Environmental and Social Impact Assessment

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Uzbekistan: Samarkand 1 Solar PV and BESS Project

Appendixes – Part 4

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Socio-economic Survey Report
for Samarkand I and Samarkand II Projects

Survey I.Sazagan, Saroy and Chortut communities

Contents

Socio-economic baseline

1. Introduction

Administratively the Project will be located in Nurabad district of the Samarkand region in the Republic of Uzbekistan. In general, the landscape of the area is represented by pastoral land with the natural geographic features of an area, such as the mountains and valleys. The Project site will be located on pastoral land with partially growing crops.

Three communities (Sazagan, Chortut and Saroy) are located close to the Project site. **Sazagan community** is located approximately 1.3 km on the eastern part of the Project site. The total area of the Sazagan community is 11,235 ha, and the total number of households amounts to 721. **Chortut community** is situated in approx. 1.4 km on the southern part of the Project site. The total area of the Chortut community is 5,220 ha. The total number of households is 520. **Saroy community** is located around 3 km on the southeast side of the Project site. The total area of Saroy community according to the information provided by the mahalla is 10,523 ha with 684 households. All of these communities are considered to be directly impacted by the Project ("AOI communities")[1]. See **Error! Reference source not found.** for the location of the Project within Samarkand region in relation to AOI communities.

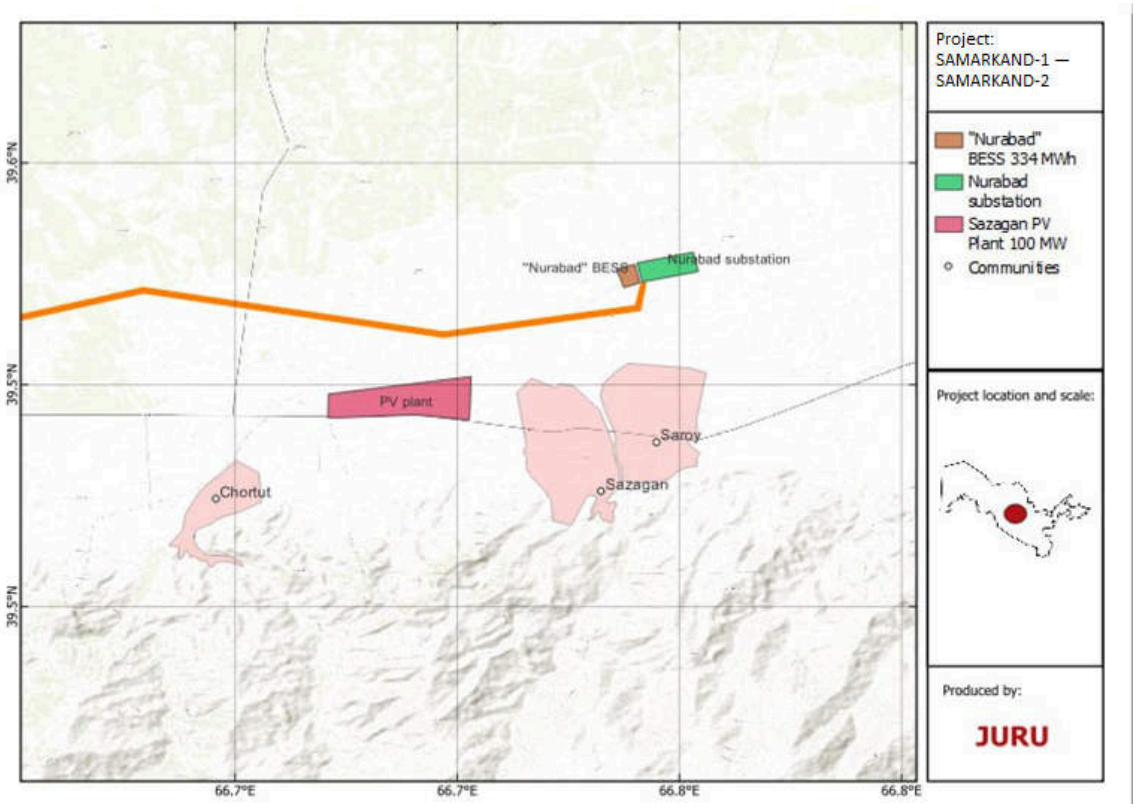

Figure 1: Location of Project site in relation to AOI communities

1 Nearest communities may benefit from a small amount of employment as a result of the Project.

A socio-economic profile of the AOI was developed, through a socio-economic survey of households in the AOI communities, which was undertaken on June 21-26, 2023. A total of 41 households in the Sazagan community (approximately 6% of the total households), 52 households in Chortut (approximately 10% of the total households) and 37 households in Saroy (approximately 5.4% of the total households) were surveyed. Table 1 below demonstrates the sample sizes.

Table 1 Survey sampling of AOI communities

No	Name of community	Overall number of households	Proposed number of households for survey (as planned)	Surveyed number of households	The date of survey
Nurabad district					
1.	Sazagan	721	41	41	21-22 June, 2023
2.	Chortut	520	52	52	22-24 June, 2023
3.	Saroy	684	37	37	25-26 June, 2023
	Total	**1925**	**130**	**130**	**21-26 June, 2023**

The following section provides a socioeconomic baseline of the Project site, it is based on existing secondary information and the results of the socioeconomic survey.

2. Demographics

As of January-June 2023, the population of the Samarkand region totalled 4,159,100 people. For the same period the population of the Nurabad District reached 160,500 people. Nurabad district is predominantly rural, the urban population of the Nurabad district totalled 18,000 people (11.2% of the population) and the rural totalled 141,900 people (88.7% of the population)[2]. It should be noted that the proportion of men and women in the district is nearly equal – 50% each.

Table 2 below shows the number of the population of these three communities.

Table 2 Population of AOI communities

No	Name of community	Total population	Households
1.	Sazagan	4043[3]	721
2.	Chortut	2601[4]	520
3.	Saroy	3928[5]	684
Total		**10,572**	**1925**

2https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=284&id=3577&Itemid=1000000000000

3 Passport of " Sazagan " community assembly

4 Passport of " Chortut " community assembly

5 Passport of " Saroy " community assembly

The gender distribution of the AOI communities, based on survey information showed that it slightly differs from the district statistics, with slightly more women (46.7%) than men (53.3%). The majority of the households in the surveyed communities are male-headed households at 87.7%, with households headed by women making up just 12.3% of all surveyed households.

The members of the surveyed households aged between 7 and 17 (20.6 %) and 0-6 (18.2%) made up the largest individual age groups while only 1.8 % above are 70, as shown in **Figure 2** below.

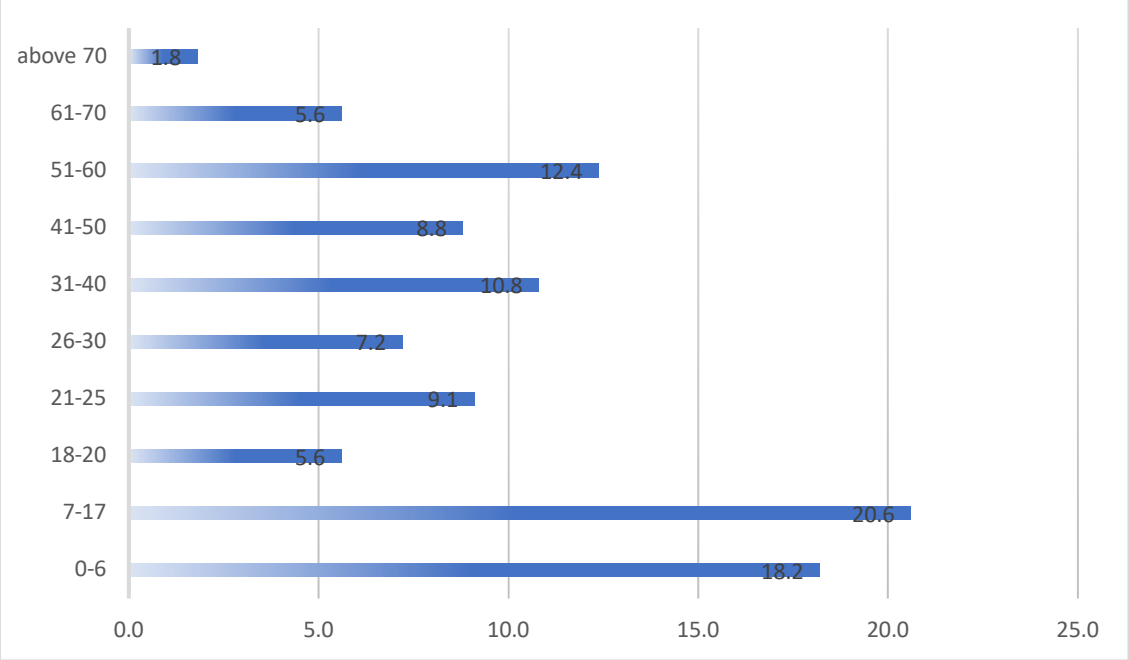

Figure 2: Age of surveyed household members

3. Economy, Employment and Livelihoods

3.1 Economy

The Samarkand region has strong economic potential and a fascinating history. In recent years, the area has seen the creation of new businesses, small businesses, and diversified farms. In the fields of tourism, the textile industry, agriculture, and others, new projects have been launched. Construction has been placed on homes, hospitals, schools, and kindergartens. In 2022 the value of agricultural products produced within the region amounted to 41,834 billion UZS which increased by 1.5% compared to the last year[6].

6https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=294&id=3339&Itemid=1000000000000

Tourism is also an important sector in the Samarkand region's economy. The cultural heritage of Samarkand is quite large, for many centuries the city has been a key center of the Great Silk Road. As per the annual report of the Statistics Committee, the gross regional product (GRP) for 2023 January-March amounted to 12.4 billion UZS (1.078 million USD[7]) with an increase of 3.6% compared to the same period of the previous year. In this region, positive growth rates were noted in the sectors of agriculture, forestry and fisheries - 2.8%, industry - 3.6%, construction - 7.4% and services - 3.3%.[8]

According to preliminary data 62.4 billion UZS (5.4 million USD) worth of industrial products were produced by local enterprises in Nurabad district in January-March, 2023, and the increase compared to the same period of last year was 66.1%. In the reporting period, the value of consumer goods was 13.7 billion UZS (1.2 million USD) with a 7.8% increase compared to the same period of last year. Food products made up 56% of the total consumer goods 7.6 billion UZS (0.67 million USD), while the share of non-food products was 44% with 6.1 billion UZS (0.53 million USD).

Data obtained as a result of consultations with communities of Sazagan, Chortut and Saroy revealed that the economy is almost exclusively reliant on agricultural activities with livestock grazing and also remittances from migrants.

3.2 Employment

As of January-December 2022, in Nurabad District, the rate of unemployment in the labor market amounted 9,5%. In January-March 2023, the number of people who immigrated to Nurabad district was 38, and the number of those who left was 142 people during this period. The majority of economically active people are employed in the agricultural sector (33.5%), followed by commerce (28.7%), industry (11.8%), other sectors (9.2%), accommodation and food services (6.1%), construction (5%), and health and social welfare (3.7%).

The average monthly salary of a person living in Samarkand region amounted to 3,127,700 UZS (or USD $273) in January-March 2023 as per statistics provided. The average monthly salary of a person living in Nurabad District amounted to 2,760,300 UZS (or 235 USD) in January-March 2023 according to the data provided by the statistic committee of Nurabad District[9]. The average family income reported by survey respondents was 5,675,600 UZS (or approximately 495 USD) with a per capita income of 1,176,800 UZS (or 100 USD). The average salaries in the district and per capita household incomes cannot be directly compared, as the calculation of per capita income will include both workers and dependents.

Figure 3 below provides information on the occupation of the household members in the surveyed households. It was revealed that 18% reof spondents are pensioners, whereas 19.8% of respondents stated they are employed in the government sector. Entrepreneurs

7 https://bank.uz/uz/currency/archive

8 https://stat.uz/en/press-center/news-of-committee/39302-sa1marqand-viloyatining-yalpi-hududiy-mahsuloti-qanchaga-o-sdi-6

9 These data is taken from statistical newsletter of Nurabad district for the 1st quarter of 2023

and business owners make up 4.4% of respondents. Registered unemployed people make up 0.3% of the population while those that are not registered unemployed make up another 12.2%. A total of 7.3% of respondents reported that they work as seasonal workers (working in temporary and seasonal jobs) while about 3.1% of respondents work on their household farm.

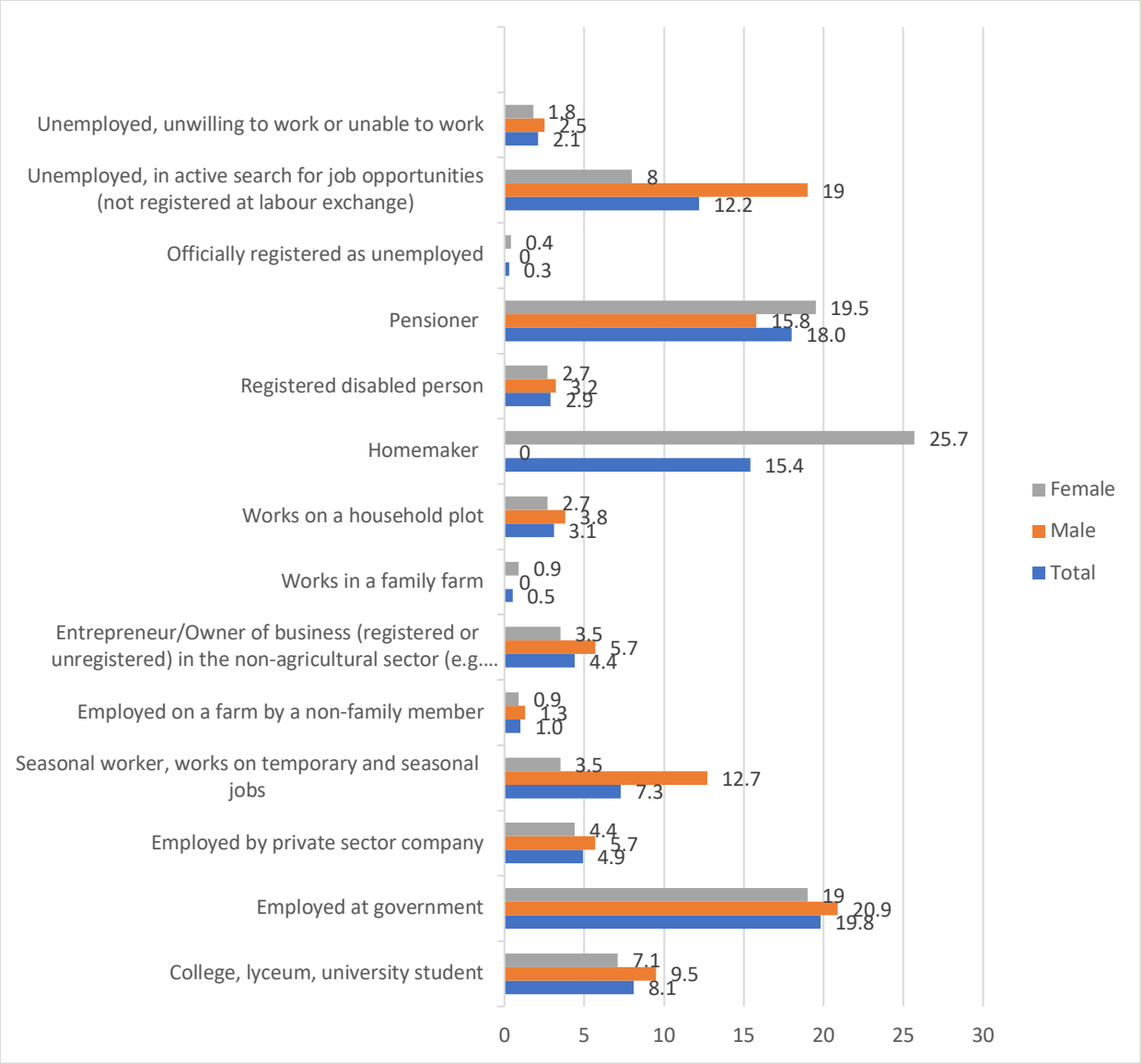

Figure 3: Occupations in surveyed communities

Approximately 46.9% of the surveyed households stated that they have household members who have migrated to work in other regions of Uzbekistan or abroad. Around 88.3% of all the households with labor migrants had only one person that had migrated whereas only 11.7% of the households with labor migrants had two labor migrants that had left for work.

During the survey it was found that total of 60.6% school children work, they mainly do household chores and work on the family's 'tomorka' (household garden plots), including

caring for livestock. In Sazagan and Chortut the same – 68.4%, and in Saroy community 51.5% children are engaged in household chores.

The main income threats for the majority of respondents (44.6%) are lack of irrigation water, while for others unemployment (20.8%), rising prices for consumer goods (16.2%), decrease in prices of agricultural products (1.5%) while for the remaining respondents, there were no threats (34.6%) and difficult to answer (7.7%).

Table 3 Main threats that impact income of respondents

	Sazagan	Chortut	Saroy	**Total**
No threats	36.6	35.1	32.7	**34.6**
Decrease in prices for agricultural products	0.0	2.7	1.9	**1.5**
Lack of irrigation water	34.1	37.8	57.7	**44.6**
Rising prices for consumer goods	17.1	41.6	5.8	**16.2**
Unemployment Difficult to answer	12.2 2.4	29.7 2.7	21.2 15.4	**20.8** **7.7**

Source: Socioeconomic survey, 2023.
*Multiple options could be selected

The socio-economic survey revealed that the majority of female members of the surveyed households have limited access to equal opportunities (35.4%) in society, especially at the workplace. Others face unequal access to public services (17.3%), no career opportunities (16.5%), lack of respect (15.7%), economic inequality (15%), limited access to education (7.1%), and weak participation in political life 6.3%). 15% of women reported not facing any difficulties at all).

Table 4 Challenges faced by female household members in affected communities (%)

	Sazagan	**Saroy**	Chortut	**Total**
Economic inequality	17.1	15.7	11.4	**15.0**
Limited access to equal opportunities	12.2	64.7	20.0	**35.4**
Lack of respect	17.1	3.9	31.4	**15.7**
Unequal access to public services	14.6	11.8	28.6	**17.3**
No opportunities for career	22.0	9.8	20.0	**16.5**
Limited access to education, professional trainings	2.4	0.0	22.9	**7.1**
Weak participation in political life, in governance and power	4.9	2.0	14.3	**6.3**
No problem	26.8	13.7	2.9	**15.0**

Source: Socioeconomic survey, 2023.

* Multiple options could be selected

3.3 Accommodation, Living Conditions and Household Amenities

Survey revealed that all the respondents live in private houses. In 83.8% cases the houses are registered (owned) under a male while the remaining 16.2% registered under a female member (usually the household head).

When respondents were asked how stable is the electricity supply in their community, 11.5% respondents stated that the electricity supply is unstable in Winter, while electricity supply is unstable all year round for 55.4% of respondents. According to 33.1% surveyed households, electricity is stable.

Centralized water supply is available only in 1.5% of surveyed households and they are only within Sazagan community.

Table 5 below provides information about the main sources of water for cooking and drinking.

Table 5 The main sources of water for cooking and drinking

	Sazagan	Saroy	Chortut	**Total**
Electric or fuel pump in my or neighboring yard	48.7	76.9	64.9	**64.8**
Own well for underground water in the yard	30.8	19.2	35.1	**27.3**
From the drainage channel/collector	7.7	1.9	0.0	**3.1**
Delivered water by a water carrier, for a fee	2.6	0.0	0.0	**0.8**
Delivered water by a water carrier free of charge	2.6	0.0	0.0	**0.8**

Water supply on the street or in other places of mahalla, district	7.7	1.9	0.0	**3.1**
Total	100.0	100.0	100.0	**100.0**

Table below gives information about the main sources of water for other household needs.

Table 6 Main sources of water for other household needs

	Sazagan	Saroy	Chortut	**Total**
Electric or fuel pump in my or neighboring yard	44.1	76.0	64.9	**63.6**
Own well for underground water in the yard	35.3	20.0	35.1	**28.9**
From the drainage channel/collector	7.7	1.9	0.0	**3.3**
Delivered water by a water carrier, for a fee	2.9	0.0	0.0	**0.8**
Delivered water by a water carrier free of charge	2.9	0.0	0.0	**0.8**
Water supply on the street or in other places of makhalla, district	5.9	2.0	0.0	**2.5**
Total	100.0	100.0	100.0	**100.0**

Most of the respondents are not connected to the centralized gas system and it is working only in Saroy community (1.9%). However, Sazagan and Chortut communities are not connected to the centralized gaz system. Table 7 below provides more data about centralized gas systems in these communities.

Table 7 Existence of centralized gas supply in communities

Name of living communities	Centralized gas supply	
	Yes, we have and it works	Not available
Sazagan	0.0	100
Saroy	1.9	98.1
Chortut	0.0	100
Total	**0.8**	**99.2**

There is no centralized heating in place. For heating, in Sazagan community mostly wood or plant materials are used, while respondents of Saroy and Chortut communities are reliant on dry manure.

Table 8 Source of fuel for heating (%)

	Sazagan	Saroy	Chortut	Total
Centralized gas supply	0.0	1.9	0.0	**0.8**
Gas cylinders	0.0	0.0	5.4	**1.5**
Coal	4.9	3.8	0.0	**3.1**
Wood or plant materials	51.2	32.7	37.8	**40**
Dry manure	34.1	61.5	54.1	**50.8**
Electricity	9.8	0.0	2.7	**3.8**
Total	100.0	100.0	100.0	**100.0**

Source: Socioeconomic survey, 2023.

For cooking, gas cylinders are predominantly used by the respondents of Sazagan community at 75.6%, while coal and wood or plant materials are used by 9.8% and 14.6% respondents respectively. In Saroy community 32.7% respondents use gas cylinders, while 1.9% of respondents use centralized gas supply, 59.6% use wood or plant materials and 5.8% dry manure for cooking. In Chortut community, however, 86.5% of respondents use wood or plant materials and the remaining 13.5% use gas cylinders in terms of cooking.

There is no central sewerage in these communities.

For Saroy and Sazagan communities' removal of waste to the special pit for waste in the yard is the most used method of waste disposal, but in Chortut community most of the waste is taken out by the state garbage company and the state waste-processing company.

Table 9 Waste disposal methods (%)

	Sazagan	Saroy	Chortut	Total
To the special pit for waste in the yard	39	69.2	32.4	**49.2**
In public trash cans on the street	2.4	0,0	2.7	**1.5**
Waste is taken out by a private waste company	34.1	1.9	29.7	**20.0**
Waste is taken out by the state garbage company	24.4	28.8	35.1	**29.2**
Total	100,0	100,0	100,0	**100,0**

Source: Socioeconomic survey, 2023.

3.4 Land Use, Agriculture and Natural Resources

Most of the surveyed households have agricultural land plots (within their communities, not on or near the Project site). Of the total respondents 92.3% have only tomorka (household garden plots), while 3.1% have tomorka and other areas of land as well. 4.6% of the respondents reported that they do not have land.

Of the respondents that own land, the total plot area for 28.4% of respondents was up to 0.6 hectares, and 41.3% respondents own 0.7-1.2 hectares of land plots, while the remaining 29.9% own land plots larger than 0.6 hectares.

The types of agricultural products respondents grew on their land plots in 2022 are provided in the figure below. Respondents were allowed to select multiple answers.

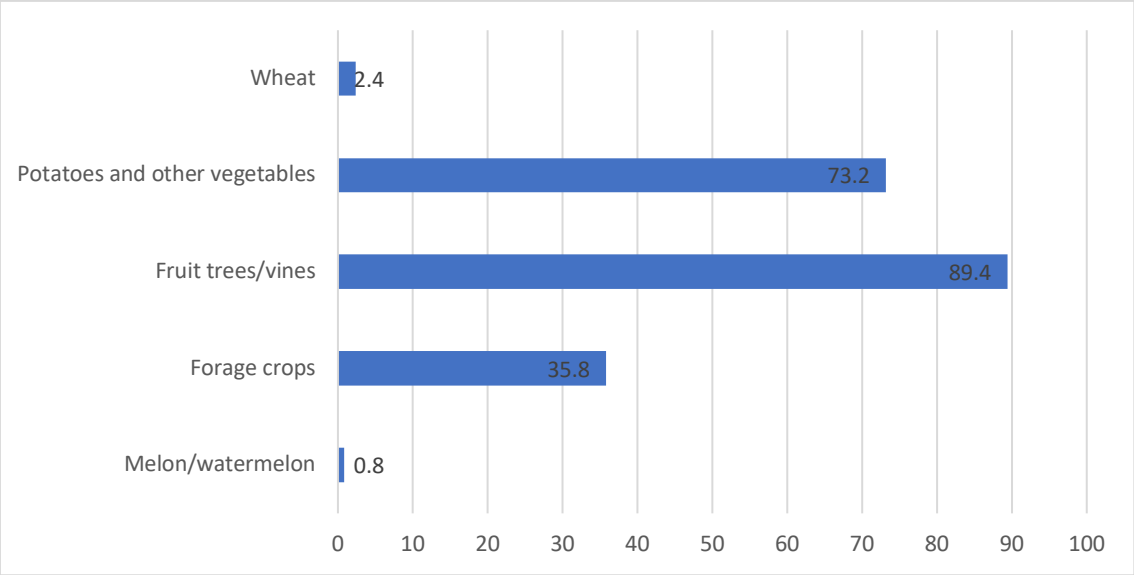

Figure 4: Types of agricultural crops grown on agricultural land plots

When respondents were asked about whether they farm throughout the year or during certain seasons of the year. 3.3% respondents engage in farming activities whole year, while 85.4% in Spring, 66.7% in Summer and 43.9% in Autumn.

Table 10 below gives information about sources of labor in the households for their agricultural activities.

Table 10 Source of labor for their agricultural activities

	Paid workers	Family members (adults – not children)	Family members (children)
Sazagan	0.0	100.0	8.6
Saroy	2.1	95.7	14.9
Chortut	0.0	91.9	10.8
Total	0.8	95.8	11.8

*The total share exceeds 100%, because multiple answers could be selected

According to the survey results, female family members are a bit more involved in agricultural activities. The figure for them is 52.1%, while in 47.9% cases men are involved in farming.

Respondents of surveyed households were asked that does your household have livestock and poultry? 25.9% in Sazagan, 43.3% in Saroy and 11.1% respondents in

Chortut community have livestock and poultry. Most of the families own cows and bulls (73.1% in Sazagan, 76.7% in Saroy and 88.9% respondents in Chortut). More than half of the respondents have lambs and goats, 51.9% in Sazagan, 65.4% in Saroy and 63% respondents in Chortut community. 4% in Sazagan and 3.8% of respondents in the Chortut community own horses.

The Project area is used by 19.5% (8) respondents from Sazagan, 13.5% (7) from Saroy and 27% (10 respondents) from Chortut communities.

According to survey results, the Project site is used for agricultural activities, livestock grazing, collection of medicinal herbs and also cultural/entertainment events. 1 respondent from Sazagan and 1 respondent from Saroy communities indicated that they use the Project area for agricultural activities. The Project site is used for the collection of medicinal herbs by only 1 respondent from Sazagan, and 1 from Chortut community use the area for cultural/entertainment events. Most of the surveyed respondents who use the Project site graze their livestock in the Project area (7 people in Sazagan, 7 in Saroy and 9 in Chortut communities).

Only 3 respondents in Saroy community said that they have an agreement to use the Project site for livestock grazing and from that 1 have an agreement with the agrocluster,1 with the council of farmers, and remaining 1 with farmers. Those respondents from Saroy community who use the Project area in terms of livestock grazing were asked about existence of other alternative lands. 1 respondent stated that yes there are alternative lands belong to agro cluster.

8.7% respondents use the area daily, while 91.3% respondents use seasonally.

1 of the land users in Saroy and 1 in Chortut communities pay for the use of the area, whereas others do not pay for the usage of the area. 100% respondents from the Sazagan community o not pay for the usage of the site. In the Chortut community the user pays 150 000 UZS while one person from' Saroy community pays 250 000 UZS. Both of them said that they pay to agro cluster.

4. Education

The right to education is guaranteed to all citizens of the Republic of Uzbekistan under the Article 50 of Constitution, which states that every person has a right to education". The State oversees education and provides free education up to secondary school. Almost 100% of the Uzbek population has at least a secondary education with women and men both at an equal ratio of 99.9%[10] .

[10] UNDP "Human Development Report", 2016

As of October 2022, in Samarkand region 874 pre-schools,15 colleges,1285 schools, and 14 higher educational institutions in the region. There are 76 schools, 21 preschool educational organizations, and 3 colleges in Nurabad district[11].

According to the survey results, 51.2% of respondents in Sazagan community said that there is 1 school, 46.3% said 2 schools and 2.4% said 3.

In Chortut community 43.2% of respondents stated that there is 1 school, 40.5% said 2, and the percentage of people who responded that there are 3 and 4 schools was the same (1.9%).

In Saroy community, 59.6% of respondents said that there is 1 school, 36.5% said 2, 2.7% said 3 and 13.5% said 4 schools.

Regarding kindergartens, in Sazagan community 46.3% of respondents said that there is 1 kindergarten, 53.7% said 2 kindergartens compared to the Saroy community where 15.4% said 1, 21.2% said 2, 40.4% said 3, 5.8% said 4, 13.5% said 5 and 3.8% said 6 kindergartens.

In Chortut community, 24.3% of respondents said that there is 1 kindergarten, 64.9% said 2, 2.7% said 3, 5.4% said 4 and 2.7% said 5 kindergartens.

The nearest distance to reach the school was up to 200 m for 22% respondents in Sazagan, 13.5% in Saroy community and 2.7% in Chortut community. Following this, the distance between 201-500 m in Sazagan community was chosen by 31.7% respondents compared to Saroy and Chortut with 32.7% and 21.6% respectively. Next, 501-1000 m distance was mentioned by 24.4% in Sazagan, 42.3% in Saroy and 45.9% in Chortut, while 22% respondents in Sazagan, 9.6% in Saroy and 29.7% in Chortut community have to walk 1001-3000 m in order to reach the nearest school. Finally, the distance of more than 3000 m was said only by Saroy community by 1,9%.

As for kindergartens, the nearest distance was up to 200 m for 19.5% respondents in Sazagan, 21.2% in Saroy community and 2.7% in Chortut community. Following this, the distance between 201-500 m in the Sazagan community was said by 31.7% of respondents compared to Saroy and Chortut with 30.8% and 16.2% respectively. Next, 501-1000 m distance was mentioned by 24.4% in Sazagan, 30.8% in Saroy and 48.6% in Chortut communities, while 24.4% respondents in Sazagan, 15.4% in Saroy and 32.4% in Chortut community have to walk between 1001 and 3000 m in order to reach the nearest kindergarten. Finally, the distance of more than 3000 m was chosen by Saroy community by only 1,9%.

Around 20% of the children and students in all communities have to walk more than 1 km to reach either kindergarten or school. In general, Sazagan and Chortut community members are slightly closer to education facilities compared to Saroy. Tables 11 below

[11] https://samstat.uz/uz/rasmiy-statistika/social-protection-2

gives information about how far the nearest educational facilities from the surveyed households.

Table 11 Distance to the nearest educational facility

Kindergarten

	Up to 200 m	201-500 m	501m-1km	1km-3km	More than 3km
Sazagan	19.5	31.7	24.4	24.4	0.0
Saroy	21,2	30,8	30,8	15,4	1,9
Chortut	2,7	16,2	48,6	32,4	0,0
Total	**15,4**	**26,9**	**33,8**	**23,1**	**0,8**

School

	Up to 200 m	201-500 m	501m-1km	1km-3km	More than 3km
Olga	22,0	31,7	24,4	22,0	0,0
Sazagan	13,5	32,7	42,3	9,6	1,9
Saroy	2,7	21,6	45,9	29,7	0,0
Chortut	**13,1**	**29,2**	**37,7**	**19,2**	**0,8**

Source: Socioeconomic survey, 2023.

Survey respondents were asked that is the school equipped with the necessary equipment. In Sazagan 63.4% of respondents stated that the school has everything students need, while remaining 36.6% stated that the school is equipped with only essentials. In Saroy 28.8% of respondents think that school is well equipped, while 53.8% believe that school is equipped with only essentials, and according to 5.8%, schools are poorly equipped, and 11.5% found it difficult to answer. In Chortut community 59.5% respondents indicated that schools are equipped with everything students need, while 32.4% stated that schools are equipped with only essentials, whereas 2.7% respondents are not satisfied with the provision of schools, and 5.4% found it difficult to answer.

Survey responses show (see Table 3) that only 0.2% of household members were recorded as illiterate. However, the rate of attending higher education is also low (8.8%) in the surveyed area.

Table 3 Levels of education including all household members

Household members	**%**
Illiterate	0.2
Can read and write, but did not graduate from secondary school	0.3

Household members	%
Incomplete secondary (grades 8-9)	1.6
Complete secondary education (grades 10-11)	31.3
Graduated from secondary special (college, lyceum, vocational school, technical school)	19
Higher education (bachelor) / postgraduate (Master's/PhD)	8.8
Schoolchildren	19
Preschoolers	19.9
Total	100.0

Source: Socioeconomic survey, 2023.

Of the total surveyed population all students (both boys and girls) eligible to attend schools/colleges/lyceums were attending these types of schools located in their communities.

5. Health

As of 2021 there were 635 health clinics in Samarkand region, while the number of clinics in Nurabad district was 24[12]. Overall, local communities in the regions of Uzbekistan and in particular in the districts have only limited number of healthcare services. Usually, villages have only one policlinic to provide first aid and general medical consultations. For specified medical services villagers have to refer to district or regional medical centres.

Survey results found that health services are available for almost all of the total surveyed respondents in the AOI communities – 96.9%. There is an almost similar situation in terms of the availability of health services between communities. 100% respondents from the Saroy community stated that they have access to health services, while the figures for Sazagan and Chortut are 92.7% and 97.3% respectively. The remainder of the respondents stated that they use the health services located in the district center or health services located within other communities.

Respondents who stated there was no health service available in their community were asked to specify how far and where they go for medical care. 33.3% of the respondents in Sazagan community stated that they use the health services located at 500 m and 66.7% said it is located at 600 m, whereas in Chortut community, 100% of respondents said that the nearest healthcare facilities are located 600 m away from their home.

[12] https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=288&id=2820&Itemid=1000000000000

In addition, survey respondents were asked if they found their local health services to be well equipped, and 80.8% of all respondents stated that their local health facilities were well equipped, and 15.4% were not satisfied, while 3.8% of respondents found the question difficult to rate.

Figure 5 shows that survey respondents indicated the most prevalent diseases in the AOI communities to be cardiovascular diseases (heart disease), acute respiratory diseases (these include influenza and colds), infectious diseases (jaundice, tuberculosis).

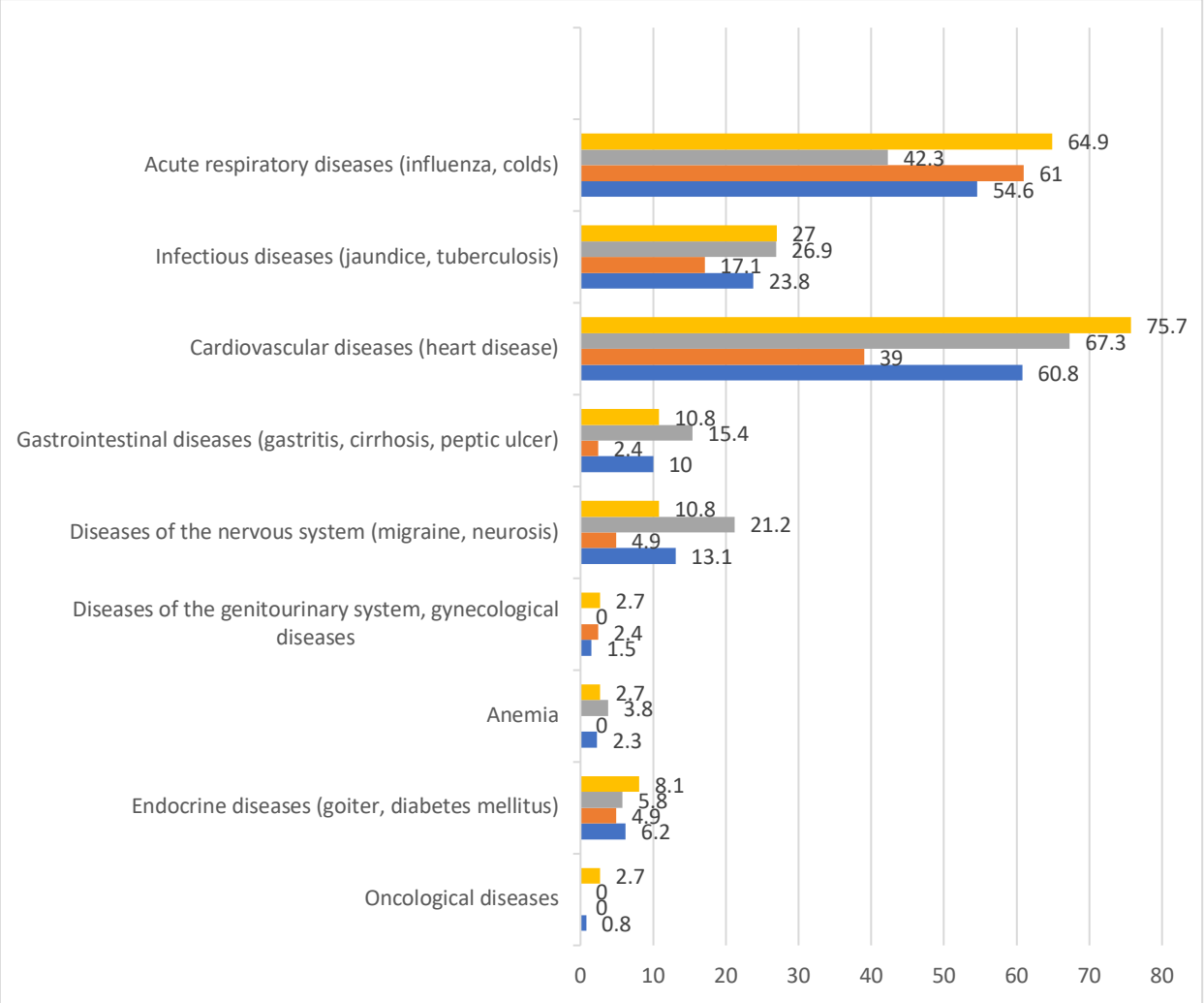

Figure 5 Most common health concerns in the AOI communities

*Total share exceeds 100% as multiple options could be selected

6. Language and Ethnicity

The survey identified that all of the people (100%) in the surveyed communities are Uzbek.

The survey showed that all the respondents speak Uzbek language. Site observations found that while Uzbek is widely spoken, community members also use a mixture of words from a dialect spoken in the southern part of Uzbekistan.

The socioeconomic survey did not include questions related to religion due to sensitivity to this type of question for people in the region. However, in general, people practice Islam. Site observations as well as consultations conducted with local communities at the Scoping and ESIA stages did not reveal the presence of attributes of other religions that could cause conflict or cause individuals to be more vulnerable to Project impacts.

7. Indigenous peoples

IFC PS8 defines Indigenous peoples (IPs) as a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as member of a distinct indigenous social and cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats, ancestral territories, or areas of seasonal use or occupation, as well as to the natural resources in these areas;
- Customary cultural, economic, social, or political institutions that are distinct or separate from those of the mainstream society or culture; and
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

No IPs were observed during the site visit or identified during communications with the nearest communities. IPs are not present in the AOI communities.

8. Infrastructure

8.1 Road, and transportation

The main road (A378) is located southern part of the Project site and this road is highly important as it connects districts with each other.

There are a number of roads which are used by PAPs. The main used roads can be seen in figure 6 below.

Figure 6: Existing Road used by local community members

Respondents were asked how often they use the road next to the project site. The table below gives information about this.

Table 13 Frequency of usage of the road next to the Project site

	Daily	2-3 times in a week	Once per month	Seasonally	Do not use	Total
Sazagan	14.6	7.3	12.2	36.6	29.3	**100**
Saroy	11.5	23.1	1.9	17.3	46.2	**100**
Chortut	5.4	16.2	10.8	32.4	35.1	**100**
Total	**10.8**	**16.2**	**7.7**	**27.7**	**37.7**	**100**

Source: Socioeconomic survey, 2023.

According to survey results, small percentage of respondents use it daily (14.6% in Sazagan, 11.5% in Saroy and 5.4% in Chortut communities).

A number of roads were mentioned by respondents as possible alternatives. table below gives information about mentioned alternative roads.

Table 14 Mentioned alternative roads

	Road next to Mehnat kash community	Karshi-Samar kand	Trail	Honchor voq	Road inside Chandir village	Nuro bod	Karshi	A-378 mainr oad	Total
Sazagan	4.8	66.7	0.0	0.0	0.0	4.8	23.8	0.0	100.0

Saroy	0.0	0.0	22.2	0.0	0.0	0.0	66.7	11.1	100.0
Chortut	0.0	38.5	0.0	15.4	7.7	38.5	0.0	0.0	100.0
Total	2.3	44.2	4.7	4.7	2.3	14.0	25.6	2.3	100.0

9. Culture, tourism and recreation

Respondents were asked about any cultural sites of international, national or local importance located within or around the Project area if they know. 4.6% said that they know, while 71.5% do not know, and 23.8% found it difficult to answer. And they were asked that if yes, please indicate what it is. Table 4 gives information about this.

Table 4 Cultural sites mentioned by respondents

	Sazagan	Saroy	Chortut	**Total**
Mine	0.0	0.0	100.0	**16.7**
Monument "Yetti tepa"	75.0	0.0	0.0	**50.0**
Medieval ruins	0.0	100.0	0.0	**16.7**
Resting place "Qamar Sochchinor"	25.0	0.0	0.0	**16.7**
Total	**100.0**	**100.0**	**100.0**	**100.0**

10. Poverty and Equity

According to the Asian Development Bank (ADB), as of 2020 a total of 11.5% of the population of Uzbekistan lived under the national poverty line. A total of 6.5% of the working population earned less than the $1.90 using the purchasing power parity poverty indicator as of 2021[13]. Poverty levels in Uzbekistan had been decreasing, however, they have been negatively impacted by the COVID-19 pandemic. In 2020 it was determined that 1.3% of the population (approximately 448,000 people) may have fallen into poverty as a result of COVID-19[14].

13 https://www.adb.org/countries/uzbekistan/poverty
14 https://www.undp.org/press-releases/uzbekistans-health-care-system-economy-hit-hard-covid-19

In Uzbekistan, the minimum consumption expenditure index is used as the poverty line. According to the State Statistics Committee, the minimum consumer spending amounted to 568 thousand soums per month per person. The share of surveyed HHs whose income does not exceed 568 thousand soums per capita is 9.8% in Sazagan, in Saroy community 30.8% in Saroy and 21.6% in Chortut community.

Respondents of the socioeconomic survey were asked whether their income is sufficient or not. The majority of respondents indicated that their income is enough only to cover basic needs (44.6%). Of all the respondents in the AOI communities, 26.9% stated their income was not enough to cover basic needs, and 3.1% said their income is not enough to cover expenses even for food. 23.1% of respondents stated that their income is enough for more than just basic needs, but not enough to buy anything, while 2.3% of the total respondents believe that their income is more than enough, and can buy anything.

Table 165 Sufficiency of incomes in AOI communities

	Sazagan	Saroy	Chortut	**Total**
Income is more than enough, can buy anything	2.4	1.9	2.7	**2.3**
Income is enough for more than just basic needs, but not enough to buy anything	26.8	28.8	10.8	**23.1**
Income is enough only for basic needs (food, clothing, bills)	53.7	28.8	56.8	**44.6**
Income is not enough to cover basic needs	12.2	36.5	29.7	**26.9**
Income is not enough even for food	4.9	3.8	0.0	**3.1**
Total	**100**	**100**	**100**	**100**

Source: Socioeconomic survey, 2023.

Table below provides information about the main household assets of the respondents. The majority of households own a TV and a mobile phone (97.7% and 91.5% respectively), and the next most owned item is a refrigerator (82.3%). Almost half of the surveyed households have cars (45.4%), and more than half own washing machine (53.1%).

Table 17 Main household assets of the respondents

	Yes	**No**
Car	45.4	54.6
TV	97.7	2.3
Satellite dish	4.6	95.4
Washing machine	53.1	46.9
Refrigerator	82.3	17.7

Air conditioner	16.2	83.8
Greenhouse	2.3	97.7
Personal computer	25.4	74.6
Mobile phone	91.5	8.5
Motorbike	2.3	97.7

Source: Socioeconomic survey, 2023.

*TOTAL SHARE EXCEEDS 100% AS MULTIPLE OPTIONS COULD BE SELECTED

11. Human Rights

As Uzbekistan is considered as a member of UN, all the main international instruments of the UN relating to the protection of human rights and freedoms, including UN Universal Declaration of Human Rights, Human Rights Council Resolution No. 30/15 on human rights and preventing and countering violent extremism, Convention on the Elimination of all Forms of Discrimination against Women among others, implemented by Uzbekistan government.

In order to create the necessary organizational, legal, social, economic, spiritual and moral foundations for the protection of human rights, the state policy of Uzbekistan in the field of human rights is aimed at preventing violations or any restriction of human rights and freedoms.

In 1995-1996, two independent and effective institutions for the protection of human rights were established in Uzbekistan:

- The Human Rights Commissioner (Ombudsman) of the Oliy Majlis of the Republic of Uzbekistan; and
- The National Centre for Human Rights.

In subsequent years, special structures for the protection of human rights were established in various ministries and departments of the Republic of Uzbekistan.

Homosexual relations are prohibited in Uzbekistan and restricted by Article 120 of the Criminal Code on "Sodomy".

Although Uzbekistan prohibits violence against women and girls, there is no reliable data on domestic violence in Uzbekistan where many victims remain silent for fear of bringing shame to their families (ADB,2018).

It should be noted that Uzbekistan has experienced an increase in domestic violence since the outbreak of COVID-19. Alongside the economic hardships which have resulted in income and job losses in many households, there has been an increase in the rates of physical, verbal, emotional, economic, and sexual abuse against women and girls.

According to the Ministry of Internal Affairs, local law enforcement in Uzbekistan issued more than 8,430 protection orders to ensure security of domestic violence victims

between January to October 2020. Out of these, 4330 experienced physical abuse, while around 3,200 suffered emotional abuse (World Bank, 2021). The number of unreported cases is expected to be much higher. In over 7,600 cases, women and girls in Uzbekistan experienced violence within their own families and in almost 5,920 of these cases, the aggressors were the husbands.

Survey results reveals that women are expected to perform domestic chores like cooking and washing in their families. While the men are more involved in going to the market, the purchase of food and non-food items.

This information is further discussed in the Project Human Rights Impact Assessment (HRIA).

12. Vulnerable Groups

Among surveyed households, the number of disabled people in the total number of household members was10, and 7 of them have physical disability while remaining 3 are mentally disabled, and one has chronic illness.

Applicability to receive allowances is also a measure of vulnerability. Respondents were asked do they receive a monthly low-income allowance, and 9.2% respondents of the total said yes, while 18.5% respondents indicated that they should receive an allowance, but it is not provided. The remainder of the respondents do not receive an allowance as their family does not fit the criteria.

When respondents were asked if they receive monthly child allowances from the mahalla, 24.4% in Sazagan confirmed that they received a child allowance, while 2.4% stated that they should receive an allowance, but none is provided. 56.1% do not meet the criteria to receive a monthly child allowance, and the remaining 17.1% have no children under 16. In Saroy 36.5% receive a monthly child allowance, while 9.6% should receive but are not provided with one. 42.3% stated that they do not meet the criteria to receive a monthly child allowance, and 11.5%, meanwhile, have no children under 16. The figures for Chortut community are almost the same. 37.8% respondents in Chortut community stated they receive, but 10.8% of respondents should receive but are not provided, and 35.1% stated that they do not meet the criteria to receive a monthly child allowance. The percentages of respondents that do not meet the criteria and have no children under 16 is35.1% and 16.2% respectively.

13. Knowledge About the Project

According to survey results, very little percentage of respondents (12.2%) in Sazagan community reported that they had previous knowledge about the Project, and 51.2% said that they had heard about it, but not much, while remaining 36.6% households surveyed did not have any information about the Project. In Saroy community 3.8% of respondents knew about the Project, while 17.3% had heard about it, but not much, and 78.8% had no information about the Project. Regarding Chortut community 2.7% of respondents

had previous knowledge about the Project. 54.1% had heard about it, but not much, and 43.2% had no information about the Project.

Table below gives information about from which sources would respondents prefer to receive information about the progress and the results of the Project. Multiple options could be selected.

Table 18 Sources of information respondents prefer

	Sazagan	Saroy	Chortut	**Total**
Special information bulletins on the Project	0.0	13.5	2.7	**6.2**
TV	19.5	23.1	51.4	**30.0**
Radio	2.4	1.9	2.7	**2.3**
Social media	53.7	40.4	29.7	**41.5**
Public consultations	2.4	1.9	2.7	**2.3**
Makhalla Committee\Project Representatives	26.8	40.4	29.7	**33.1**
Municipality \ energy sales company \ energy sales inspector	4.9	34.6	8.1	**17.7**

13.1 Positive expectations of surveyed households from Project

When asked what would be the positive impacts of the Project, the most they were expecting was creation of new jobs (32.8% of AOI communities), improvement in the power supply voltage (28.1% of AoI communities) and 21.1% think that nothing will change, everything will remain the same. Table below provides an overview of respondent's opinions on positive impacts of the Project.

Table 19 Positive impacts of project implementation

	Sazagan	Saroy	Chortut	**Total**
The power supply will improve	39.0	26.0	18.9	**28.1**
The conditions for doing business will improve	0.0	2.0	0.0	**0.8**
Electricity generation costs will decrease	0.0	2.0	16.2	**5.5**
The power supply voltage will improve	2.4	10.0	13.5	**8.6**
The cost of electricity will decrease	2.4	38.0	2.7	**16.4**
Ecology will improve	0.0	2.0	10.8	**3.9**
New jobs will be created	39.0	38.0	18.9	**32.8**

The activities of schools, hospitals, and other social institutions will improve	0.0	4.0	5.4	**3.1**
Power supply efficiency will improve	7.3	8.0	8.1	**7.8**
Nothing will change, everything will remain the same	24.4	24.0	13.5	**21.1**
Difficult to answer	4.9	4.0	27.0	**10.9**

*total share exceeds 100% as multiple options could be selected
Source: Socioeconomic survey, 2023.

13.2 Negative effects of project

Respondents were asked what negative impacts they are expecting for the population and territory from the Project. The majority of respondents (40.8%) from all AOI communities think that the Project will cause Environmental degradation, while 16.2% believe that it can damage the gardens\farm\pastoral lands. Responses regarding the negative impact are provided in Table 206 below.

Table 206 Negative impacts of project implementation

	Sazagan	Saroy	Chortut	**Total**
Housing and property may be affected during construction	2.4	3.8	8.1	**4.6**
Damage to gardens\farm\pastoral lands	12.2	9.6	29.7	**16.2**
Noise, dust during construction work	2.4	11.5	2.7	**6.2**
Job cuts	0.0	3.8	5.4	**3.1**
I am against this project	0.0	0.0	2.7	**0.8**
Increased radiation levels in the Project area	2.4	0.0	0.0	**0.8**
Damage to roads, irrigation canals, gas, water pipes, bridges	2.4	5.8	8.1	**5.4**
Environmental degradation	41.5	46.2	32.4	**40.8**
Increased pressure on social infrastructure due to the influx of labour during the construction work of the Project	4.9	1.9	5.4	**3.8**
Traffic due to the moving heavy machinery	2.4	3.8	5.4	**3.8**
The project will not harm anyone	12.2	17.3	8.1	**13.1**
Reduced grazing areas	2.4	26.9	10.8	**14.6**

There is a possibility of the spread of various diseases	0.0	3.8	0.0	**1.5**
Difficult to answer	19.5	21.2	16.2	**19.2**

*total share exceeds 100% as multiple options could be selected
Source: Socioeconomic survey, 2023.

Almost one of third of the respondents (29.2%) support the idea that tasks that may harm the ecology/ environment should be removed, while 12.3% of respondents stated that some forms of public control over the progress of the Project through the involvement of the local community could be very helpful in terms of reducing negative effects of the Project. More than one-tenth of respondents (11.5%) want compensation for losses, and 10.8% of respondents believe that programs to support families in need should be implemented. 14.6% proposed that developers have to agree with the local community on the project work plan, and 3.8% of respondents, meanwhile, requested the refusal of work that may damage the property of the population and business.

The table below includes respondents' opinions from the AOI communities on what measures can be taken to mitigate the negative impacts of the Project.

Table 21 Measures to mitigate negative impacts of the Project

	Sazagan	Saroy	Chortut	**Total**
Compensation for losses	17.1	9.6	8.1	**11.5**
Refusal to work that may damage the property of the population and business	2.4	0.0	10.8	**3.8**
Programs to support families in need	12.2	15.4	2.7	**10.8**
Restoration of damaged communal, irrigation and social infrastructure in a short time	4.9	13.5	16.2	**11.5**
Agree with the local community on the project work plan	12.2	17.3	13.5	**14.6**
Removal of tasks that may harm the ecology/ environment	26.8	21.2	43.2	**29.2**
Public control over the progress of the Project through the involvement of representatives of the local community	7.3	13.5	16.2	**12.3**
Solve the problem of lack of irrigation water	4.9	0.0	2.7	**2.3**
Residents of nearby mahallas/communities need to be resettled elsewhere	0.0	0.0	2.7	**0.8**

The project should not be implemented close to populated areas	0.0	0.0	2.7	**0.8**
Creation of pastures	0.0	0.0	2.7	**0.8**
Improve drinking water supply	0.0	1.9	0.0	**0.8**
Difficult to answer	31.7	38.5	16.2	**30.0**

Source: Socioeconomic survey, 2023.

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Socio-economic Survey Report
for Samarkand I and Samarkand II Projects

Survey II.Chorvador and Olga communities

Contents

Socio-economic baseline

1 Introduction

Administratively the Project will be located in Nurabad district of the Samarkand region in the Republic of Uzbekistan. In general, the landscape of the area is represented by pastoral land with the natural geographic features of an area, such as the mountains and valleys. The Project site will be located on pastoral land with partially growing crops.

There are two communities (Olga and Chorvador) located close to the Project site. **Olga community** is located approximately 3,5 km southeast of the Project site. The total area of the Olga community is 22,103 ha, and the total number of households amounts to 1015. In terms of **Chorvador community**, it is located almost 1 km in the southern part of the Project site. The total area of the Chorvador community is 1,000 ha. According to the information provided by the mahalla the total number of households is 599. Both of these communities are considered to be directly impacted by the Project ("AOI communities")[1]. See Figure 1 for the location of the Project within Samarkand region in relation to AOI communities

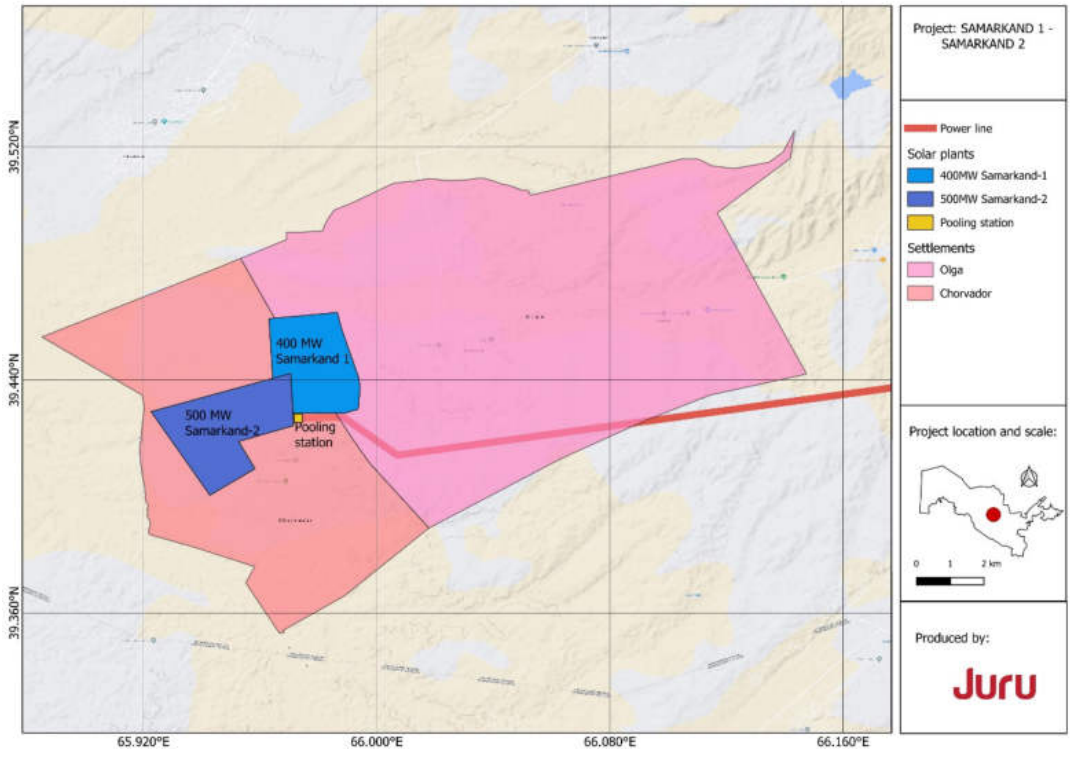


Figure 1: Location of Project site in relation to AOI communities

A socio-economic profile of the AOI was developed, through a socio-economic survey of households in the AOI communities, which was undertaken from 27th June to 1st July,

1 Nearest communities may benefit from a small amount of employment as a result of the Project.

2023. A total of 81 households in Olga community (approximately 8% of the 1015 total households) and 46 households in Chorvador (approximately 7.6% of the 599 total households) were surveyed. Table 1 below demonstrates the sample sizes.

Table 1 Survey sampling of AOI communities

No	Name of community	Overall number of households	Proposed number of households for survey (as planned)	Surveyed number of households	The date of survey
Nurabad district					
1.	Olga	1015	81	81	27.06-29.06.2023
2.	Chorvador	599	46	46	30.06-01.07.2023
3.	Total	1614	127	127	27.06-01.07.2023

The following section provides a socioeconomic baseline of the Project site, it is based on existing secondary information and the results of the socioeconomic survey.

2 Demographics

As of January-March 2023, the population of the Samarkand region totalled 4,137,900 people. For the same period the population of the Nurabad District reached 159,900 people.[2] Nurabad district is predominantly rural, in January 2023 the urban population of the Nurabad District totalled 18,000 people (11.2% of the population) and the rural totalled 141,900 people (88.7% of the population). It should be noted that the proportion of men and women in the district is nearly equal – 50% each.

Table 2 shows that the population of the Olga and Chorvador communities were reported to be 5308 and 2,516 people respectively in 2022.

Table 2 Population of AOI communities in 2022

No	Name of community	Total population	Households
1.	Olga	5,308[3]	1015
2.	Chorvador	2,516[4]	599
	Total	**7,824**	**1614**

The gender distribution of the AoI communities, based on survey information showed it is fairly consistent with the district statistics, with slightly more women (51.2%) than men

2https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=284&id=3297&Itemid=1000000000000

3 Passport of " Olga " community assembly as of January 1, 2023

4 Passport of " Chorvador " community assembly as of January 1, 2023

(48.8%). The majority of the households in the surveyed communities are male-headed households at 94.5%, with households headed by women making up just 5.5% of all surveyed households.

The members of the surveyed households aged between 7-17 years made up the largest individual age group, as shown in Figure 2 below.

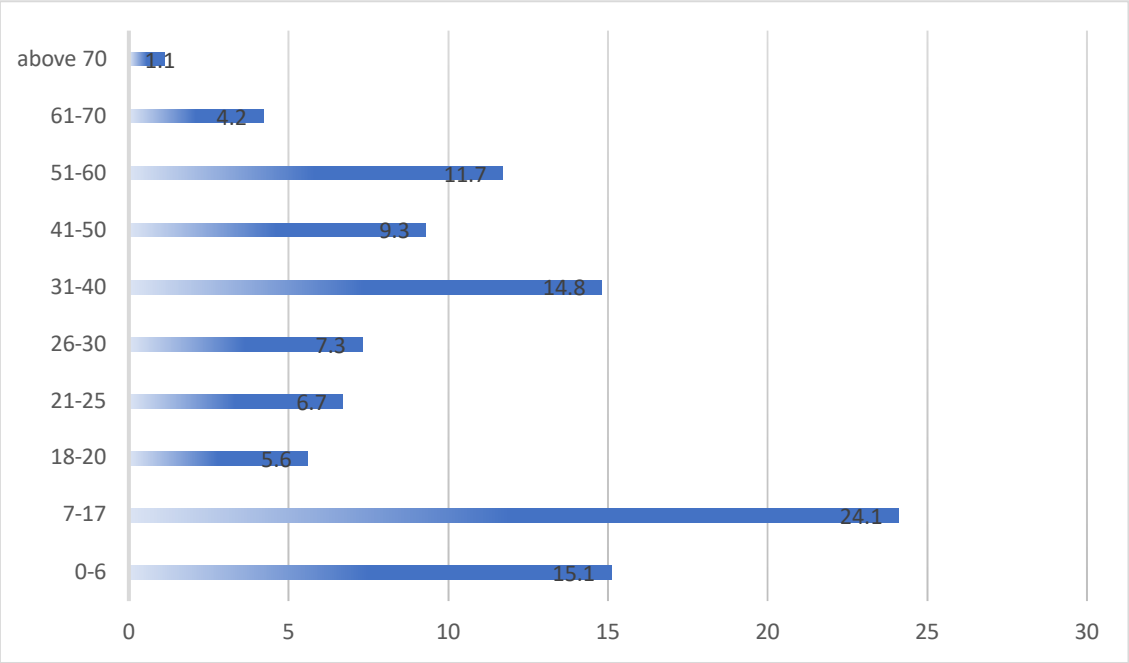


Figure 2: Age of surveyed household members

3 Economy, Employment and Livelihoods

3.1 Economy

The Samarkand region has strong economic potential and a fascinating history. In recent years, the area has seen the creation of new businesses, and diversified farms. In the fields of tourism, the textile industry, agriculture, and other new projects have been launched. Construction has been placed on homes, hospitals, schools, and kindergartens. In 2022 the value of agricultural products produced within the region amounted to 41,834 billion UZS, which increased by 1.5% compared to the last year[5].

Tourism is also an important sector in the Samarkand region's economy. The cultural heritage of Samarkand is quite large, for many centuries the city has been a key center of the Great Silk Road. As per the annual report of the Statistics Committee, the gross regional product (GRP) for 2023 January-March amounted to 12.4 billion UZS (1.078

5https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=294&id=3339&Itemid=1000000000000

million USD) with an increase of 3.6% compared to the same period of the previous year[6].

According to preliminary data 62.4 billion UZS (5.4 million USD) worth of industrial products were produced by local enterprises in Nurabad district in January-March, 2023, and the increase compared to the same period of last year was 66.1%. In the reporting period, the value of consumer goods was 13.7 billion UZS (1.2 million USD) with a 7.8% increase compared to the same period of last year. Food products made up 56% of the total consumer goods with 7.6 billion UZS (0.67 million USD), while the share of non-food products was 44% with 6.1 billion UZS (0.53 million USD).

Data obtained as a result of consultations with the communities of Olga and Chorvador revealed that the economies of both communities are almost exclusively reliant on agricultural activities and livestock grazing and also remittances from migrants.

3.2 Employment

As of January-December 2022, in Nurabad District, the rate of unemployment in the labour market was 9,5%. In January-March 2023, the number of people who immigrated to Nurabad district was 38, and the number of those who left was 142 people during this period. The majority of economically active people are employed in the agricultural sector (33.5%), followed by commerce (28.7%), industry (11.8%), other sectors (9.2%), accommodation and food services (6.1%), construction (5%) and health and social welfare (3.7%).

The average monthly salary of a person living in Samarkand region amounted to 3,127,700 UZS (or USD $273) in January-March 2023 as per statistics provided. The average monthly salary of a person living in Nurabad District amounted to 2,760,300 UZS (or USD $235) in January-March 2023 according to the data provided by the statistic committee of Nurabad district. The average family income reported by survey respondents was 3,979,300 UZS (or approximately USD $347) with a per capita income of 786,300 UZS (or USD $67). The district salaries and per capita household incomes cannot be directly compared, as the calculation of per capita income will include both workers and dependents.

Figure 3 below provides information on the occupation of the household members in the surveyed households. It was revealed that the majority of respondents (19.8%) are employed in the government sector, whereas 18% of respondents stated they are pensioners. 15.4% of the total respondents are homemakers, while 12.2% are unregistered unemployed people in labor market.

6 https://stat.uz/en/press-center/news-of-committee/39302-sa1marqand-viloyatining-yalpi-hududiy-mahsuloti-qanchaga-o-sdi-6

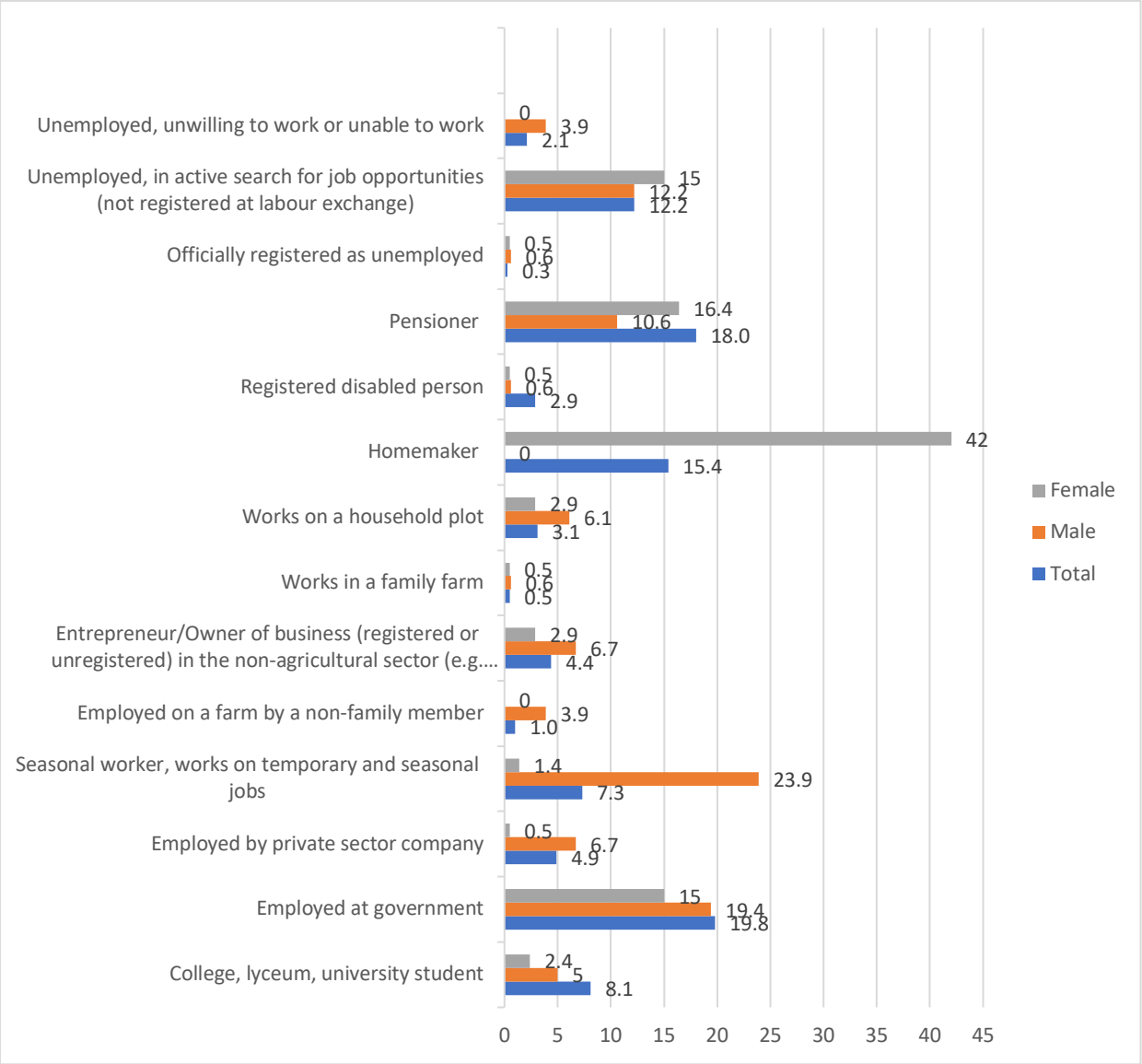


Figure 3: Occupations in surveyed communities

During the survey it was found that total of 70% school children work, they mainly do household chores and work on the family's tomorka (household garden plots), including caring for livestock. In Olga community, 61.5% children work while in Chorvador 80.6% of surveyed households stated that their children are active in different household chores. Table 3 below gives information about how many hours children work.

Table 3 Working hours of children

Living communities	1-7 hours	8-10 hours	11-15 hours	16-20 hours	21-25 hours	More than 25 hours	**Total**
Olga	8.3	45.8	25.0	4.2	8.3	8.3	100.0

Chorvador	8.3	0.0	16.7	20.8	20.8	33.3	100.0
Total	**8.3**	**22.9**	**20.8**	**12.5**	**14.6**	**20.8**	**100.0**

Approximately 29.9% of the surveyed households stated that they have household members who have migrated to work in other regions of Uzbekistan or abroad. Around 84.2% of all the households with labor migrants had only one person that had migrated whereas only 15.8% of the households with labor migrants had two labor migrants that had left for work.

Survey respondents were asked the main threats that impact their income, 9.4% of respondents reported that there are no threats (8.6% of respondents from Olga and 10.9% from Chorvador), 42.5% of respondents indicated unemployment, lack of irrigation water was a concern for 62.2% of respondents, but this was much more of a concern in Olga (65.4%) than Chorvador (56.5%). Respondents were allowed to select multiple answers. Table 4 below provides more information.

Table 4 main threats that impact income of respondents

	Olga	Chorvador	**Total**
No threats	8.6	10.9	**9.4**
Decrease in prices for agricultural products	1.2	2.2	**1.6**
Lack of irrigation water	65.4	56.5	**62.2**
Rising prices for consumer goods	14.8	10.9	**13.4**
Unemployment	40.7	45.7	**42.5**
Deterioration of ecology	1.2	2.2	**1.6**
Electricity voltage is low	2.5	8.7	**4.7**
Pasture cuts	2.5	0.0	**1.6**
Difficult to answer	0.0	4.3	**1.6**

Source: Socioeconomic survey, 2023.

When asked about challenges faced by female household members (particularly in their place of work), more than one-tenth of respondents stated that no challenges were faced (13.4%). Following that the main concerns raised were economic inequality (29.9%), and the lack of opportunity for a career 21.3%. Respondents from Chorvador also raised access to public services and unemployment as key challenges (both 26.1%). Respondents were allowed to select multiple options.

Table 5 Challenges faced by female household members in affected communities (%)

	Olga	Chorvador	%
Economic inequality	42.0	8.7	**29.9**
Access to equal opportunity	30.9	4.3	**21.3**

Lack of respect	3.7	2.2	**3.1**
Access to public services	2.5	26.1	**11.0**
No opportunities for career	22.2	23.9	**22.8**
Limited access for education, professional trainings	18.5	19.6	**18.9**
Unemployment	3.7	26.1	**11.8**
Weak participation in political life, in governance and power	6.2	6.5	**6.3**
No challenges faced	8.6	21.7	**13.4**

Source: Socioeconomic survey, 2023.

* Total share exceeds 100% as multiple options could be selected

3.3 Accommodation, Living Conditions and Household Amenities

All of the respondents of the survey live in a private house, meaning that no one lives in multi-stored apartments and all of them live there all year round. About 94.5% of the houses are registered (owned) under a male member of the household and the remaining 5.5% are registered under a female member (usually the household head).

A total of 12.3% of Olga community members responded that electricity is stable in their community all year round, while 69.1% of respondents stated that electricity supply is unstable during the whole year, and 18.5% face some problems with electricity only in winter. In comparison, in Chorvador community only 4.3% respondents have stable electricity supply all year round and 95.7% of respondents stated their electricity supply is not stable all year round.

Centralized water supply is not available for almost all the respondents in both communities. Only 6.2% respondents from Olga community stated that they have access to centralized water supply, but it does not work, and others do not have access. Regarding potable water, 95.7% in Chorador and 98.8% surveyed households in Olga community take it from a water carrier, for a fee and remaining 4.3% and 1.2% respectively uses delivered water by a water carrier free of charge. Table 6 below illustrates the sources of water for other household needs.

Table 6 The sources of water for other household needs

	Olga	Chorvador	**Total**
Electric or fuel pump in my or neighboring yard	8.6	39.1	19.7
Own well for underground water in the yard	18.5	8.7	15.0
Hand pump (rocker)	0.0	2.2	0.8

Drainage channel	0.2	0.0	0.8
Water is delivered by a water carrier, for a fee	67.9	50.0	61.4
Water is delivered by a water carrier free of charge	2.5	0.0	1.6
Rainwater	1.2	0.0	0.8
Total	100.0	100.0	100.0

The centralized gas supply is not available in both communities. Also, there is no centralized heating in place. For heating, 85.2% respondents in Olga community use dry manure, while 13.6% use wood or plant materials, and gas cylinders are used by remaining 1.2%. In Chorvador community also, the most used resource in terms of heating house is dry manure with 71.7%, and wood or plant materials are used by 21.7%, meanwhile remaining 6.7% use electricity. For cooking most of the respondents use gas cylinders (67.9% in Olga and 97.8% in Chorvador community), and dry manure is used by 18.5% from Olga and 2.2% respondents from Chorvador community. Remaining 13.6% respondents from Olga community use wood or plant materials.

All respondents in both AOI communities use special pits in their households for household waste disposal. However, for wastewater disposal in Olga community 44.4% respondents use the yards and 55.6% use special pits. In Chorvador community 97.8% respondents discharge the waste water to special pits, while 2.2% discharge to outside.

3.4 Land Use, Agriculture and Natural Resources

Almost all (96.9%) of the surveyed households reported that they had agricultural land plots. Of the total respondents, 96.1% have tomorka (household garden plots), while 0.8% have tomorka and other areas of land as well. 3.1% respondents reported that they do not have land plots. Of the respondents that own land, respondents with land area up to 0.6 hectares made up 43.9%, and the remaining 56.1% own land plots larger than 0.6 hectares. Only one respondent from Olga community has a farm land with the area of 20 hectares.

The types of agricultural products respondents grew on their land plots in 2022 are provided in the figure below. Respondents were allowed to select multiple answers.

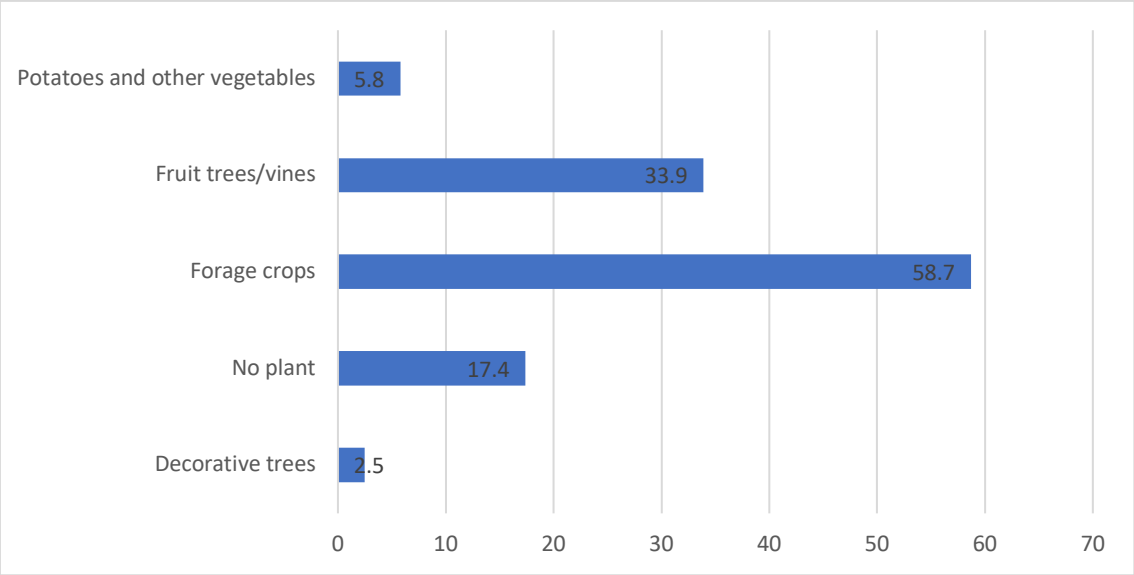


Figure 4: Type of agricultural crops grown on agricultural land plots

Respondents were asked about whether they farm throughout the year or during certain seasons of the year. 1% respondents engage in farming activities whole year, while 67.6% in Spring, 51.4% in Summer, 25.7% in Autumn and 1% in Winter. The main purpose of their agricultural activities is personal consumption (98.3% in Olga and 100% in Chorvador communities), not making profit by selling the products.

Source of labour for the agricultural activities of the respondents from Olga community is adult family members (not children), while in Chorvador community 97.7% respondents use the adult family members, and 32.6% use the help of their children. Respondents were allowed to select multiple answers. Women's engagement in farming activities is nearly the same with their male counterparts, at 46.7% compared to 53.3%.

With regard to livestock raising, 85.2% and 91.3% respondents have livestock in Olga and Chorvador communities respectively. Most of the families own cows, bulls, lambs, goats and poultry. 94.2% of surveyed households own cows and bulls, while 67.3% have poultry. According to survey results, 83% of respondents have lambs and goats and 6.4% of respondents have horses.

There are currently no agricultural activities being undertaken on the Project site, except for grazing of livestock. Survey respondents from the AOI communities were asked if they used the Project site and if so, what they used it and 36.2% (46 respondents, 39 from Olga and 7 from Chorvador) of all respondents indicated that they use the Project area, and all of them use this area for grazing livestock. 14 respondents from Olga and 4 respondents	Olga	Chorvador	Total

from Chorvador have an agreement to use the area. The table below shows which organizations the herders have contracted with.			
With a livestock cluster	11	2	13
With the council of farmers	1	2	3
With farmers	1	0	1
Difficult to answer	1	0	1
Total	**14**	**4**	**18**

17 respondents from Olga and 1 respondent from Chorvador community pay for the use of the area.

In Olga community 8 respondents pay up to 100,000 UZS, 8 respondents pay between 100,001 and 200,000 UZS, and one pays more than 200,000 UZS. One respondent from Chorvador community pays up to 100,000. In Olga community 11 of them pay to livestock cluster, 3 respondents make the payment to herders, while one pays to the council of farmers and one found it difficult to answer. One respondent from Chorvador pays to the council of farmers for land use.

4 Education.

The right to education is guaranteed to all citizens of the Republic of Uzbekistan under the Article 50 of Constitution, which states that “every person has a right to education”. The State oversees education and provides free education up to secondary school. Almost 100% of the Uzbek population has at least a secondary education with women and men both at an equal ratio of 99.9%7.

As of October 2022, in Samarkand region 874 pre-schools,15 colleges,1285 schools, and 14 higher educational institutions in the region. There are 76 schools, 21 preschool educational organizations, and 3 colleges in Nurabad district8.

According to the survey results, 29.6% respondents in the Olga community said that there is 1 school, 18.5% said 2, 50.6% said 3, and 1.2% said 4 schools, whereas in the Chorvador community 73.9% said 1, 23.9% said 2 and 2.2% mentioned 5 schools.

Regarding kindergartens, in Olga community 64.2% responded that there is 1, 19.8% said 2, 14.8% said 3 and 1.2% mentioned 4 kindergartens in the community. However, 89.1% respondents stated that there is 1 and 10.9% said there are 2 kindergartens within the community.

7 UNDP “Human Development Report”, 2016

8 https://samstat.uz/uz/rasmiy-statistika/social-protection-2

Most of the kindergarten children and students in Olga community have to walk less than 1 km to reach either kindergarten or school. Chorvador community members are in general closer to education facilities. Tables 7 below illustrate the approximate distance that students have to travel from their homes to the nearest educational facility.

Table 73 Distance to the nearest educational facility

Kindergarten

	Up to 200 m	201-500 m	501m-1km	1km-3km	More than 3km	Total
Olga	4.9	22.2	35.8	35.8	1.2	**100.0**
Chorvador	6.5	41.3	37.0	15.2	0.0	**100.0**
Total	**5.5**	**29.1**	**36.2**	**28.3**	**0.8**	**100.0**

School

	Up to 200 m	201-500 m	501m-1km	1km-3km	More than 3km	Total
Olga	11.1	49.4	28.4	11.1	0.0	**100.0**
Chorvador	28.3	37.0	28.3	6.5	0.0	**100.0**
Total	**17.3**	**44.9**	**28.3**	**9.4**	**0.0**	**100.0**

Source: Socioeconomic survey, 2023.

Survey respondents were asked that is the school equipped with the necessary equipment. In Olga community 11.1% respondents stated that the school has everything students need, 51.9% stated that the school is equipped with only essentials, whereas 30.9% think that schools are poorly equipped, 1.2% found schools in bad condition and 4.9% found it difficult to answer. In Chorvador 56.5% respondents think that school is well equipped, while 34.8% believe that school is equipped with only essentials and 8.7% found it difficult to answer.

Survey responses show (see Table 8) that only 0.5% of household members were recorded as illiterate. However, the, rate of attending higher education is also low (5.3%) in the surveyed communities.

Table 8 Levels of education including all household members

	%
Illiterate	0.5
Can read and write, but did not graduate from secondary school	0.3
Graduated secondary school	2.0
Graduate high school	39.1
Graduated from secondary special (college, lyceum, vocational school, technical school)	14.0
Higher education (bachelor) / postgraduate (Master's/PhD)	5.3

	%
Schoolchildren	22.3
Preschoolers	16.5
Total	100

Source: Socioeconomic survey, 2023.

Of the total surveyed population all students (both boys and girls) eligible to attend schools/colleges/lyceums were attending these types of schools located in their communities.

5 Health

As of 2021, there were 635 health clinics in Samarkand region, while the number of clinics in Nurabad district was 24[9]. Overall, local communities in the regions of Uzbekistan and in particular in the districts have only a limited number of healthcare services. Usually, villages have only one health clinic to provide first aid and general medical consultations. For specified medical services villagers have to refer to district or regional medical centres.

Regarding the availability of health facilities, there is a significant difference between the two communities, 100% of respondents from Olga community stated that they have access to health services, while 54.3% of respondents from Chorvador community have access to health services.

Respondents who stated there was no health service available in their community were asked to specify how far and where do they go for medical care. 45% of the respondents in Chorvador community stated that they use the health services located up to 700 m while 55% said it is located more than 700 m from their home.

In addition, survey respondents were asked if they found their local health services to be well equipped, and 66.1% of all respondents stated that their local health facilities were well equipped, 25% were not satisfied, while 8.9% of respondents found the question difficult to rate.

9https://samstat.uz/uz/?preview=1&option=com_dropfiles&format=&task=frontfile.download&catid=288&id=2820&Itemid=1000000000000

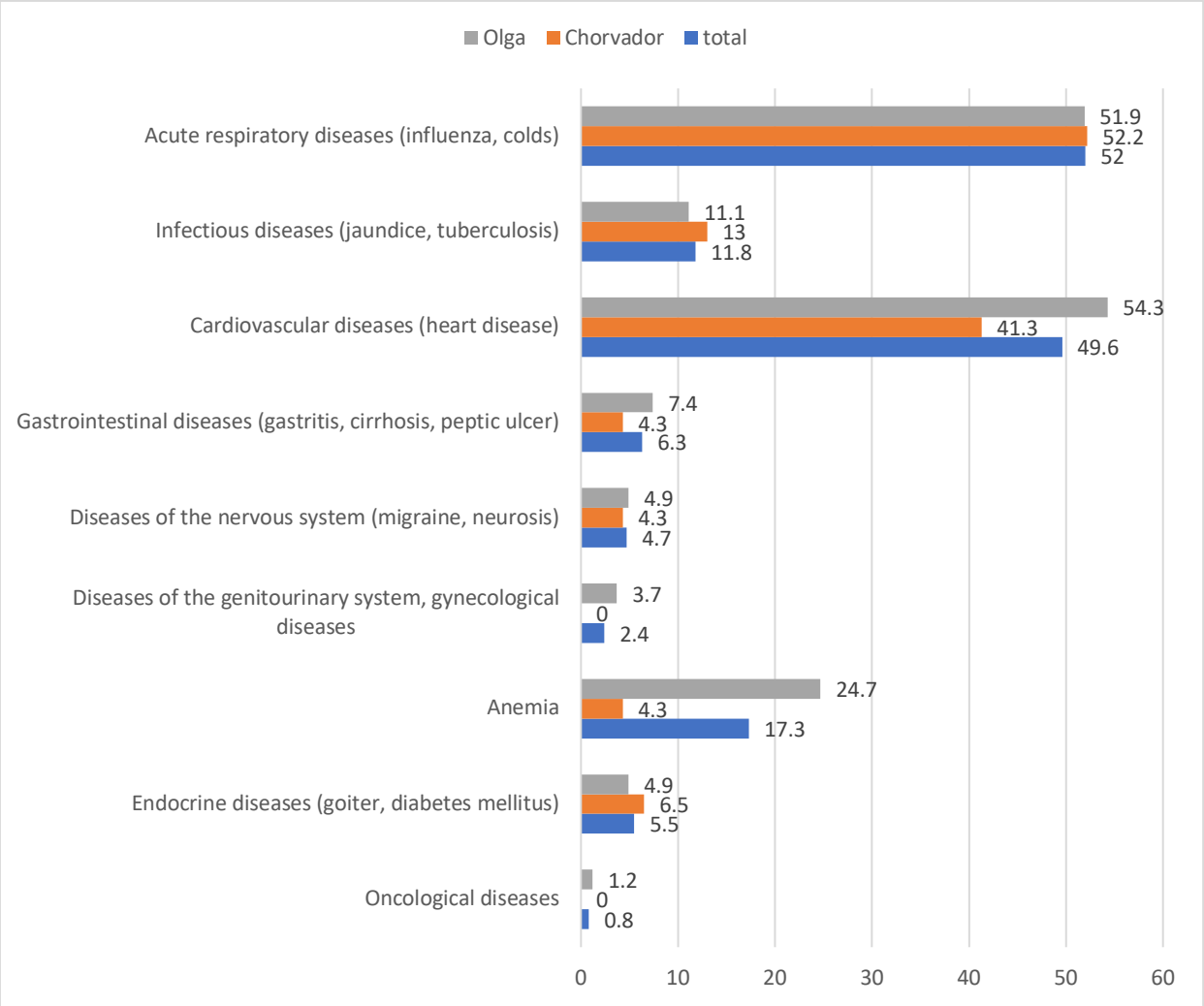


Figure 5: Most common health concerns in the AOI communities

*Total share exceeds 100% as multiple options could be selected

6 Language and Ethnicity

The survey identified that all (100%) of the people in the surveyed communities are Uzbek.

The survey showed that all the respondents speak Uzbek language. Site observations found that while Uzbek is widely spoken, community members also use a mixture of words from a dialect spoken in the southern part of Uzbekistan.

The socioeconomic survey did not include questions related to religion due to sensitivity to this type of question for people in the region. However, in general, the majority of people in surveyed communities belong to the Uzbek nationality and practice Islam. Site observations as well as consultations conducted with local communities at the Scoping and ESIA stages did not reveal the presence of attributes of other religions that could cause conflict or cause individuals to be more vulnerable to Project impacts.

7 Indigenous peoples

IFC PS8 defines Indigenous peoples (IPs) as a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as a member of a distinct indigenous social and cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats, ancestral territories, or areas of seasonal use or occupation, as well as to the natural resources in these areas;
- Customary cultural, economic, social, or political institutions that are distinct or separate from those of the mainstream society or culture; and
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

No IPs were observed during the site visit or identified during communications with the nearest communities. IPs are not present in the AOI communities.

8 Infrastructure

8.1 Road, and transportation

There are a number of roads which are used by PAPs. Main used roads can be seen in the 6 below.

Figure 6: Existing Road used by local community members

Respondents were asked how often they use the road next to the project site. The table below gives information about this.

Table 9: Frequency of usage of the road next to the Project site

	Daily	2-3 times in a week	Once per month	Seasonally	Do not use	Total
Olga	13.6	18.5	17.3	14.8	35.8	**100.0**
Chorvador	2.2	37.0	2.2	17.4	41.3	**100.0**
Total	**9.4**	**25.2**	**11.8**	**15.7**	**37.8**	**100.0**

Source: Socioeconomic survey, 2023.

2.5% in Olga and 2.2% in Chorvador community have alternative roads. A number of roads were mentioned by these respondents as possible alternatives.

Table 10 Mentioned alternative roads

	Through rain-fed lands	Across the steppe	Difficult to answer	Total
Olga	0.0	50.0	50.0	**100.0**
Chorvador	100.0	0.0	0.0	**100.0**
Total	**33.3**	**33.3**	**33.3**	**100.0**

9 Culture, tourism and recreation

There are no recreation facilities or cultural features of national or international importance on or near the Project site.

Regarding the cultural heritage, the respondents were asked if they know any cultural sites of international, national or local importance located within the Project area or within a 5 km radius. Only 2.5% (2 respondents) respondents in Olga community said that there are objects of local importance while 70.4% said there is no tangible object and 27.2% found it difficult to answer. In Chorvador community, where no respondents mentioned existing cultural sites, 82.6% said no tangible object and 17.4% found it difficult to answer. Of the 2 respondents from Olga, 1 mentioned ancient cemetery and another one told about "Usman ota" tomb.

10Poverty and Equity

According to the Asian Development Bank (ADB), as of 2020 a total of 11.5% of the population of Uzbekistan lived under the national poverty line. A total of 6.5% of the working population earned less than $1.90 using the purchasing power parity poverty indicator as of 2021[10]. Poverty levels in Uzbekistan had been decreasing, however they have been negatively impacted by the COVID-19 pandemic. In 2020 it was determined

10 https://www.adb.org/countries/uzbekistan/poverty

that 1.3% of the population (approximately 448,000 people) may have fallen into poverty as a result of COVID-19[11].

In Uzbekistan, the minimum consumption expenditure index is used as the poverty line. According to the State Statistics Committee, the minimum consumer spending amounted to 568 thousand soums per month per person. The share of surveyed HHs whose income does not exceed 568 thousand soums per capita in Chorvador is 21.7%, while the figure for Olga community is 32.1%.

A large number of the members of the AoI communities are considered to be poor. While income data was not provided by survey respondents, their level of poverty can be identified in other ways. Survey respondents have provided their self-determined poverty status, while we have also looked at ownership of household items to verify poverty levels. These poverty measurements are discussed further below.

Respondents to the socioeconomic survey were asked whether their income is sufficient or not. The majority of respondents indicated that their income is enough only to cover basic needs. Of all of the respondents in the AOI communities, 30.7% stated their income was not enough to cover basic needs and 3.9% said their income is not enough to cover expenses even for food. Table below provides information about how sufficient their income.

Table 11 Sufficiency of incomes in the AOI communities

	Olga	Chorvador	**Total**
Income is more than enough, can buy anything	0.0	2.2	0.8
Income is enough for more than just basic needs, but not enough to buy anything	18.5	15.2	17.3
Income is enough only for basic needs (food, clothing, bills)	50.6	41.3	47.2
Income is not enough to cover basic needs	24.7	41.3	30.7
Income is not enough even for food	6.2	0.0	3.9
Total	100	100	100

Source: Socioeconomic survey, 2023.

Surveyed household members in general did not own a lot of household items, which can verify the majority of households reporting that their income is not enough to buy anything. Table 12 below provides information about the main household assets of the respondents. The majority of households own a TV and a mobile phone (97.6% and 89% respectively), the next most owned item is a refrigerator (74%). Approximately half of the households own cars (50.4%) and 5.5% motorbikes.

11 https://www.undp.org/press-releases/uzbekistans-health-care-system-economy-hit-hard-covid-19

Table 12 Main household assets of the respondents

	Yes	No
Car	50.4	49.6
TV	97.6	2.4
Satellite dish	0.8	99.2
Washing machine	12.6	87.4
Refrigerator	74.0	26.0
Air conditioner	5.5	94.5
Greenhouse	0.0	100
Personal computer	9.4	90.6
Mobile phone	89.0	11.0
Motorbike	5.5	94.5

Source: Socioeconomic survey, 2023.

*TOTAL SHARE EXCEEDS 100% AS MULTIPLE OPTIONS COULD BE SELECTED

11 Human Rights

As Uzbekistan is considered as a member of UN, all the main international instruments of the UN relating to the protection of human rights and freedoms, including UN Universal Declaration of Human Rights, Human Rights Council Resolution No. 30/15 on human rights and preventing and countering violent extremism, Convention on the Elimination of all Forms of Discrimination against Women among others, implemented by Uzbekistan government.

In order to create the necessary organizational, legal, social, economic, spiritual and moral foundations for the protection of human rights, the state policy of Uzbekistan in the field of human rights is aimed at preventing violations or any restriction of human rights and freedoms.

In 1995-1996, two independent and effective institutions for the protection of human rights were established in Uzbekistan:

- The Human Rights Commissioner (Ombudsman) of the Oliy Majlis of the Republic of Uzbekistan; and
- The National Centre for Human Rights.

In subsequent years, special structures for the protection of human rights were established in various ministries and departments of the Republic of Uzbekistan.

Homosexual relations are prohibited in Uzbekistan and restricted by Article 120 of the Criminal Code on "Sodomy".

Although Uzbekistan prohibits violence against women and girls, there is no reliable data on domestic violence in Uzbekistan where many victims remain silent for fear of bringing shame to their families (ADB,2018).

It should be noted that Uzbekistan has experienced an increase in domestic violence since the outbreak of COVID-19. Alongside the economic hardships which have resulted in income and job losses in many households, there has been an increase in the rates of physical, verbal, emotional, economic, and sexual abuse against women and girls.

According to the Ministry of Internal Affairs, local law enforcement in Uzbekistan issued more than 8,430 protection orders to ensure security of domestic violence victims between January to October 2020. Out of these, 4330 experienced physical abuse, while around 3,200 suffered emotional abuse (World Bank, 2021). The number of unreported cases is expected to be much higher. In over 7,600 cases, women and girls in Uzbekistan experienced violence within their own families and in almost 5,920 of these cases, the aggressors were the husbands.

Survey results reveals that women are expected to perform domestic chores like cooking and washing in their families. While the men are more involved in going to the market, the purchase of food and non-food items.

This information is further discussed in the Project Human Rights Impact Assessment (HRIA).

12 Vulnerable Groups

According to the survey results, vulnerable groups identified in the AOI communities mainly consist of low-income families, people with disabilities as well as the unemployed.

Among surveyed households, the number of disabled people in the total number of household members is 8 (1.2%). Of the 8 members 5 people (62.5%) have physical disability, while 1 person (12.5%) is mentally disabled and 2 people (25.0%) have chronic disease.

Applicability to receive allowances is also a measure of vulnerability. Respondents were asked do they receive a monthly low-income allowance and 8.7% resondents said yes, while 32.3% indicated that they should receive an allowance, but it is not provided. The remainder of respondents do not receive an allowance.

When respondents were asked whether they receive monthly child allowances from the mahalla, 37.8% respondents indicated that they receive, 17.3% stated that they have to receive, but none is provided, while 29.1% do not meet the criteria, and 15.7% have no children under 17.

13 Knowledge About the Project

According to survey results, 1.2% respondents in Olga community reported that they had previous knowledge about the Project, and 25.9% said that they had heard about it, but

not much, while 72.8% households surveyed did not have any information about the Project. In Chorvador community 4.3% of respondents knew about the Project, while 65.2% had heard about it, but not much, and 30.4% had no information about the Project.

In Olga community 44.4% of respondents preferred to receive information from the Makhalla Committee, 9.9% from social networks, 46.9% from TV, 6.2% during public consultations, 24.7% from local authorities, and 3.7% from special information bulletins on the Project.

In Chorvador community 23.9% of respondents chose to receive information from the Makhalla Committee, 47.8% from social networks, 21.7% from TV, 2.2% during public consultations, 4.3% from both special information bulletins on the Project.

13.1 Positive expectations of surveyed households from Project

When asked what would be the positive impacts of the Project, survey respondents from both AoI communities provided similar responses. The most they were expecting was improvement in power supply (48.8% of AoI communities), creation of new jobs (39.4% of AoI communities) and increased efficiency of electricity supply (8.7% of AoI communities). Table 13 provides an overview of respondent's opinions on positive Project impacts.

Table 13 Positive impacts of project implementation

	Olga	Chorvador	%
The power supply will improve	43.2	58.7	**48.8**
The conditions for doing business will improve	1.2	0.0	**0.8**
Electricity generation costs will decrease	2.5	2.2	**2.4**
The power supply voltage will improve	9.9	4.3	**7.9**
The cost of electricity will decrease	2.5	0.0	**1.6**
Ecology will improve	1.2	0.0	**0.8**
New jobs will be created	32.1	52.2	**39.4**
The activities of schools, hospitals, and other social institutions will improve	0.0	4.3	**1.6**
Efficiency of electricity supply will increase	3.7	17.4	**8.7**
Nothing will change, everything will remain the same	24.7	15.2	**21.3**
Difficult to answer	24.7	4.3	**17.3**

*total share exceeds 100% as multiple options could be selected

Source: Socioeconomic survey, 2023.

13.2 Negative effects of the Project

Respondents were asked what negative impacts are anticipated from the Project. 64.2% respondents from Olga community believe that grazing areas will be reduced as a result of the Project, and half of the respondents from Chorvador community stated that the Project will not harm anyone. Responses regarding the negative impact are provided in the table 14 below.

Table 14 Negative impacts of project implementation

	Olga	Chorvador	**Total**
Housing and property may be affected during construction	12.3	4.3	9.4
Job cuts	0.0	2.2	0.8
Damage to gardens\farm\pastoral lands	1.2	2.2	1.6
Noise, dust during construction work	11.1	4.3	8.7
Damage to roads, irrigation canals, gas, water pipes, bridges	3.7	4.3	3.9
Ecological/Environmental Impairment	25.9	8.7	19.7
The project will not harm anyone	7.4	50.0	22.8
Traffic due to the moving heavy machinery	1.2	4.3	2.4
Reduced grazing areas	64.2	2.2	41.7
Damage of infrastructure objects during construction phase	1.2	2.2	1.6
Difficult to answer	17.3	23.9	19.7

*total share exceeds 100% as multiple options could be selected
Source: Socioeconomic survey, 2023.

Nearly a quarter of respondents (23.6%) found it difficult to suggest measures to mitigate the negative impacts anticipated for the Project. Some respondents (15%) support the idea - development of programs to support families in need near the project area, 26.8% of respondents stated that some form of public control over the progress of the Project through the involvement of the local community could be very helpful in terms of reducing negative effects of the Project. Other respondents highlighted further mitigation measures, such as appropriate compensation for losses (30.7%), implementation of a project work plan that is agreed with the population and the local community (12.6%), and removal of activities that may harm the ecology/environment (13.4%). The table below includes respondents' opinions from the AoI communities on what measures can be taken to mitigate negative impacts of the Project.

Table 4 Measures to mitigate negative impacts of the Project

	Olga	Chorvador	**Total**
Compensation for losses	40.7	13.0	**30.7**
Removal of tasks that could damage property	3.7	8.7	**5.5**
Programs to support families in need	18.5	8.7	**15.0**
Timely rehabilitation of damaged infrastructure	6.2	2.2	**4.7**
Agree with local community on project work plan	17.3	4.3	**12.6**
Removal of tasks that may harm the ecology/ environment	13.6	13.0	**13.4**
Involvement of local community in the progress of the Project	35.8	10.9	**26.8**
Project should be relocated	1.2	2.2	**1.6**
Difficult to answer	8.6	50.0	**23.6**

Source: Socioeconomic survey, 2023.

Table 1 Traffic survey point 1

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
Traffic survey point 1	February 29th	9:00-9:30	30	414	15	1	460
		9:30-10:00	50	422	18	5	495
		10:00-10:30	46	433	11	8	498
		10:30-11:00	43	442	22	9	507
						subtotal	**1969**
		13:00-13:30	25	334	12	10	381
		13:30-14:00	40	356	23	10	429
		14:00-14:30	38	328	18	4	388
		14:30-15:00	47	347	20	5	419
						subtotal	**1617**
		17:00-17:30	48	418	8	8	482
		17:30-18:00	52	403	19	3	477
		18:00-18:30	48	419	28	2	497
		18:30-19:00	52	379	11	3	445
						subtotal	**1901**











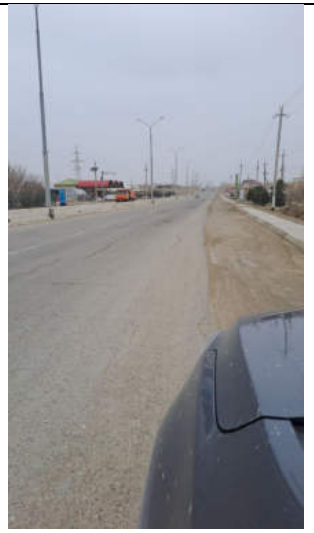


Figure 1 Photos for location 1

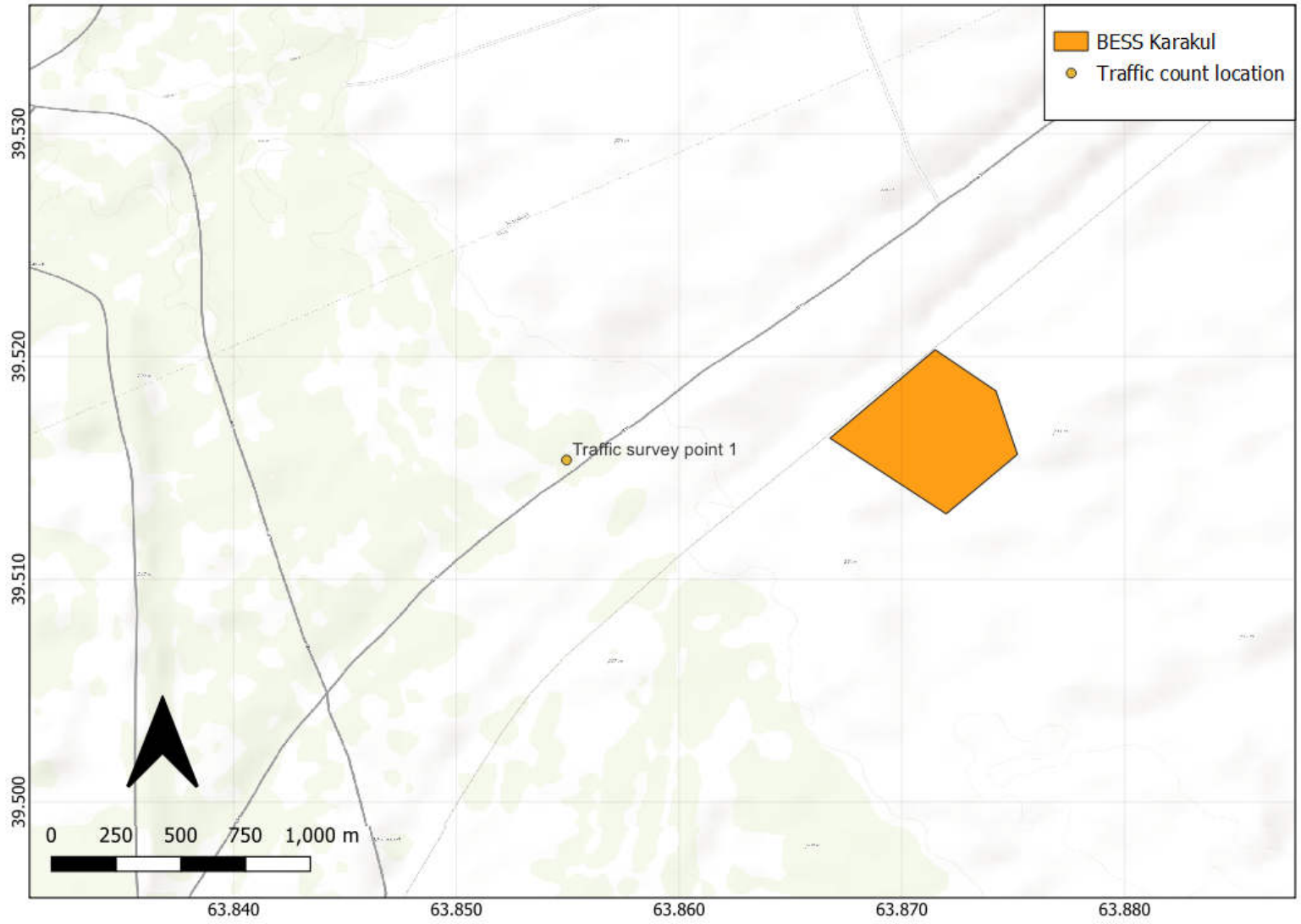


Figure 2 Location of Traffic survey 1

Table 2 Traffic survey point 2

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
Traffic survey point 2	March 1st	9:00-9:30	30	199	10	0	239
		9:30-10:00	38	222	7	0	267
		10:00-10:30	33	219	9	0	261
		10:30-11:00	36	252	12	0	300
						subtotal	**1067**
		13:00-13:30	28	284	7	1	320
		13:30-14:00	29	279	8	0	316
		14:00-14:30	37	296	13	0	346
		14:30-15:00	33	326	12	0	371
						subtotal	**1353**
		17:00-17:30	35	323	10	0	368
		17:30-18:00	40	338	8	0	386
		18:00-18:30	35	282	10	0	327
		18:30-19:00	32	268	9	0	309
						subtotal	**1390**





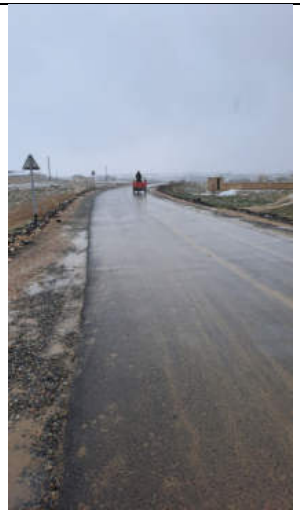

Figure 3 Photos for location 2

Table3 Traffic survey point 3

Location	Date	Duration	HGV	Cars	VAN	Motorcycle	Total
Traffic survey point 3	March 2nd	9:00-9:30	1	28	2	0	31
		9:30-10:00	2	34	0	1	37
		10:00-10:30		29	1	0	30
		10:30-11:00	1	26	0	0	27
						subtotal	**125**
		13:00-13:30	0	18	0	1	19
		13:30-14:00	0	29	0	0	29
		14:00-14:30	0	18	0	0	18
		14:30-15:00	0	14	0	2	16
						subtotal	**82**
		17:00-17:30	0	10	0	0	10
		17:30-18:00	0	9	0	0	9
		18:00-18:30	0	13	0	0	13
		18:30-19:00	0	8	0	0	8
						subtotal	**40**





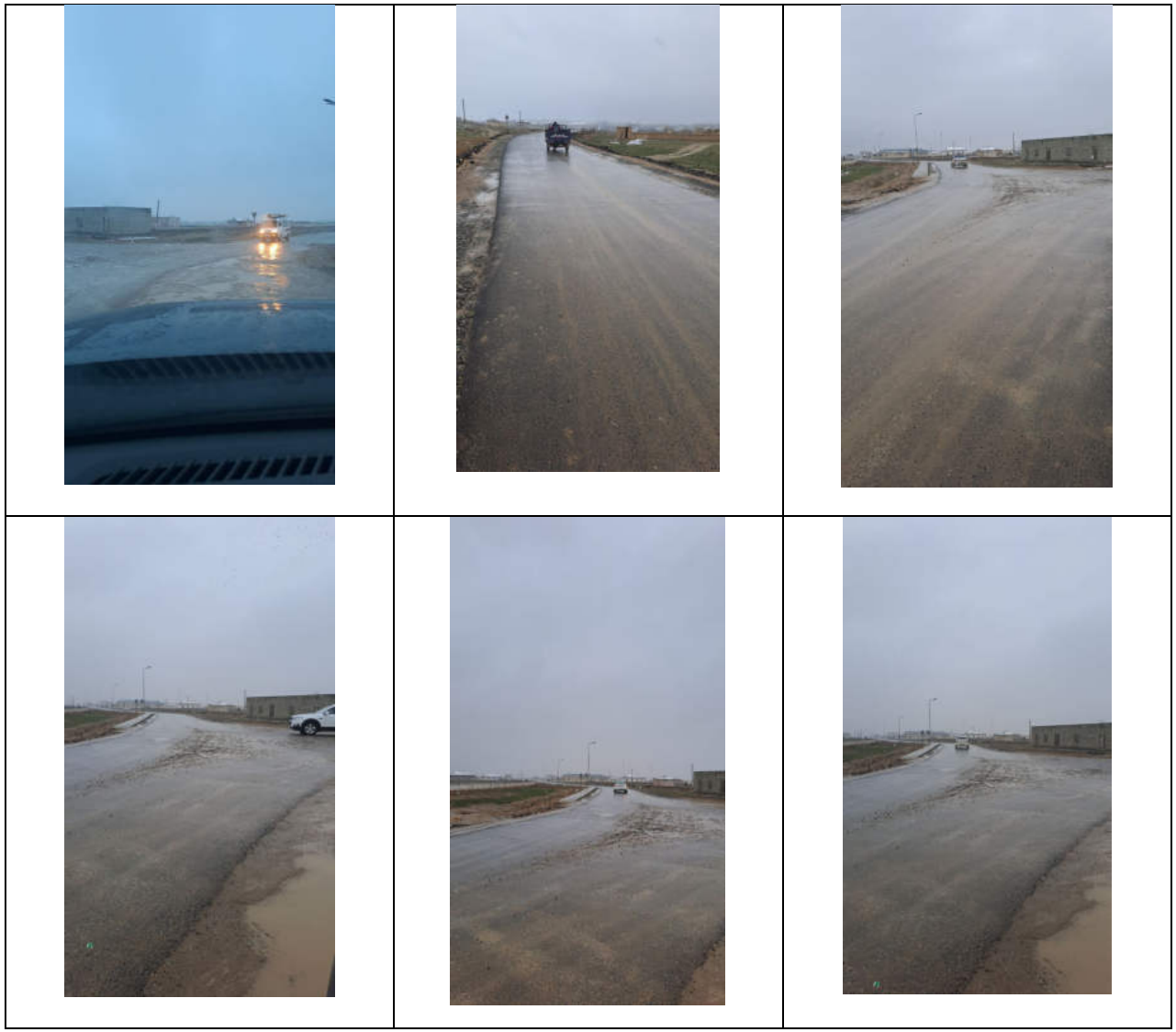


Figure 4 Location 3

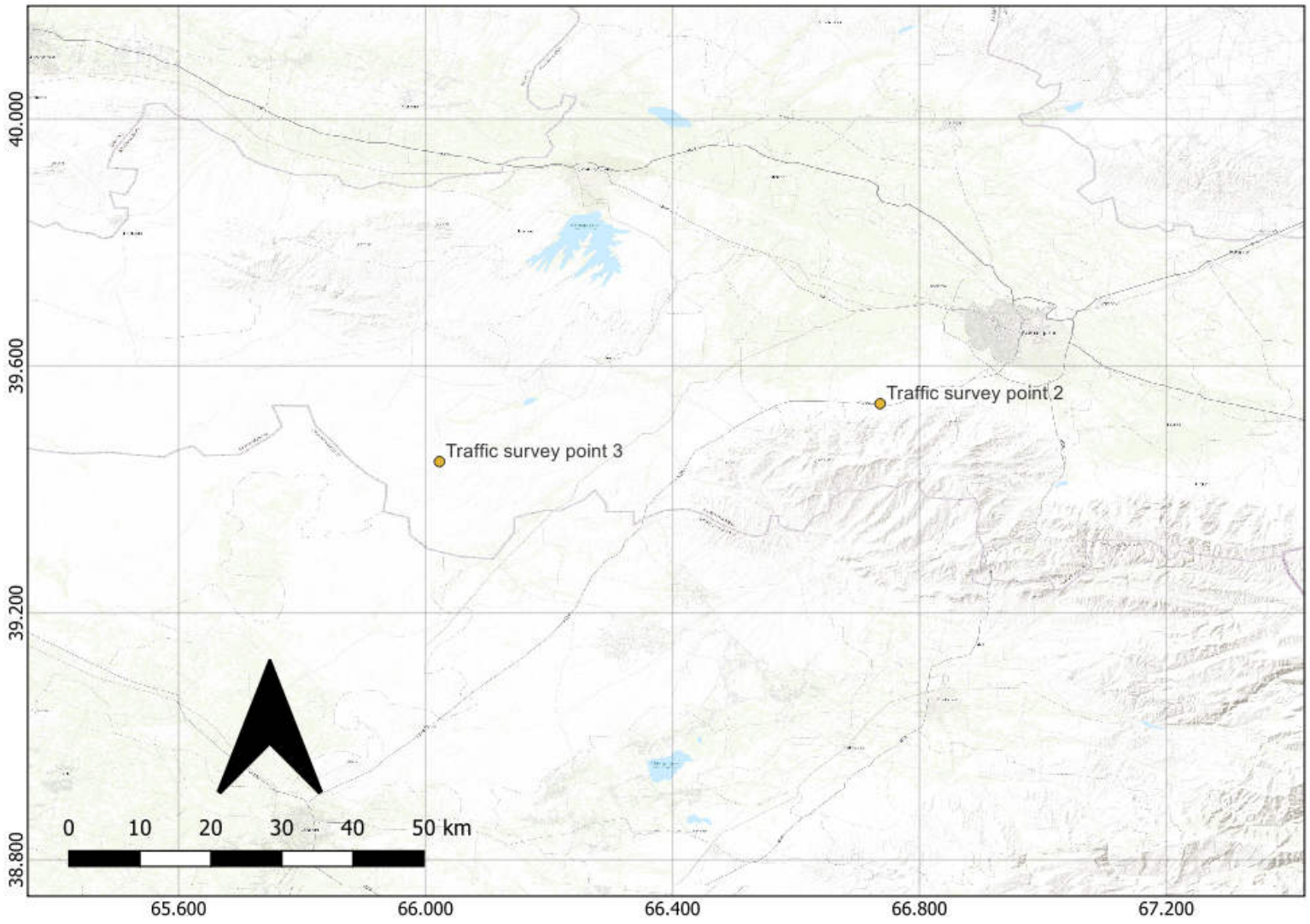


Figure 5 Traffic locations 2,3

Habitat and Summer-Autumn botanical survey report

UZB-ACWA-Samarkand Solar 1 and Solar 2 & OHTL ESIA

Juru

Document Information

Project Name	Environmental and Social Impact Assessment (ESIA) for the development of a solar power project in Samarkand Region, Uzbekistan
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Juru's Project Manager	Dinara Rustami
Juru's Project Director	Jushkinbek Ismailov

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Disclaimer

Table of Content

Table of tables

Table of figures

1 Introduction

In accordance with the Resolutions of the President of the Republic of Uzbekistan No. PP-207 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region - Sazagan Solar 1'," and No. PP-208 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region - Sazagan Solar 2'," investment agreements were signed on April 19, 2023, between the Ministry of Investments, Industry, and Trade of the Republic of Uzbekistan, the company "ACWA Power Company" (Investor), and the companies "ACWA Power Sazagan Solar 1" and "ACWA Power Sazagan Solar 2" (hereinafter referred to as the "Project Companies").

Under the aforementioned investment agreements, the Project Companies are implementing the projects "Sazagan Solar 1" and "Sazagan Solar 2," within which three solar photovoltaic power stations with a total capacity of 1000 MW and a substation with a capacity of 500/220 kV will be constructed in the Nurabad District of the Samarkand Region. Additionally, two energy storage systems with a capacity of 334 MW will be built - one in the Nurabad District of the Samarkand Region and another in the Karakul District of the Bukhara Region. Furthermore, two parallel overhead power transmission lines with a voltage of 220 kV and a length of 70 km will be constructed to connect the main project facilities. 360 km overhead transmission line will also connect stations located in Samarkand region with the Khalka substation, located in Tashkent region.

The main tasks of expert-botanist are following:

- Field botanical research and processing of field data;
- Analysis of any previous botanical surveys and other available data (publications, reports, etc.) compared with the results of the 2023 survey;
- Detailed description and GIS-based mapping of habitat types present in the project area;
- Compilation of the check-list of plant species recorded project site (in particular, threatened species included in the Red Data Book of Uzbekistan and/or the IUCN Red List).

Figure 1: UZB-ACWA-Samarkand Solar 1 and Solar 2 & OHTL ESIA Project

UZB-ACWA-Samarkand Solar 1 and Solar2&OHTL ESIA Project consists of the following parts:

1) 100 MW PV plant
2) 500/220KV Nurabad substation
3) 500 MW Nurabad BESS
4) 400 MW PV plant
5) 500 MW PV plant
6) Karakul BESS
7) Khalka substation and 360 km OHTL
8) 70 km OHTL

Figure 2: Samarkand 100 MW PV (216 ha)

Figure 3: 500/220 KV Nurabad Substation (54.5 ha) -yellow polygon and 500 MW Nurabad Bess (17 ha) – green polygon.

Figure 4: 500 MW PV (994 ha)

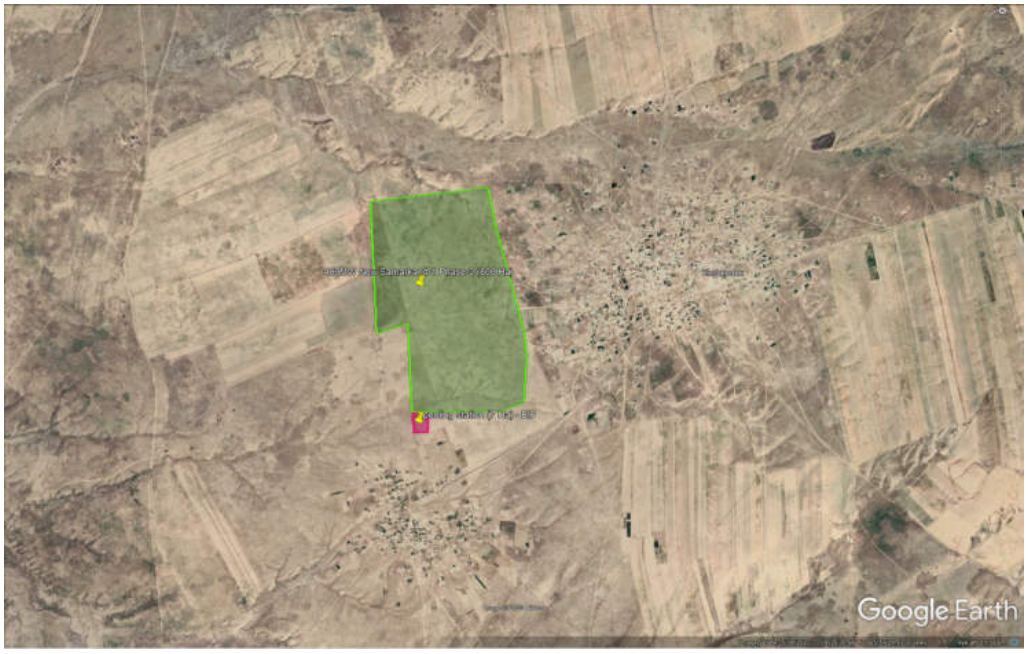

Figure 5: 400 MW PV (800 ha) and Pooling station (7 ha)

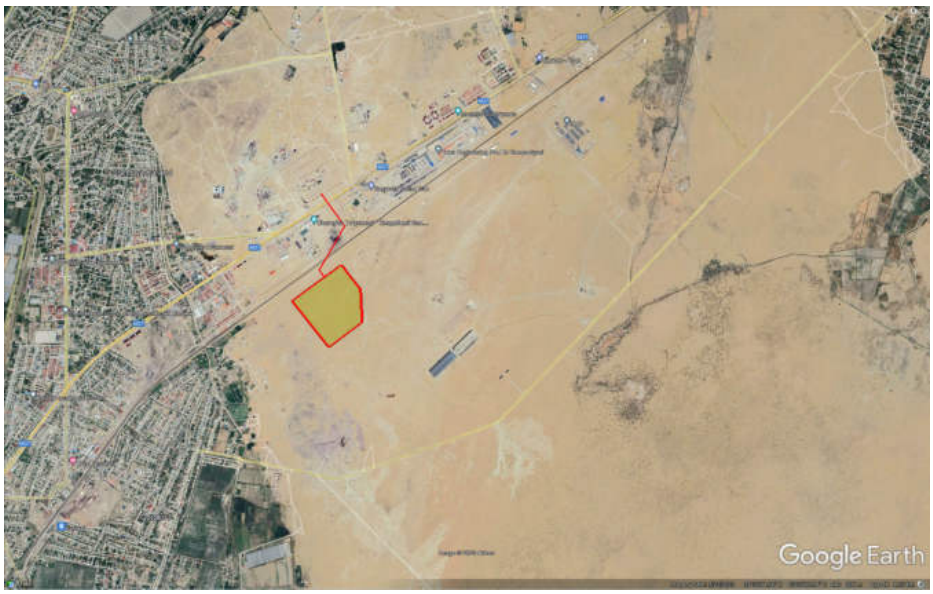

Figure 6: Karakul substation (32.4 ha)

Figure 7: 360 km OHTL and Khalka substation

Figure 8: 70 km OHTL

Figure 9: 4.9 km OHTL

2 Study Area Description

Flora

According to the scheme of phytochoria of Uzbekistan (Tojibaev et al., 2017), the project area belongs to the Nuratau and Aktau phytogeographical regions of Nuratau district and Urgut region of Kuhistan district of Mountain Central Asian province, Chinaz and Mirzachul regions of Middle Syrdarya district and Middle Zeravshan, Lower Zeravschan and Karshi-Karnabchul regions of Bukhara district of Turan province. 360 km OHTL area belongs to the Nuratau and Aktau phytogeographical regions of Nuratau district and Urgut region of Kuhistan

district of Mountain Central Asian province, Chinaz and Mirzachul regions of Middle Syrdarya district and Middle Zeravshan region of Bukhara district of Turan province. 500 and 400 MW PV areas belong to Karshi-Karnabchul region of Bukhara district of Turan province, 100 MW PV, BESS and Nurobod substation areas – to Urgut region of Kuhistan district of Mountain Central Asian province. Karakul substation area belongs to Lower Zeravschan region of Bukhara district of Turan province. Khalka substation area belongs to Chinaz region of Middle Syrdarya district of Turan province. Thus, the study area covers a very large region with heterogeneous flora and vegetation.

Geographical description

Tashkent Region is located in the northeastern part of the Republic of Uzbekistan. Its area is about 15.3 thousand km2, the population is almost 3 million people and the average population density is about 200 people / km2. Physiographically, Tashkent Region can be divided into alluvial-proluvial plain situated on the right bank of the middle reaches of the Syrdarya River, and mountain ranges of the Western Tien Shan. The Khalka substation and eastern segment (32 km) of OHTL are situated in Quyi Chirchiq District of the Tashkent Region of Uzbekistan, in the valley of the river Chirchiq (right tributary of Syrdarya River), on the alluvial-proluvial plain occupied mainly with anthropogenic landscapes (irrigated arable lands, gardens, woodland belts, channels and settlements). This area belongs to the ancient Tashkent oasis, a region with the most valuable agricultural lands and with the best and most fertile soils of Uzbekistan. Within this area, the terrain is nearly flat or slightly inclined plain, dissected with irrigation channels. The elevations range from 259–260 m above sea level on the bank of the Syrdarya River up to 323-325 m.s.l. near the SS Khalka.

The Syrdarya Region is located in the central part of Uzbekistan, on the left bank of Syrdarya River. It occupies 4.276 thousand km2, the population is about 896.6 thousand people and the average population density is 209.5 people/km2. Physiographically, all territory of this administrative region is a part of the Hungry Steppe (Mirzachul), an alluvial-proluvial plain on the left bank of the Syrdarya River in its middle reaches. The elevation is 230-395 m a.s.l. In the past, about 120–130 years ago, the Hungry Steppe was an almost waterless desert with ephemeroid vegetation used as a spring pasture for nomadic herding, and fragments of salt marshes; the floodplain of the river Syrdarya was covered by tugay vegetation represented with riparian poplar and willow woodlands and reeds. At present, almost the entire Syrdarya Region is occupied by anthropogenic landscapes (agricultural lands and settlements).

The Dzhizak Region is located in the central part of Uzbekistan. The total area is 21.21 thousand km2, the population is about 1.475 million people and the average population density is 69.6 people/km2. The territory of the Dzhizak Region can be divided into two physiographical parts. The northern plain part includes the desert of south-eastern Kyzylkum, the Aydar-Arnasay lake system, and an alluvial-proluvial plain of the Hungry Steppe. The southern mountainous part includes Turkestan Ridge and its western spurs, Malguzar and Nuratau mountains. The Nuratau Mountains are two parallel medium-altitude ranges separated by Sanzar-Nurata intermountain depression (so-called Nurata valley). The northern branch is the Nuratau Range (about 200 km long, 2,169 m.s.l.), one of the oldest mountain ranges of Central Asia, and the southern branch of the Nuratau Mountains consists of several smaller ranges, Aktau (about 100 km long, 1,993 m.s.l.), Karatau (50 km long, 1,190 m.s.l.), Karachatau (20 km long, 1,101 m.s.l.), and Khobduntau (35 km long, 1,672 m.s.l.). The slopes of the Nuratau Mountains are deeply dissected by numerous valleys of mountain streams and dry riverbeds. The northern slopes are steep, rocky, with strongly rugged terrain, while southern slopes have rather gentle, hilly terrain.

The Samarkand Region is located in the central part of Uzbekistan, in the basin of the Zeravshan River, in its middle reaches. This region has an area of 16.77 thousand km2, the population of about 4.1 million people and the average population density of 245.6 people/km2. Physiographically, its territory also consists of plain and mountainous parts. Plains are represented in the centre of the region (the Zeravshan valley) and its southwest (piedmont plains of Zeravshan Range, including Karnabchul). The Zeravshan valley is bordered by the Nuratau mountains from the north and Zeravshan Range and its western spurs, Zirabulak-Ziadin mountains, from the south. The Samarkand oasis situated in the middle reaches of the Zeravshan River is one of the oldest agricultural oases in the Central Asia with the most valuable agricultural lands and with the best and most fertile soils of Uzbekistan. Currently, almost the entire Zeravshan valley is occupied by an anthropogenic landscape, with small fragments of floodplain ecosystems. The landscape of Karnabchul (western piedmont plain) and northern piedmont plain of Zeravshan Range and northern piedmont plain of Nuratau Mountains is represented with piedmont semidesert, with almost flat or slightly inclined, wavy or gentle hilly terrain, dissected with dry beds of temporary streams.

Thus, the study area includes parts of almost flat to slightly inclined clayey plains of the middle reaches of the rivers Syrdarya and Zeravshan, alluvial valleys and terraces of these rivers, the eastern part of Nuratau Range,

the eastern part of intermontain Nurata valley, the eastern and southern piedmonts of Khobduntau Range, almost flat to slightly inclined clayey northern and western piedmont plain of the Zeravshan Range, and a small plot of sandy desert of South-western Kyzylkum. The elevation ranges from 259–260 m.s.l. on the banks of the Syrdarya River up to 840–845 m.s.l. in the piedmonts of Khobduntau. Within the Karakul BESS area, elevation is 210–216 m.s.l.

The **climate** of the study area is continental semi-arid and arid with mild wet winters and hot dry summers. According to the Köppen-Geiger climate classification (Kottek et al., 2006), the study area belongs to the zones of cold semi-arid climate (BSk) and hot-summer Mediterranean climate (Csa). The average temperature of January is about -1–0 °C in the valley of the Syrdarya River and Karnabchul, and about +1°C in the Zeravshan valley. The average temperature of July is from +26–27°C in the valleys of the Syrdarya and Zeravshan to +28–30°C in Karnabchul, the mean annual temperature is 14–15°C in the valleys of the Syrdarya and Zeravshan and 17°C in Karnabchul. The annual precipitation is about 150–200 mm in Karnabchul, 250–300 mm in the Syrdarya valley, 300–400 mm in the Zeravshan valley and eastern part of Nuratau Mountains. Precipitation occurs mainly in the late autumn, winter, spring and early summer, the maximum falls in March-April (Geographical Atlas of Uzbekistan, 2012; Williams, Konovalov, 2008; https://ru.climate -data.org; http://worldweather.wmo.int).

Following **protected areas** are situated in the Tashkent Region: Chatkal State Biosphere Reserve (category Ia of IUCN, 24.7 thousand ha, 96 km to the northeast of SS Khalka), Ugam-Chatkal National Park (category II of IUCN, 506.9 thousand ha, 53–55 km to the east of SS Khalka), the Ugam-Chatkal Biosphere Reserve (42.9 thousand ha, 53–55 km to the east of SS Khalka), natural monument Urungach (category III of IUCN, 43 ha, about 145 km to the north of SS Khalka), Dalverzin hunting farm (category VI of IUCN, 5.3 thousand ha, about 38 km to the southeast of SS Khalka and OTHL). Among them, the nearest to the Project area is the Dalverzin hunting farm, which is situated. The Ugam-Chatkal National Park and Ugam-Chatkal Biosphere Reserve are situated about.

Protected areas of the Syrdarya Region: Saykhun wildlife sanctuary (category IV of IUCN, … ha, 17 km to the south of OTHL) and Kalgansyr hunting farm (category VI of IUCN, … ha, 15 km to the north of OTHL).

Protected areas of the Dzhizak Region: Nuratau Nature Reserve (category Ia of IUCN, 17.752 thousand ha, 73 km to the northwest of OTHL), Zaamin Nature Reserve (category Ia of IUCN, 26.84 thousand ha, 65 km to the southeast of OTHL), Zaamin National Park (category II of IUCN, 24.11 thousand ha, 73 km to the southeast of OTHL), Arnasay wildlife sanctuary (category IV of IUCN, 63.3 thousand ha, 33 km to the north of OTHL).

Protected areas of the Samarkand Region: Zeravshan National Park (category II of IUCN, 2.426 thousand ha, 36 km to the east of OTHL), Amankutan National Park (category II of IUCN, 1.5 thousand ha, 33 km to the south of Samarkand 100 MW PV, BESS and Nurobod substation), Kushrabad wildlife sanctuary (category IV of IUCN, 16.5 thousand ha, 45 km to the northwest of OTHL), Nurobod wildlife sanctuary (category IV of IUCN, 40.0 thousand ha, 20 km to the west of 500 and 400 MW PV).

Protected areas of the Bukhara Region: Kyzylkum Nature Reserve (category Ia of IUCN, 10.311 thousand ha, 185 km to the northwest of Karakul substation), natural monument Paykent (category III of IUCN, 30 ha, about 13 km to the northeast of Karakul substation), Dzheyran wildlife nursery (category IV of IUCN, 16.522 thousand ha, 63 km to the east of Karakul substation), Dengizkul wildlife sanctuary (category IV of IUCN, 50.0 thousand ha, 35 km to the south of Karakul substation), Qumsulton wildlife sanctuary (category IV of IUCN, 4.9 thousand ha, 27 km to the east of Karakul substation), Khadicha wildlife sanctuary (category IV of IUCN, 11.3 thousand ha, 53 km to the east of Karakul substation), Qora-qir wildlife sanctuary (category IV of IUCN, 30.0 thousand ha, 87 km to the north of Karakul substation).

The nearest to the Project area is the Muborak wildlife sanctuary (category IV of IUCN, 264.469 thousand ha, Muborak District of Kashkadarya Region) situated in 750 m to the west of 400 MW PV plant.

Desktop data

Anthropogenic (modified) landscapes predominate in the plain part of the study area, except for a few small plots of more or less disturbed natural ecosystems. In piedmonts and low mountains, there are both, natural and anthropogenic landscapes.

The flora and vegetation of Tashkent, Dzhizak and Samarkand Regions are well studied and described in numerous publications, but the plant diversity of the Syrdarya Region is still insufficiently explored. The history of botanical research in this region has about 180 years. A huge amount of herbarium material collected from the Project area during almost two centuries is kept mainly in the National Herbarium of Uzbekistan in Tashkent (TASH), Herbarium of the Komarov Botanical Institute in St. Petersburg (LE), Herbarium of the Lomonosov Moscow State University (MW), and several other largest and oldest herbaria of the world (B, K, GOET, P, etc.).

The first scientific data on landscapes and plant diversity of the Project region have been obtained in the 19th and early 20th Century by European and Russian naturalists who took part in several research missions (A. Lehmann in 1841–1842, N. Severtzov in 1864–1868, A.P. and O.A. Fedtschenko in 1866–1871, P. Capus and G. Bonvalot in 1881, A. Regel in 1875–1885, V.I. Lipsky in 1887–1903, D. Glazunov in 1892, O.A. and B.A. Fedtschenko in 1897–1915, A.I. Michelson in 1914, M.D. Spiridonov in 1915, etc.). V.I. Lipsky in the book "Flora of Central Asia, i.e. Russian Turkestan and Bukhara and Khiva Khanates" (1902–1905) described in details the history of botanical research for this initial period (with expedition routes). Herbarium collections made by above mentioned pioneers of the study of Central Asian flora laid the basis for our contemporary knowledge on the plant diversity of the Project area.

The earliest publications with the data on plant diversity and landscapes of study area are "A. Lehmanii reliquiane botanicae sive Enumeratio plantarum in itinere per deserta Asiae mediae ab. A. Lehmann annis 1839—1842 collectarum" (Bunge, 1848), "Contribution to the knowledge of flora native to Russia and the steppes of Central Asia" (Bunge, 1852), "Topographic essay of the Zeravshan valley" (Fedtschenko, 1870), "Traveling around the Turkestan region and exploring the mountainous country of the Tien Shan" (Severtzov, 1873), «Fedtschenko's Reisen in Turkestan, 1868–1870» (Fedtschenko, 1874), 24 issues of "Proceedings of the Turkestan expedition" and "List of plants collected in Turkestan in 1869–1871" (Fedtschenko), "Plantes du Turkestan: Mission Capus" (Franchet, 1883), "Materials for Flora of Central Asia" (Lipsky, 1900) and "Mountainous Bukhara" (Lipsky, 1902–1905).

In 1908–1917, the Migration Department of Russian government organized a number of expeditions for investigation of soils and vegetation of Central Asia within the framework of colonization and agricultural development of this region. In the basins of Syrdarya and Zeravshan rivers, these studies were carried out by soil scientist N. Dimo and botanists M.V. Kultiasow, E.P. Korovin and M.G. Popov. The supervisor of botanical studies of these expeditions was B. Fedtschenko, a head botanist of the Imperial Botanical Garden in Saint Petersburg. As a result of these large-scale researches, a huge amount of herbarium was collected, numerous new taxa and a diversity of plant communities were described for the first time, and the first geobotanical maps were compiled. Main results of these expeditions were published in series of reports (Fedtschenko, 1912–1915), 6 volumes of «Conspectus florae Turkestanicae» (Fedtschenko, 1906–1916), a detailed synopsis of the flora of Central Asia with the information on localities, 13 issues of «Flora of Asiatic Russia» (Fedtschenko, 1913–1918), «List of weedy plants of Turkestan» (Fedtschenko, 1915). These preliminary data of the inventory of Central Asian flora became the basis for further botanical studies of the Soviet period.

In 1918, the Turkestan State University was established in Tashkent (it was given a name of Central Asian State University from 1923 to 1960, Tashkent State University in 1960–2000, and National University of Uzbekistan since 2000). Since early 1920s, botanists of the University performed field surveys covering the entire territory of Central Asia (including Project area) and focused mainly on the inventory of the flora, investigation of the vegetation cover and identification of plant resources. The history of botanical studies performed by Central Asian State University in 1920–1945 was described in detail by R.U. Rakhimbekov in the book «From the history of studying of nature of Central Asia» (1970).

In 1927, the Uzbek Pedagogical Institute was established in Samarkand. In 1933 it has been reorganized into the Uzbek State University (since 1961 – Samarkand State University). Professors and students of the Samarkand University carried out numerous field expeditions, collected numerous herbarium specimens and contributed to the accumulation of floristic data. Thus, in 1937–1943, famous Uzbek botanist K.Z. Zakirov, a head of the department of botany of Samarkand State University, performed large-scale research within the entire basin of the river Zeravshan (Uzbekistan and Tajikistan). Later, he published the two-volume monograph "Flora and vegetation of the Zeravshan River basin" (Zakirov, 1955, 1961) which contains a checklist of 2588 plant species recorded for this huge area, with reference to herbarium collections. This book remains one of the basic sources on the flora and vegetation of the Samarkand Region.

In 1930, Zonal Experimental Karakul Breeding Station was organized in Samarkand Region (since 1935 – Uzbek Research Institute of Karakul Breeding and Desert Ecology), with several experimental stations, including Karnabchul. Botanical researches of Institute of Karakul Breeding and Desert Ecology were focused on investigation, rehabilitation and improving of rangelands of arid and semi-arid zones of Central Asia, assessment of seasonal yield of different types of rangelands, detailed study of ecology, biology and nutritional value of desert fodder plants, their selection and introduction, as well as development, testing and implementation of measures to combat desertification (Sovetkina, Korovin, 1941; Shamsutdinov, 1975).

In the 1930–1940s, geobotanical studies (first of all, inventarization of flora and survey of pastures) were also carried out in different regions of Uzbekistan by special expeditions of the Committee of Sciences (which in 1940

was reorganized into the Academy of Sciences of Uzbekistan); the results were used for creation of the first geobotanical map of Uzbekistan and publication of «Flora of Uzbekistan» (1941–1962, in 6 volumes), which reported 4148 plant species (3663 native, 485 – alien, introduced and cultivated). In 1950–1980, the Institute of Botany of the Academy of Sciences of Uzbekistan carried out large-scale expeditions focused mainly on investigation of the vegetation and plant resources. Results of geobotanical studies were published in the book «Vegetation cover of Uzbekistan and the ways of its practical use» (1971–1984, in 4 volumes).

Main publications of the Soviet period containing data on flora and vegetation of Project area are "Essay on the vegetation of the Pistalitau Mountains" (Kultiasow, 1923), "Plant formations of the Nurata Valley" (Korovin, 1923), "An identification guide of plants of surroundings of Tashkent" (Popov, 1923), "Vegetation of the Khobduntau and Karachatau Mountains" (Kudryashev, 1930), "The vegetation of Nuratau Mountains" (Knorring, 1934), "An identification guide of plants of the Tashkent oasis" (Lapin, 1938, 1941), "Vegetation of Central Asia and South Kazakhstan" (Korovin, 1934, 1961, 1962), "Flora and vegetation of the Zeravshan River basin" (Zakirov, 1955, 1961), "Tugay vegetation of Angren River valley and its peculiarities" (Usmanov, 1953), "An identification guide of wild plants of the Hungry Steppe" (Botschantzev et al., 1961), "Vegetation of the South-Western Kyzylkum" (Granitov, 1964, 1967), "Vegetation of the western part of Turkestan Range and its spurs" (Demurina, 1975), "Medicinal plants of Tashkent Region" (Pulatova et al., 1980), etc. The most important publications of the second half of the 20th Century dedicated to the plant diversity of the Nuratau Mountains are the monographs of P.K. Zakirov "The vegetation cover of Nuratau Mountains" (1969) and "The botanical geography of Nuratau Range and low mountains of Kyzylkum" (1971). These books contain detailed descriptions of the vegetation and a checklist of the flora of the Nuratau Range with 679 species of vascular plants. Later, R.V. Kamelin (1973) added 157 new records to this checklist. A huge volume of herbarium material collected by Uzbek and Russian botanists in Project region during the Soviet period currently is stored in the National Herbarium of Uzbekistan (TASH) and the Herbarium of the Komarov Botanical Institute (LE) in St. Petersburg.

The disintegration of USSR caused dramatic reductions in financing of researches, loss of scientific personnel, the collapse of scientific schools and studies in 1990s. Since early 2000s, the botanical studies in Uzbekistan have been revitalized; several new species have been described and dozens of new records were found from the Project area. It is connected with the start of a number of international projects financed by FAO, ICARDA, UNDP, GEF and other international organizations, as well as with increased government funding of science.

The most important results of botanical research of the post-Soviet period were summarized in following books: "Rangelands of the arid and semi-arid zones in Uzbekistan" (Gintzburger et al., 2003), "Botanical geography of Kazakhstan and Middle Asia" (Rachkovskaya et al., 2003), "Flora of the South-Western Tien Shan (within the Republic of Uzbekistan)" (Tojibaev, 2010), «Plants of Syrdarya Valley» (Sulaymonov et al., 2015), "Botanical geography of Uzbekistan" (Tojibaev et al., 2017), "Flora of Bukhara Oasis" (Esanov, 2019), "Inventory of the flora of Uzbekistan: Samarkand Region" (Tojibaev et al., 2018), "Inventory of the flora of Uzbekistan: Bukhara Region" (Tojibaev et al., 2020)", "Flora of the Dzhizak Province, Uzbekistan" (Tojibaev et al., 2020) and "Inventory of the flora of Uzbekistan: Dzhizak Region" (Tojibaev et al., 2021), in dissertations "Wild food plants of the Tashkent Region" (Umarov, 1992), "Vegetation of the Sanzar River basin" (Tirkasheva, 2011), "Analysis of the flora of Bukhara Oasis" (Esanov, 2017), "Vegetation of the Akhangaran river basin" (Azimov, 2018), and "Ecological and phytocoenotic assessment of vegetation transformation of semi-desert pastures of Uzbekistan (on the example of Karnabchul)" (Rajabov, 2022), as well as numerous papers in scientific journals listed in References.

Fundamental taxonomical treatments, as "Flora of the U.S.S.R." (1934–1964, in 30 volumes) and "Conspectus Florae Asiae Mediae" (1963–2015, in 11 volumes), should also be mentioned among the important sources of information on the plant diversity of the project region. Information about endemic and rare plant species is given in the Red Data Book of Uzbekistan (1984, 1998, 2006, 2009, 2019). Modern online resources, including Plantarium (www.plantarium.ru), iNaturalist (www.inaturalist.org), Global Biodiversity Information Facility, GBIF (www.gbif.org), as well as digital herbaria, also are very important in studying the flora of the region.

Since 2016, the Institute of Botany launched a large-scale project devoted to the publication of the 2nd edition of «Flora of Uzbekistan». Recently published first 4 volumes of the new national "Flora" (2016, 2017, 2019, 2022) contain the treatment of 18 families with 92 genera and 507 species performed to date (11.7% of the national flora); for each species, herbarium specimens are cited and distribution maps based on their georeferencing are given.

Since 2013, the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan performed several scientific projects targeted to the step-by-step inventory of flora of the administrative regions of the Republic of Uzbekistan and compilation of the state cadaster of threatened plants. At the present, the inventory of the flora of Bukhara, Dzhizak, Kashkadarya, Navoi and Samarkand Regions was completed and published (Tojibaev et al.,

2018, 2019, 2020, 2021). The following information for each species is provided: life form, habitat, distribution within the phytogeographical regions, conservation status, and economic use.

Since 2020, the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan performs the state scientific project "Cadaster of the flora of Tashkent region". A regularly updated online check-list of the flora of the Tashkent Region (with a photo gallery) was created on the Plantarium Internet portal. To date, it contains 2260 species of 664 genera and 118 families, including 49 national endemics, 71 nationally and 5 globally red-listed species. Most of endemic and threatened species occur in the mountainous part of Tashkent Region.

According to series of books "Inventory of the flora of Uzbekistan", the flora of Bukhara Region includes 764 species of vascular plants, 25 species are included in the Red Data Book of Uzbekistan. Among them, 546 species are recorded for Lower Zeravshan phytogeographical region (Bukhara Oasis). The check-list of the flora of Samarkand Region includes 1687 species (53 red-listed), among them, 1182 species are reported for Urgut phytogeographical region, 816 species – for Aktau phytogeographical region, 790 species – for Middle Zeravshan region, and 348 species are reported for Karnabchul. The check-list of the flora of Dzhizak Region includes 1991 species (50 red-listed), among them, 1139 species are reported for Nuratau phytogeographical region, 563 – for Aktau phytogeographical region, and 625 – for Mirzachul.

Check-list of the flora of Syrdarya region published by N.O. Sulaymonov, K.K. Kushiev et Kh.F. Shomurodov (Sulaymonov et al., 2015) includes 347 species from 56 families, 4 species of them are listed in the Red Data Book of Uzbekistan.

As for assessments of areas with high biodiversity conservation significance, they have been performed in Uzbekistan within the framework of UNDP-GEF project "Strengthening Sustainability of the National Protected Area System by Focusing on Strictly Protected Areas" and CEPF project "Mountains of Central Asia Biodiversity Hotspot". According to results of the first project published in the "Recommendations for protected areas system development in Uzbekistan" (Ismatov, 2013), 17 sites important for plant diversity were identified within Uzbekistan and recommended for protected areas. The second project has been focused on the assessment of Key Biodiversity Areas within Mountains of Central Asia Global Biodiversity Hotspot using the KBA standards; 36 KBA were identified for Uzbekistan (Mountains of Central Asia Biodiversity Hotspot, 2017).

General conclusion: the study area covers a very large region with heterogeneous flora and vegetation.

3 Materials and methods

The field research on the project area was conducted using the traditional methods of botanical survey commonly used for sampling and mapping of vegetation, recognition of floristic composition and spatial patterns of plant communities (Field geobotany, 1959–1976; Granitov, 1980; Kent, 2011). The field surveys were carried out June 10–11, July 15–16 and 29–30, and September 7-8, 2023.

Vegetation structure and species composition was described from 50x50 m square geobotanical sample plots (SP) chosen in an area with homogeneous vegetation, representative for the project site and situated away from roads and boundaries between different vegetation communities (coordinates of these boundaries observed during the survey were recorded separately). 55 sample plots were described in total, among them, 30 sample plots were described along the 360 km OHTL, 11 sample plots were described along the 70 km OHTL, 10 sample plots were described within 3 solar PV plants, and 1 sample plot was described within SS Khalka, 500 MW BESS, Nurobod subslation and Karakul BESS each.

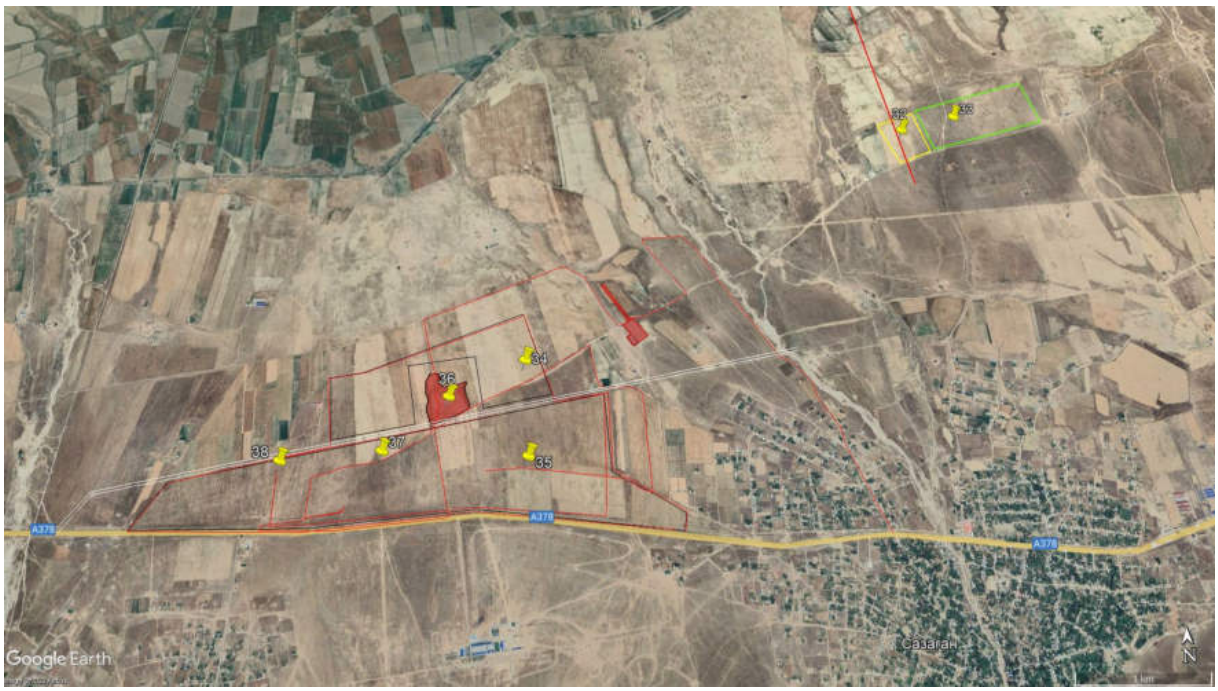

Figure 10: Survey map. Survey track (red line) and sample plots in the areas of 100 MW PV, 500 MW BESS, Nurabad substation and the southwestern part of 360 km OTHL (Nurabad District of Samarkand Region)

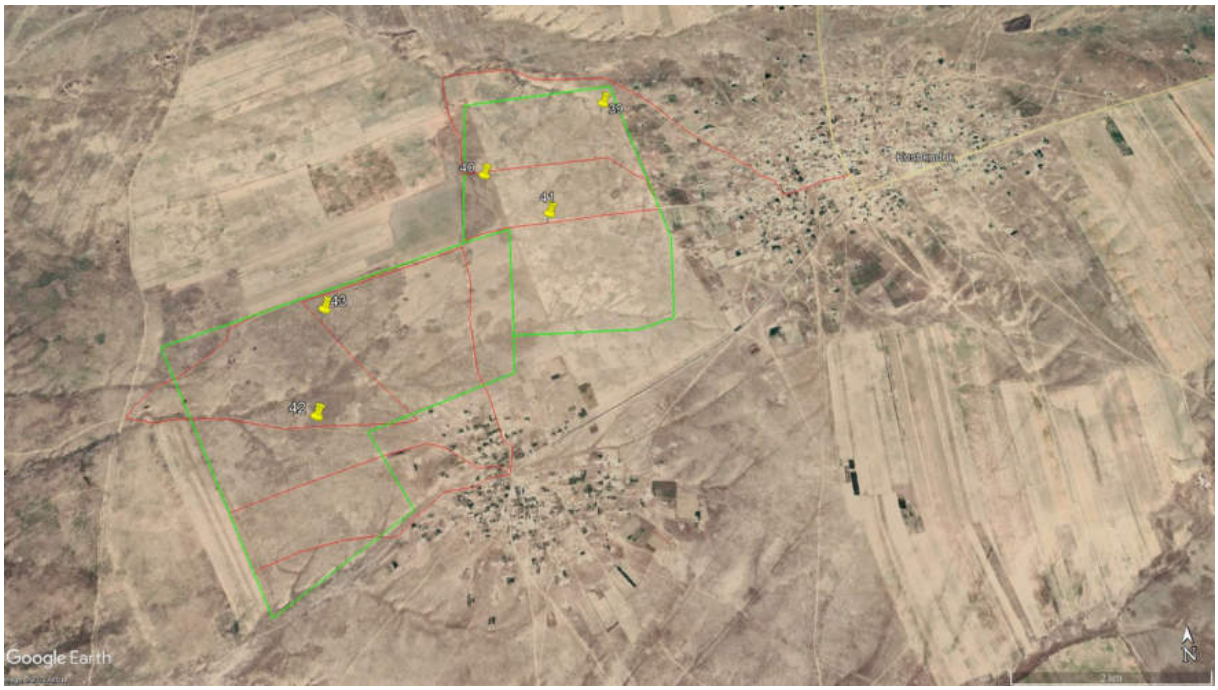

Figure 11: Survey map. Survey track (red line) and sample plots in the areas of 400 MW and 500 MW PV (Nurabad District of Samarkand Region)

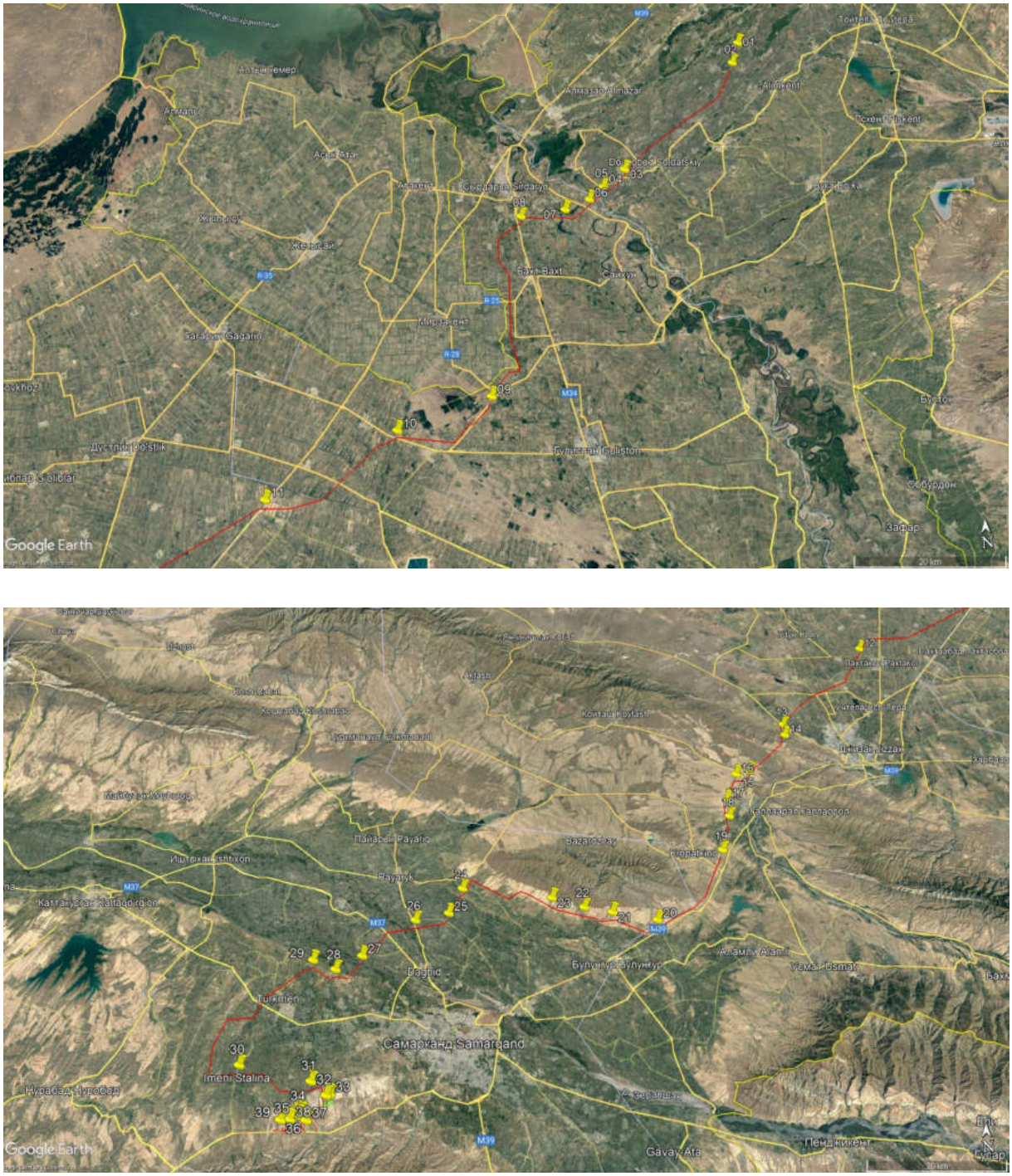

Figure 12: Survey map. Sample plots in the southwestern part of 360 km OTHL (Dzhizak and Samarkand Regions), 100 MW PV, 500 MW Bess and Nurabad substation

Figure 13: Survey map. Karakl BESS

Figure 14: Survey map. Sample plots in the area of 70 km OHTL (Nurabad District of Samarkand Region)

For each sample plot, photographs of the landscape and vegetation were taken using a digital camera, and following data were recorded: location and physical environment (including GPS coordinates, elevation, topography, and soil), state of vegetation and disturbance factors (grazing, etc.), plant association, canopy cover (%), canopy height, all plant species present at the plot, their cover and abundance, phenological stage and height. Microcomplexes (e.g. along dry riverbeds) were described separately. Coordinates of populations of endemic, red listed or alien species, number of individuals and area occupied by population also were recorded.

According to the International Code of Phytosociological Nomenclature (2019), plant associations were identified on the basis of composition of dominant species. The vegetation types and formations were classified in accordance with four-volume "Vegetation cover of Uzbekistan" (1971–1984).

Species cover and abundance were determined using the Braun-Blanquet scale (1965) and the DACFOR scale widely used in geobotanical and ecological studies as a rapid visual assessment technique.

Following 6 gradations are distinguished in classical Braun-Blanquet cover-abundance scale:

+ – low number of individuals, coverage less than 1%;

1 – high number of individuals, coverage 1-5%;

2 – number of individuals is high, coverage 5-25%;

3 – any number of individuals, coverage 25-50%;

4 – any number of individuals, 50-75% coverage;

5 – any number of individuals, coverage exceeds 75%.

The DACFOR scale also has 6 gradations of abundance of plants: D – Dominant; A – Abundant, C – Common, F – Frequent, O – Occasional, R – Rare.

Plants recorded during the field survey were identified using special literature (Conspectus Florae Asiae Mediae, 1968-2016; Flora of Uzbekistan, 1941-1963, 2016, 2017, 2019, 2022) and the herbarium collections of the National Herbarium of Uzbekistan (TASH). The accepted scientific names of plant species are given according to the global taxonomic databases International Plant Names Index (www.ipni.org), Global Biodiversity Information Facility (www.gbif.org) and Plants of the World Online (www.powo.science.kew.org).

Various scientific publications and online databases (Nikitin, 1983; IUCN/ISSG, 2014; CABI, 2017; Sennikov et al., 2018) were used for identification of alien species, while the Red Data Book of Uzbekistan (1984, 1998, 2006, 2009, 2019) and the IUCN Red List (www.iucnredlist.org) were used for identification of threatened species.

It should be noted that currently only 289 taxa of more than 4380 species recorded for the flora of Uzbekistan were assessed by IUCN (6.6% of the flora), 27 species of them were included in the IUCN Red List as threatened (7 – CR, 10 – EN, 10 – VU), 17 of them are redlisted at the national level. 12 plant species were assessed as Near Threatened (NT), 227 – Least Concern (LC), and 23 species belong to the category DD (Data Deficient). The majority of species of the flora of Uzbekistan has not yet been assessed by IUCN and belongs to the category NE (Not Evaluated).

To date, 5 editions of the Red Data Book of Uzbekistan have been published. The first (1984) included 163 plant species, the second (1998) – 301, the third (2006) – 302, the fourth (2009) – 321, and an actual, fifth edition (2019), includes 314 plant species. National categories of threatened plants are follows: 0 (probably extinct species) – corresponds to EX or EW categories of the IUCN Red List (www.iucnredlist.org), 1 (endangered, disappearing species) – meets CR category of IUCN, 2 (rare species) – meets EN category of IUCN and 3 (vulnerable, declining species) – corresponds to VU or NT category of IUCN.

For the purposes of implementation of IFC Performance Standard 6, habitats are divided into modified, natural, and critical. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition. Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Critical habitats are a subset of modified or natural habitats.

As defined by the International Finance Corporation (IFC) Performance Standard 6 (PS6) and EBRD Performance Requirement 6 (PR6), critical habitats are areas with high biodiversity value which meet at least one following criteria:

Criterion 1. Habitat of significant importance to Critically Endangered and/or Endangered species;

Criterion 2. Habitat of significant importance to endemic and/or restricted-range species;

Criterion 3. Habitat supporting globally significant concentrations of migratory species and/or congregatory species;

Criterion 4. Highly threatened and/or unique ecosystems;

Criterion 5. Areas associated with key evolutionary processes.

Numerical thresholds have been defined for the first four critical habitat criteria, based on these published by IUCN in "A Global Standard for the Identification of Key Biodiversity Areas" (2016) and "IUCN Red List Categories and Criteria" (2012). Assessment parameters are: i) number of mature individuals, ii) area of occupancy, iii) extent of suitable habitat, iv) range, v) number of localities, vi) distinct genetic diversity.

According to the IFC Guidance Note 6, quantitative thresholds of critical habitat are following:

Criterion 1. CR/EN species: a) habitat required to sustain at least 10% of global population of CR or EN species, where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species; (b) habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species; (c) habitat supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally important concentrations of a red-listed EN species where that habitat could be considered a discrete management unit for that species/subspecies; (d) habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species; (e) as appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.

Criterion 2. Endemic / restricted range species: (a) habitat known to sustain ≥95% of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g. a single-site endemic); (b) habitat known to sustain ≥1% but <95 % of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.

Criterion 3 (migratory species) is inapplicable for plants. As for Criterion 4, unfortunately, the officially approved national list of highly threatened and/or unique ecosystems and habitats does not exist in Uzbekistan. For Criterion 5, there are no numerical thresholds.

QGIS 3.18 free software was used for mapping of habitats and vegetation. The vegetation map was compiled in QGIS by visual interpretation of the satellite image using the field data and a topographical map (1:100.000) of the region.

Since Uzbekistan has not developed the national system of classification of habitats, IUCN Habitats Classification Scheme, ver. 3.1 (https://www.iucnredlist.org/resources/habitat-classification-scheme) was used for the classification of habitats of project area. As far it was applicable to the local conditions, we also followed the pan-European system, EUNIS habitat classification scheme.

4 Habitat Assessment

According to IUCN Habitats Classification Scheme and EUNIS habitat classification, following habitats can be identified in the project area.

4.1 100 MW PV plant

Two types of modified habitats are represented within 100 MW PV plant area:

Arable lands with agricultural crops. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, and represented with a subtype V1 Arable land and market gardens (V11 Intensive unmixed crops). Wihin 100 MW PV plant area and its surroundings, this habitat is represented with rainfed arable lands used under wheat (*Triticum aestivum*), barley (*Hordeum vulgare*) and safflower (*Carthamus tinctorius*).

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned irrigated or rainfed arable lands are occupied with communities of grasses (*Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Hordeum spontaneum*, *Cynodon dactylon, Elymus repens, Poa bulbosa*), annual and perennial weeds (*Artemisia annua, A. scoparia*, *Atriplex micrantha, Capsella bursa-pastoris, Descurainia sophia*, *Centaurea iberica*, *C. solstitialis*, *Cirsium vulgare*, *Carthamus oxyacanthus*, *Echinophora sibthorpiana*, *Lepidium latifolium*, *Xanthium spinosum, X. strumarium*, etc.), saltworts (*Caroxylon dendroides, Suaeda altissima*), caper (*Capparis spinosa*) and camel thorn (*Alhagi pseudalhagi*). The species composition and abundance, and density of canopy cover very much varies on different areas depending of soil type, level of salinization, humidity and other local conditions.

In addition of above mentioned, one type of modified habitats and one type of natural habitats are represented in surroundings of 100 MW PV plant area (in area of influence):

Fruit gardens and vineyards. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.3 Plantations and 14.4 Rural Gardens. According EUNIS classification, it belongs to habitat type V Vegetated man-made habitats and subtypes V5 Shrub plantations (V54 Vineyards) and V6 Tree dominated man-made habitats (V61 Broadleaved fruit and nut tree orchards). This habitat is represented with plantations of fruit trees (mainly apple – *Malus domestica*) and rural gardens of local people inhabiting the village Sazagan and scattered farmhouses. The local rural gardens are fenced and usually surrounded at margins with lines of poplars (*Populus afhganica, P.alba*), willows (salix excelsa), elms and mulberry trees (*Morus alba*). Fruit trees planted in these gardens are apple (*Malus domestica*), apricot (*Prunus armeniaca*) and peach (*Prunus persica*). Alfalfa (*Medicago sativa*) and different vegetables (*Solanum tuberosum, Lycopersicon esculentum, Allium cepa*, etc.) usually are planted between the rows of trees. Wild grasses and weeds grow along the ditches and fences of the gardens.

Dry grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R1 Dry grasslands. This habitat occupies boundary-strips between the fields and unplowed areas with rugged terrain along dry beds of temporary streams and on the hills (including Ettitepa Archeologic Heritage site). The vegetation is represented with forb-grass communities with domination of ephemeroids (*Poa bulbosa, Carex pachystylis*), annual grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus tectorum*, *Hordeum murinum* subsp. *leporinum*, *Taeniatherum caput-medusae*), camel thorn (*Alhagi pseudalhagi* subsp. *kirghisorum*), caper (*Capparis spinosa*), and other xerophytic forbs (*Phlomis thapsoides, Cousinia resinosa*), which belong to the type of ephemeral-ephemeroid vegetation (Agrillophyta, or Ephemerophyta), widely spread on serozem soils (Calcic xerosols) on piedmont plains and foothills of Uzbekistan. This natural habitat is used by local people as pasture. The abundance of spiny forbs (*Alhagi pseudalhagi* subsp. *kirghisorum, Capparis spinosa, Cousinia resinosa,* species of *Carthamus* and *Centaurea*) and poisonous species *Peganum harmals*, *Sophora pachycarpa* and *Diarthron vesiculosum* indicates that the level of degradation of this habitat is rather high, which is connected with overgrazing. Canopy cover is 20–30 to 50–60%. Threatened plants included in the global or national Red lists were not found during the field survey.

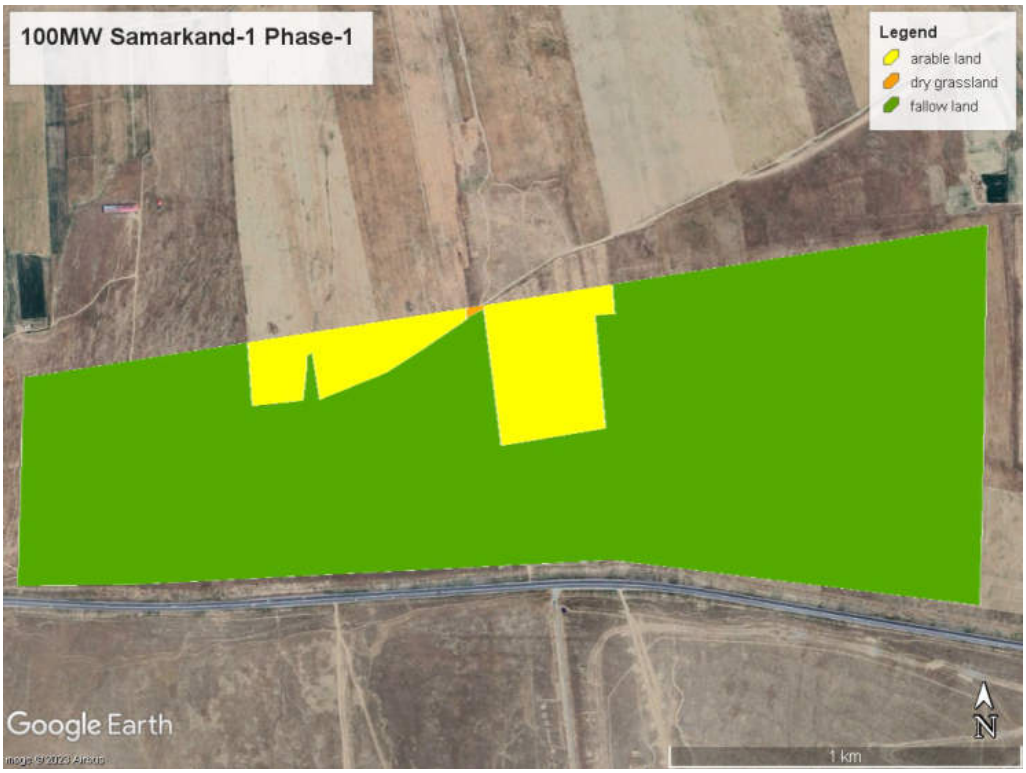

Figure 15: Habitat types — 100 MW Samarkand 1

4.2 500/220KV Nurabad substation

One type of modified habitats is represented within both plots, Nurabad substation.

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned non-irrigated arable lands with sandy-clayey soil and bluegrass-camel thorn community (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary harmel (*Peganum harmala*) and *Cousinia resinosa*. Plants are scattered or occur in patches, species composition is poor, and the canopy cover is sparse (from nearly 0 to 10-20%). Both plots currently are used by local people as pasture.

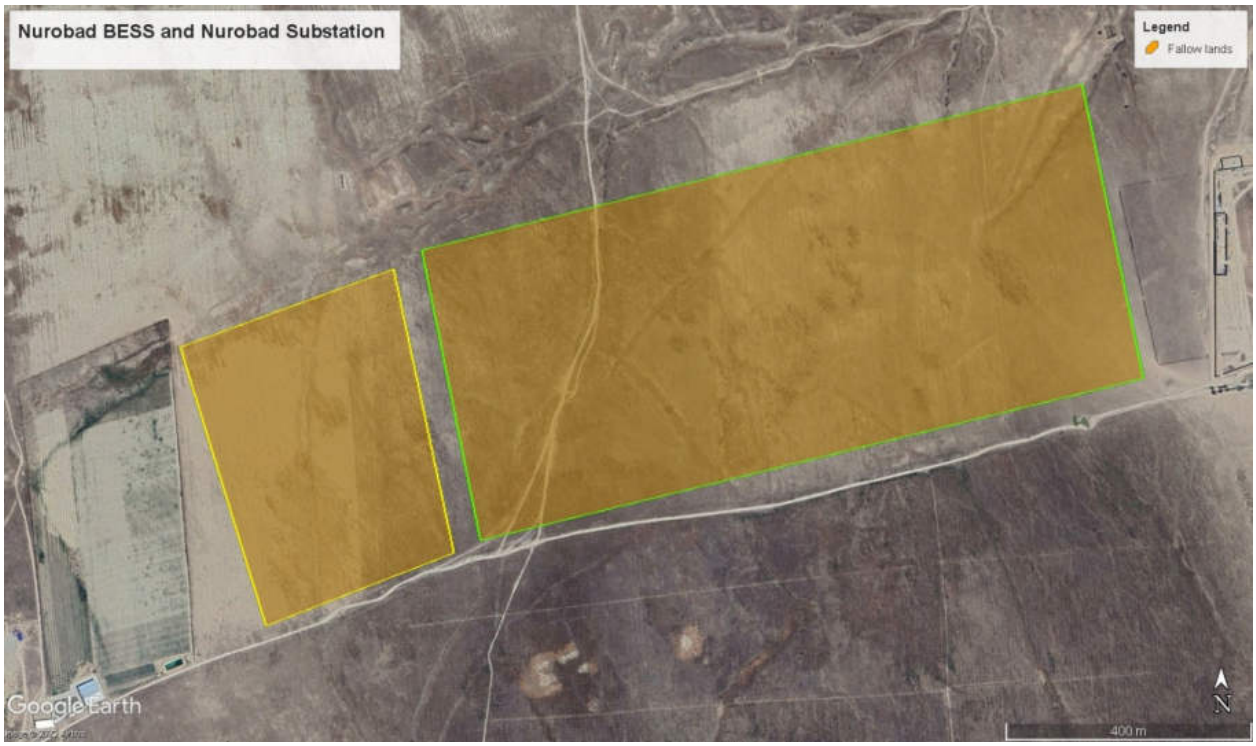

Figure 16: Habitat types — Nurabad BESS (left polygon) and Nurabad Substation (right polygon)

4.3 Nurabad 500 MW BESS

One type of modified habitats is represented within Nurabad BESS (Figure 1Figure 16).

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned non-irrigated arable lands with sandy-clayey soil and bluegrass-camel thorn community (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary harmel (*Peganum harmala*) and *Cousinia resinosa*. Plants are scattered or occur in patches, species composition is poor, and the canopy cover is sparse (from nearly 0 to 10-20%). Both plots currently are used by local people as pasture.

4.4 400 MW PV plant

One type of modified habitats and one type of natural habitats are represented within 400 MW PV plant. The site currently is used by local people as pasture.

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned non-irrigated arable lands with sandy-clayey soil and bluegrass-harmel-camel thorn (*Alhagi pseudalhagi subsp. kirghisorum, Peganum harmala, Poa bulbosa*) and bluegrass-camel thorn communities (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary *Cousinia resinosa*.

Dry grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R1 Dry grasslands. This habitat occurs between the abandoned fields and occupies unploughed areas with rugged terrain along dry beds of temporary streams. The vegetation the same as mentioned above, bluegrass-harmel-camel thorn (*Alhagi pseudalhagi subsp. kirghisorum, Peganum harmala, Poa bulbosa*) and bluegrass-camel thorn communities (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary *Cousinia resinosa*.

Whithin fallow lands and on unploughed areas both, plants are scattered or occur in patches, species composition is poor, and the canopy cover is sparse (from nearly 0 to 10-30%). These two types of habitats practically do not differ from each other in the character of the landscape and vegetation, except for the weakly visible contours of fields and furrows on the fallow lands.

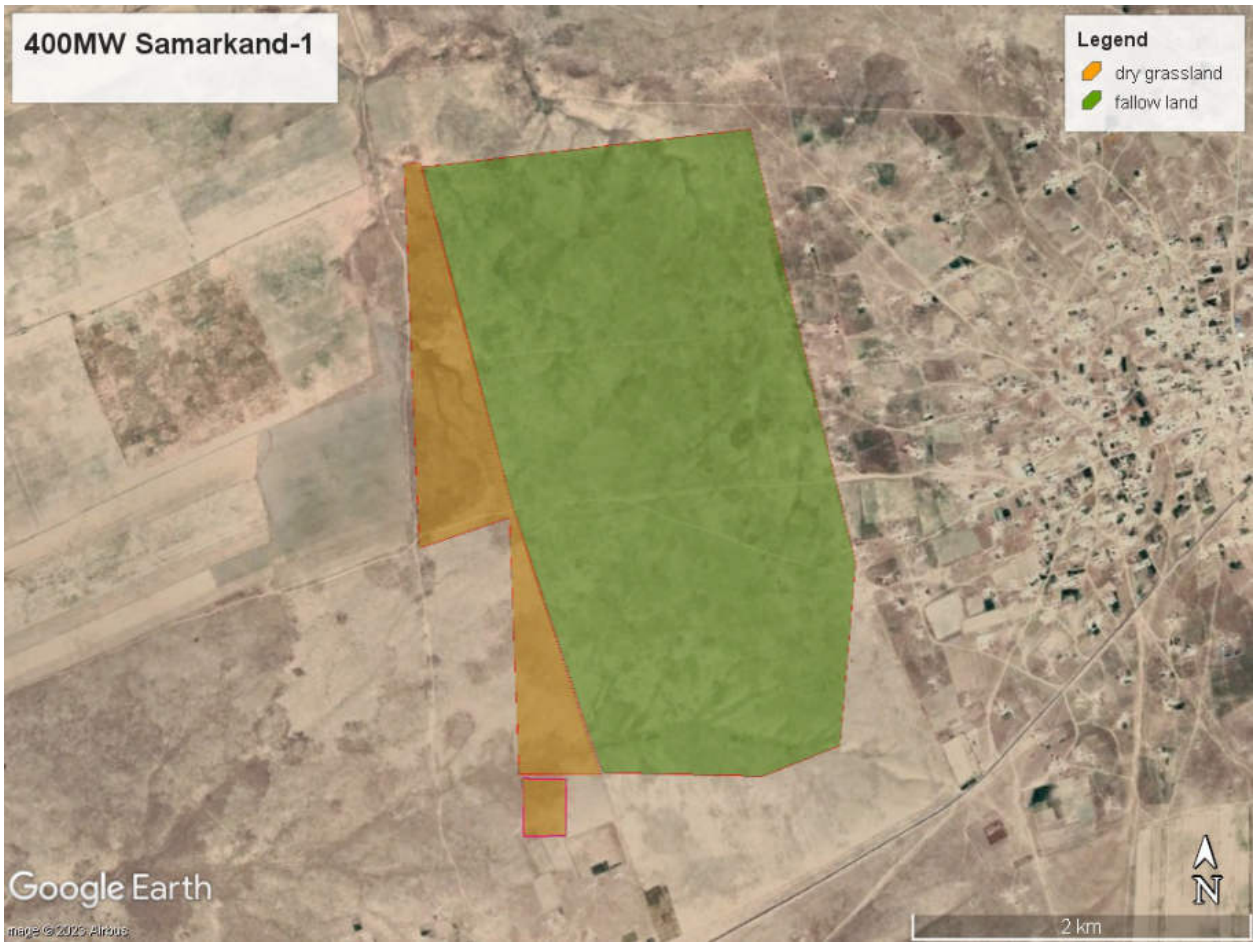

Figure 17: Habitat types — 400 MW Samarkand -1

4.5 500 MW PV plant

One type of modified habitats and one type of natural habitats are represented within 500 MW PV plant. The site currently is used by local people as pasture.

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned non-irrigated arable lands with sandy-clayey soil and bluegrass-harmel-camel thorn (*Alhagi pseudalhagi subsp. kirghisorum, Peganum harmala, Poa bulbosa*) and bluegrass-camel thorn communities (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary *Cousinia resinosa*.

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Whithin fallow lands and on unploughed areas both, plants are scattered or occur in patches, species composition is poor, and the canopy cover is sparse (from nearly 0 to 10-30%). These two types of habitats practically do not differ from each other in the character of the landscape and vegetation, except for the weakly visible contours of fields and furrows on the fallow lands.

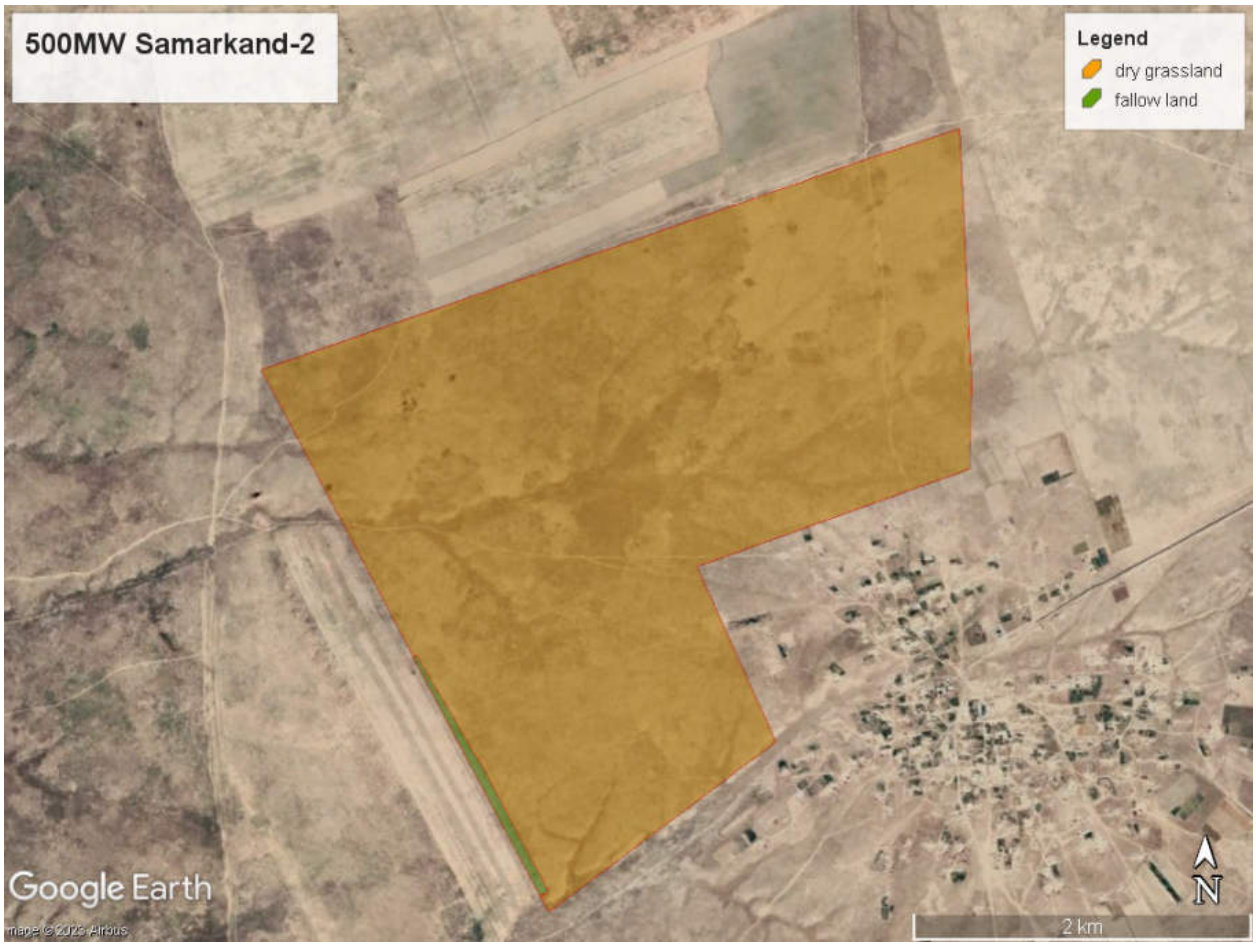


Figure 18: Habitat types - 500 MW Samarkand 2

4.6 Karakul BESS

One type of habitats is represented within the BESS site:

Sandy desert with psammophilous scrub. The BESS site is located at the edge of natural habitat of South-western Kyzylkum with white saxaul growth (*Haloxylon persicum*) on shallow wavy fixed sands, and modified habitats of

Bukhara Oasis (garbage dump and construction site). It can be classified as IUCN habitat type 8 Desert and subtype 8.2 Temperate Desert. According to EUNIS habitat classification, this habitat more or less corresponds to type S Heathland, scrub and tundra and subtype S68 Semi-desert sand dune with sparse scrub. The level of degradation is high, construction machinery is actively working on this site, and the natural ecosystem has already been destroyed on about half of the territory.

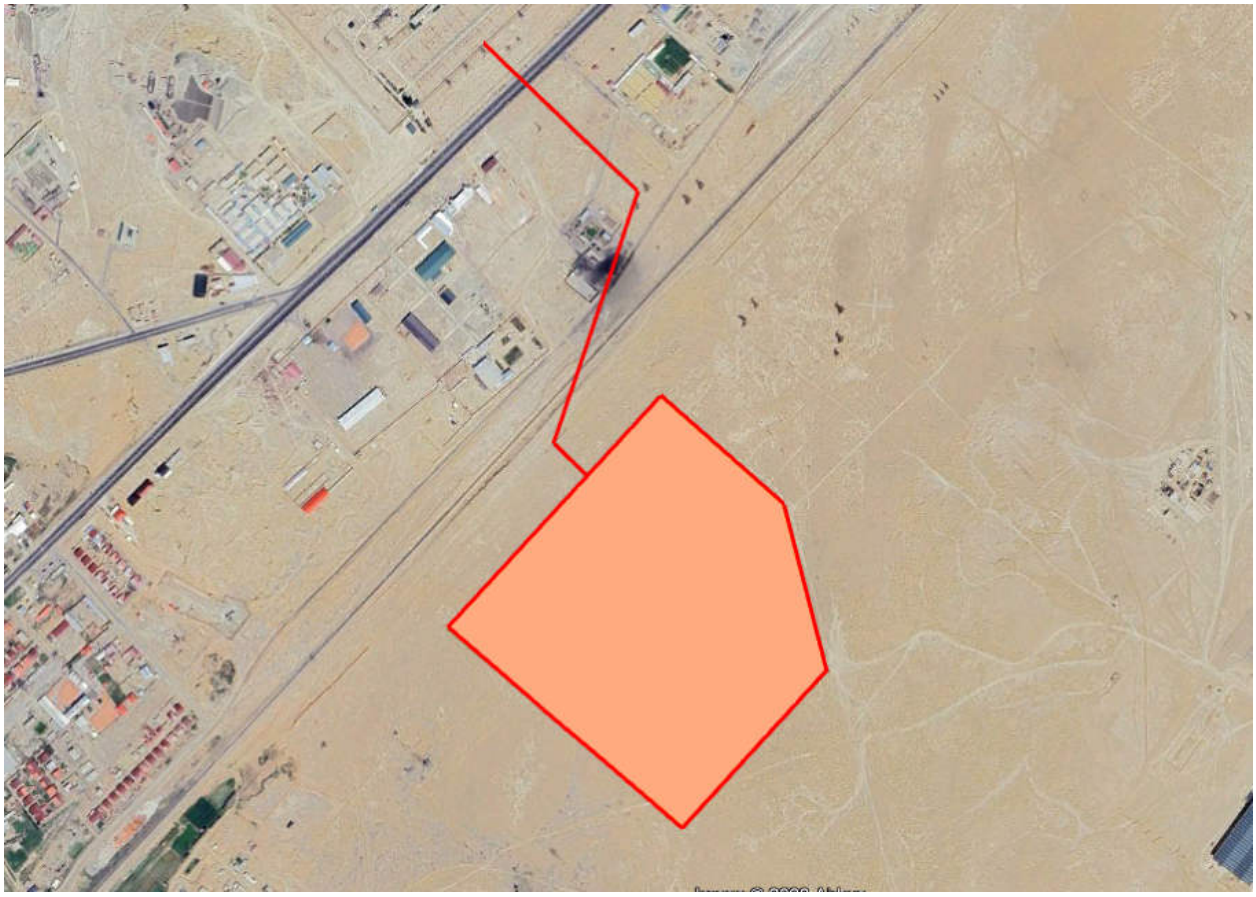


Figure 19: Habitat types- Karakul BESS (1 habytat - Sandy desert with psammophilous scrub)

4.7 Khalka substation and 360 km OHTL

Khalka substation

Arable lands with agricultural crops. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and represented with a subtype V1 Arable land and market gardens (V11 Intensive unmixed crops). At the present, irrigated arable lands within the SS Khalka area are used under cotton (*Gossypium hirsutum*). This habitat type occupies almost all territory of the SS Khalka (about 29 of 32.6 ha).

Woodland belts, boundary-strips, roadsides, canals and drainage channels. This habitat type occupies a narrow stips (10–20 m in width) between the fields. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and represented with a complex of subtypes V64 Lines of planted trees, V39 Mesic perennial anthropogenic herbaceous vegetation and R31 Mediterranean tall humid inland grassland. Woodland belts are composed of mulberry (*Morus alba*), poplar (*Populus alba, P. afghanica*), elm (*Ulmus sp.*), oleaster (*Elaeagnus angustifolia*), apple (*Malus domestica*), apricot (*Prunus armeniaca*), and other native and non-native trees. Banks of irrigation and drainage canals are occupied with oleaster (*Elaeagnus angustifolia*), reed (*Phragmites australis*), cattail (*Typha sp.*), liquorice (*Glycyrrhiza glabra*), camel thorn (*Alhagi pseudalhagi*), other mesophytic and hydrophytic plants typical for natural wetlands (*Clematis orientalis, Cynanchum sibiricum, Equisetum arvense, Mentha longifolia var. asiatica, Epilobium hirsutum*, etc.), as well as with weeds (*Artemisia annua, A. tournefortiana, Cichorium intybus, Cynodon dactylon, Paspalum*

distichum, Rhaponticum repens, Imperata cylindrica, Xanthium strumarium, etc.). Between the fields, there are boundary-strips with ruderal vegetation represented by communities of annual and perennial grasses (*Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Hordeum spontaneum*, *Cynodon dactylon, Elymus repens, Poa bulbosa),* weeds (*Atriplex micrantha*, *Centaurea iberica*, *Cirsium vulgare*, *Lepidium latifolium*, *Xanthium spinosum, X. strumarium,* etc.), and camel thorn (*Alhagi pseudalhagi*).

Both types are modified habitats. Threatened plants included in the global or national Red lists were not found during the field survey.

360 km OHTL

Modified habitats are represented with 4 types:

Arable lands with agricultural crops. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and represented with a subtype V1 Arable land and market gardens (V11 Intensive unmixed crops, on some areas with V14 Inundated or inundatable croplands, including rice fields). This habitat type can be divided into 2 subtypes – Irrigated arable lands, and Non-irrigated (rainfed) arable lands. At the present, irrigated arable lands along the OTHL are used under cotton (*Gossypium hirsutum*), wheat (*Triticum aestivum*), alfalfa (*Medicago sativa*), corn (*Zea mays*), rice (*Oryza sativa*), potatoes (*Solanum tuberosum*) and other vegetables. This habitat type prevail along the OTHL line within Tashkent and Syrdarya Regions, Dustlik and Pakhtakor Districts of Dzhizak Region, and Jomboy, Payariq, Akdarya, Pastdargom and Nurabad Districts of Samarkand Region. Rice fields are situated on some areas in Syrdarya Region. Rainfed (non-irrigated) arable lands along the OTHL are used under wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), and safflower (*Carthamus tinctorius*). Rainfed croplands are situated along the OTHL line on some areas of Gallaaral District of Dzhizak Region and Bulungur District of Samarkand Region.

Fruit gardens and vineyards. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.3 Plantations and 14.4 Rural Gardens. According EUNIS classification, it belongs to habitat type V – Vegetated man-made habitats and subtypes V5 Shrub plantations (V54 Vineyards) and V6 Tree dominated man-made habitats (V61 Broadleaved fruit and nut tree orchards). This habitat is represented with plantations of fruit trees, including apple (*Malus domestica*), apricot (*Prunus armeniaca*), cherry (*Prunus avium, Prunus cerasus*), peach (*Prunus persica*), and grapevine (*Vitis vinifera*). Alfalfa (*Medicago sativa*) and different vegetables (*Solanum tuberosum, Lycopersicon esculentum, Allium cepa*, etc.) usually are planted between the rows of fruit trees; wild grasses and weeds grow along the ditches and margins of the gardens and vineyards. Along the OTHL this habitat type is represented mainly with fruit gardens, while vineyards are situated on some areas in Samarkand Region.

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned irrigated or rainfed arable lands are occupied with secondary communities with domination of grasses (*Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Hordeum spontaneum*, *Cynodon dactylon, Elymus repens, Poa bulbosa*), annual and perennial weeds (*Artemisia annua, A. scoparia*, *Atriplex micrantha, Capsella bursa-pastoris, Descurainia sophia*, *Centaurea belangeriana, C. iberica*, *C. solstitialis*, *Cirsium vulgare*, *Carthamus oxyacanthus*, *Echinophora sibthorpiana*, *Eryngium caeruleum*, *Lepidium latifolium*, *Xanthium spinosum, X. strumarium*, etc.), ephemeral dicots (*Papaver pavoninum, Roemeria refracta*, annual species of *Astragalus*, etc.), saltworts (*Suaeda altissima, Climacoptera sp., Halocharis hispida, Ceratocarpus arenarius*), caper (*Capparis spinosa*), camel thorn (*Alhagi pseudalhagi*) and other forbs. Secondary ephemeral and forb-ephemeral plant communities developing on abandoned fields represent different stages of succession. The species composition and abundance, and density of canopy cover very much varies on different areas depending of fallow land "age", soil type, level of salinization, humidity and other local conditions. These parameters also vary greatly in different years depending on meteorological conditions.

On satellite images, fallow lands are easily identified by the regular contours of the former fields, lined with former channels and parallel furrows. These these signs of former plowing are usually clearly during the field survey, although the vegetation communities on old fallow landss almost does not differ from the native vegetation. Currently, these lands are used by local people mainly as a pasture.

Woodland belts, boundary-strips, roadsides, canals and drainage channels. This habitat type occupies a narrow stips (10–20 m in width) between the fields. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and represented with a complex of 3 subtypes V64 Lines of planted trees (Woodland belts along the roads, railway and between the fields), V38 Dry perennial anthropogenic herbaceous vegetation (Boundary-strips and roadsides) and V39 Mesic perennial anthropogenic herbaceous vegetation (banks of canals and drainage channels). These subtypes are often difficult to distinguish on a map as a separate polygons because of their mosaic and small scale.

Woodland belts are composed of mulberry (*Morus alba*), poplar (*Populus alba, P. afghanica*), elm (*Ulmus sp.*), oriental plane-tree (Platanus orientalis), redcedar (*Juniperus virginiana*), China-sumac (*Ailanthus altissima*), oleaster (*Elaeagnus angustifolia*), apple (*Malus domestica*), apricot (*Prunus armeniaca*), and other native and non-native trees. Banks of irrigation canals and drainage canals are occupied with oleaster (*Elaeagnus angustifolia*), tamarisk (*Tamarix sp.*), reed (*Phragmites australis*), cattail (*Typha sp.*), liquorice (*Glycyrrhiza glabra*), camel thorn (*Alhagi pseudalhagi*), other mesophytic, and hydrophytic plants typical for natural wetlands (*Clematis orientalis, Cynanchum sibiricum, Equisetum arvense, Mentha longifolia var. asiatica, Epilobium hirsutum*, etc.), as well as with mesophytic weeds (*Artemisia annua, A. tournefortiana, Paspalum distichum, Rhaponticum repens, Imperata cylindrica, Xanthium strumarium, etc.*). Dry boundary-strips and roadsides are occupied by communities meso-xerophytic and xerophytic annual and perennial grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Hordeum spontaneum*, *Cynodon dactylon, Poa bulbosa),* weeds (*Centaurea iberica*, *C. solstitialis*, *Xanthium spinosum,* etc.), caper (*Capparis spinosa*), camel thorn (*Alhagi pseudalhagi*), saltworts and annuals (*Papaver pavoninum, Roemeria refracta*, *Astragalus filicaulis, Trigonella geminiflora*, etc.). The species composition and abundance, and density of canopy cover very much varies on different areas depending of soil type, level of salinization, humidity and other local conditions. Within the Syrdarya Region where the soils are more or less saline, annual and perennial saltworts (*Suaeda altissima, Climacoptera sp., Halocharis hispida, Halostachys caspica*) and other halophytic and halomesophytic plants (*Aeluropus littoralis, Limonium otolepis, Cressa cretica*, etc.) are common for this habitat type.

Natural and semi-natural habitats are represented with 4 types:

Xerophytic shrublands. IUCN habitat type 3 Shrubland, subtype 3.8 Mediterranean-type shrubby vegetation. According to EUNIS habitat classification, this habitat more or less corresponds to type S Heathland, scrub and tundra, and subtype S35 Temperate and submediterranean thorn scrub. Along the OTHL, this habitat is represented only on the steep stony slopes of Nuratau Ridge and occupies a small area (about 5–6 hectares in total). The vegetation is represented with sparse communities of spiny almond (*Prunus (Amygdalus) spinosissima*), a thorny shrub 1–1.5 m tall. The herbage is dominated by sagebrush (*Artemisia sogdiana*), ephemeroids (*Poa bulbosa, Carex pachystylis*), wheatgrass (*Thinopyrum intermedium*), annual grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus tectorum*, *Taeniatherum caput-medusae*), forbs and ephemers. Canopy cover is 20-40%. The formation of spiny almond belongs to the type of xerophytic open woodlands and shrubs (Xerodendra, or so-called "shibljak") widely spread in foothills and lower montane zone of Central Asia and composed of deciduous, small-leaved, drought-resistant shrubs and small trees, mostly species of genera Prunus, Crataegus, Acer, Pistacia and Rosa. As noted in literature (Zakirov, 1969, 1971; Vegetation cover of Uzbekistan, 1971–1984), on the Nuratau Ridge, communities of xerophytic shrubs are distributed from 500-600 to 1800-1900 m s.l. In the foothills, spiny almond has environment-forming role, and serve as a habitat to many species of animals. Xerophytic shrublands are sensitive for cutting and overgrazing. Due to long-term anthropogenic press, shrublands currently are mostly confined to steep stony slopes. As a result of the extermination of shrubs, sagebrush and other and subshrubs, this type of vegetation is replaced by secondary ephemeral communities, which can lead to erosion of steep slopes, deflation, mudflows, droughts and further desertification.

One endemic species included in the Red Data Book of Uzbekistan with the status 3 was recorded during the field survey – *Phlomis thapsoides*. It is narrow endemic to Nuratau Mountains and national endemic of Uzbekistan.

Dry grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R1 Dry grasslands. This habitat is represented in piedmonts and foothills of Nuratau and Khobduntau ridges and occupies rather small area. The vegetation is represented with ephemeroid-sagebrush,

Phlomis-ephemeroid and forb-grass communities with domination of sagebrush (*Artemisia sogdiana*), ephemeroids (*Poa bulbosa, Carex pachystylis*), annual grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus tectorum*, *Hordeum murinum* subsp. *leporinum*, *Taeniatherum caput-medusae*), camel thorn (*Alhagi pseudalhagi* subsp. *kirghisorum*), caper (*Capparis spinosa*), and other xerophytic forbs (*Phlomis thapsoides, Cousinia resinosa, Cullen drupaceum*), which belong to the types of xerophytic subshrubs (Xerohemithamna) and ephemeral-ephemeroid vegetation (*Agrillophyta, or Ephemerophyta*), widely spread on light, typical and dark serozem soils (Calcic xerosols) on piedmont plains and foothills of Uzbekistan. This is moderately to strongly degraded natural habitat, used mainly as pasture. The abundance of spiny forbs (*Alhagi pseudalhagi* subsp. *kirghisorum, Capparis spinosa, Cousinia resinosa,* species of *Carthamus* and *Centaurea, Eryngium caeruleum*), harmel (*Peganum harmala*) and *Cullen drupaceum* indicates that the level of degradation of this habitat is rather high, which is connected with overgrazing. Canopy cover on most areas is sparse (10–30%). Threatened plants included in the global or national Red lists were not found during the field survey.

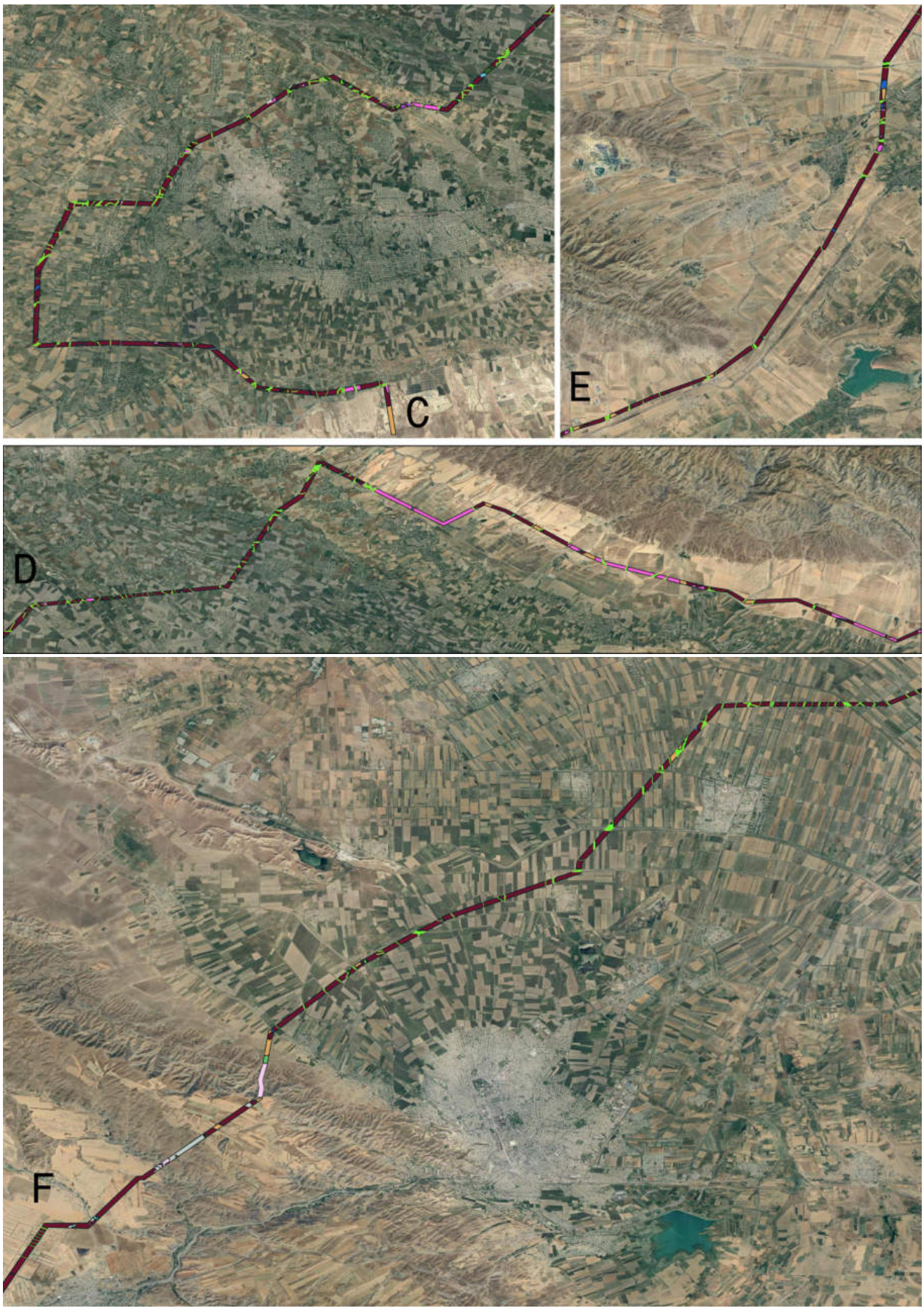
Wet grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R3 Seasonally wet and wet grasslands. This habitat is represented on very small areas along valleys of temporary streams and near springs. The vegetation is represented with intensively grazed dense green swards formed by Cynodon dactylon, Trifolium fragiferum, T. repens, Plantago major, P. lanceolata, Paspalum distichum, Juncus sp., etc., and ruderal weeds (Centaurea iberica, Xanthium spinosum).

Riparian scrub. IUCN habitat type 5 Wetlands (inland), subtype 5.3 Shrub dominated wetlands. Corresponds with EUNIS habitat type S Heathland, scrub and tundra and subtype S9 Riverine and fen scrubs (S9314 Irano-Turanian tamarisk thickets). In accordance with the classification of the vegetation of Uzbekistan, riparian scrub also belong to the type Potamophyta (tugay vegetation). This habitat occupies a strip up to 200-300 m in width along the banks of the rivers Syrdarya and Zeravshan, and narrow strips along some large canals. There are rather dense stands of tamarisk (*Tamarix arceuthoides, T.hispida, T.hohenackeri, T.ramosissima*), other halomesophytic shrubs, as wolfberry (*Lycium dasystemum)* and salt tree (*Caragana (Halimodendron) halodendron*), and solitary trees of poplars (*Populus euphratica, P. pruinosa*) and oleaster or Russian olive (*Elaeagnus angustifolia*). The density of tamarisk stands is up to 70-80%. The herbage is composed of reeds (*Phragmites australis*), camel thorn (*Alhagi pseudalhagi*), liquorice (*Glycyrrhiza glabra*) and other mesophytic, halophytic and hydrophytic plants typical for this vegetation type (*Aeluropus littoralis, Clematis orientalis, Cynanchum acutum ssp. sibiricum*, *Karelinia caspia, Limonium otolepis*). Canopy cover of herbage varies from 10-20 up to 80-100%. The level of anthropogenic degradation is high due to sand mining, land development, overgrazing, garbage dumps and cutting of trees and shrubs.

Although threatened plants included in the global or national Red Lists were not found during the field survey, the riparian ecosystems in Central Asia are relict and one of the most threatened and sensitive habitats (especially, tugay woodlands and scrub). In the past, the riparian woodlands were widespread over the territory of Central Asia. The catastrophic decline of the area of the natural floodplain ecosystems as a result of human activities was observed throughout their distribution range. In Central Asia, these ecosystems currently occupy less than 10% of their territory 50-60 years ago (Treshkin, 2011). Riparian habitats (tugay woodlands, scrub and reeds) play a crucial role in maintaining the hydrological regime of rivers and biological water treatment, conserving water resources and preventing mudflows.

Wetlands. IUCN habitat type 5 Wetlands (inland), subtype 5.8 Seasonal/intermittent freshwater marshes/pools (under 8 ha). According to EUNIS habitat classification, this is a complex of subtypes R31 Mediterranean tall humid inland grassland and subtype V39 Mesic perennial anthropogenic herbaceous vegetation. This habitat can be classified as semi-natural. Landscape is modified, because there are artificial former ponds, rectangular in shape, but vegetation communities are almost the same that in natural riparian habitats, mostly with herbaceous vegetation composed of reeds (*Phragmites australis, Typha angustifolia, T. latifolia, T.laxmannii, T. minima*), liquorice (*Glycyrrhiza glabra*) and other mesophytic and hydrophytic plants typical for natural wetlands (*Aeluropus littoralis, Clematis orientalis, Cynanchum acutum ssp. sibiricum, Limonium otolepis, Mentha longifolia var. asiatica, Persicaria minor*, etc.), on some areas with local abundance of weeds (*Artemisia vulgaris, Cynodon dactylon, Imperata cylindrica, Paspalum distichum*, etc.) and with solitary shrubs of tamarisk and oleaster (*Elaeagnus angustifolia, Tamarix sp*.). Taking into account arid conditions and climate change (especially, desertification), both natural,

semi-natural and modified wetlands in Central Asia are sensitive habitats. Although threatened plants included in the global or national Red lists were not found during the field survey, as other riparian habitats, these wetlands are important in maintaining the hydrological regime of rivers and biological water treatment, conserving water resources and preventing mudflows.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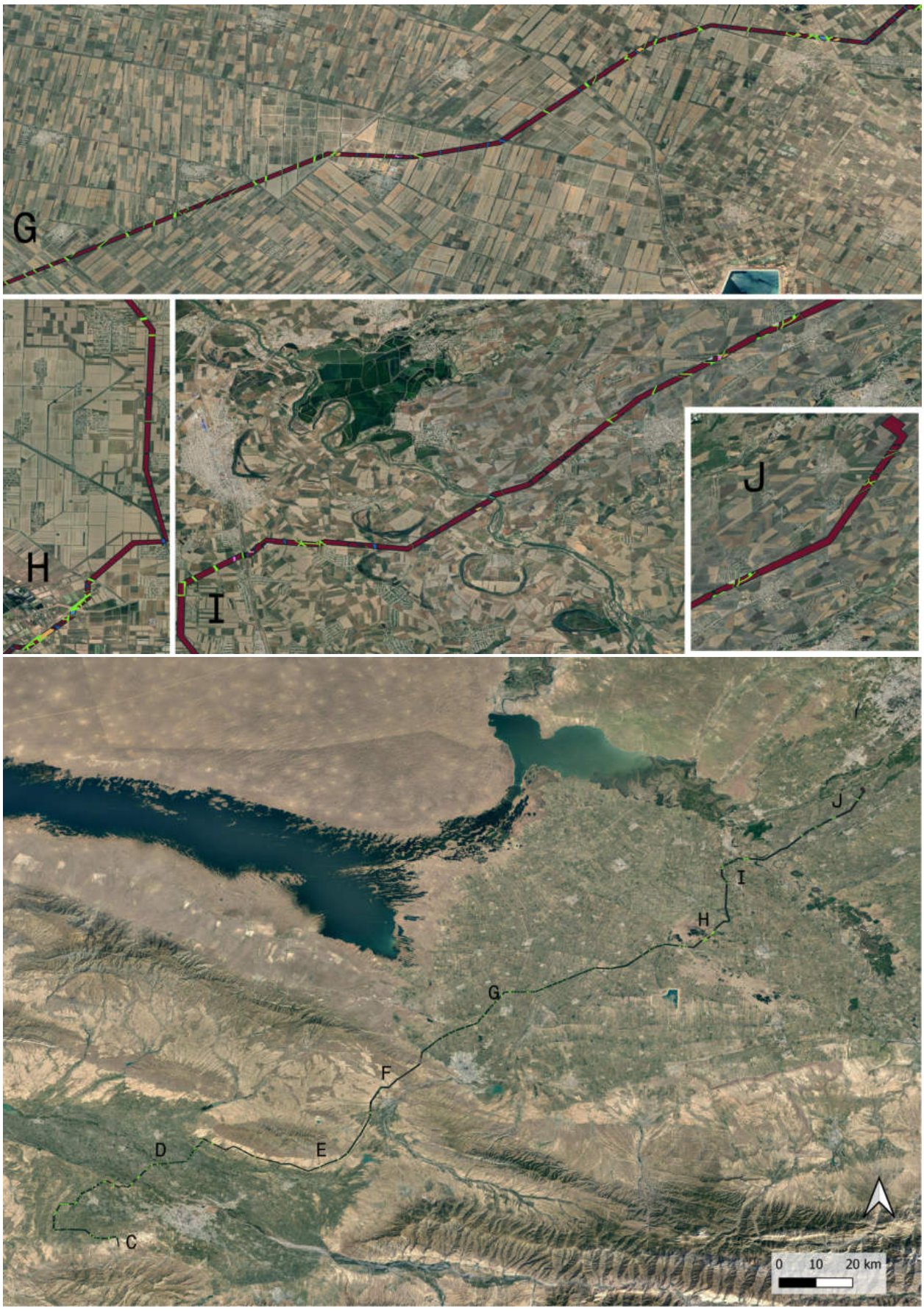
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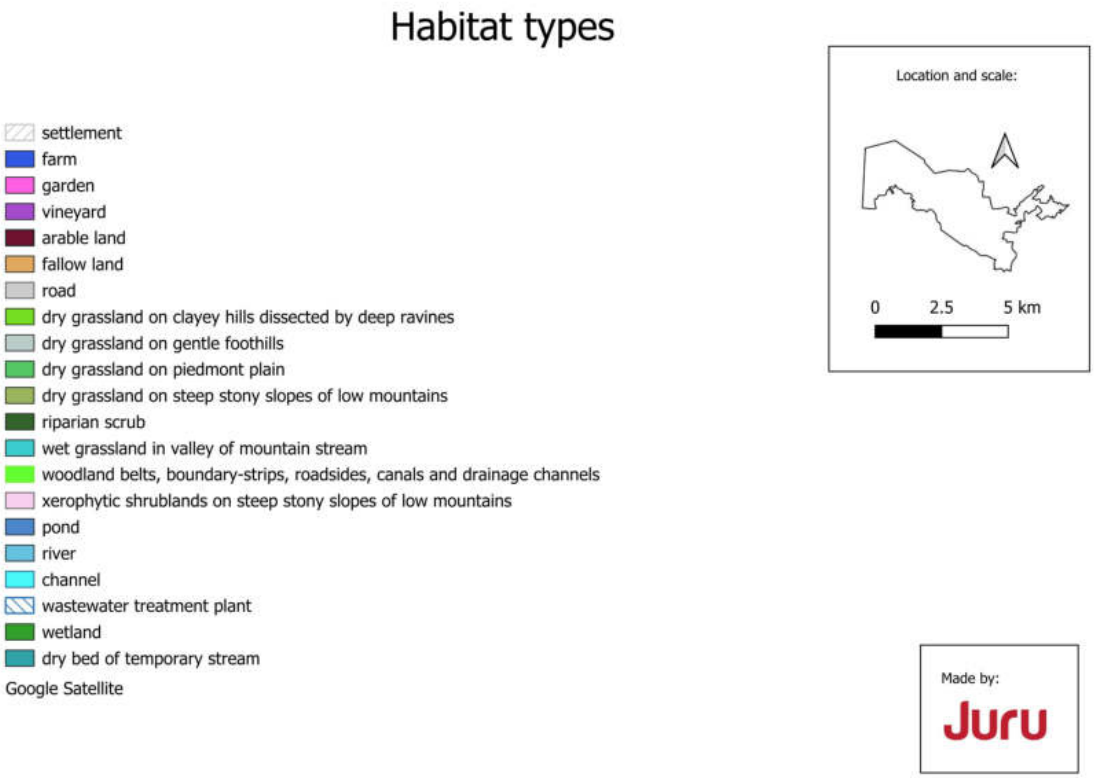

Figure 20: Habitat types – 360 km OHTL and Khalka SS

4.8 OHTL 70 km

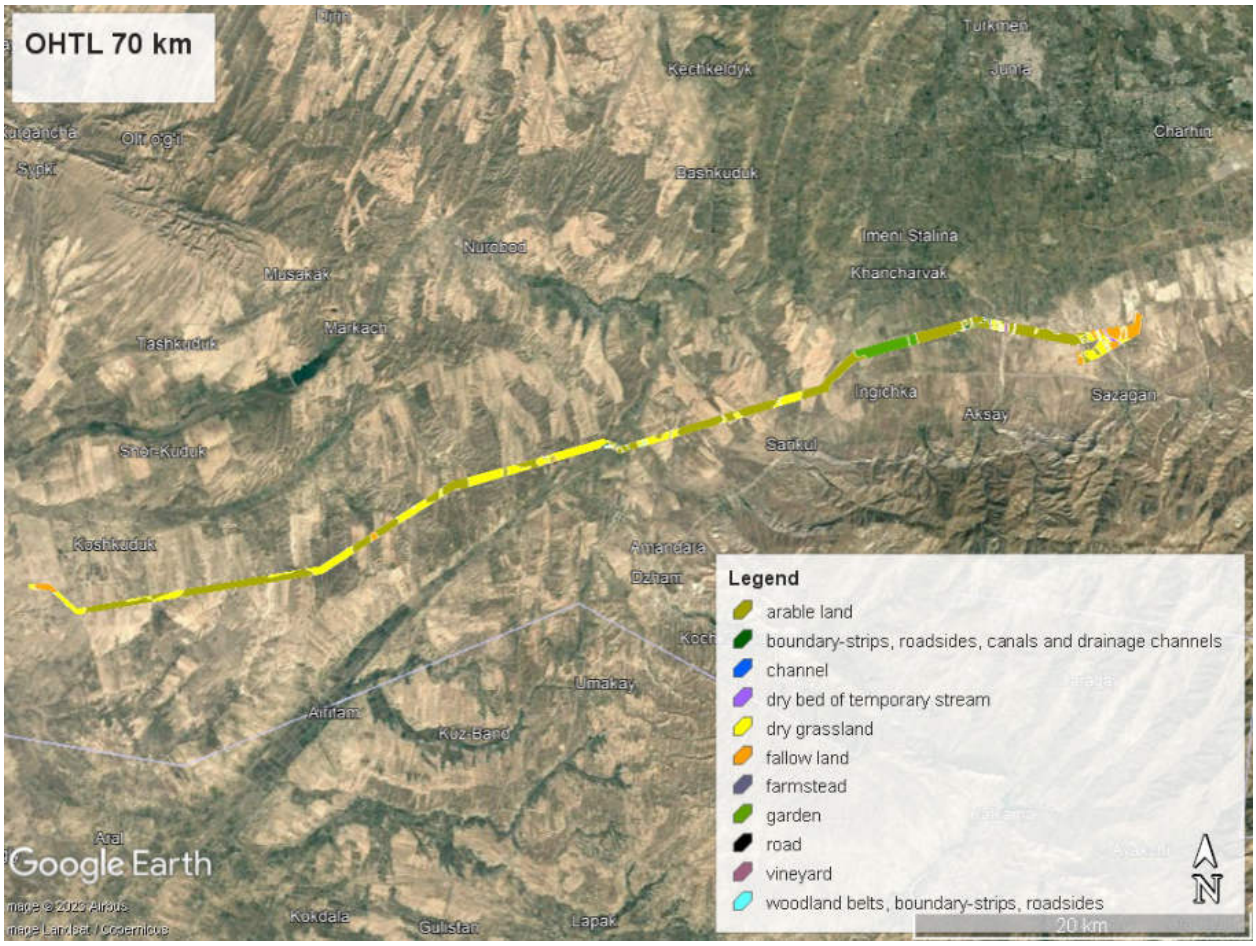

Figure 21: Habitat types - OHTL 70 km

Modified habitats are represented with 4 types:

Arable lands with agricultural crops. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and represented with a subtype V1 Arable land and market gardens (V11 Intensive unmixed crops, on some areas with V14 Inundated or inundatable croplands, including rice fields). This habitat type can be divided into 2 subtypes – Irrigated arable lands, and Non-irrigated (rainfed) arable lands. At the present, irrigated arable lands along the 70 km OTHL are used under mainly cotton (*Gossypium hirsutum*), wheat (*Triticum aestivum*) and peanut *(Arachis hypogaea*). This habitat type covers rather small areas in eastern part of the 70 km OTHL line, in surroundings of villages Khancharvak and Kyzylkarvan. Non-irrigated arable lands used under wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*) is the main type of modified habitats along the 70 km OTHL.

Fruit gardens and vineyards. This habitat type covers rather small areas in eastern part of the 70 km OTHL line, in surroundings of villages Khancharvak and Kyzylkarvan, and it can be divided into 2 subtypes – Fruit gardens, and Vineyards. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.3 Plantations and 14.4 Rural Gardens. According EUNIS classification, it belongs to habitat type V – Vegetated man-made habitats and 2 subtypes, V5 Shrub plantations (V54 Vineyards) and V6 Tree dominated man-made habitats (V61 Broadleaved fruit and nut tree orchards). Fruit gardens are represented with plantations of fruit trees, mainly apple (*Malus domestica*) and apricot. (*Prunus armeniaca*), and grapevine (*Vitis vinifera*). Wild grasses and weeds grow along the ditches and margins of Vineyards are the plantations of grapevine (*Vitis vinifera*). Wild grasses and weeds grow along the ditches and margins of the gardens and vineyards, as well as between the rows of trees and grapevine.

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market

gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned irrigated or rainfed arable lands are occupied with communities of grasses (*Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Hordeum spontaneum*, *Cynodon dactylon, Poa bulbosa*), annual and perennial weeds (*Centaurea iberica*, *C. solstitialis*, *Cirsium vulgare*, *Carthamus oxyacanthus*, *Echinophora sibthorpiana*, *Xanthium spinosum,* etc.), caper (*Capparis spinosa*) and camel thorn (*Alhagi pseudalhagi*). The species composition and abundance, and density of canopy cover very much varies on different areas depending of soil type, humidity, the age of fallow land, and other local conditions.

Boundary-strips, roadsides, canals and drainage channels. This habitat type occupies a narrow stips between the fields, along the roads and irrigation systems. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V – Vegetated man-made habitats, and 2 subtypes, V38 Dry perennial anthropogenic herbaceous vegetation and V39 Mesic perennial anthropogenic herbaceous vegetation. This habitat is occupied with communities of camel thorn (*Alhagi pseudalhagi*), Persian rose (Rosa persica), annual and perennial grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus scoparius*, *B.tectorum*, *Hordeum murinum* ssp. *leporinum*, *Cynodon dactylon, Poa bulbosa),* weeds (*Centaurea iberica*, *C. solstitialis*, *Sophora alopecuroides, Sophora pachycarpa, Xanthium spinosum,* etc.). Banks of irrigation and drainage canals are occupied with oleaster (*Elaeagnus angustifolia*), tamarisk (*Tamarix sp.*), reed (*Phragmites australis*), camel thorn (*Alhagi pseudalhagi*), other mesophytic plants (*Mentha longifolia var. asiatica, Epilobium hirsutum*, etc.), as well as with mesophytic weeds. The species composition and abundance, and density of canopy cover very much varies on different areas depending of local conditions.

Natural and semi-natural habitats are represented with 2 types:

Dry grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R1 Dry grasslands. This habitat occupies unplowed areas with more or less rugged terrain along dry beds of temporary streams and on the hills. The vegetation is represented with forb-grass communities with domination of ephemeroids (*Poa bulbosa, Carex pachystylis*), annual grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus tectorum*, *Hordeum murinum* subsp. *leporinum*, *Taeniatherum caput-medusae*), camel thorn (*Alhagi pseudalhagi* subsp. *kirghisorum*), caper (*Capparis spinosa*), and other xerophytic forbs (*Phlomis thapsoides, Cousinia resinosa*), which belong to the type of ephemeral-ephemeroid vegetation (Agrillophyta, or Ephemerophyta), widely spread on serozem soils (Calcic xerosols) on piedmont plains and foothills of Uzbekistan. This natural habitat is used by local people as pasture. The abundance of spiny forbs (*Alhagi pseudalhagi* subsp. *kirghisorum, Capparis spinosa, Cousinia resinosa,* species of *Carthamus* and *Centaurea*) indicates that the level of degradation of this habitat is rather high, which is connected with overgrazing. Canopy cover is 20–30% or less. Threatened plants included in the global or national Red lists were not found during the field survey.

Dry beds of temporary streams. This habitat covers narrow strips along dry beds of several rather large temporary streams in eastern part of the 70 km OTHL line, and corresponds with EUNIS habitat type H – Inland unvegetated or sparsely vegetated habitats. The vegetation is very sparse and represented with solitary specimens of tamarisk, camel thorn and other annual and perennial plants. This habitat is moderately to strongly degraded due to gravel extraction.

4.9 OHTL 4.9 km

Arable lands with agricultural crops. IUCN habitat type 14 Artificial – Terrestrial, subtype 14.1 Arable Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, and represented with a subtype V1 Arable land and market gardens (V11 Intensive unmixed crops). Wihin 100 MW PV plant area and its surroundings, this habitat is represented with rainfed arable lands used under wheat (*Triticum aestivum*), barley (*Hordeum vulgare*) and safflower (*Carthamus tinctorius*).

Fallow lands. IUCN habitat type 14 Artificial – Terrestrial, subtypes 14.1 Arable Land and 14.2 Pasture Land. This IUCN habitat type corresponds with EUNIS habitat type V Vegetated man-made habitats, subtype V1 Arable land and market gardens (V15 Bare tilled, fallow or recently abandoned arable land). Abandoned non-irrigated arable lands with sandy-clayey soil and bluegrass-camel thorn community (*Alhagi pseudalhagi subsp. kirghisorum, Poa bulbosa*), with solitary harmel (*Peganum harmala*) and *Cousinia resinosa*. Plants are scattered or occur in patches, species composition is poor, and the canopy cover is sparse (from nearly 0 to 10-20%). Both plots currently are used by local people as pasture.

Dry grasslands. IUCN habitat type 4 Native grassland, subtype 4.4 Temperate grassland. According to EUNIS habitat classification, this habitat corresponds to type R Grasslands and lands dominated by forbs, mosses or lichens, and subtype R1 Dry grasslands. This habitat occupies boundary-strips between the fields and unplowed areas with rugged terrain along dry beds of temporary streams and on the hills. The vegetation is represented with forb-grass communities with domination of ephemeroids (*Poa bulbosa, Carex pachystylis*), annual grasses (*Aegilops cylindrica, Ae. triuncialis*, *Bromus tectorum*, *Hordeum murinum* subsp. *leporinum*, *Taeniatherum caput-medusae*), camel thorn (*Alhagi pseudalhagi* subsp. *kirghisorum*), caper (*Capparis spinosa*), and other xerophytic forbs (*Phlomis thapsoides, Cousinia resinosa*), which belong to the type of ephemeral-ephemeroid vegetation (Agrillophyta, or Ephemerophyta), widely spread on serozem soils (*Calcic xerosols*) on piedmont plains and foothills of Uzbekistan. This natural habitat is used by local people as pasture. The abundance of spiny forbs (*Alhagi pseudalhagi* subsp. *kirghisorum, Capparis spinosa, Cousinia resinosa,* species of *Carthamus* and *Centaurea*) and poisonous species *Peganum harmals*, *Sophora pachycarpa* and *Diarthron vesiculosum* indicates that the level of degradation of this habitat is rather high, which is connected with overgrazing. Canopy cover is 20–30 to 50–60%. Threatened plants included in the global or national Red lists were not found during the field survey.

Dry beds of temporary streams. This habitat covers narrow strips along dry beds of several rather large temporary streams in eastern part of the 70 km OTHL line, and corresponds with EUNIS habitat type H – Inland unvegetated or sparsely vegetated habitats. The vegetation is very sparse and represented with solitary specimens of tamarisk, camel thorn and other annual and perennial plants. This habitat is moderately to strongly degraded due to gravel extraction.

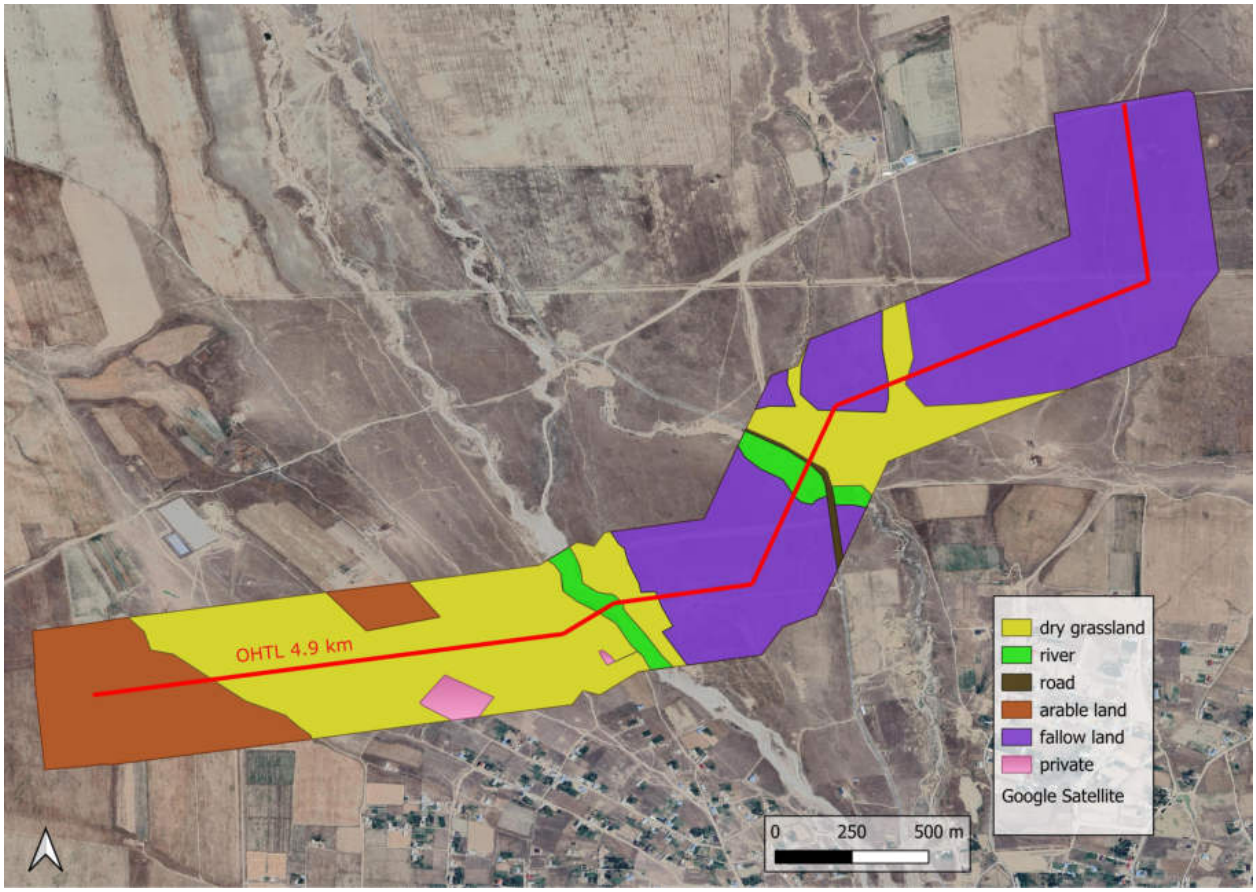

Figure 22: Habitat types - OHTL 4.9 km