000	1150	51400	82900
	Total for the district	7800		2150		134300	
	Total for highway	9750	5250	2540	1210	167400	88700
		15000		3750		256100	

Table 5.3.

Alienation of land under 220 kV HV lines highway "Exit of 220 kV HV lines "Crystal - Sardor" with Turakurgan CHP-plant."

Land user		Name and length of cultivated lands, m		Withdrawn, m^2			
				For permanent use		For temporary use (under the strip and pits)	
		cultivated area	non-cultivated area	cultivated area	non-cultivated area	cultivated area	non-cultivated area
Republic of Uzbekistan Namangan region	Kasansay district	6650	350	1540	60	113000	5800
	Total for the district	7000		1600		118800	
	Turakurgan district	4150	3350	1600	750	71100	56600
	Total for the district	7500		2350		127704	
	Total for highway	10800	3700	3140	810	184100	62400
		14500		3950		246500	

Table 5.4.

Alienation of land under 220 kV HV lines highway " Exit of 220 kV HV lines of Kizil-Ravat-Sardor" with Turakurgan CHP-plant."

Land user		Name and length of cultivated lands, m		Withdrawn, m^2			
				For permanent use		For temporary use (under the strip and pits)	
		cultivated area	non-cultivated area	cultivated area	non-cultivated area	cultivated area	non-cultivated area
Republic of Uzbekistan Namangan region	Kasansay district	6000	500	1440	60	102150	8050
	Total for the district	6500		1500		110200	
	Turakurgan district	4100	3400	1600	750	70350	57350
	Total for the district	7500		2350		127700	
	Total for highway	10100	3900	3040	810	172500	65400
		14000		3850		237900	

Table 5.5.

Alienation of land under 220 kV HV lines highway "Charging of 220 kV HV lines "Sardor-Crystal"on the Kyzyl – Ravat SS".

Land user		Name and length of cultivated lands, m		Withdrawn, m^2			
				For permanent use		For temporary use (under the strip and pits)	
		cultivated area	non-cultivated area	cultivated area	non-cultivated area	cultivated area	non-cultivated area
Republic of Uzbekistan Namangan region	Uchkurgan district	772,1	-	270	-	13532	-
	Total for highway	772,1		270		13532	
	Extension of the SS	-	50*146		7300		800
	Total for district	OHL -772,1, SS-50*146		7570		14332	

6. ALTERNATIVE CHOICES OF PROJECT SOLUTIONS

“Zero option”. Waiving from implementing of a project decision is considered as the "zero option". This excludes: improving of grid system stability in Uzbekistan, economical and reliable power supply for industrial and civil use, stable supply of energy-saving newly commissioning consumers of Ferghana Valley, reduction of losses in transmission of electricity.
Alternative choices of passage highway. The most economical options of HV lines highway construction are options on maximum straightened lines. However, natural barriers and engineering services on the route highways give it a shape of a broken line with rotation angles. 220 kV HV lines highway has 12 corners on the considered project.
Thus, the chosen highway of 220 kV HV lines has advantages in terms of impact on the environment and development of emergency risks.

7. IMPACT ASSESSMENT ON POSSIBLE EMERGENCY SITUATIONS

Emergency risks are mainly connected with a fall of supports and wires to the cliff closest approach to engineering services, residential buildings during the operation of 220 kV HV lines. Negative impacts are strengthened during the fall of support on intersecting roads (for example, Namangan-Kasansay highway at the initial part of the highway) for the environment in the event of such an accident many times resulting in damage of the fuel tank of a passing car cause fire and subsequent explosion. Thus, oxides of nitrogen, sulfur, carbon go into the atmosphere. Their concentration exceeds the permitted level several times in the range of up to 0.1 km.
Protection of HV line supports are provided on the roadside of motorways through parapet against transport collision, nuts welding bolts to the studs in the nodes of support on a height of 10m against vandalism to prevent the occurrence of such accidents.
Anti subsidence and drainage activities are conducted in close proximity to the Kasansay River during excavation works.
In addition, high equipment protection and emergency control are provided to reduce accident risk, taking into account the specificity of HV lines in accordance with the "Code for electrical installations".
There is a high probability of accidental risks during construction works on the highway of 220 kV HV lines Turakurgan TPP (angle #10) near to
toxic chemicals warehouse of JSC «Kishlokkhuzhalikkimyo» of Turakurgan district. Distance from the borders of chemical landfill to the highway of HV lines is 25 m. Migration of buried pesticides in soil; groundwater and soil leaching at atmospheric precipitation can be happened when boundary of landfill violations occurs by construction equipment. Therefore, it is necessary strict control of construction equipment operation and the integrity of structures for the land-buried chemicals.
Thus, the negative environmental impacts on the environmental in emergency situations on the highway of 220 kV HV lines are eliminated using of measures to strengthen supports with compliance of necessary breakage between HV lines and engineering services, residential development and the burial place of pesticides, using of high-frequency protection equipment and emergency control automatics .
Emergency risks during operation of “Kyzyl–Ravat” SS mainly connected with oil spillage with its subsequent fire, and fire in case of damaged transformers and in the event of short-circuit cable facilities.
Fire safety of SS is achieved by using the following design decisions provided in accordance with instructions for fire protection design of energy companies (RD 153-34.0-49.101-2003).

1. Oil drain from the transformer in the indoor sump to prevent the spreading of the oil and the spread of fire in case of damage of oil-filled transformers.
2. Installation of lightning protection device structures at the substation.
3. Compliance with fire breaks between structures and oil-filled equipment.
4. Cables are laid in ground reinforced concrete trays and trenches with the requirements and recommendations of Chapter 2.3, Electrical Installation Code, and ensuring fire safety in the cable sector.
5. The following primary fire-extinguishing appliances are provided: the powder and carbon dioxide fire extinguisher, sand boxes with a capacity of 0.5 m^3, fire fighting appliances (shovels, picks, scrap).

Lower plates of capacitors are grounded through the coil coupling filters to eliminate the life-threatening industrial frequency currents flowing through the coupling capacitors.
The distance from the coupling capacitor up to filter attachment does not exceed 1.5 m.
Lower plate of the capacitor is tightly grounded by disconnect in case of breakdown in coupling capacitor.
In accordance with the Circular, all power cables provided by the project are checked for non-combustion action short circuit currents.
In accordance with the fire safety rules for energy providers all cables provided by the project are accepted with flame retardant insulation. Fire sealing of cable lines are provided at the cable sector of substation.
The project takes into account the requirements of "Guidelines for the Protection of the secondary circuits of power stations and substations against impulse noise" to cabling and implementation of substation grounding device.
“Kyzyl – Ravat” Substation is not classified as hazardous installations, therefore special measures on explosion is not provided by the project.
The following measures on SS are provided to prevent contamination of soil, surface and groundwater with oil and water contaminated by oil in accidents and fire fighting, to drain the oil from transformers in accordance with the requirements of the Electrical Installation Code:
- device of closed oil line;
- oil collector bund.
Oil collector capacity is calculated on the full scope of the detention of transformer oil, based on the largest single equipment with the additional volume of water (20 m^3) in accordance with the requirements of RD 153-34.0-49.101-2003 and Recommendations for the design of drainage systems oil transformers ESP # 11099TM.
The following measures are planned by the project on the SS:
- Control of accidental water level in the oil collector;
- Removal of random water to the places, coordinated with the sanitary and epidemiological surveillance at least twice a year.

8. NATURE AND EFFECTS ON THE ENVIRONMENT

Impact of high-voltage lines is characterized as a mechanical impact and impact on the ambient air by the nature of the impact on the environment due to collection of pollutants during construction works.
Construction of power transmission lines connected with the alienation of land, which could affect to agriculture. Disordered arrangement of HV lines may break the integrity of fields and forage land.
The present project provides allotment of land for permanent use, on average, 45 times less than the temporary use. The project envisages the implementation of measures on rehabilitation of

lands seized for temporary use: re-cultivation and restoration of top soil, and backfilling the trench pits, lining turf slopes and slopes.
Projected highway of HV lines does not pass through forested area, the value of which is determined by the reserves of valuable wood and medicinal plants, hunting animals. The highway does not affect the lands occupied by valuable crops, reserves and sanctuaries. Arable land, cotton crops are main types of land on which the highway passes. Highway direction is chosen along the direction of the field cultivation and the borders of fields in order to minimize damage during laying highways on arable lands. Supports will be installed mainly on agricultural lands (on the border of field), and uncultivated lands, outside of industrial enterprises land, roads, irrigation and drainage network. Free lands between fields and abutment will be used for the installation of equipment, as well as country roads. Construction works are carried out after harvesting of crops on irrigated arable land.
Analysis of the land crossed by the highway of 220 kV HV lines shows that the tree plantations do not grow all over the road.
It is not expected the damage to woody vegetation when laying 220 kV HV lines, also it is not planned felling of trees across the road. Ornamental trees are saved in roadside plantings, crossed the highway, thus it is assumed to perform tall trees pruning to comply with the necessary conditions on the breakage between the wires and the trees not less than 4m.
The project envisages the implementation of measures on rehabilitation of lands seized for temporary use: re-cultivation and restoration of top soil, and backfilling the trench pits, lining turf slopes and slopes.
Prior to construction works it is supposed to perform a set of measures for mechanical and biological re-cultivation in order to save the most fertile topsoil. It includes a preliminary removal of the top layer of humus and turf soil, warehousing it into a small pile of soil near the site of the construction works and laying it on the top as a re-cultivation layer upon completion of construction works. In addition, additional sowing of turf grasses will be done around the pit in loose soil.
Compensation for withdrawn lands at permanent use will be conducted immediately prior to construction works. Costs will be determined on actual works.
Impact on ambient air in the form of pollutants supply is not expected during operation of HV lines. Temporary local air pollution is expected during construction works.
Pollutant emissions are carried out during construction works, including construction equipment and mechanisms operation, during the painting works, in case of working with bulk materials.
Atmospheric air is polluted by emissions of 14 pollutants, mainly by carbon monoxide, hydrocarbons, nitrogen dioxide.
Pollutant emissions will not change the air condition during the construction works.
Impact on the ambient air is estimated as temporary and local during the construction works.
Acoustic impact on the environment does not exceed the standard value of 45 dBA at the border of residential development on the highway of 220 kV HV line.
Impact levels of electric and magnetic components created by 220 kV HV line conductors of electromagnetic fields are in acceptable limits.
Project activities exclude the impact of electric current affects on humans and animals.
Thus, the impact on air emissions from sources of the construction facilities will not lead to a change in its condition.
The impact of the studied object on the environment significantly increases due to nitrogen dioxide, carbon monoxide and soot supply during fires, followed by an explosion in the event of emergencies, considered above.
The quality construction works and accurate performance of design solutions are the guarantee of HV line safe operation.
Emergency risks associated with flooding close to the Kasansay river bed are eliminated using technology decisions, envisaged in the project on the choice of the type of supports and technology of their installation.

Impact on surface water bodies and ground water, soil and vegetation is expected.
Organization system of construction sites collection, temporary storage and handling of waste will eliminate their impact on the soil.
Thus, the construction and operation of Turakurgan TPP 220 kV HV line subject to environmental protection measures in highway selection, construction and assembly works and operation are associated with low environmental impact, meeting the standard values.

9. MEASURES ON PREVENTION OF ADVERSE EFFECTS ON ENVIRONMENT

Technical project includes a number of measures to reduce the impact of construction facilities on the environment, as well as to eliminate the possibility of accidents.
It is supposed to continuously monitor the progress of the construction and installation works to identify the violations of the general requirements for conservation of nature: the movement of construction machinery and mechanisms in unknown locations, storage of structures in not intended areas for these purposes, dumping industrial oils and domestic water into water reservoirs by destruction of grass sods.
In addition to the proposed technical solutions, it is necessary to provide special containers for collection and temporary storage of each type of waste at the construction sites formed during the construction of 220 kV HV line and reconstruction of "Kyzyl – Ravat" SS, with subsequent removal of wastes to the specialized organizations and SDW landfills, determined by sanitary-epidemiological supervision bodies.

In addition, it is necessary strict control of construction equipment operation and the integrity of structures for the land-buried chemicals by JSC "Kishlokhuzhalikkime" Turakurgan district on highway of 220 kV Turakurgan TPP HV line (angle # 10). When trespass repository construction equipment can migrate buried pesticides in soil, groundwater and soil leaching at atmospheric precipitation. Migration of buried pesticides in soil; groundwater and soil leaching at atmospheric precipitation can be happened when boundary of landfill violations occurs by construction equipment.

Topsoil is removed and transported to places defined by landholder and later used to improve and restore the land in areas of excavation of pits for the installation of supports. The production costs of these works are provided by the resource estimate documentation.

Installation of supports is not performed in areas with gullies and natural pits.
Installation of anti bird rejectors are designed by project on pole arms and mesh caps on the upper ends of centrifuged racks in order to prevent nesting birds and landing on the 220 kV HV lines.
Emergency risks have been eliminated using the security facilities and automation during the operation of 220 kV HV lines.
Analysis of the adequacy of environmental protection measures stipulated by the project during the construction of highway HV line in the adyr area of highway is showed that the main engineering geological processes that determine the current state of the hillsides are areal and linear processes of erosion. Areal erosion is expressed during proluvial flushing of fine material and its accumulation at the foot of the slopes, while is developed everywhere on exposed slopes. Linear erosion is represented by jet erosion on hillsides.
Thus, the analysis of the conditions of the relief, state of soil and groundwater is revealed the necessity of measures for the construction of the supports in the adyr area to reduce infringed relief area. The project includes the installation of supports on the watershed surface hills with small shelving unit sizes from 50-60 up to 300 m to prevent the development of erosion and the drainage of surface water from the slopes in order to prevent erosion of the soil. Sufficiency of the proposed activities meets the requirements of engineering standards voltage overhead power lines of 35-750 kV and Regulations for Electrical Installation.
In addition, the recommended protective measures against dangerous exogenous processes during the operation of HV lines are:

- additional device along the upper edge of the upland slopes erosion ditches to catch surface waters, as well as trays and chutes at the foot of the hills;
- restoration of the disturbed areas of the grassy turf of the hills;
- regular cleaning of material washed off along the roads;
- maintenance cleaning of debris talus along the bottom of the hills;
- strengthening of slopes by dense turf cover.

The project provides the protection of wires from vibration, and ground rope supports according to the "Regulation of electric operation."

The following measures on “Kyzyl – Ravat” SS are provided to prevent contamination of soil, surface and groundwater with oil and water contaminated by oil in accidents and fire fighting, to drain the oil from transformers:

- device closed oil line;
- oil collector bund.

The following measures are planned by the project on the SS:

- control of accidental water level in the oil collector;
- removal of random water to the places, coordinated with the sanitary and epidemiological surveillance at least twice a year.

In addition, lightning protection device of substation structures, compliance with fire breaks between structures and oil-filled equipment, cabling in the ground reinforced concrete trays and trenches are provided during the reconstruction of SS, and the set of following primary fire-extinguishing appliances are provided: the powder and carbon dioxide fire extinguisher, sand boxes with a capacity of 0.5 m^3, fire fighting appliances (shovels, picks, scrap).

10. FORECAST OF ENVIRONMENT CHANGES AS A RESULT OF IDENTIFIED IMPACTS

Assessment of environment change is showed the following results in the result of the conducted work.

Atmospheric air. Commissioning of 220 kV HV line and reconstruction of “Kyzyl – Ravat” SS will not change the condition of air. Air condition still will be permissible during the operation of the 220 kV HV line.

Surface water. Surface water will not change; impact on surface waters is not expected.

Soil, vegetation. State of soil and vegetation will not change after project implementation.

Soils and groundwater. Operation of 220 kV HV line and “Kyzyl – Ravat” SS at normal mode will not affect on the quality of soil and groundwater. Groundwater conditions will remain permissible.

The project realization will reduce the accident risks during the operation of 220 kV HV line and “Kyzyl – Ravat” SS.

CONCLUSSION

Assessing the impact of construction small plants on the existing 220 kV HV line at Turakurgan TPP and "Kyzyl - Ravat" SS with reconstruction of "Kyzyl – Ravat" in Namangan region is conducted based on a review of existing environment condition, socio-economic aspects and technical solutions.

Highway of 220 kV HV line with total length of 58.6 km will pass through the Namangan region. In general, the territory in question belongs to the zone with acceptable environmental situation. However, there are areas of potential environmental risks posed by the intersection of utilities, gardens and proximity to residential development along the road of laying highways. There are no protected natural areas, preserved areas near the constructed highway.

Deep groundwater is the favorable conditions of highway passing of HV line and location of the site of the SS.

The characteristic of HV line impacts during the operation and construction, implementation of works on reconstruction of "Kyzyl – Ravat" SS is given in this paper. It is shown that the operation of 220 kV HV line of Turakurgan TPP and "Kyzyl – Ravat" SS after reconstruction is associated mainly with the physical effects (acoustic, electromagnetic) and accident risks.

Analysis of technical solutions is demonstrated their adequacy to prevent accidental risks of the automated control system and protection, as well as the choice of the type of support and technology of installation, which allows to eliminate the negative consequences for the environment in the event of accident scenarios of EIS considered in the project. Risks of accidents connected with the release of oil from transformers at "Kyzyl – Ravat" SS are reduced by installation of damp-proof oil trap and oil drain system.

Impact on the ambient air is estimated as temporary and local during the construction works. Impact on the ambient air also is not predicted during the operation of the "Kyzyl – Ravat" SS, drain and filling operations of transformer oil is accompanied by slight discharge in the form of oil vapor hynodrcarbons, thus, it is created a concentration not exceeding the allowed quota.

The technology and scale of all kinds of work, as well as their consequences are evaluated in the EIS project.

The assessment of pollutants supply to the environment during construction works, physical impact, extraction of natural resources, the prognosis of environment change as a result of the identified impacts are given in the paper.

Impacts associated with the withdrawal of the land resources in the implementation of the project is defined as a constant in the form of land allocation for the support area of 2,277 hectares and temporary (for the construction of temporary roads, the organization of the construction base, right-of-way for HV line and under pits supports) area of 101.228 hectares.

Impact on surface water is not expected: passing over the Kasansay River and through small sais and collector is performed by one span, without implementation of works in riparian areas.

System organization in the construction site during construction works collection, temporary storage and handling of waste will eliminate their impact on soil, grounds, groundwater and surface water.

Analysis of alternative options of design solution is showed that the proposed version of the highway passage is optimal in terms of negative environmental impacts.

Analyzes of the adequacy of environmental protection measures provided by the project is conducted in the EIS project to prevent negative impacts on the environment, a package of measures to reduce the negative environmental impact of building 220 kV HV line is proposed in addition to the proposed technical project activities.

Thus, the construction of small plants of existing 220 kV HV line on Turakurgan TPP and "Kyzyl – Ravat" SS with reconstruction of "Kyzyl – Ravat" in Namangan region will not lead to environmental degradation and feasible in case of compliance with environmental protection measures proposed in the technical design and the present work.

LIST OF SOURCES

1. Resolution of the Cabinet of Ministers № 491 dated 31.12.01, the "Regulation on State Ecological Expertise of the Republic of Uzbekistan."

2. Resolution of the Cabinet of Ministers № 152 dated 05.06.09 "On making f amendments and additions, as well as the invalidation of certain decisions of the government of the Republic of Uzbekistan."

3. Overview of air pollution and emissions in the cities of the activity of the Main Department for Hydrometeorology of Uzbekistan for 2012.

4. Methodological guidelines for ecological and hygienic zoning areas of Uzbekistan on the degree of danger to public health. Ministry of Health of Uzbekistan, Tashkent, 1995.

5. SanPin № 079-04. Hygienic standards. List of maximum permissible concentration (MPC) of pollutants in the air of residential areas on the territory of the Republic of Uzbekistan. - Tashkent, 2005.

6. Directory ecologist expert of the State Committee for Nature Protection of the Republic of Uzbekistan. Tashkent, 2009.

7. Instructions for inventory of pollution sources and standardization of emissions into the atmosphere for enterprises of the Republic of Uzbekistan. Reg. № 1553 of the Ministry of Justice dated 03.01.06, Tashkent, 2006.

8. SanPin Uzbekistan № 0128-02. Hygienic classifier of toxic industrial wastes in the conditions of Uzbekistan. Tashkent, 2002.

9. Uz RH 84.3.15: 2005. Handling of waste production and consumption. The organization and conduct of waste inventory. The State Committee for Nature Protection. Tashkent, 2005.

10. CNR; 2.01.08-96. Protection against noise. The State Committee for Architecture and Construction of the Republic of Uzbekistan. Tashkent, 1996.

11. Handbook of power chemical engineer. Moscow: Energiya, 1972.

12. GND-86. Method of calculating the concentrations in the air of harmful substances contained in industrial emissions. L. Goskomgidromet, 1988.

13. Collection methods for calculation of emissions of air pollutants under different industries. Edited by L.I.Veris. L., Gidrometeoizdat, 1986.

14. N.F.Tischenko "Air protection. Calculation of the content of harmful substances and their distribution in the air", M. Khimiya, 1991.

15. RD 118.0027714.24-93. Handbook on benefit risk assessment associated with the potential for accidents during production, storage, use and transportation of large quantities of flammable or explosive substances.

16. Statistical book of Ministry of Macroeconomics of Uzbekistan. "Regional Statistical Yearbook of Uzbekistan." Tashkent, 2011.

17. Uz RH 84.3.19: 2005. Handling of waste production and consumption. Terms and definitions. The State Committee for Nature Protection of the Republic of Uzbekistan. Tashkent, 2005.

18. Yearbook of surface water quality and effectiveness of protection measures within the area of Main Department for Hydrometeorology of Uzbekistan for 2012. Tashkent: Glavgidromet, Uzbekistan 2013.

19. Yearbook of soil pollution on the territory of activity of Main Department for Hydrometeorology of Uzbekistan 2012. Glavgidromet, Tashkent, 2013.

ANNEXES